Clean Water Council
Budget and Outcomes Committee (BOC) Meeting Agenda
Friday March 3rd, 2023 9:30 a.m. to 12:00 p.m.

Webex Only

2022 BOC Members: Steve Besser (BOC Vice-Chair), Dick Brainerd, Gary Burdorf, Warren Formo, Frank Jewell, Jen Kader, Holly Kovarik (BOC Chair), Todd Renville

9:30 Regular Business
- Introductions
- Approve agenda & most recent minutes
- Chair and Staff update
  - Legislative update

9:45 Status of County Geologic Atlases (Part A)
- Barb Lusardi, Minnesota Geological Survey

10:30 BREAK

10:45 Microplastics Update
- Dave Duffey, MPCA

11:15 Latest Outcomes from Minnesota Agricultural Water Quality Certification Program (MAWQCP)
- Brad Redlin, Director

12:00 Adjourn

Minnesota Geological Survey

County Geologic & Groundwater Atlas Program

Barbara Lusardi
Minnesota Geological Survey
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Paul Putzier
MN Department of Natural Resources
paul.putzier@state.mn.us

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

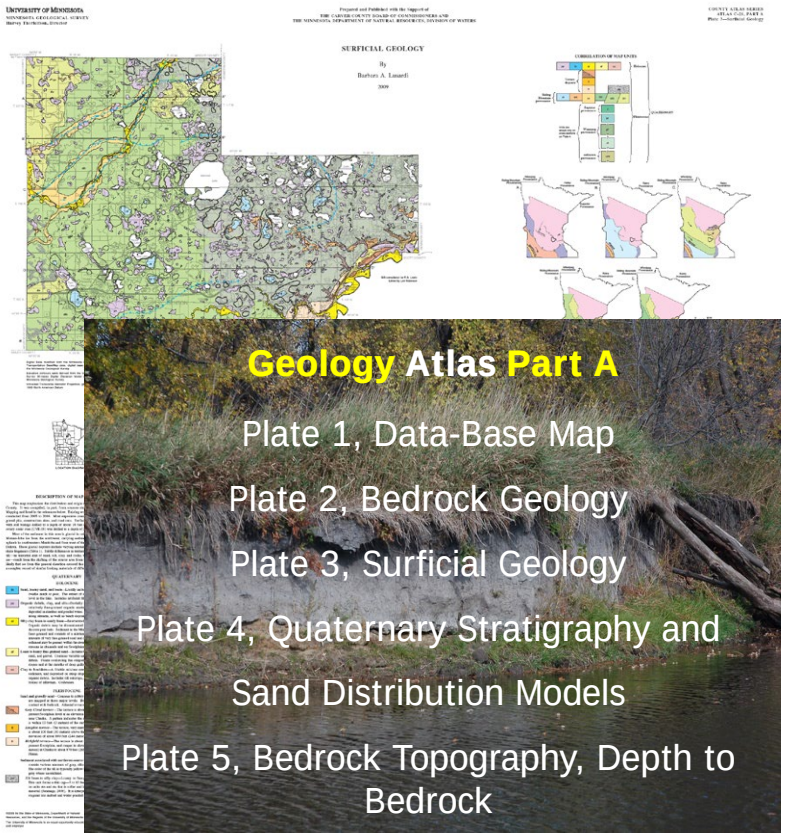
CLEAN WATER LAND & LEGACY AMENDMENT

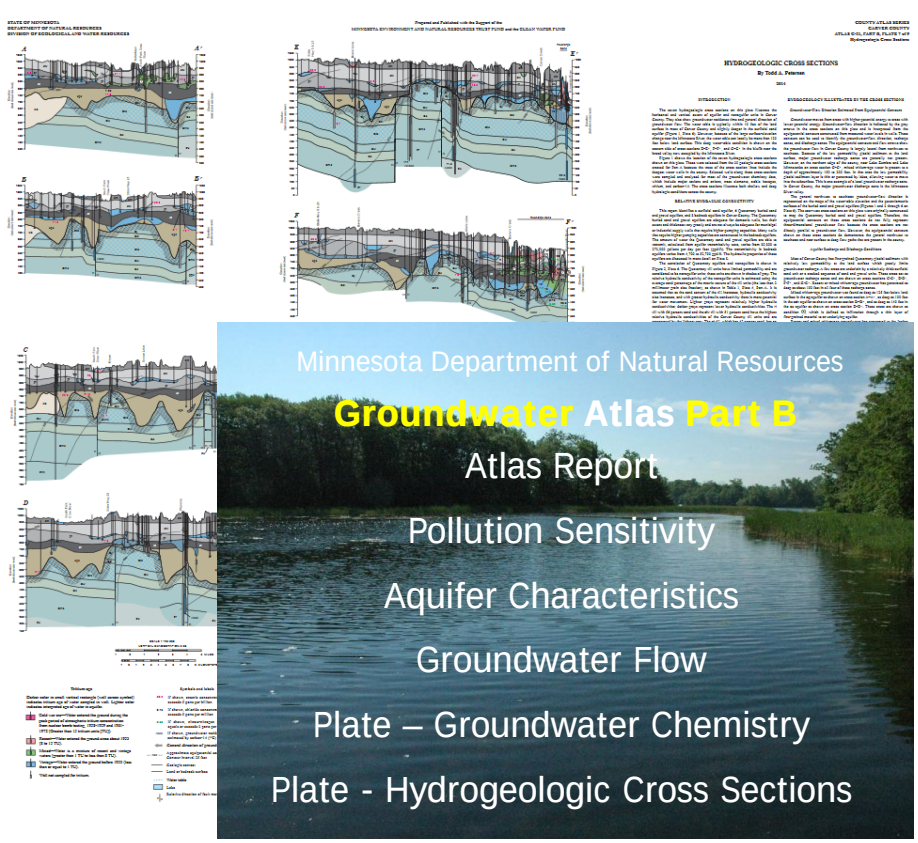
USGS

DEPARTMENT OF NATURAL RESOURCES

UNIVERSITY OF MINNESOTA

Geology (Part A)--County Geologic Atlas--Groundwater (Part B)



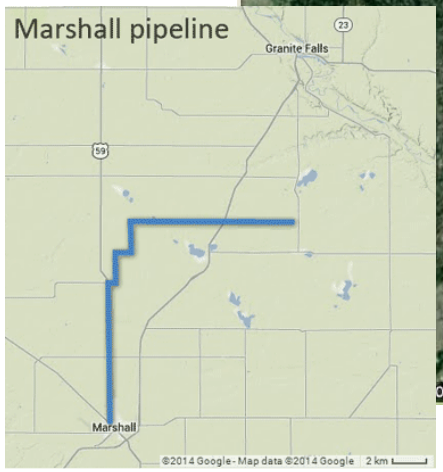


UNIVERSITY OF MINNESOTA

Mar 17, 2019

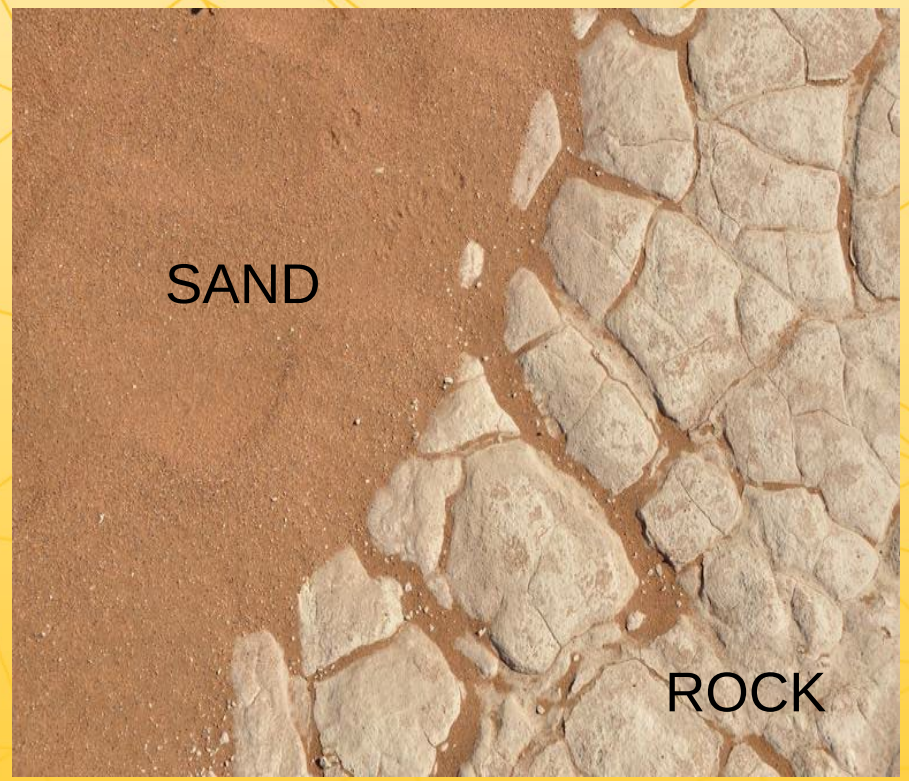
DNR hydrologist: Swift County aquifers' decline "not an emergency, but it is concerning"

Why do you need one?



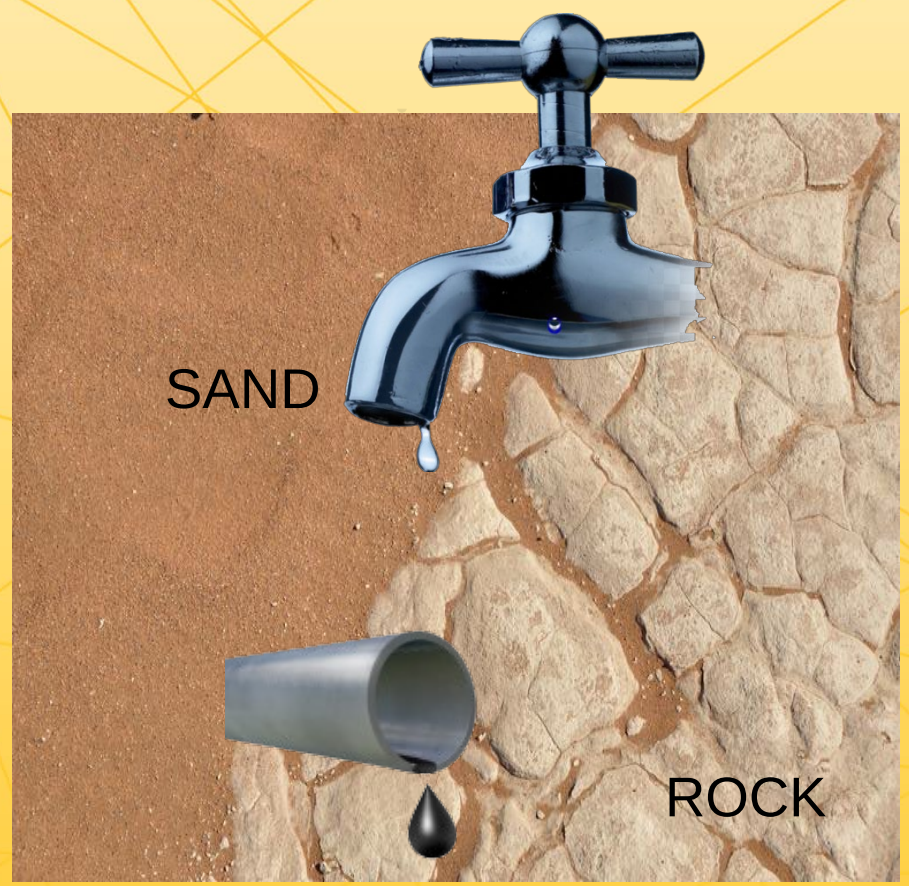
One Watershed
One Plan

CGAs provide Foundational Data



- Geology is the “container”
- It holds all of our natural resources including: minerals, aggregate, and water
- Maps show the distribution of rocks, sediment, and resources.

The Good and the Bad



- It also holds many undesirable things
- By knowing the geologic framework, we can predict where to find, plan how to use, and protect our natural resources.

Strategic Plan Goals

- Drinking water/Groundwater
- Engagement/Education

Purpose

- A geologic atlas provides comprehensive geologic and groundwater mapping and associated databases suitable for managing mineral and water resources.

- Applicable to land-use planning, wellhead protection, source-water protection, remediation, appropriation, monitoring, and support for permitting decisions.

MGS County Geologic Atlas Part A

- Database
- Bedrock geology
- Surficial geology
- Quaternary stratigraphy
- Sand distribution models
- Bedrock topography
- Drift thickness

Print, pdfs, GIS files

User's Guide

County Geologic Atlas Mapping Program since ~1980

Data Base

-Exposures of the rock

-Core samples

-Water well construction records (CWI)

-Scientific and engineering borings (QDI)

-Drill cuttings

-Borehole geophysical logs

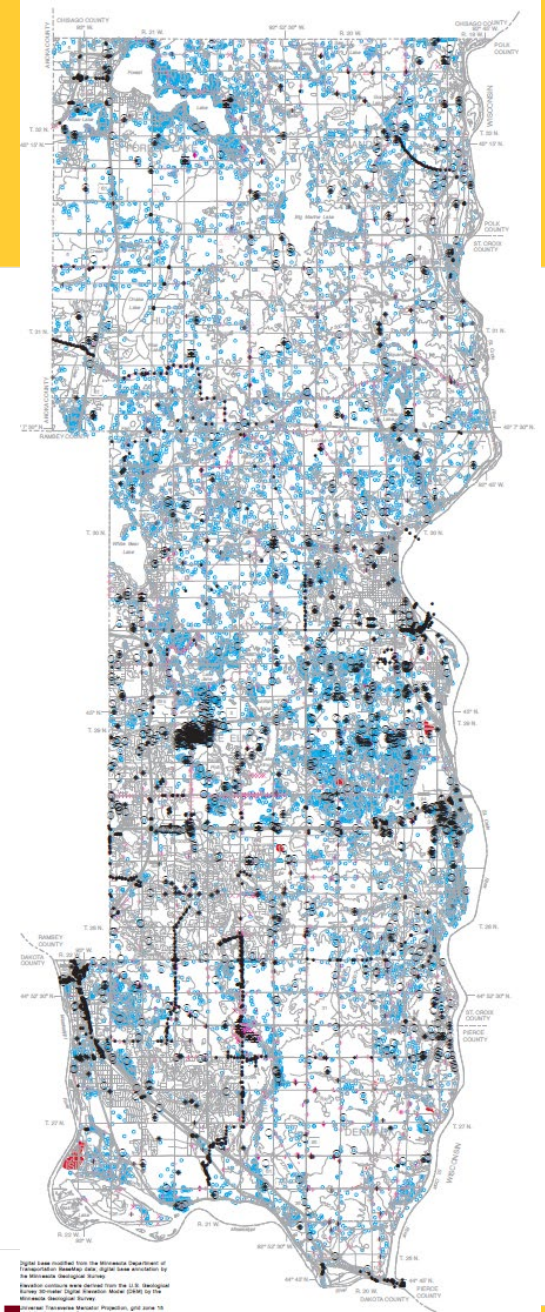
-Giddings probe holes

-Texture analyses

-Soil auger holes

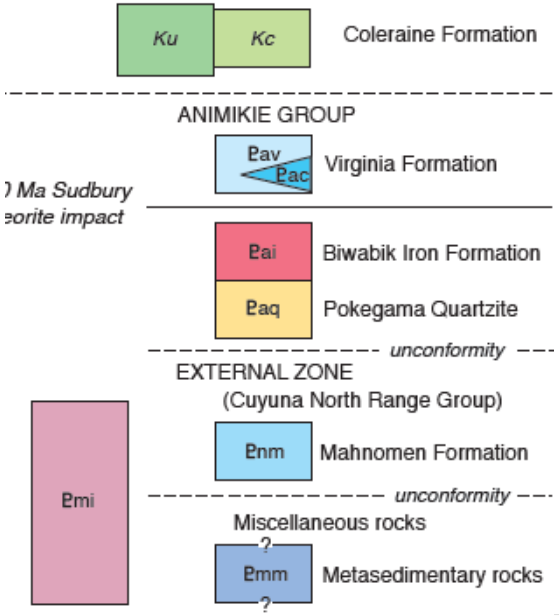
-Passive seismic soundings

-Seismic refraction soundings

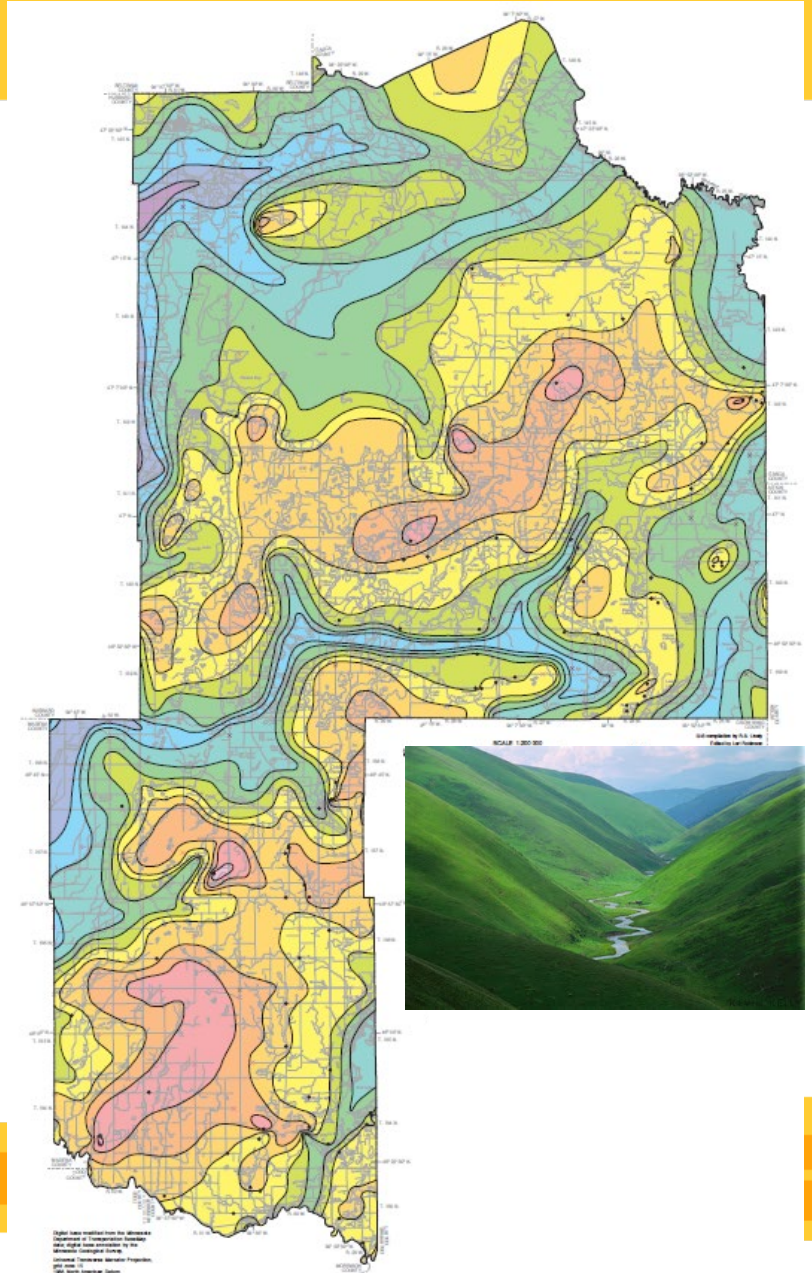


Bedrock Geology

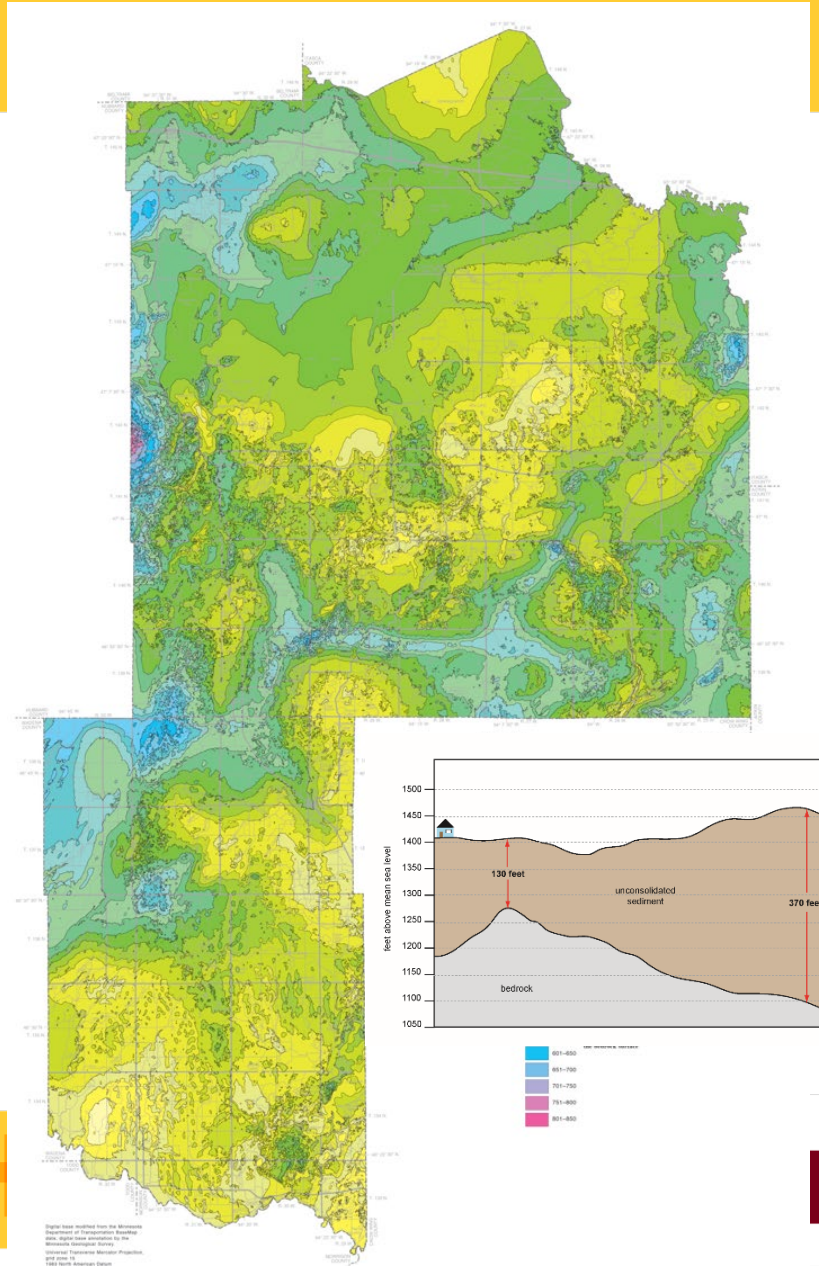
- Bedrock geologic maps depicts the type, structure, and distribution of all of the different bedrock units beneath the Quaternary sediment.



Bedrock Topography



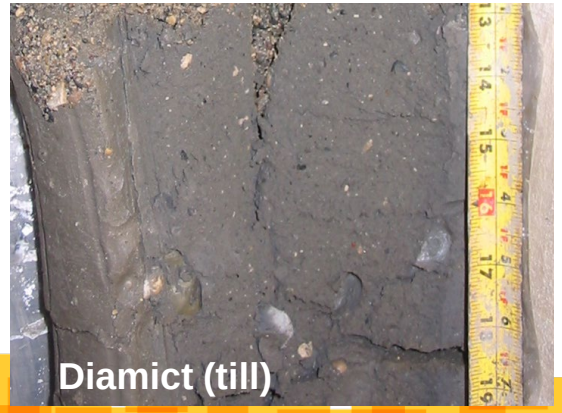
Depth to Bedrock



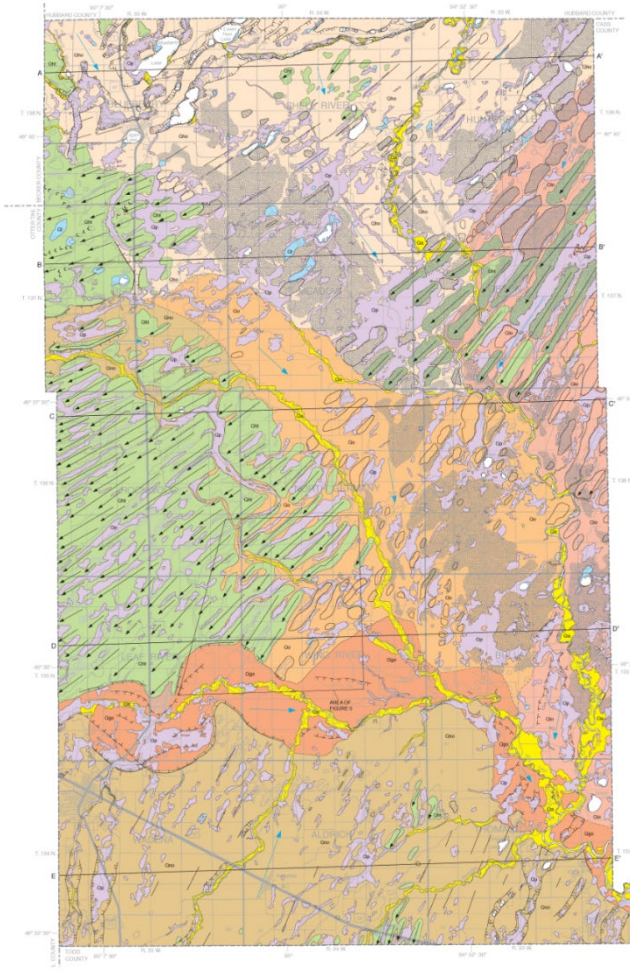
Surficial Geology

SAND

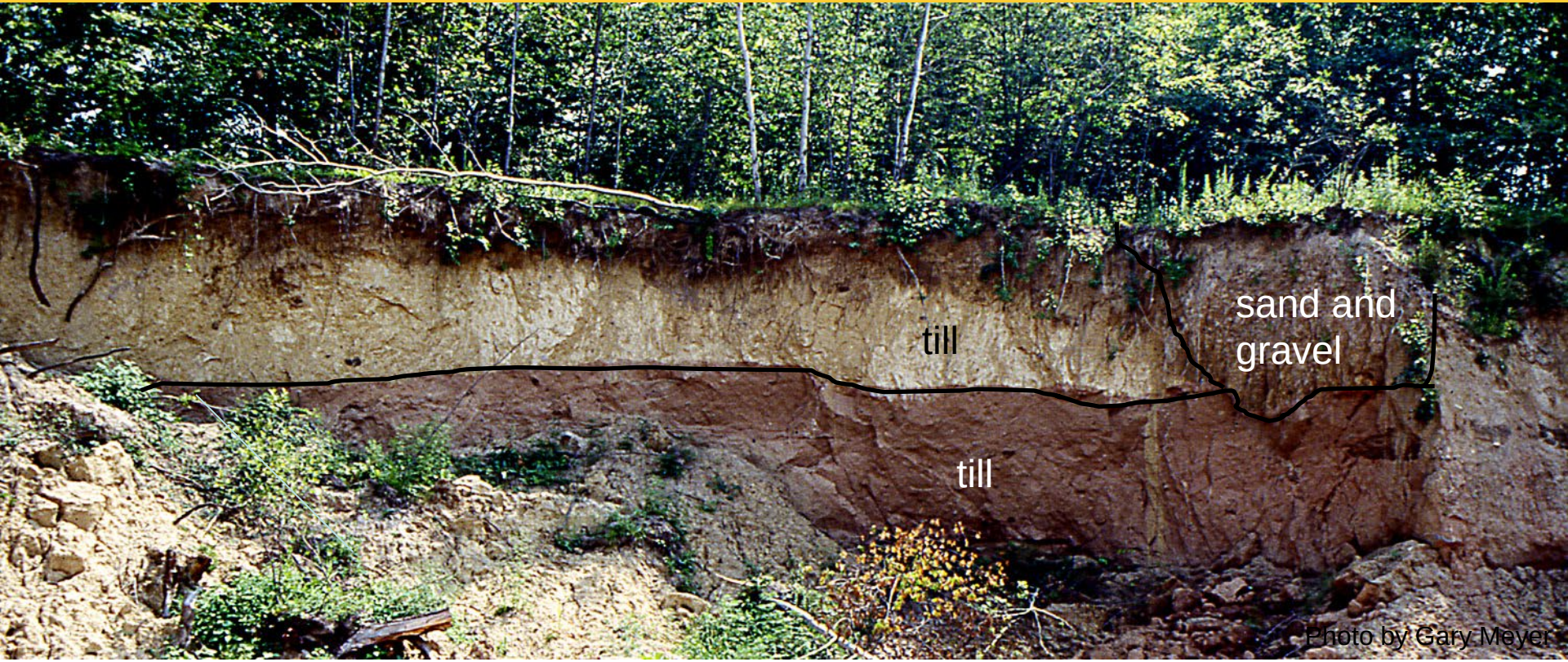
Not SAND

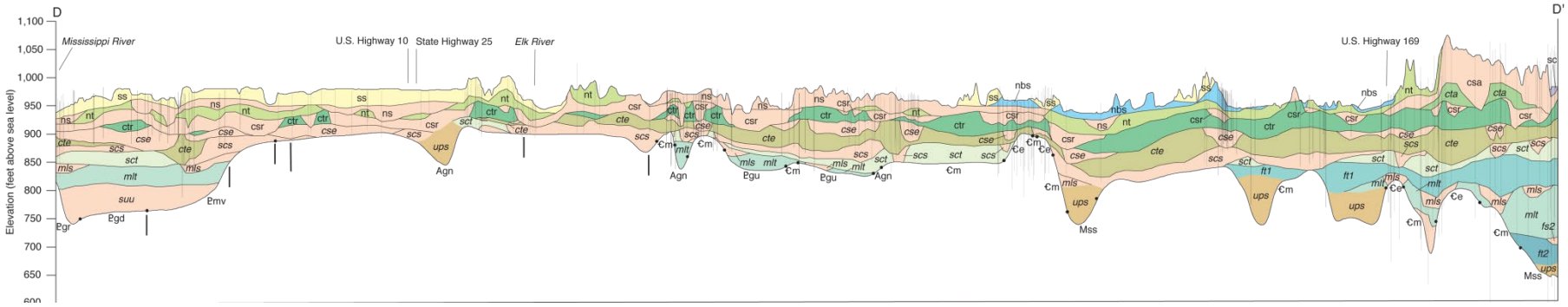


Surficial Geologic map

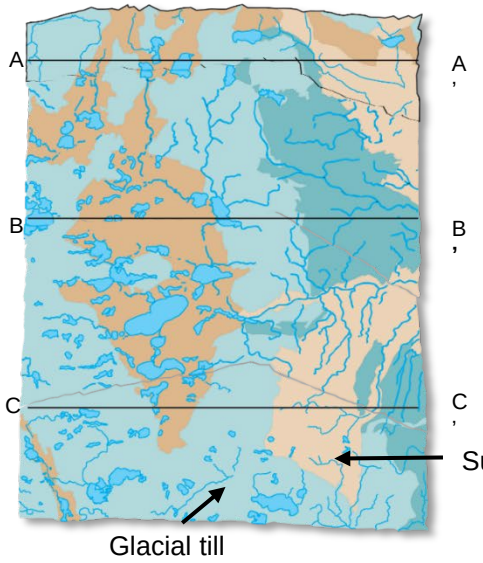


Simplified Surficial map

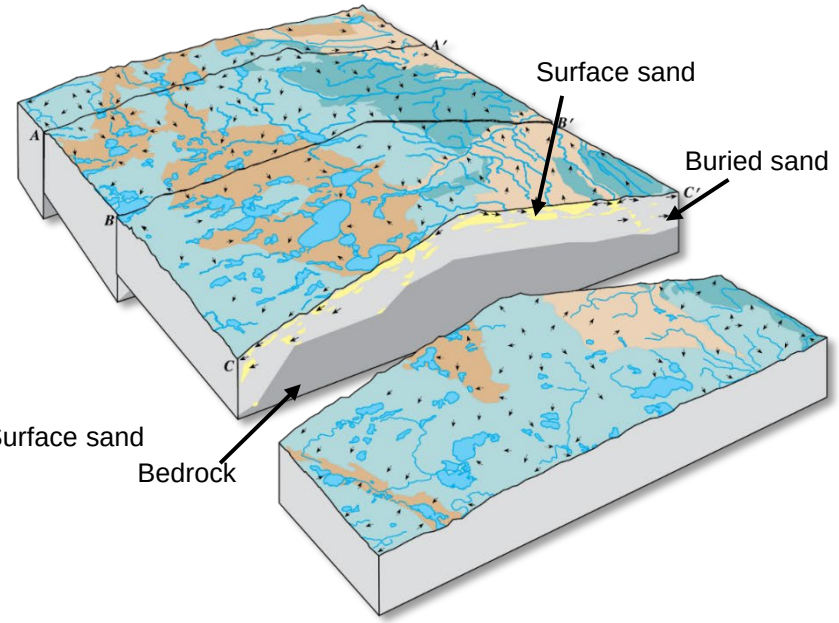

till
sand and
gravel
till
Photo by Gary Meyer


D
D'
Elevation (feet above sea level)
1,100
1,050
1,000
950
900
850
800
750
700
650
600
Mississippi River
U.S. Highway 10
State Highway 25
Elk River
U.S. Highway 169

Geologic Cross Section



Map View

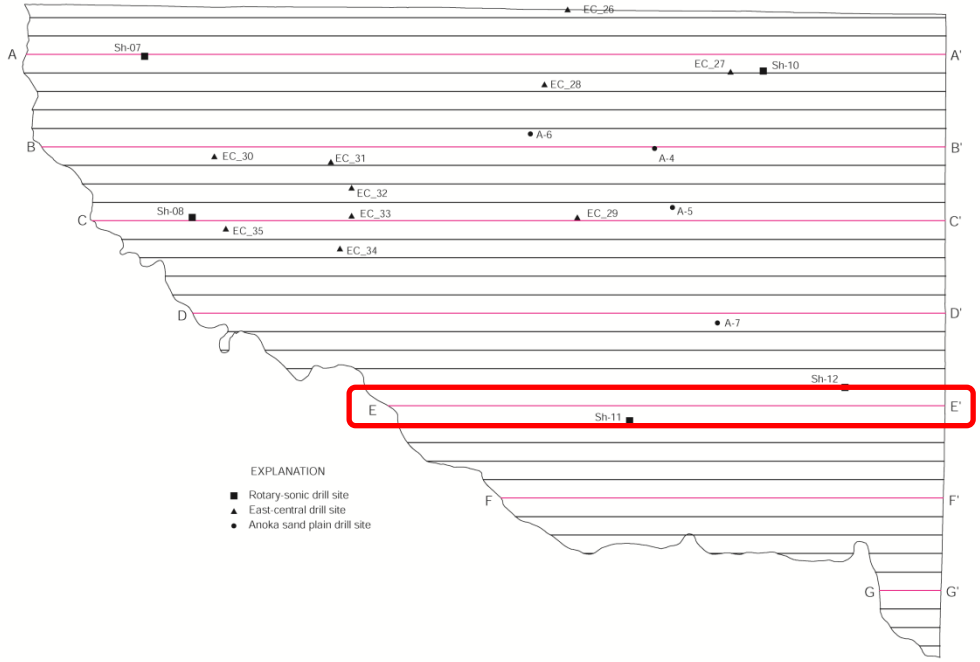


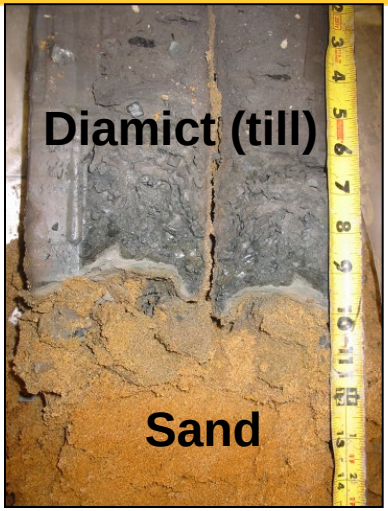
3D Cross Section View

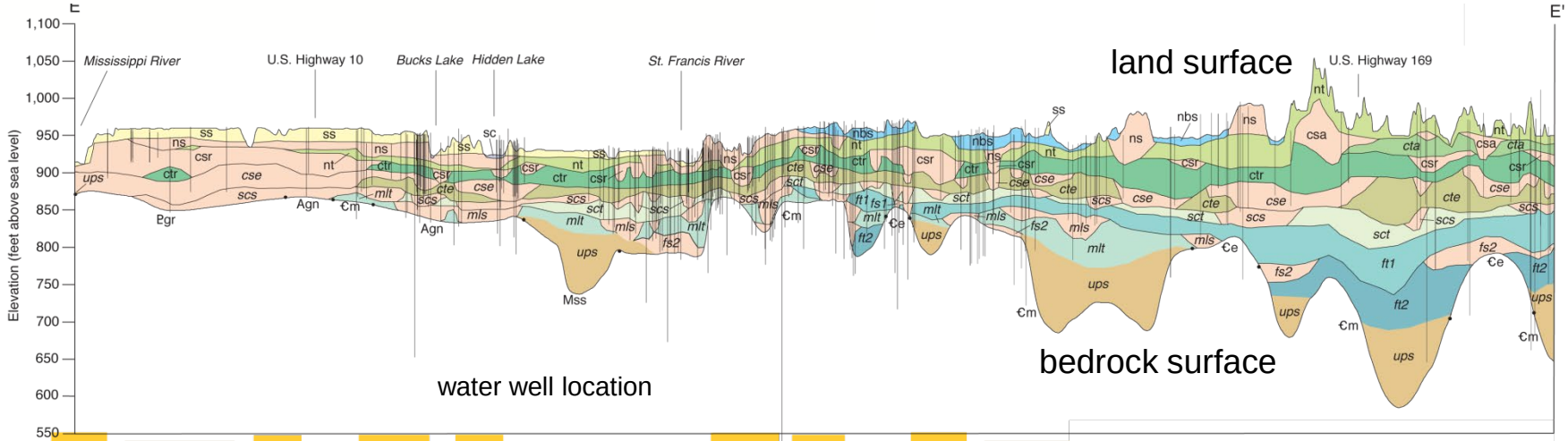
Image courtesy of R. McDonald, MN DNR

Cross Sections

Plate 4, Quaternary Stratigraphy







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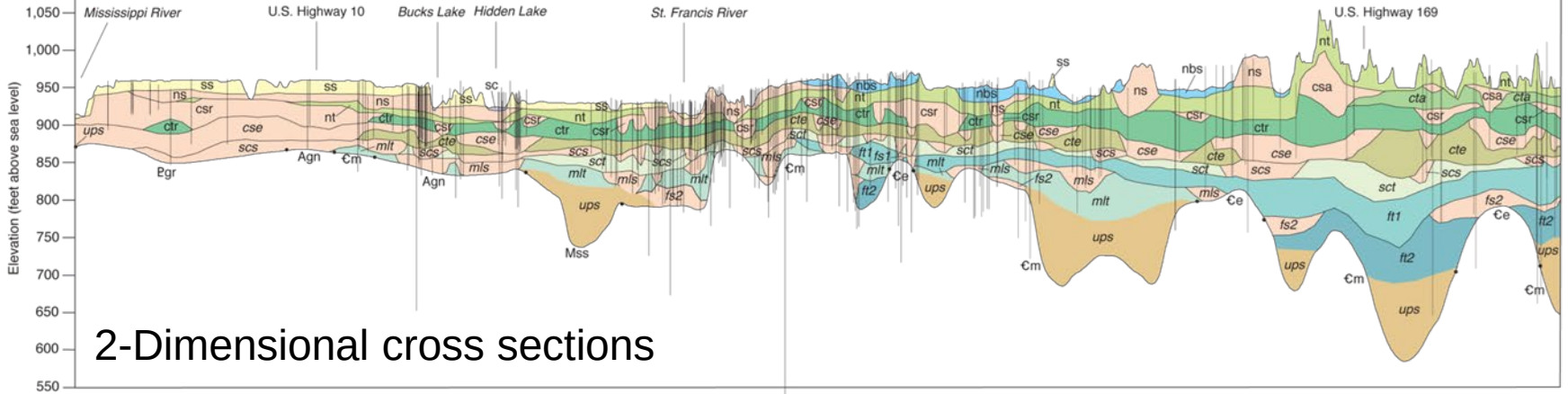
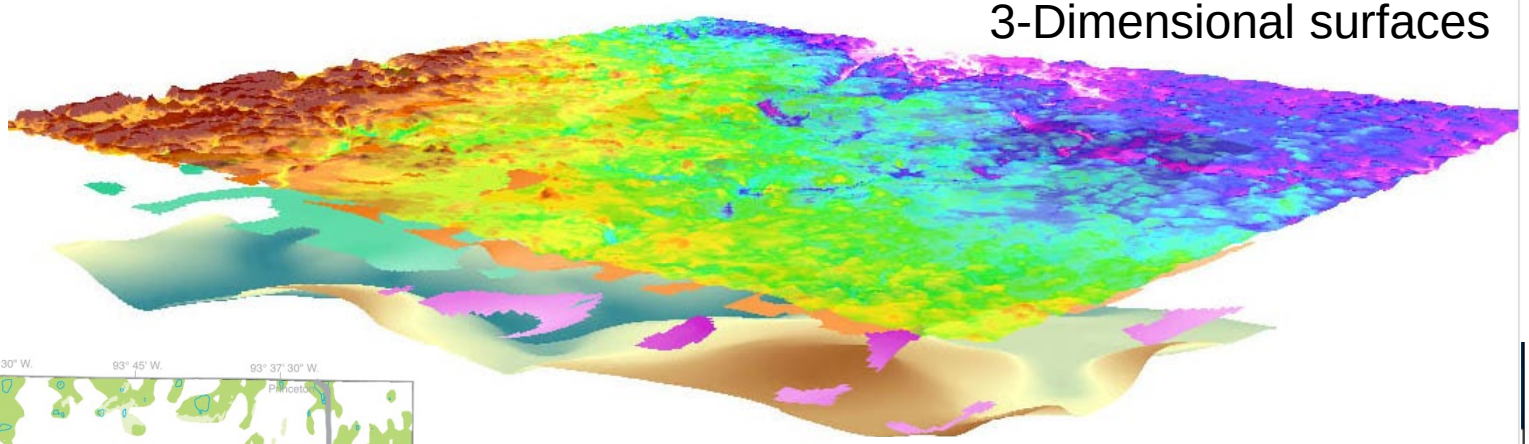
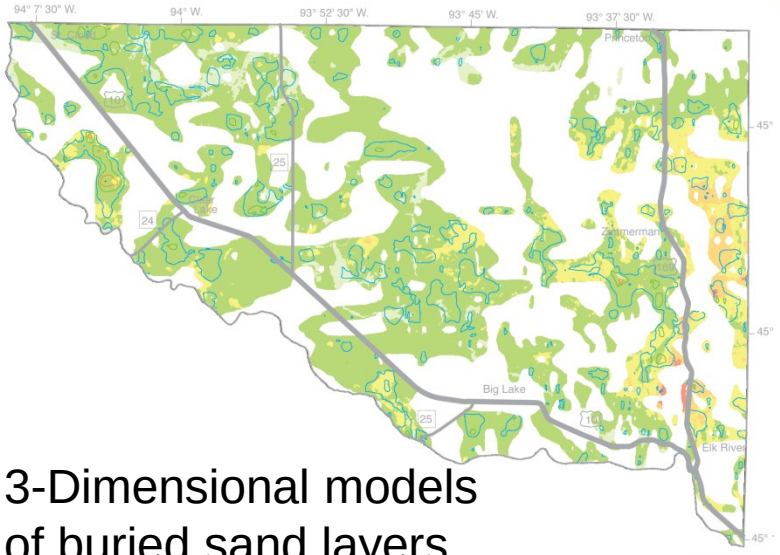


2-Dimensional cross sections

37 sections spaced1-km apart

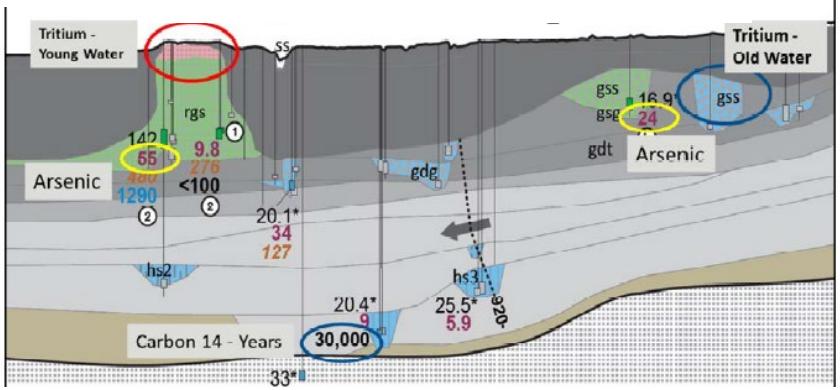
3-Dimensional surfaces





3-Dimensional models
of buried sand layers

DNR groundwater cross section



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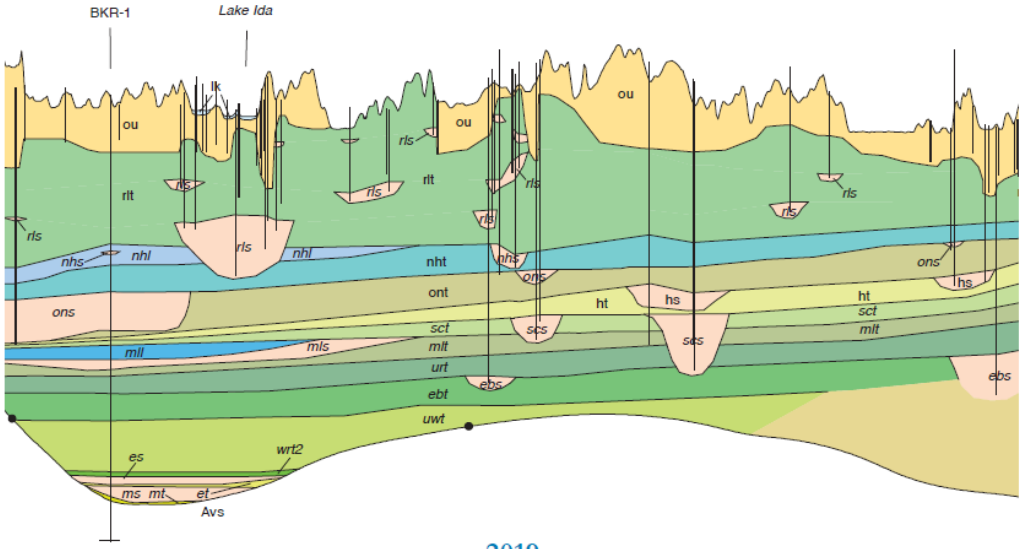
Geologic Atlas User's Guide:

Using Geologic Maps and Databases for Resource Management and Planning

Dale R. Setterholm

Open-File Report OFR-12-1



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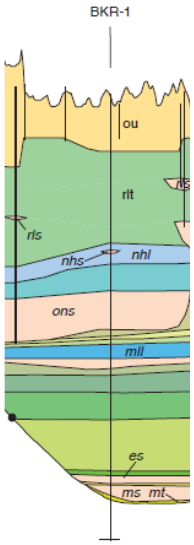

C-40, Geologic Atlas of Wadena

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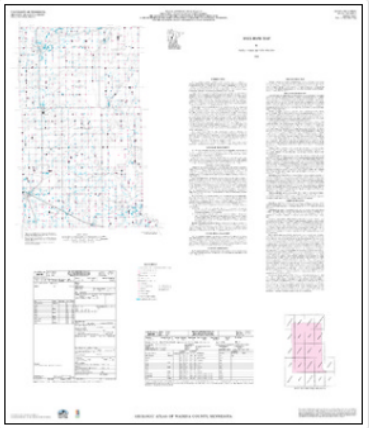
Lusardi, Barbara, A. (Minnesota Geological Survey, 2016)



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- Supplemental GIS and Digital Data in .zip format (1.061Gb application/zip)
- Plate 1 - Data Base Map (2.206Mb application/pdf)
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- Geophysical data and models (208.4Mb application/zip)

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Services

Title
C-40, Geologic Atlas of Wadena County, Minnesota

Authors
Lusardi, Barbara, A.

Issue Date
2016

Publisher
Minnesota Geological Survey

Type
Map
Report

Abstract
A County Geologic Atlas project is a study of a county's geology, and its mineral and ground-water resources. The information collected during the project is used to develop maps, data-base files, and reports. This same information is also produced as digital files for use with computers. The map information is formatted as geographic information system (GIS) files with associated data bases. The maps and reports are also reproduced as portable document files (PDFs) that can be opened on virtually any computer using the free Acrobat Reader from Adobe.com.

Keywords
geology, Quaternary, Wadena County, bedrock, glacial, ground water, stratigraphy, bedrock topography, depth to bedrock, water wells

Appears in collections
County Atlas Series [47]

Series/Report Number
County Atlas Series; C-40

Description
Plate 1 - Data Base, Plate 2 - Bedrock Geology, Plate 3 - Surficial Geology, Plate 4 - Quaternary Stratigraphy, Plate 5 - Sand Distribution Model -Bedrock Topography and Depth-to-Bedrock, Scale 1:100,000

Funding information
The U.S. Geological Survey as part of the 2014 State Geologic Mapping Program Element (STATEMAP) of the National Cooperative Geologic Mapping Program, The Wadena County Board of Commissioners, The Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources, and the Minnesota Legacy Amendment's Clean Water Fund

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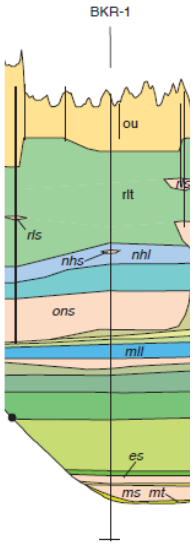

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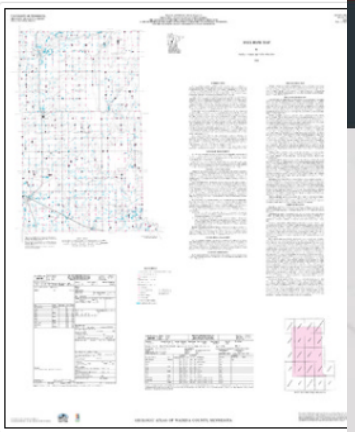

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Geophysical data and models (208.4Mb application/zip)

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Minnesota Geological Survey - Open Data Site

County Geologic Atlas, Kandiyohi County, Minnesota

More MGS Stories

CGA Kandiyohi County | Data-Base - Plate 1 | Bedrock Geology - Plate 2 | Surficial Geology - Plate 3

Bedrock Geology

This map depicts the type, distribution, and structure of bedrock units lying beneath variable thickness of unconsolidated Quaternary sediments. The map shows how the bedrock surface would appear if it were viewed from an aerial perspective and the overlying Quaternary sediments were stripped away.

c46cgaKandiyohiWeb

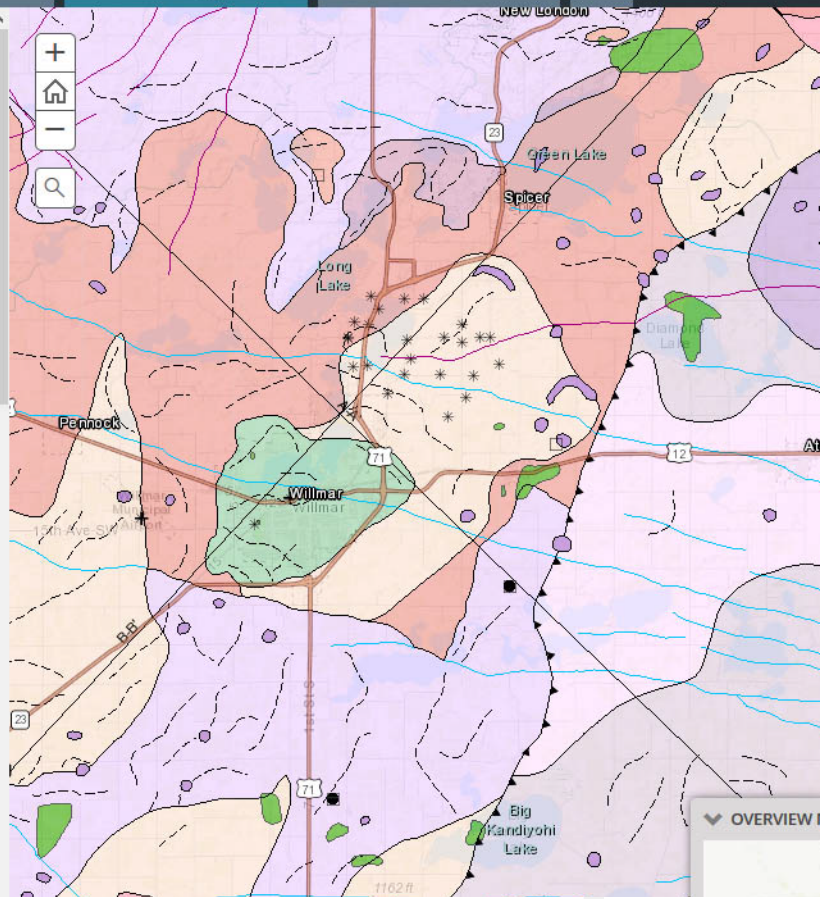
Bedrock Geology - Plate 2

contacts_faults
- boundary
- contact
- fault
- thrust fault, upper plate to east

bedrock_cores

bedrock_cuttings

Cuttings



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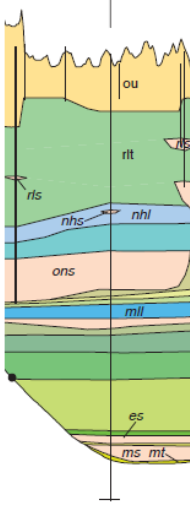

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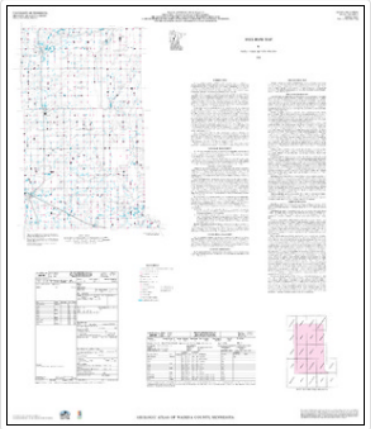

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Services

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Lusardi, Barbara

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Map
Report

Abstract

A County Geolog
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Keywords

geology, Quaterr
topography, dept

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Description

Plate 1 - Data Ba
Stratigraphy, Pla
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Funding inform

The U.S. Geolog
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recommended b
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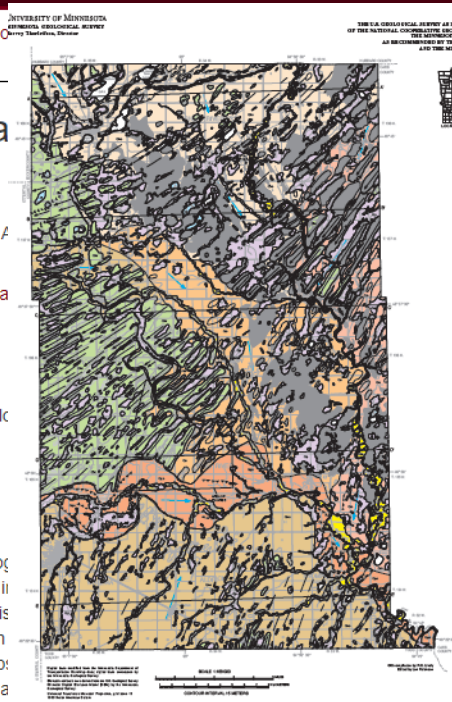
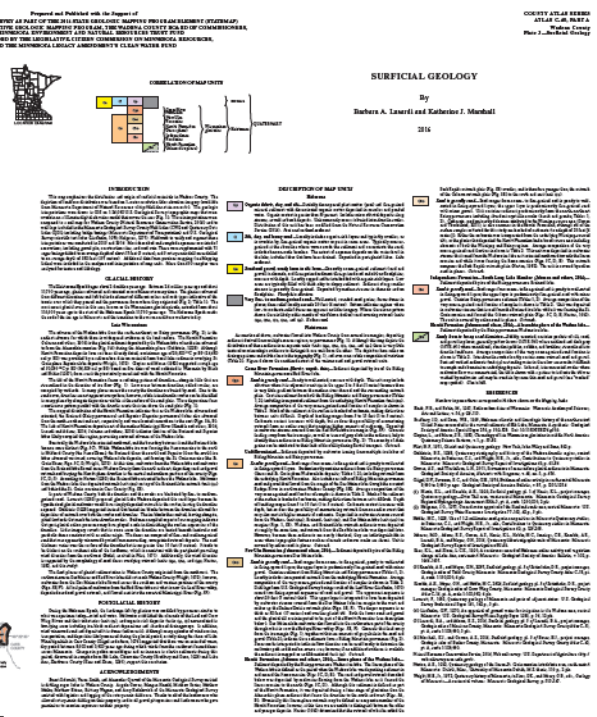
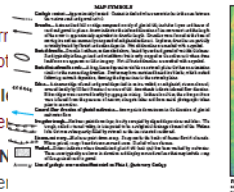
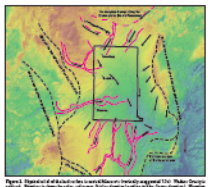
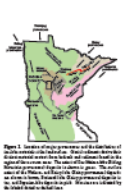
Suggested Cite

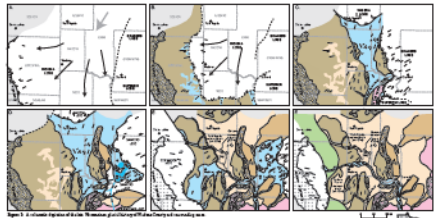


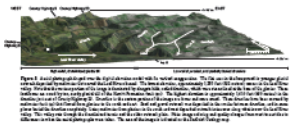


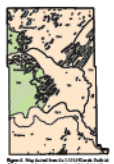


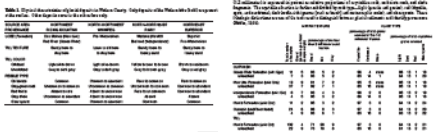












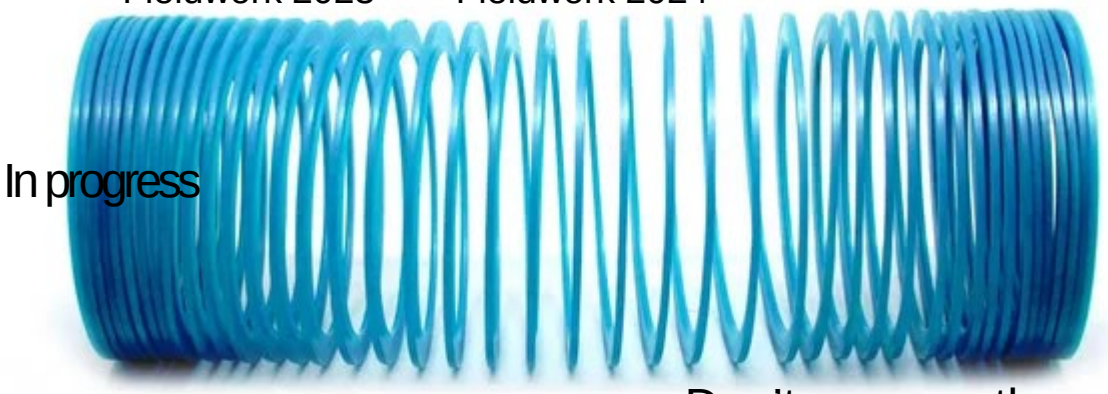
March 2019
- Remote work
- Limited/No fieldwork

2020-present
- Early retirements

2021-present
- Training new hires

New Starts
Fieldwork 2023

Sign-ups
Fieldwork 2024

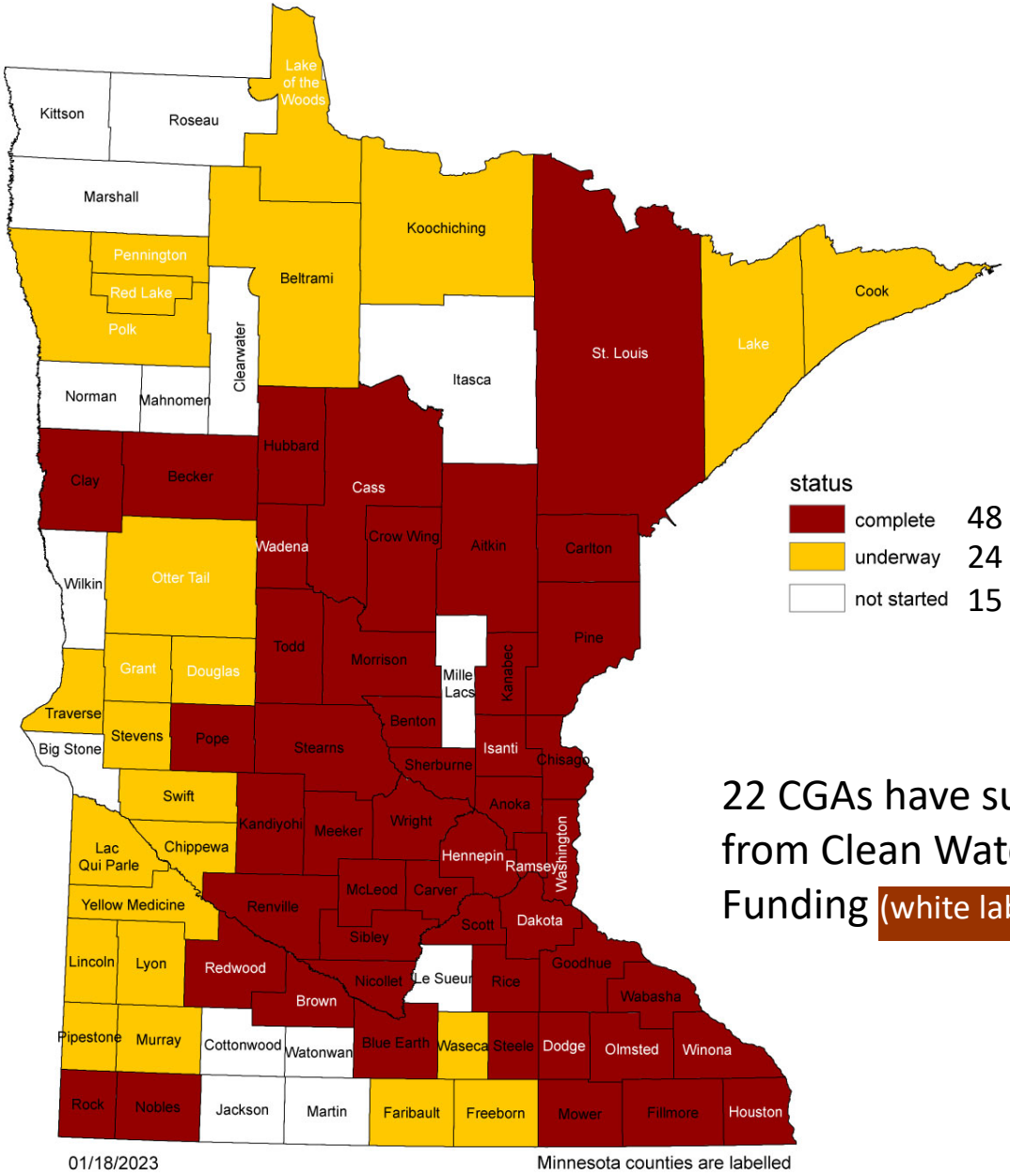


Don’t even go there. . .

Recent Retirements/Departures	Recent Hires
Val Chandler (Geophysics 41 yrs)	Aaron Hirsch (Geophysics-21)
Mark Jirsa (Precambrian 42 yrs)	Alli Severson (Precambrian-20)
Terry Boerboom (Precambrian 34 yrs)	Eric Nowariak (Precambrian-21)
Al Knaeble (Quaternary 31 yrs)	Ethan Kurak (Quaternary-21)
Kaleb Wagner (Quaternary 6 yrs)	Emma Collins (Quaternary-21)
Jenn McDonald (Quaternary 7yrs)	Jordan VanBerkel (Quat-22)
Gary Meyer (Quaternary 43 yrs)	Emma Schneider (Quat-22)
Jarrod Cicha (Subsurface 4 yrs)	Sarah Francis (GIS-21)
Rich Lively (GIS 45 yrs)	Dan Sletten (Subsurface-22)
Harvey Thorleifson (Director 18 yrs)	
combined MGS experience = 271 yrs	12 yrs = combined MGS experience
average at MGS = 27 yrs	1.5 yr = average at MGS

UNIVERSITY OF MINNESOTA

Status of County Geologic Atlas Part A



22 CGAs have support from Clean Water Funding (white labels)

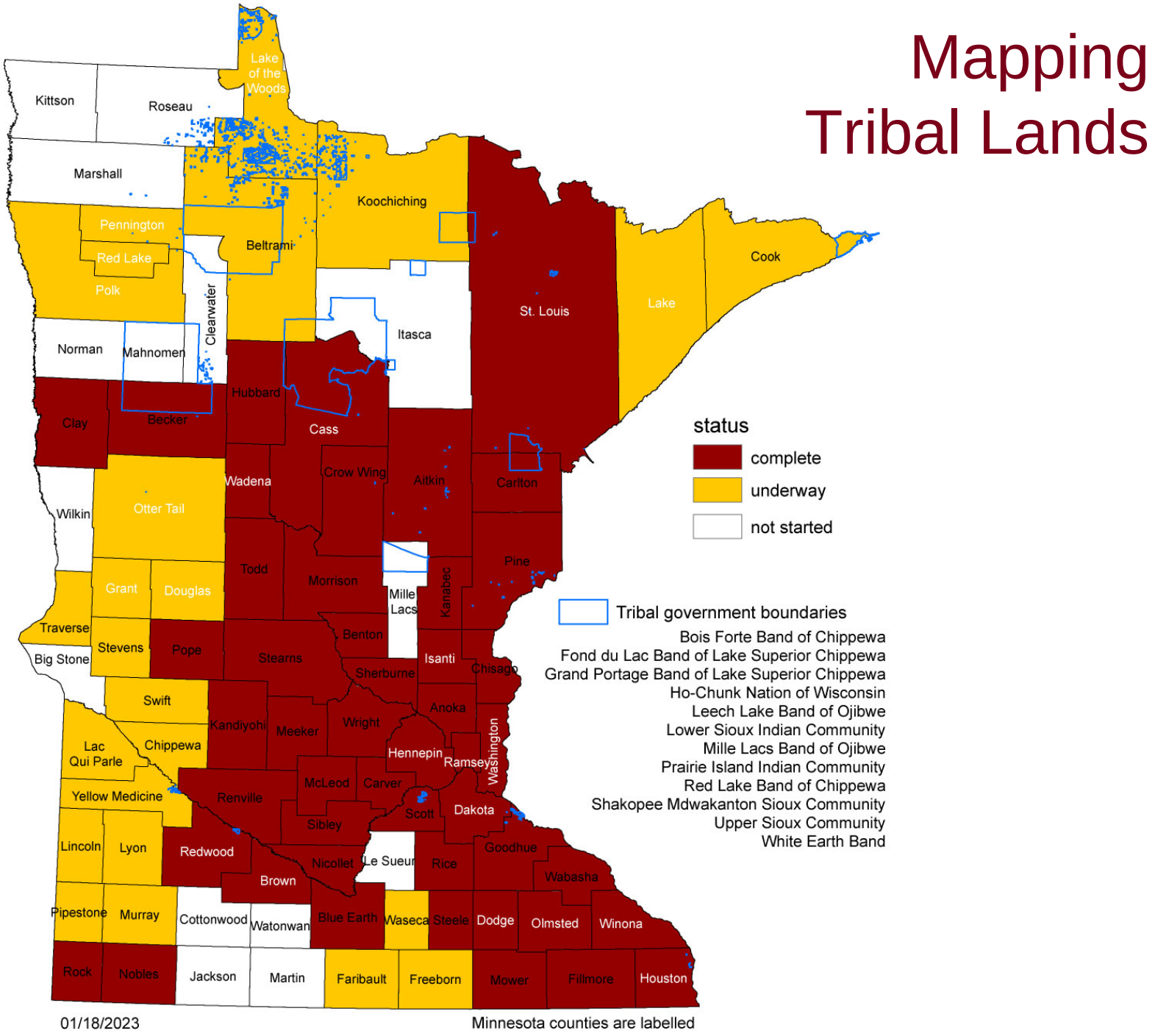
Completed:
St. Louis
Steele
Aitkin

Almost Complete:
Otter Tail
Lac Qui Parle
Lake

Recent starts:
Murray
Freeborn
Traverse
Stevens
Koochiching

15 left to start
Interest:
Itasca
Le Sueur
Martin
Clearwater

Mapping Tribal Lands



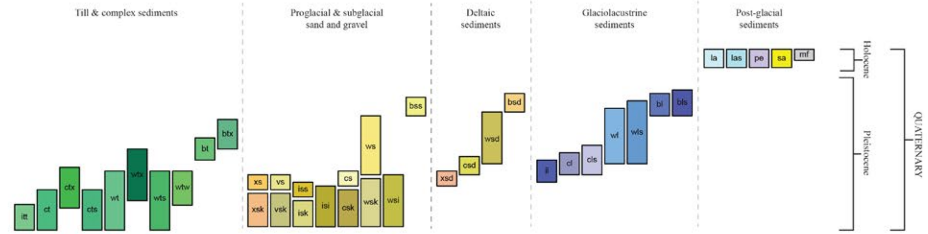
Prepared and Published with the Support of
THE U.S. GEOLOGICAL SURVEY NATIONAL COOPERATIVE GEOLOGY MAPPING PROGRAM UNDER AWARD NUMBER G20AS00006, THE COOK COUNTY BOARD OF COMMISSIONERS, AND THE MINNESOTA ENVIRONMENT AND NATURAL RESOURCES TRUST FUND AS RECOMMENDED BY THE LEGISLATIVE-CITIZEN COMMISSION ON MINNESOTA RESOURCES

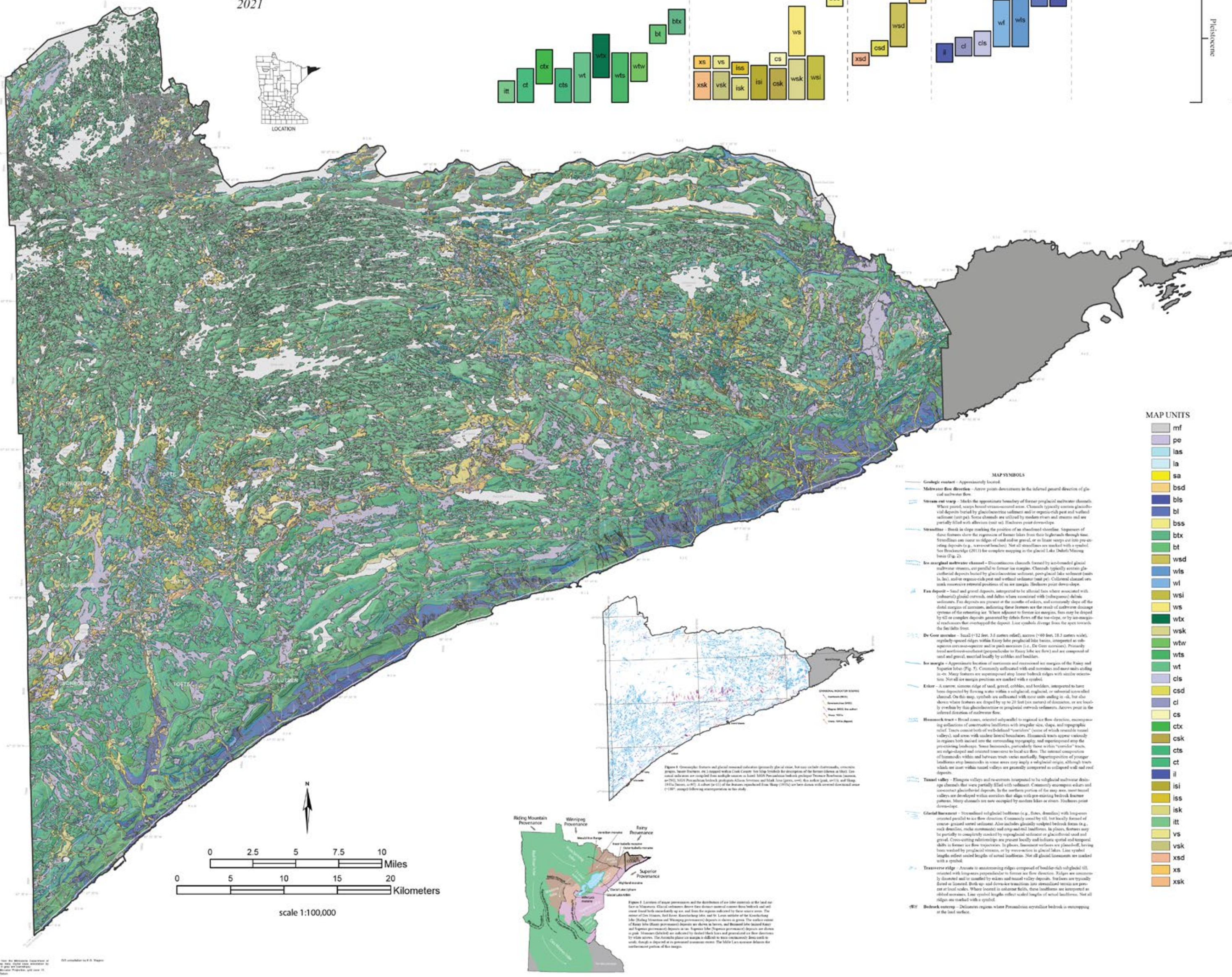
SURFICIAL GEOLOGIC MAP OF COOK COUNTY, MINNESOTA

By
KALEB G. WAGNER

Minnesota Geological Survey
University of Minnesota
2021

CORRELATION OF MAP UNITS





0 2.5 5 7.5 10 Miles

0 5 10 15 20 Kilometers

scale 1:100,000

MAP UNITS

- mf
- pe
- las
- la
- sa
- bsd
- bls
- bl
- bss
- btx
- bt
- wsd
- wls
- wl
- wsi
- ws
- wtx
- wsk
- wtw
- wts
- wt
- cls
- csd
- cl
- cs
- ctx
- csk
- cts
- ct
- il
- isi
- iss
- isk
- itt
- vs
- vsk
- xsd
- xs
- xsk

MAP SYMBOLS

Geologic contact – Approximately located.

Meltwater flow direction

Stream cut scarp

Strandline

Ice marginal meltwater channel

Fan deposit

De Geer moraine

Ice margin

Esker

Hummock tract

Tunnel valley

Glacial lineament

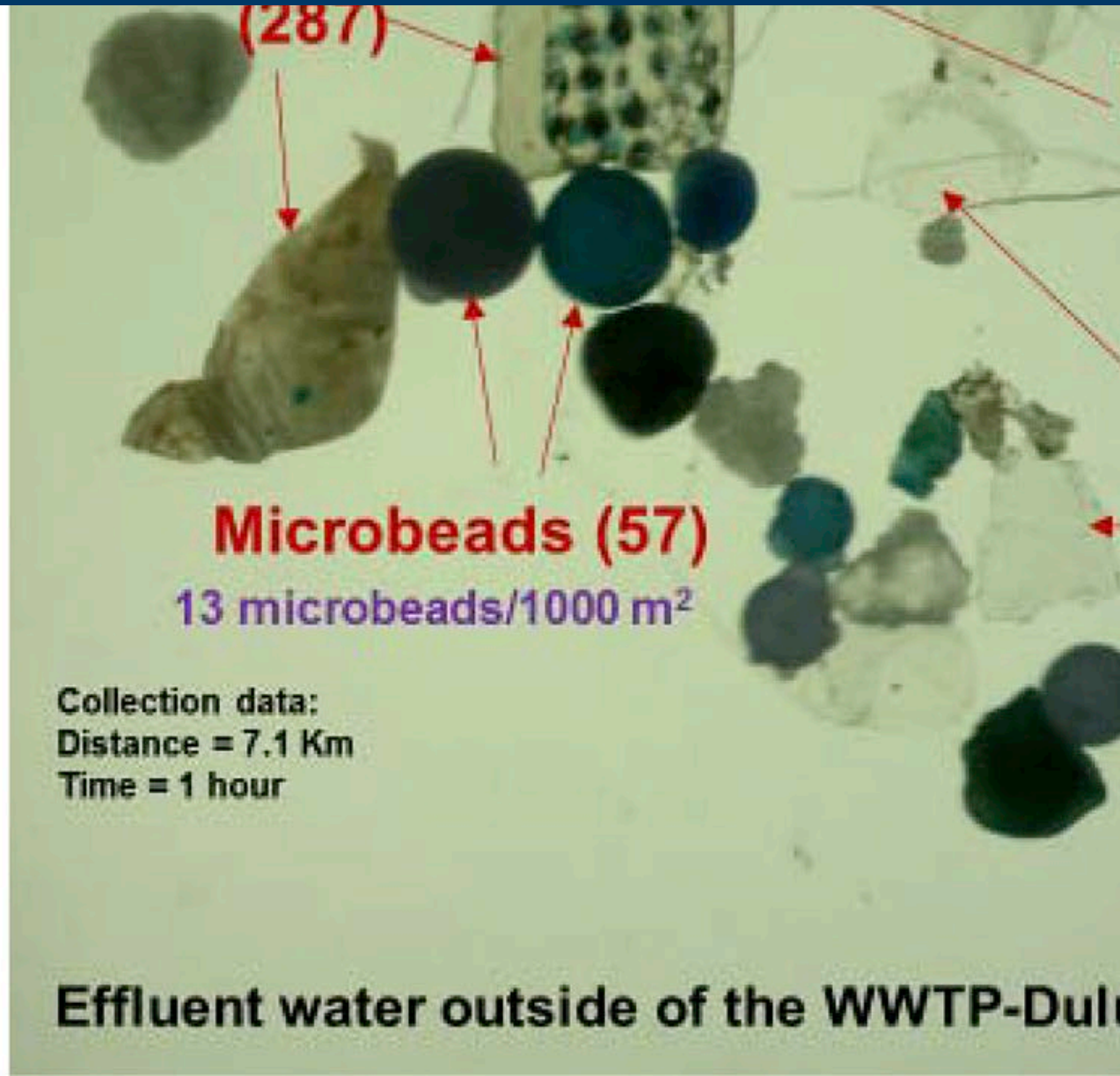
Transverse ridge

Bedrock outcrop

Making it happen…

- Digital well locations established- local contribution of in-kind services
- MGS completes part A at a cost of about $500,000 (generally takes 4-5 years)
- DNR completes part B (about 3 years)
- Presentation (possibly a field trip) held for all interested users after completion of each part

Statewide Survey of Microplastics in Water

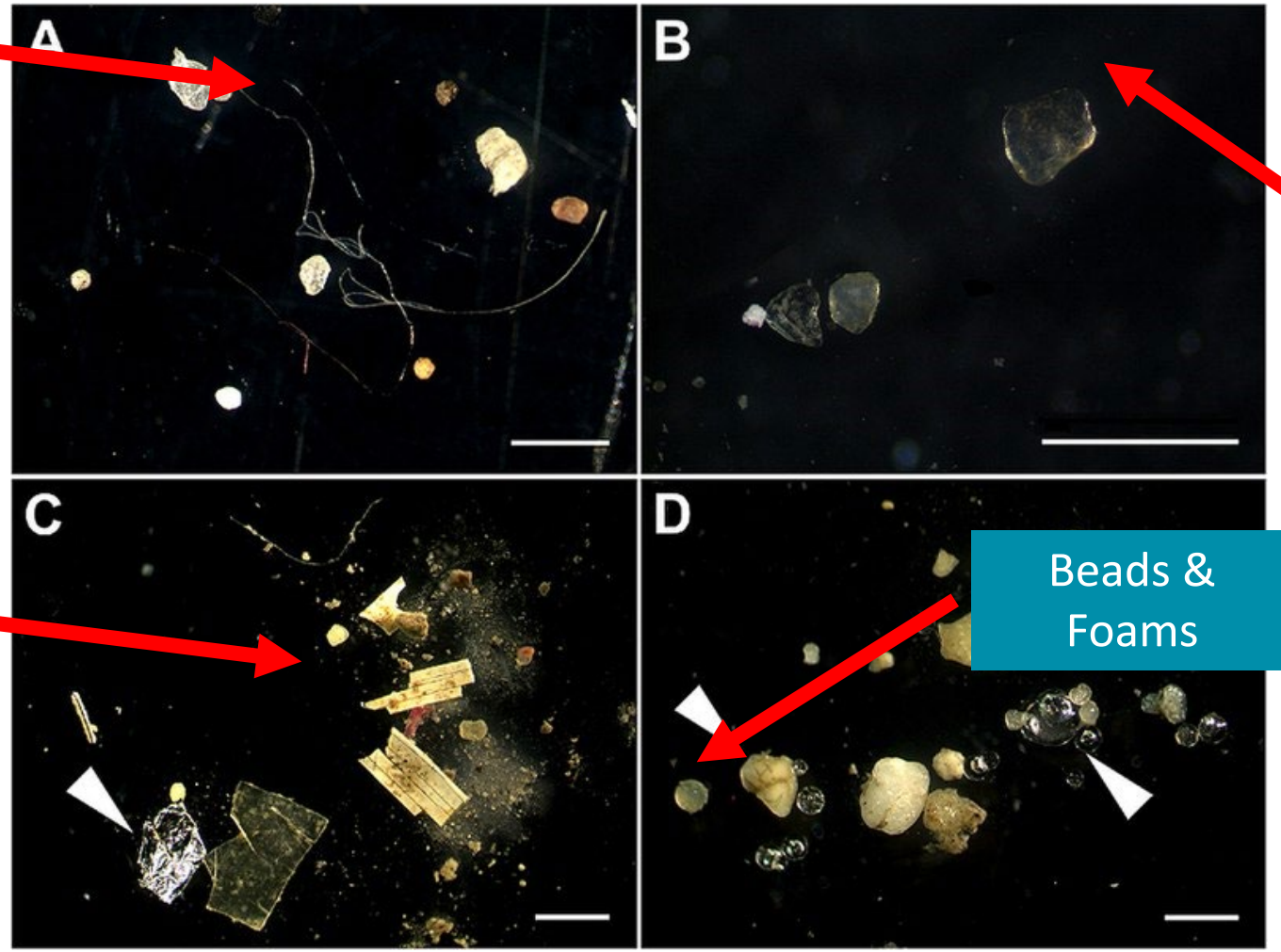


About Microplastics

- < 5mm (5000 µm) in size
- Variety of shapes, sizes, colors
- Ubiquitous Exposure
  - Inhalation & ingestion (dust, water, diet)

COMMON MATERIAL TO RELATIVE PARTICLE SIZE IN MICRONS	
Material	**Micron Size**
Powdered Sugar	60
Ground Coffee	5 to 400
Dust Mites	100 to 300
Viruses	0.005 to 0.3
Corn Starch	0.1 to 0.8
Smoke (Wood)	0.2 to 3
Beach Sand	0.3 to 60
Bacteria	0.3 to 60
Pet Dander	0.5 to 100

Fibers



Particles

Films & Fragments

Beads & Foams

"Microplastics in sediments" By Martin Wagner et al. – Microplastics in freshwater ecosystems: what we know and what we need to know. In: Environmental Sciences Europe. 26, 2014, doi:10.1186/s12302-014-0012-7 (CC BY 4.0) via Commons Wikimedia

The project

- Legislative directive
- Interagency – MPCA-led, partnering w/ sister agencies, USGS, and UMD
- Focused only on waters (surface water, groundwater, drinking water)
- Goal: determine the presence and abundance of microplastics in water and identify possible next steps

Key points

Schedule: July 1, 2022 – June 30, 2024

Sample Collection

- Groundwater/Drinking Water – done by MPCA and UMD
- Surface Water & Sediment – done by USGS

There is no standard method for sampling. We're going by experience.

UMD lab analyzing all samples

- FT-IR (Fourier transform infrared) spectroscopy

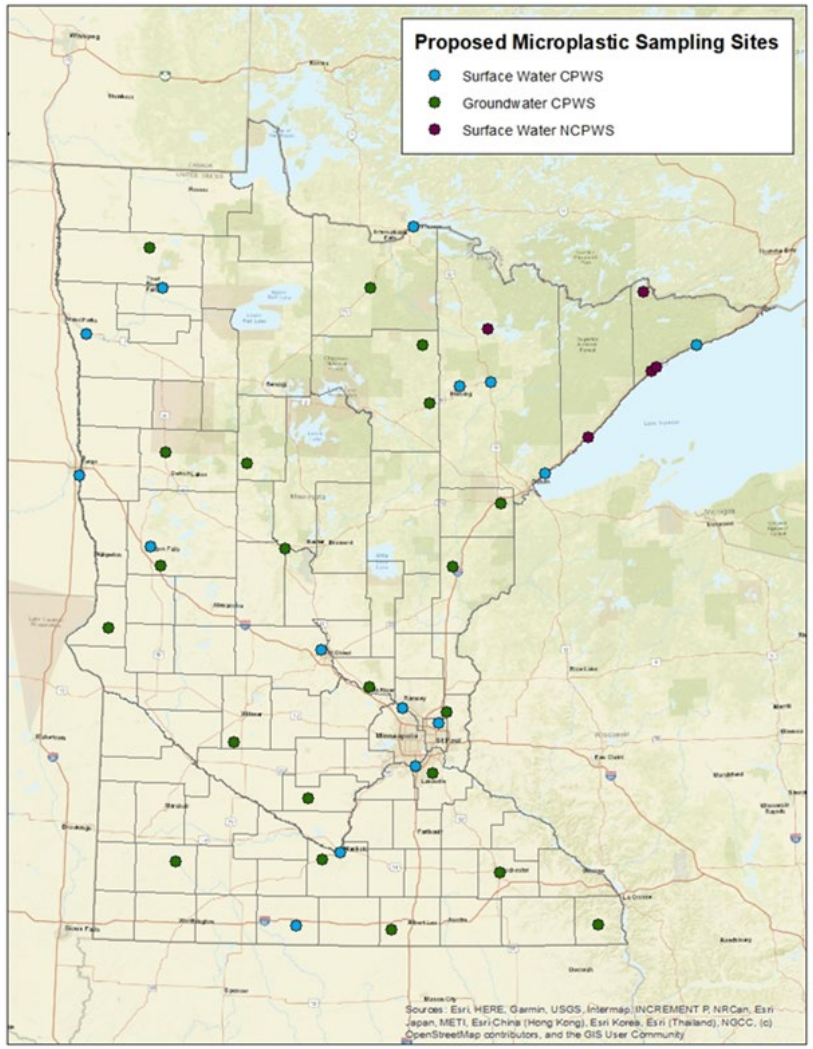
Groundwater/Drinking Water

GW Sampling started Fall ‘22

- 50 locations in 2023-2024

Drinking Water CWS (community water supplies)

- Approx. 32 locations (permission-dependent)
  - raw & finished water, sampled 2x
- Budgeted for 200 samples

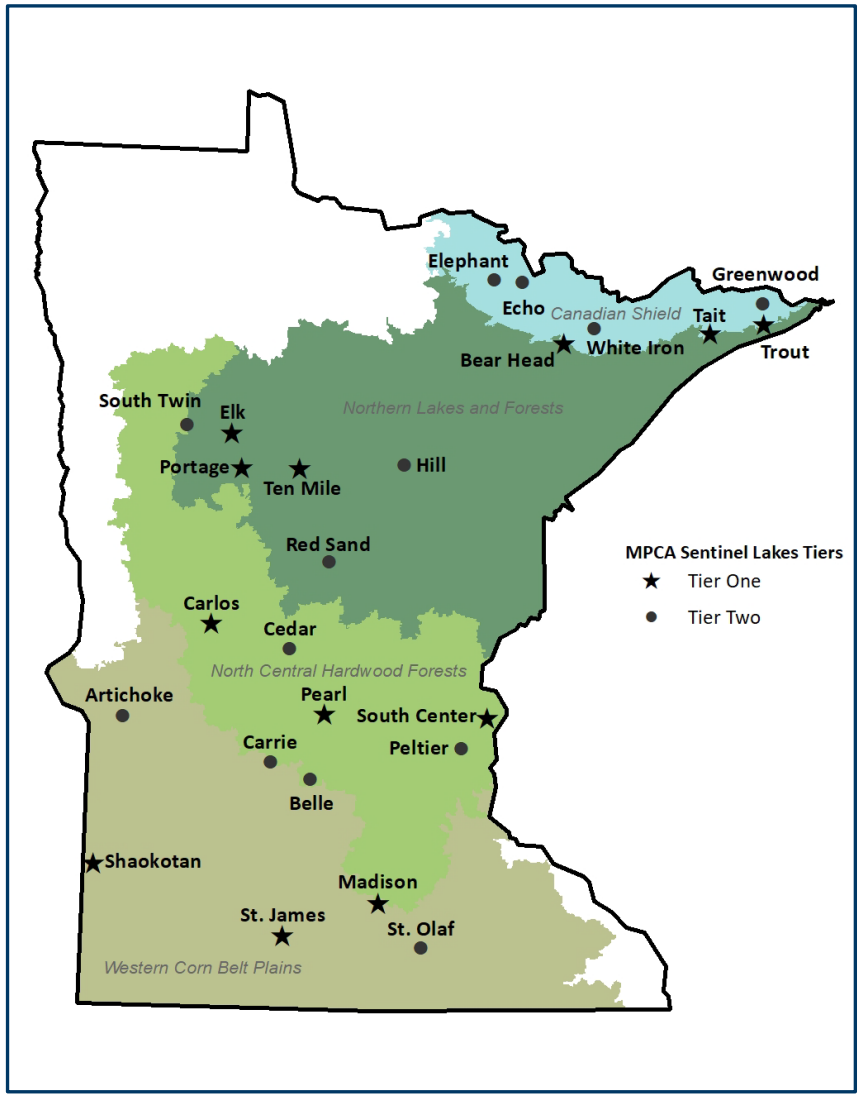


Surface Water/Sediment

Starting April 2023

116 samples across the state

- 18 Lake locations (27 surface water, 27 sediment)
- 22 River locations (22 surface water, 22 sediment)
- QC samples (18)



Sampling

Sampling: Surface Water

Images source: USGS

Conclude with the unknowns

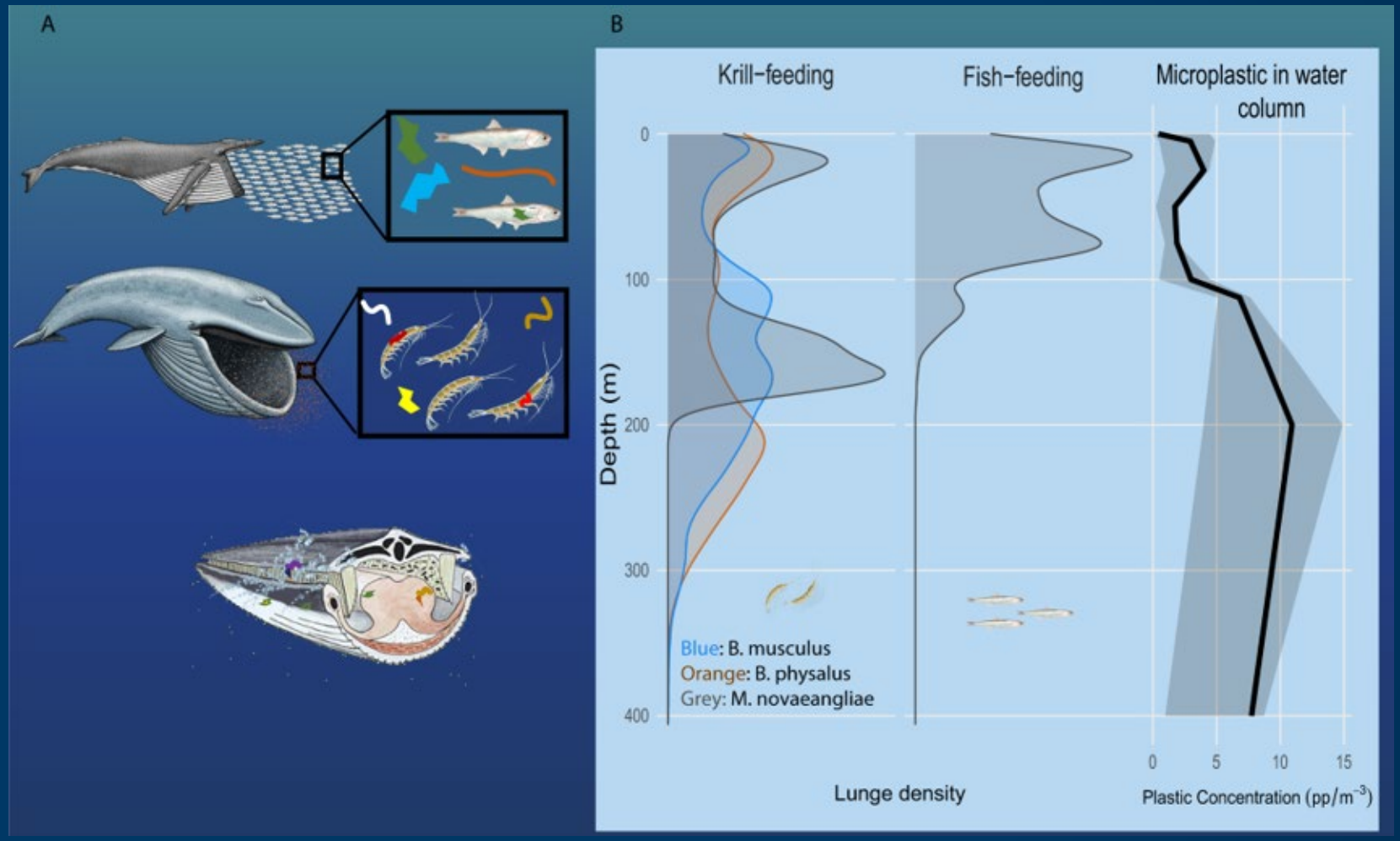
- There are no health standards for MPs, not an enforcement action
- Can’t see particles that cross blood barrier
- We don’t have studies to define human health risks

Be thankful you're not a blue whale

Estimated to consume

up to 10 million MP particles

PER DAY



Kahane-Rapport, S.R., Czapanskiy, M.F., Fahlbusch, J.A. *et al.* Field measurements reveal exposure risk to microplastic ingestion by filter-feeding megafauna. *Nat Commun* **13**, 6327 (2022). https://doi.org/10.1038/s41467-022-33334-5

Minnesota Agricultural Water Quality Certification Program

Brad Jordahl Redlin
Manager

Clean Water Council – Budget and Outcomes Committee
March 3, 2022

MAWQCP Overview

- Whole farm, voluntary risk assessment with a local conservation and agronomy professional
- Available to renters and landlords, any size/type operation
- MAWQCP addresses CWC Strategic Plan:
  - Goal 1: Strategies 1, 3, 4, 5, 7;
  - Goal 2: Strategies 5, 6;
  - Goal 3: Strategies 1, 2, 4, 5, 9, 10, 11;
  - Goal 4: Strategy 2.

MAWQCP = on-the-ground Implementation

Executive Order 19-12

- MDA, MPCA, DNR and BWSR will incorporate MAWQCP in **all watershed approaches and programs**

- MDA, MPCA, DNR and BWSR must honor MAWQCP contracts and include certified growers when implementing new laws or rules

STATE OF MINNESOTA
Executive Department

Governor Tim Walz

Executive Order 19-12; Rescinding Executive Order 14-09

Directing Agency Cooperation on the Minnesota Agricultural Water Quality Certification Program

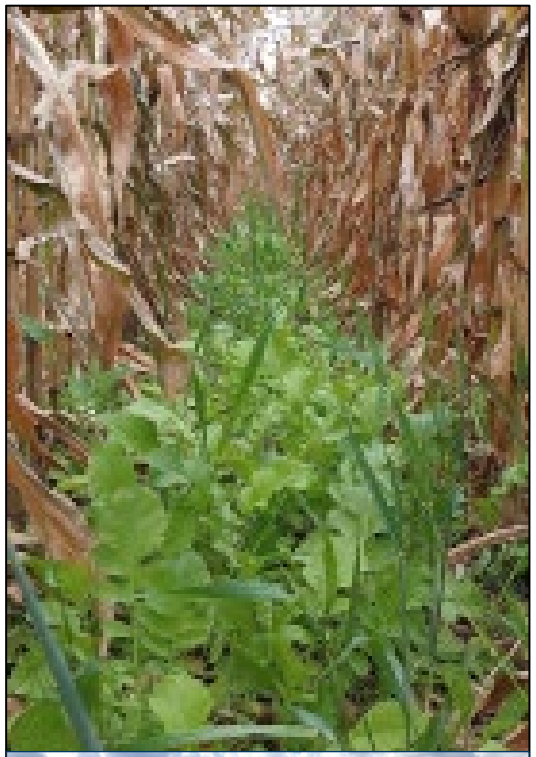
I, Tim Walz, Governor of the State of Minnesota, by the power vested in me by the Constitution and applicable statutes, issue the following Executive Order:

MAWQCP Advisory Committee

Minnesota Agricultural Water Quality Certification Program
FY 23-24 Advisory Committee

	Member	Organization
1	Anne Schwagerl	Minnesota Farmers Union MAWQCP Certified Producer
2	Ariel Kagan	Environmental Initiative
3	Brian Buhr	Dean – U of M, College of Food, Agriculture and Natural Resource Sciences
4	Bryan Biegler	Minnesota Corn Growers Association MAWQCP Certified Producer
5	Dennis Fuchs	Stearns County SWCD
6	Eric Sannerud	MAWQCP Certified Producer
7	Joe Smentek	Minnesota Soybean Growers Association
8	Leif Fixen	The Nature Conservancy
9	Lori Cox	Roots Return Heritage Farm MAWQCP Certified Producer
10	Lucas Sjostrom	Minnesota Milk Producers Association MAWQCP Certified Producer
11	Nathan Collins	Minnesota Farm Bureau MAWQCP Certified Producer
12	Spencer Herbert	Land O' Lakes - Truterra
13	Steve Peterson	retired - General Mills past-Chair - Field to Market past-Chair - Minnesota AgriGrowth Council MAWQCP Certified Producer
14	Tom Raymond	Hormel Foods
15	Trent Wimmer	Syngenta

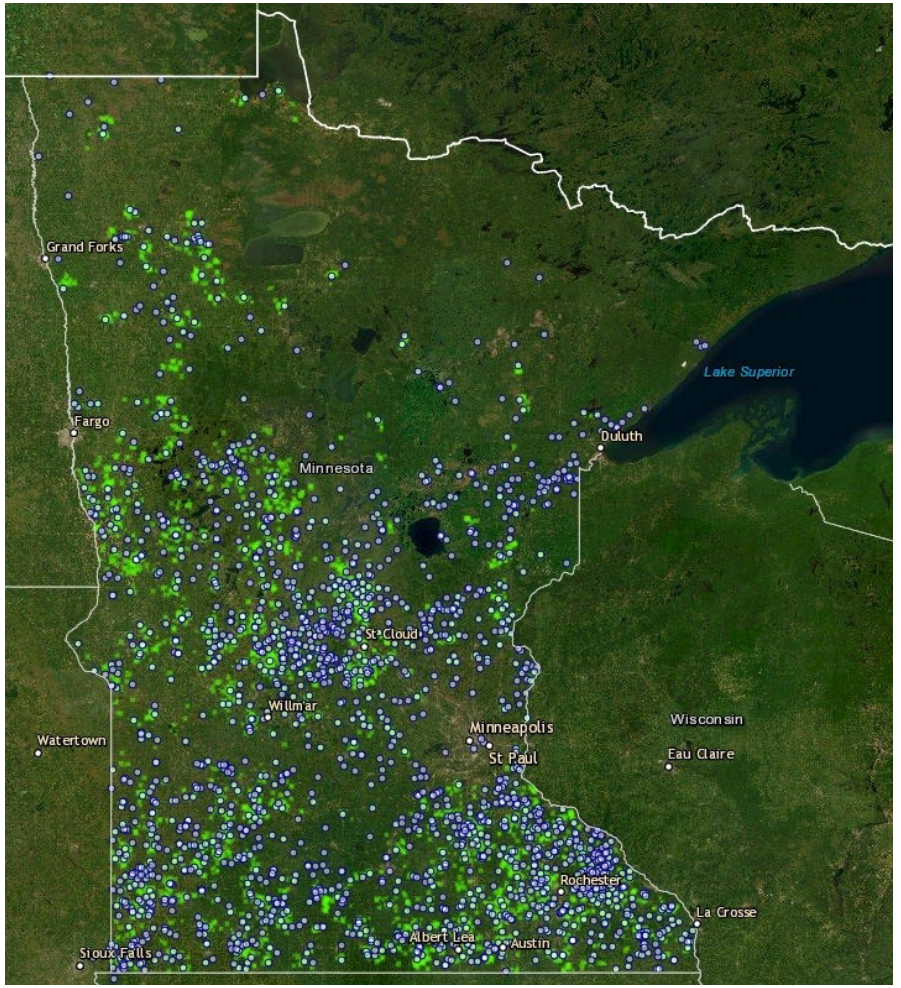
MAWQCP Implementation



Access Control
Alternative Drain Tile Intakes (rock, pattern, Agri Drain H20 Quality Intakes/no perforated risers)
Channel Bed Stabilization
Conservation Cover
Constructed Wetland
Contour Buffer Strips
Cover Crop
Critical Area Planting
Denitrifying Bioreactor
Diversion
Drainage Water Management
Feedlot/Wastewater Filter Strip
Fence
Field Border
Filter Strip
Forage and Biomass Planting
Grade Stabilization Structure
Grassed Waterway
Heavy Use Area Protection
Integrated Pest Management
Irrigation System, Sprinkler
Irrigation Water Management
Karst Sinkhole Treatment
Lined Waterway or Outlet
Mulching
Nutrient Management (plan development)
Obstruction Removal
Open Channel
Pipeline
Pond
Prescribed Grazing
Pumping Plant
Residue and Tillage Management - No-Till/ Strip Till/ Direct Seed
Residue and Tillage Management - Ridge Till
Riparian Forest Buffer
Roof Runoff Control (feedlot)
Sediment Basin
Spring Development
Stream Crossing
Streambank and Shoreline Protection
Strip cropping
Structure for Water Control
Subsurface Drain
Terrace
Trails and Walkways
Tree & Shrub Site Preparation
Underground Outlet
Vegetated Subsurface Drain Outlet (Saturated Buffer)
Vegetative Barriers
Waste Storage Facility
Water & Sediment Control Basin
Water Well
Water Well Decommissioning
Watering Facility
Wetland Restoration

MAWQCP Outcomes

- **1,305** certified producers **958,385** acres (2-24-23)
  - 2,600 new practices
  - 127,697 tons of soil saved per year
  - 43,476 tons of sediment reduced per year
  - 54,792 pounds of phosphorous loss prevented per year
  - As much as 49% reduction in nitrogen loss
  - 49,601 C02-equivalent tons GHG reduced per year
  - MAWQCP farms **averaged $25,000/yr. or 36% higher profit than non MAWQCP certified farms** over the last 3 years
- **347** Endorsements:
  - 111 Climate Smart
  - 101 Soil Health
  - 76 Integrated Pest Management
  - 55 Wildlife
  - 4 Irrigation (UofM MIP)



IRRIGATION WATER MANAGEMENT

CLIMATE SMART

SOIL HEALTH

WILDLIFE

INTEGRATED PEST MANAGEMENT

MAWQCP Budget

Appropriation/Budget	FY14-15	FY16-17	FY18-19	FY20-21	FY22-23	Total
Clean Water Funds	$3.0M	$5.0M	$5.0M	$6.0M	$6.0M	$25.0M
Dollars Passed Through	$1.6M	$2.7M	$3.1M	$4.2M	$4.02M	$15.6M
Total$/acre	**FY14** **$1.5M** $541.52 **FY15** **$3M** $113.63	**FY16** **$5.5M** $50.15 **FY17** **$8M** $31.95	**FY18** **$10.5M** $28.04 **FY19** **$13M** $25.37	**FY20** **$16M** $25.33 **FY21** **$19M** $24.25	**FY22** **$22M** $24.65	

MAWQCP Outcomes

Agriculture is Expensive, Ag Conservation is Expensive

Sample USDA conservation program comparisons

Note also that MAWQCP ***~$24 per acre*** calculation is the one-time total cost for the entire 10-year term of MAWQCP-certification

Conservation Reserve Program (CRP) 2022
MN annual total $145,744,000
MN ***per acre $146.27*** (annually over 10 year, some 15 year, contracts)

Environmental Quality Incentives Program (EQIP) FY21
MN annual total $27,328,226
MN ***per acre $212.16***

Conservation Stewardship Program (CSP) FY21
MN total obligations $17,826,714
MN ***per acre $103.68***

MN CREP September 2022
MN total project $175,000,000 (State & federal total $525,000,000)
Current acres 35,000+ (total project 2026 goal 40,000 acres)

Minnesota Agricultural Water Quality Certification Program MAWQP - Cost Analysis

1. This analysis compares all funds appropriated through the life of the program to acres certified. This does not attempt to isolate the actual labor, administration and financial assistance costs of conducting farm certifications. Instead, it applies the larger 100 percent total of all appropriations on a per acre basis. The numbers display inevitably high up-front sunk costs giving way to an efficient and cost-effective program where each acre in each year costs less than the acre that came before it.

Appropriations for MAWQCP:
FY14 - $1,500,000
FY15 - $1,500,000
FY16 - $2,500,000
FY17 - $2,500,000
FY18 - $2,500,000*
FY19 - $2,500,000*
FY20 - $3,000,000
FY21 - $3,000,000
FY22 - $3,000,000

Program Totals thru FY2014: 4 farms 2,770 acres
$1.5 million total appropriations:
$541.52/acre

Program Totals thru FY2015: 44 farms 26,400 acres
$3 million total appropriations:
$113.63/acre

Program Totals thru FY2016: 198 farms 109,667 acres
$5.5 million total appropriations:
$50.15/acre

Program Totals thru FY2017: 427 farms and 250,400 acres
$8 million total appropriations:
$31.95/acre

Program Totals thru FY2018: 594 farms and 374,488 acres
$10.5 million total appropriations:
$28.04/acre

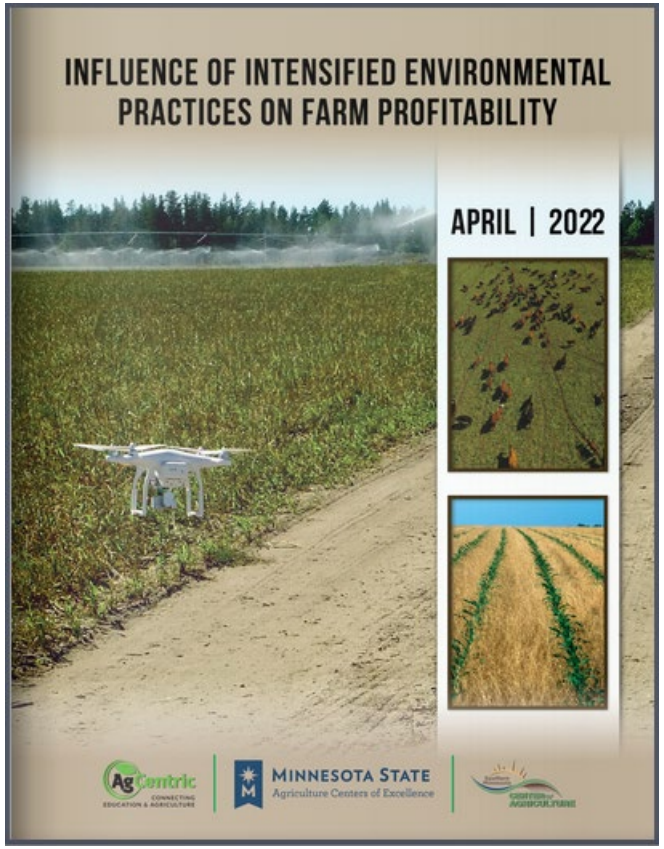
Program Totals thru FY2019: 762 farms and 512,421 acres
$13 million total appropriations:
$25.37/acre

Program Totals thru FY2020: 915 farms and 631,528 acres
$16 million total appropriations:
$25.33/acre

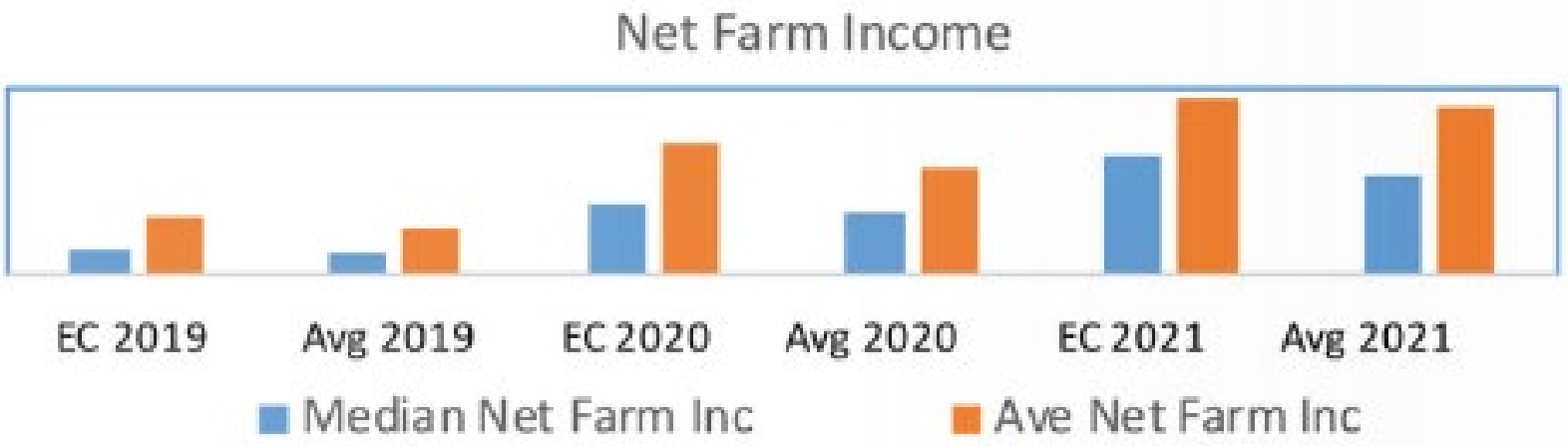
Program Totals thru FY2021: 1,087 farms and 783,339 acres
$19 million total appropriations:
$24.25/acre

Program Totals thru FY2022: 1,240 farms and 892,578 acres
$22 million total appropriations:
$24.65/acre

MAWQCP Outcomes



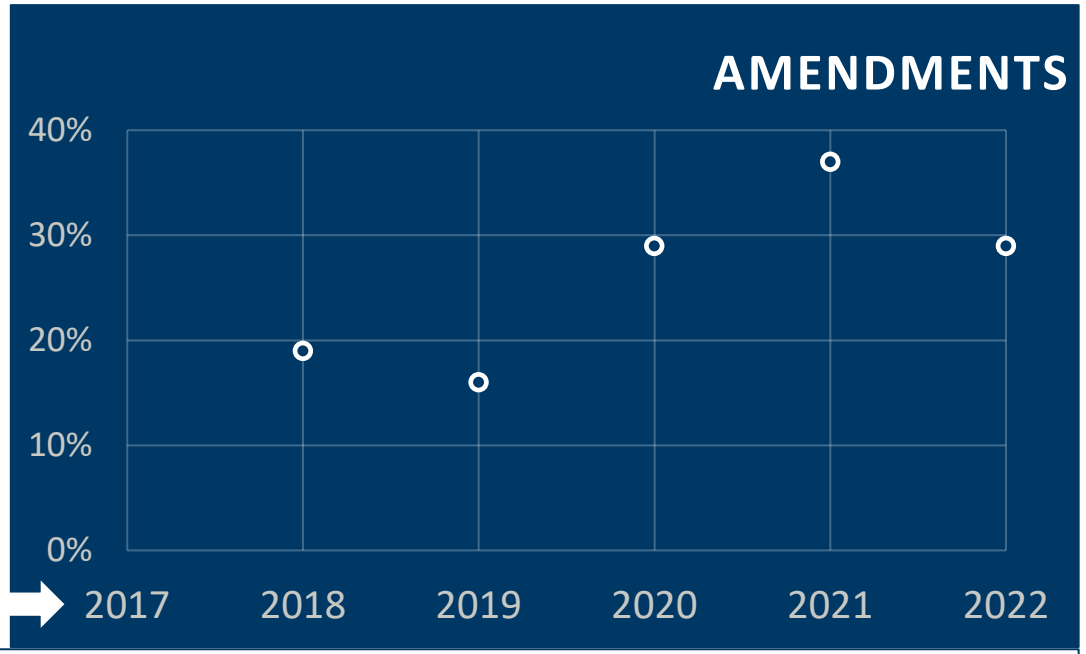
- Farm Business Management data for 2019, 2020, and 2021 show stronger financial outcomes for MAWQCP farms
- MAWQCP farm average net income was more than $25,000 or 36% higher than non-certified farms
- Next report April 2023



MAWQCP Outcomes

Audits/Reviews

- 648 reviews complete 2018-2022
- 94% remain in active certification status
    - 98% when remove sales & deaths
- Many examples of continued decreases in tillage, improved nutrient mgmt. & additional conservation practices
- Opportunity to discuss newprogram benefits and provide TA



Certification Year	2014	2015	2016	2017	2018
Number of reviews	27	50	229	199	190

MAWQCP Outcomes

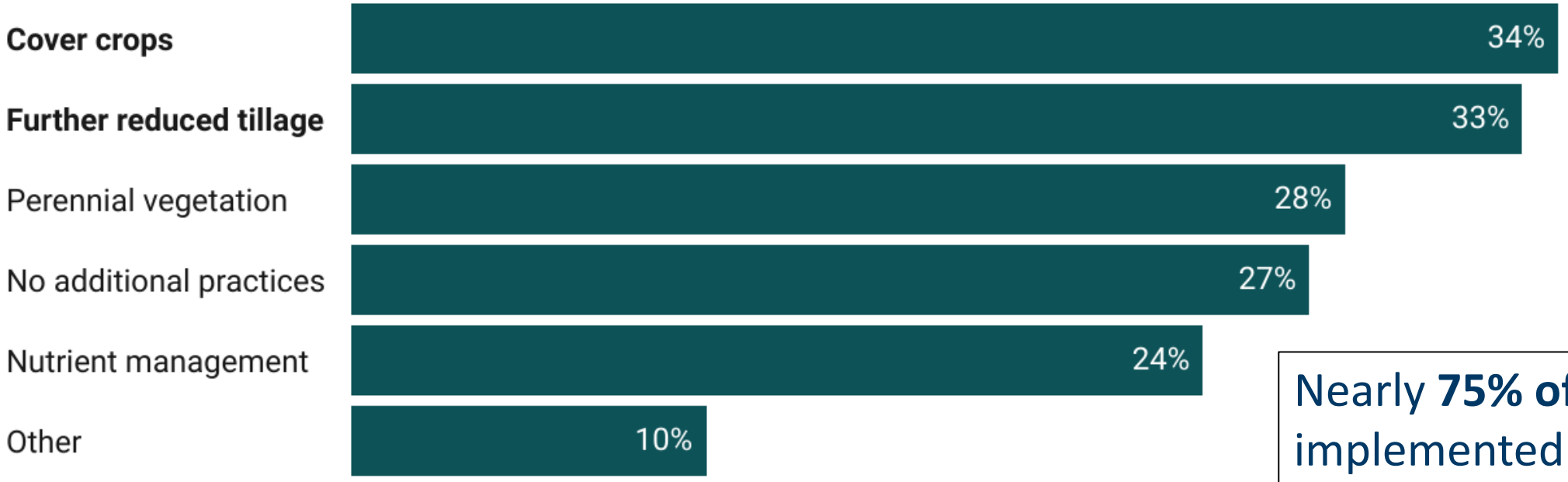
Producer Survey

- Emailed or mailed MAWQCP certified producers in November 2021
- 42% response rate
- Another survey will be conducted in 2024, previous survey conducted 2017
- 71% of producers heard about MAWQCP from their SWCD
- Producers' top three reasons for participating:
    1. Water quality ethic
    2. Review of farm management practices
    3. To obtain regulatory certainty

MAWQCP Outcomes

Have you implemented additional conservation practices since becoming certified?

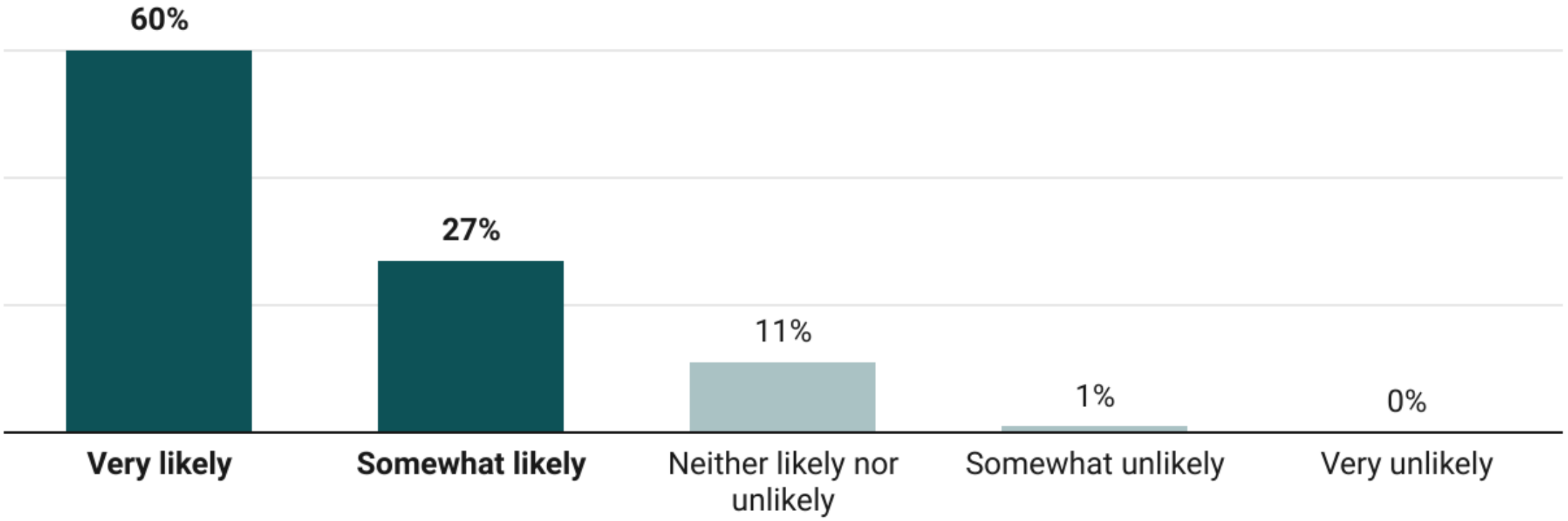
These practices do not include those required for certification.



Nearly **75% of producers** implemented additional conservation practices after earning certification

MAWQCP Outcomes

How likely are you to recommend the Minnesota Ag Water Quality Certification Program to others?



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MAWQCP Outcomes - Financial Assistance

- 3rd year of second 5-yr **$9 million** RCPP award
- MAWQCP's 2 RCPP awards account for **$18 million** MN would otherwise never receive (and would have been allocated elsewhere)
- All RCPP funds are passed through to producers and partners to implement conservation.

MAWQCP Outcomes - Financial Assistance

- $5,000 max with 75% cost share
- History to mid-year: **536 grants** totaling **$2,077,509** have been awarded directly to producers

FY	Total Grant $	# of Grants
2017	106,502.83	30
2018	214,763.23	52
2019	318,126.75	79
2020	276,166.66	75
2021	447,879.60	118
2022	487,086.68	127
2023*	226,983.48	55
TOTAL	**2,077,509.23**	**536**

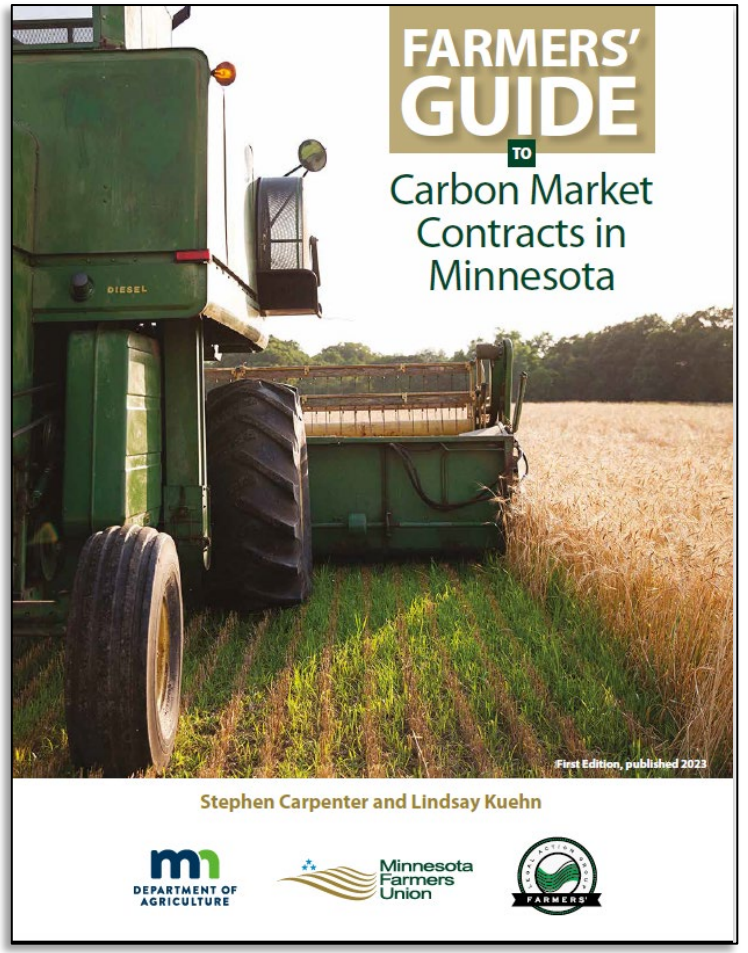
Practice	Total $$ Grant
Access Control	16,209.95
Alternative Drain Tile Intakes	82,362.37
Conservation Cover	4,310.86
Cover Crop	**728,402.20**
Critical Area Planting	10,793.52
Diversion	19,463.00
Drainage Water Management	8,026.38
Feedlot/Wastewater Filter Strip	18,564.88
Fence	**179,101.70**
Field Border	7,552.00
Field Windbreak	6,491.15
Filter Strip	15,000.00
Forage & Biomass Planting	48,751.47
Grade Stabilization Structure	62,260.00
Grassed Waterway	**133,391.29**
Heavy Use Area Protection	38,921.00
Integrated Pest Management	1,327.00
Integrated Pest Management Plan Development	1,500.00
Irrigation System	5,000.00
Irrigation System, Sprinkler	41,361.62
Irrigation Water Management	61,382.75
Irrigation Water Management-Soil Moisture Sensors	15,848.50
Mulching	10,000.00
Nurtient Management Plan Deveopment	5,000.00
Nutrient Management	7,611.00
Open Channel	2,417.63
Pipeline	35,301.35
Prescribed Grazing	**99,946.36**
Pumping Plant	8,000.00
Residue & Tillage Management - No-Till/Strip Till/Direct Seed	48,388.68
Roof Runoff Control (feedlot)	14,954.50
Sediment Basin	27,437.00
Septic System upgrade (Imminent Threat to Public Heath designated only)	10,000.00
Spring Development	5,000.00
Stream Crossing	31,558.75
Streambank & Shoreline Protection	5,000.00
Structure for Water Control	2,191.06
Waste Storage Facility	30,000.00
Water & Sediment Control Basin	**128,878.72**
Water Well	22,482.50
Water Well Decommissioning	11,312.50
Watering facility	59,647.11
Wetland Restoration	6,360.43
TOTAL	**2,077,509.23**

At least 42 different practices

MAWQCP Outcomes - Financial Assistance

Climate Smart Farms Project

- Climate Smart Farm Endorsement provides whole-farm "climate audit"
- *'Farmers' Guide to Carbon Market Contracts in Minnesota'* provides legal analysis of carbon market contracts
- $1,000 bridge-payment grants provide growers:
  - Financial support during transition period
  - Time to work with local certifier to explore and prepare for evolving climate marketplaces and public programs.



MAWQCP Outcomes - Next

CFANS next-generation agroinformatics data discovery and analysis platform G.E.M.S™ (Genetic, Environmental, Management, and Socioeconomic data)

University of Minnesota GEMS shall, per Attachment 1:

2.1.1 Produce a report and summary that a) quantifies the spatio-temporal nature of the relationship between BMP and water quality, b) reports the results of a preliminary assessment of the most impactful BMPs on water quality, including what covariates affected those (e.g., weather, soil, slope, terrain, other BMPs), and c) identifies a scope of work that establishes an on-going analytical pipeline linking BMPs to water quality outcomes and undertakes policy and practically relevant research of use to MDA.

MAWQCP Outcomes - Next

Project Title: Evaluation of what motivates farmers' participation in Minnesota's Agricultural Water Quality Certification Program (MAWQCP): a consideration of moral and economic perspectives

"Outcomes will allow producers, buyers, investors, consumers and Minnesota's Department of Agriculture (MDA) and Pollution Control Agency (MPCA) to better advocate and improve policies to mitigate business and societal risks of agriculture production. Specifically, we will provide evidence on what are the farmer values, social norms, and personal norms that drive enrollment in Minnesota's Agricultural Water Quality Certification Program (MAWQCP)."

MAWQCP Outcomes - Next

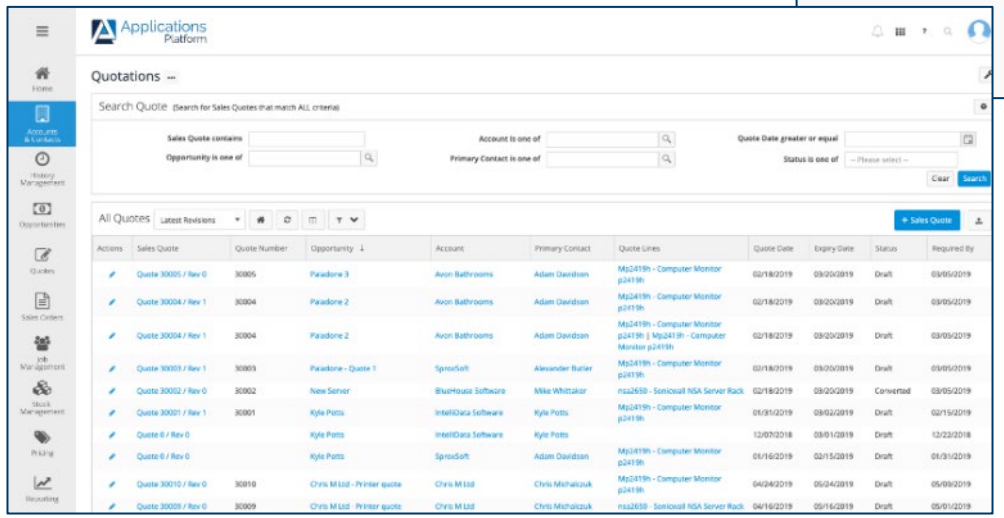
Capstone project:

"The capstone team will prepare a report of its research findings, its analysis of the challenge of farmer participation in MAWQCP, an analysis of options the MDA should consider, including the property tax credit, and make recommendations to the MDA."

MAWQCP Outcomes - Next

MAWQCP Tech Platform Update

- Unifying functions and records
  - mapping, reviews, practice outcomes, endorsements, grants, etc.
- Single database
- Original code updated



MAWQCP Partnerships

Minnesota Farmers Union

Field to Market®
The Alliance for Sustainable Agriculture

WOMEN CARING FOR THE LAND

The Nature Conservancy
Protecting nature. Preserving life.

CLEAN WATER LAND & LEGACY AMENDMENT

MASWCD

DEPARTMENT OF AGRICULTURE

Board of Water and Soil Resources

Department of Natural Resources

Pollution Control Agency

Environmental INITIATIVE
Powerful Partnerships, Effective Solutions

USDA NRCS

HOUSTON ENGINEERING INC.

AgCentric
CONNECTING EDUCATION & AGRICULTURE

CLEAN RIVER PARTNERS

RCPP
Regional Conservation Partnership Program

CERTIFIED CROP ADVISER

HASP

CFS
CENTRAL FARM SERVICE

Hormel Foods

Minnesota Milk
Producers Association

MIDWEST Dairy®

UNIVERSITY OF MINNESOTA EXTENSION

Minnesota Agricultural Services

TRUTERRA

syngenta®

ECOSYSTEM SERVICES MARKET CONSORTIUM

Centra Sota

CANNON RIVER AGRICULTURAL COLLABORATIVE

COMPEER FINANCIAL

LEGAL ACTION GROUP FARMERS'

Farmers' Legal Action Group

MINNESOTA SOIL HEALTH coalition

PHEASANTS forever

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Thank You!

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DEPARTMENT OF AGRICULTURE

www.mylandmylegacy.com

BOARD OF WATER AND SOIL RESOURCES

Minnesota Conservation Reserve Enhancement Program (MN CREP)

2023 Governor's Recommendation

The Governor recommends $11.88 million in general obligation bonds for the Minnesota Conservation Reserve Enhancement Program (MN CREP). This helps us meet the state contribution of $175 million, which makes $350 million in federal matching funds available for direct payments to landowners.

MN CREP Overview

The MN CREP is expected to protect and restore approximately 40,000 acres of marginal cropland across 54 southern and western Minnesota counties using buffer strips, wetland restoration, and drinking water wellhead area protection. Native plantings on those acres will filter water, prevent erosion, and provide critical habitat for grassland dependent species. Private ownership continues and the land is permanently restored and enhanced for water quality and habitat benefits.

In this federal-state partnership, Soil and Water Conservation Districts work with landowners to simultaneously enroll in two voluntary conservation programs: the federally funded Conservation Reserve Program, and the state-funded, BWSR-administered Reinvest in Minnesota (RIM) Reserve Program. RIM permanently protects enrolled land. Landowners receive payments from both programs.

MN CREP secured state contribution to date (in millions)

State funding for MN CREP (000s)	Appropriated in past sessions	Governor's Recs
Env. and Natural Resources Trust Fund (LCCMR)	*$19,500	-
Clean Water Fund	$68,850	-
Outdoor Heritage Fund	$55,790	-
Capital Investment	**$21,000	**$11,880**
Total	**$165,140**	

*Includes $6 million for outreach and implementation that was not available for easement payments
**This appropriation includes up to $1 million for working lands easements

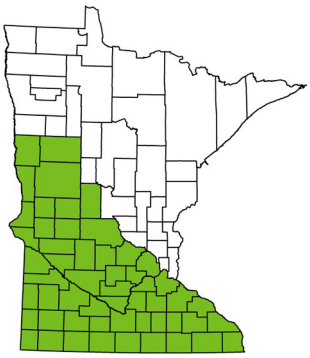
MINNESOTA

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

CLEAN WATER LAND & LEGACY AMENDMENT

www.bwsr.state.mn.us

MN CREP



54-county MN CREP area in green

MN CREP Status

APPLICATIONS SUBMITTED: 873 applications submitted to date totaling nearly $340 million in requests.

ACRES ENROLLED: 35,000 to date

BWSR Contacts

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Assistant Director
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February 9, 2023

Red River Basin River Watch 2022 Annual Report

Red River Basin River Watch employs a watershed-based, cross-curricular approach to learning: We strive to introduce students to their local watershed, allowing them to connect to the world around them both upstream and downstream. We do this by educating students in their home watershed as well as connecting them with schools throughout the basin.

Danni Halvorson
Director - Education
International Water Institute

Contents

Program Overview

The Red River Basin River Watch Program (RW) delivers innovative watershed education programming to schools and communities across the Red River of the North Basin. Believing education is the most effective tool to change attitudes and behaviors, RW delivers watershed education for elementary, middle, and high school students through hands-on science and watershed exploration activities designed to challenge students and facilitate understanding of water resources. RW classroom and outdoor activities are designed to help address MN water quality improvement initiatives and fit with the MN Clean Water Council's Mission to Protect and Restore Minnesota's Waters for Generations to Come, including:

- ✓ Build capacity of local communities to protect and sustain water resources
- ✓ Provide education and outreach to inform Minnesotans' water choices
- ✓ Encourage citizen and community engagement on water

Support from the Red River Watershed Management Board and local watershed districts has built an effective and popular watershed education program across the Red River of the North Basin that focuses on water quality. For 28 years, RW students throughout the Red River Basin have collected water quality data used by the MN Pollution Control Agency to complement the state's assessment of surface waters. Clean Water funds enable the International Water Institute (IWI) to build on this established and popular RW foundation by providing additional opportunities for participants to understand how to protect and improve MN's valuable water resources, including:

Water Quality Monitoring:

Collect and record conditions at local rivers and streams using state-of-the-art scientific methods and equipment.

Annual River Watch Forum:

Annual event challenging students to learn and share about emerging local watershed issues.

Macroinvertebrate Monitoring: Macroinvertebrate monitoring provides additional insights on watershed and ecosystem health.

River Explorers:

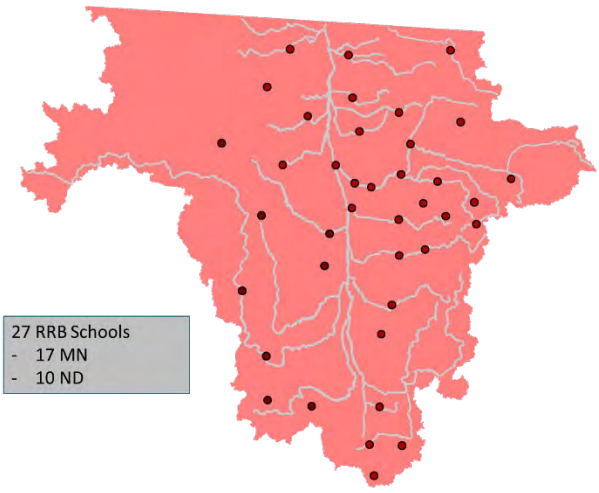
Guided kayak excursions on local rivers to observe and document watershed conditions.

River of Dreams:

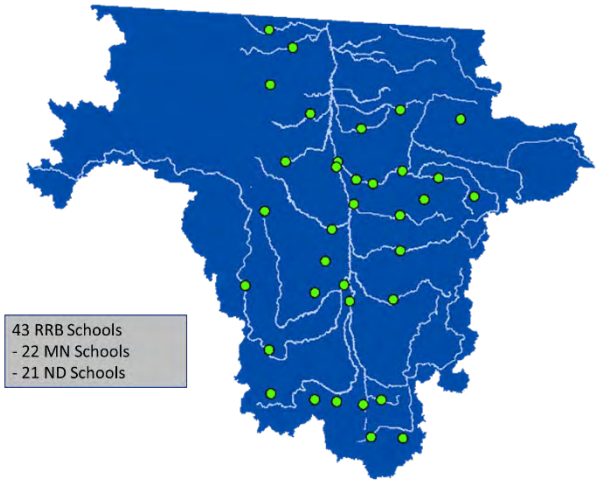
A cross-curriculum watershed education program tailored to elementary students.

Participating Schools

River Watch



River of Dreams



Project Goals, Work Tasks, and Outcomes

The project goal is to engage Red River Basin high school, middle school, and elementary students in hands-on education programs focused on river resources within their local watershed. Program activities include integrated classroom and outdoor experiences that build awareness of river ecosystems and watershed connections, increase student capacity to make informed decisions about their environment, and instill a sense of place about the uniqueness of their local watershed. The work tasks and activities completed in 2022 are discussed below. For reference, the 2022 – 2023 Clean Water Fund Work Plan is included as *Attachment A*.

Task 1. River of Dreams: Engage elementary students in River of Dreams (ROD) a hands-on education program focused on the valuable river resources of the Red River Basin. Provide integrated classroom and outdoor experiences that; build awareness of river ecosystems and watershed connections, increase student capacity to make informed decisions about their environment and instill a sense of place about the uniqueness of their local watershed—historic, economic, and ecological.

Measurable Outcomes - ROD

- Classroom resources prepared and delivered including books, art supplies, and canoes.
- Completed 44 classroom sessions to present materials and go over program expectations.
- Completed 44 field sessions with ROD participants. Release of individual ROD canoes and review of watershed lessons learned by students.
- Created canoe pages and entered canoe tracking information into the ROD database. Program and canoe information can be found here.
- Assessment pre/post surveys of students.
- Completed May 2022.

River of Dreams Canoe Launch Program — International Water Institute

Task 2. Red River Explorers Paddling Program: Increase awareness and knowledge of local land use and watershed connections through a Red River Explorers Paddling Program to allow RW teams and community members to "water-truth" streams in the Red River Basin, documenting local watershed conditions.

Measurable Outcomes – Paddle Trips

- Provided six kayak and seven canoe guided river ecology excursions with 532 participants.
- Four reports including the river route and reaches covered, photo-documentation of river conditions, and a summary of observations by trip participants on river conditions and recreation suitability are complete and available on the IWI website. You can view reports here.
- Completed November 2022.

Measurable Outcomes – Watershed Connections

- Five macroinvertebrate monitoring events completed. Provided resource materials and equipment for RW schools with assistance from IWI staff.
- Produced and distributed three electronic newsletters promoting watershed education and awareness in the Red River Basin.
- Participated in three Red River Basin Water Festivals. Three staff lead activities related to relevant watershed issues (water quality, flooding, groundwater, AIS). Over 500 grade school students participated.
- In partnership with MN State Parks, MN DNR, Warroad School American Indian Education Program, and the University of Minnesota SNAP-ED the IWI provided two paddling opportunities for Warroad Area Anishinaabe Youth. The trips took place at Zippel Bay State Park on the south shore of Lake of the Woods and at Hayes Lake State Park.
- Completed December 2022.

Task 3. Stem Assistance: Assist in provision of Science, Technology, Engineering and Math (STEM) education and engagement opportunities through watershed science. Provide professional teacher development through watershed inquiry and education opportunities. Provide opportunities for youth to engage in scientific research and outreach. Supplement stream monitoring activities with real-time continuous data collection.

Measurable Outcomes – Teacher Development/Student Training

- Three regional fall kick-offs were held in 2022. 120 students and ten teachers received training in water quality analysis (box plots and use assessment methodology), watershed delineation, and poster display development.
- Partnered with Wilderness Inquiry to provide canoe trips for participants at each location (Moorhead, East Grand Forks, and Thief River Falls).
- Completed October 2022.

Measurable Outcomes – Research and Outreach

- On March 30th the International Water Institute hosted the 27th Annual River Watch Forum at the Alerus Center in Grand Forks, ND. With over 200 students and teachers in attendance from 20 different schools, the River Watch Forum was held in-person for the first time since 2019. The schedule included four speakers who all interact with water and rivers in different ways.
- River Watch Teams competed against each other in this year's assignment by hosting a River Watch event in their community. Each project was judged on marketing materials, a video summary, and a written report detailing planning, hosting, and evaluating their event. Communities across the basin were engaged in the local watershed education events. Written materials and videos of the "Together Again; Your Watershed, Your Community, Your Forum" events can be viewed here.
- Completed March 2022.

Measurable Outcomes – Real-Time Data Collection

- Developed and presented materials on deployment, maintenance and data downloading of ten monitoring stations. Classroom sessions were not held but rather information was covered during deployment.
- Installed ten monitoring stations with assistance from partner schools. Live data was accessible over the duration of deployment at Monitor My Watershed.
- Removed ten stations for winter maintenance and storage.
- Completed November 2022.

Task 4. Oversight: Project Management and Reporting.

Measurable Outcomes – Oversight

- Grant-related expenditures tracked, bills paid and expense reimbursements submitted quarterly.
- Interim report completed and submitted to Commissioners and Legislative Committees.
- Site visit with MPCA project manager January 20, 2023.
- Completed February 2023.

Budget Performance

Below is a summary of the project budget covering April 11, 2022 through December 31, 2022.

Line Item	MPCA Funds Awarded	MPCA Funds Expended	Balance	Budget Expended (%)
Personnel	$238,900.00	$90,515.00	$148,385.00	**38%**
Travel Reimbursement	$22,500.00	$5,508.02	$16,991.98	**24%**
Equipment & Supplies	$38,600.00	$4,611.69	$33,988.31	**12%**
Total:	**$300,000.00**	**$100,634.71**	**$199,365.29**	**34%**

Project Evaluation

Twenty-five Minnesota and North Dakota educators that were involved with the RW program were provided an opportunity to complete an online survey. Eighteen educators completed the online survey (eleven from Minnesota). Overall teachers were pleased with the quality of watershed science activities offered and found them useful in helping meet education requirements. Select individual question responses are shown below (Figures 1 – 5).




Figure 1.

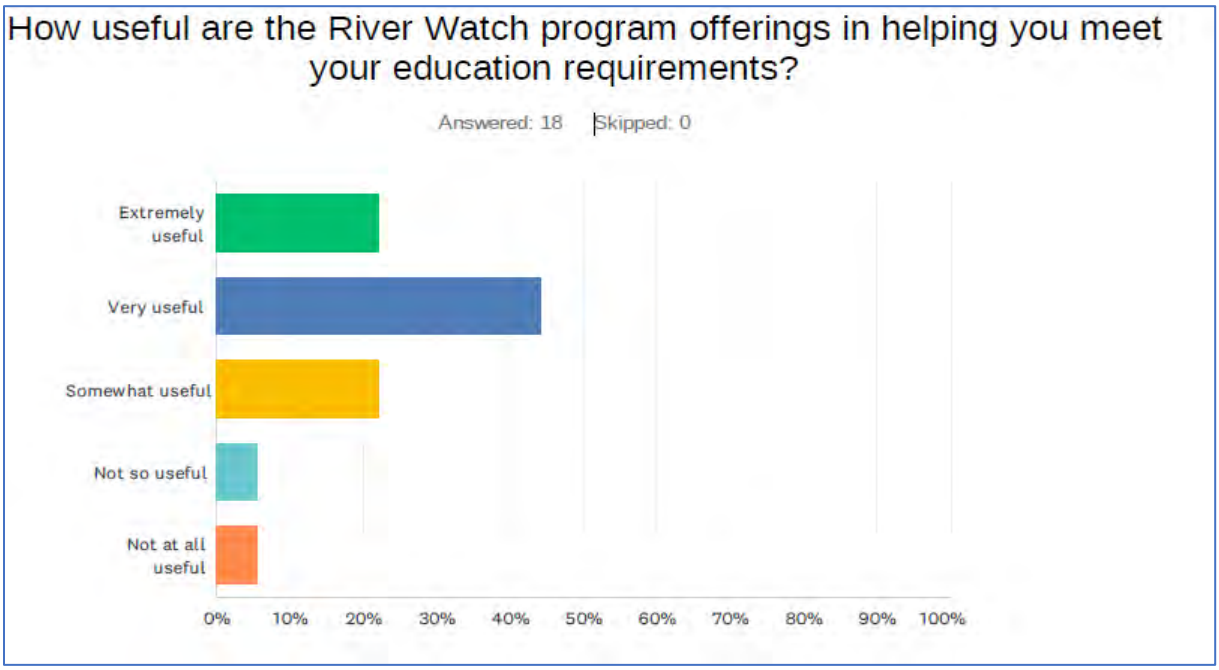


Figure 2.

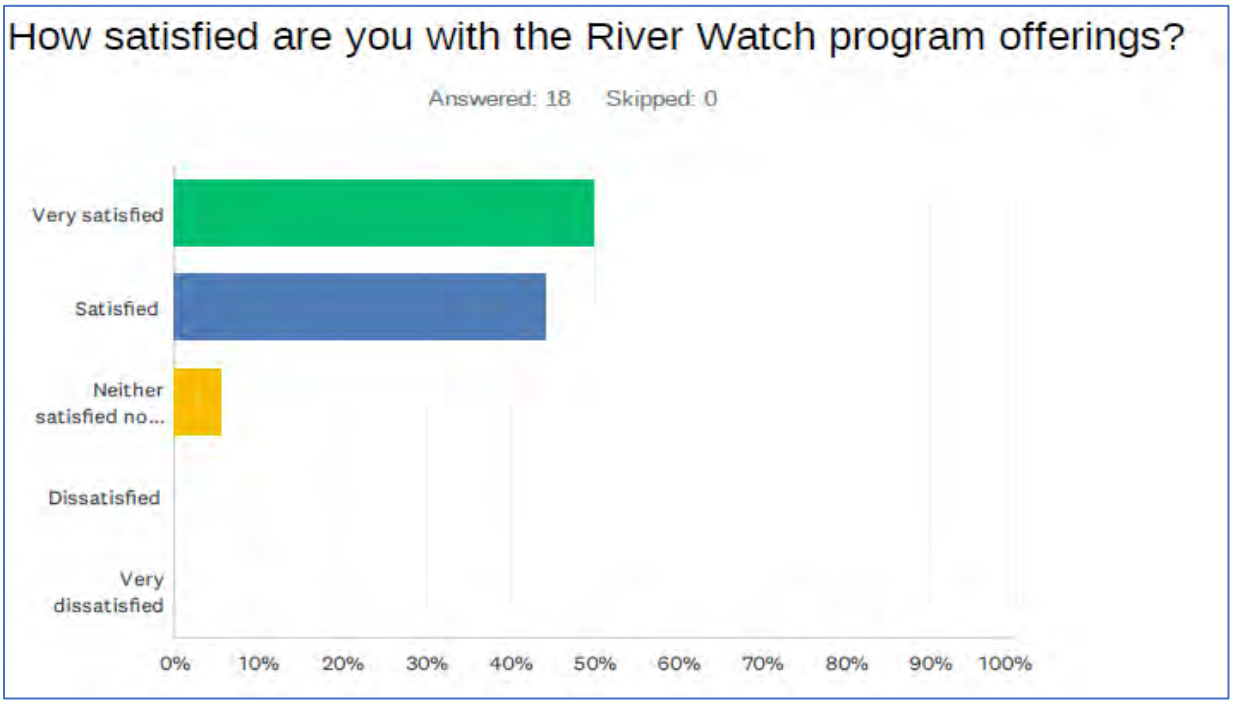


Figure 3.

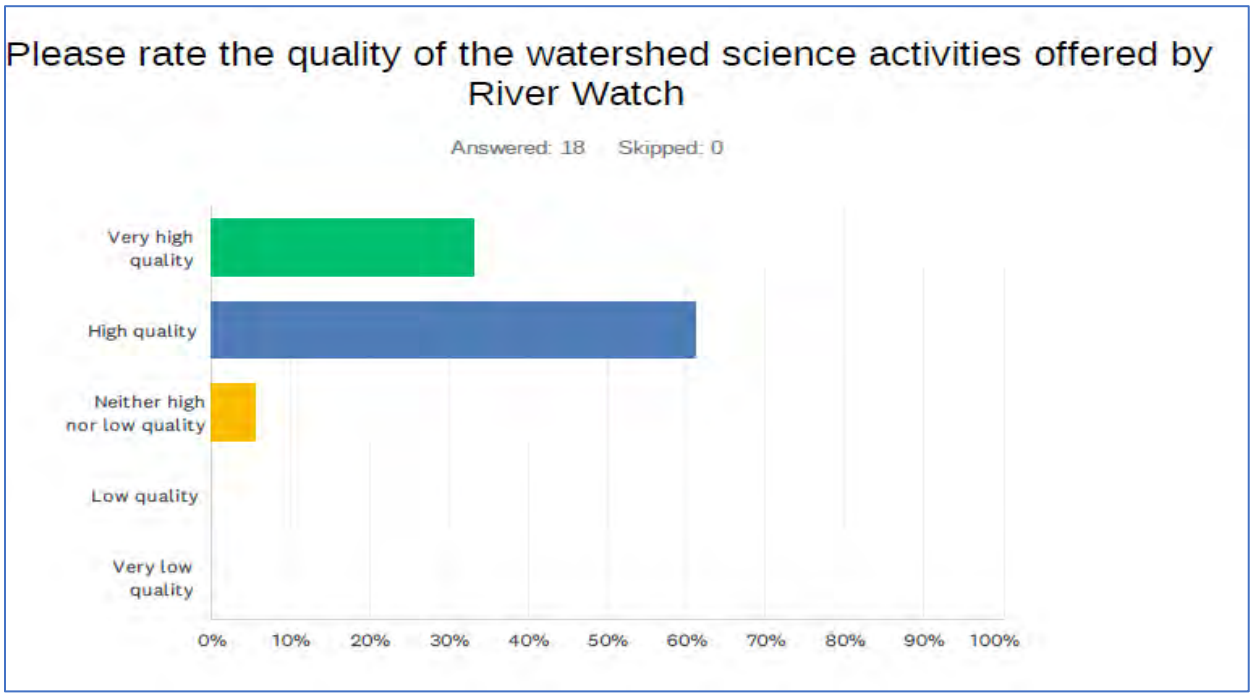


Figure 4.

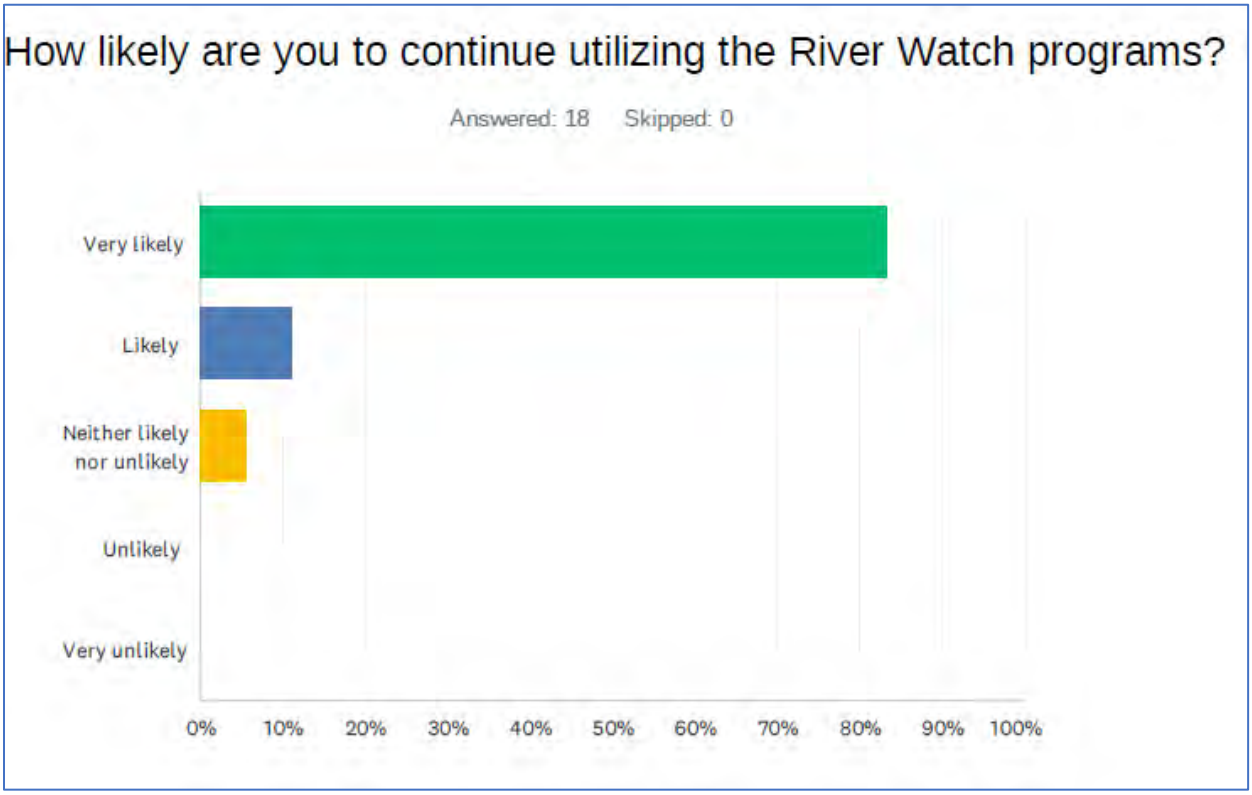
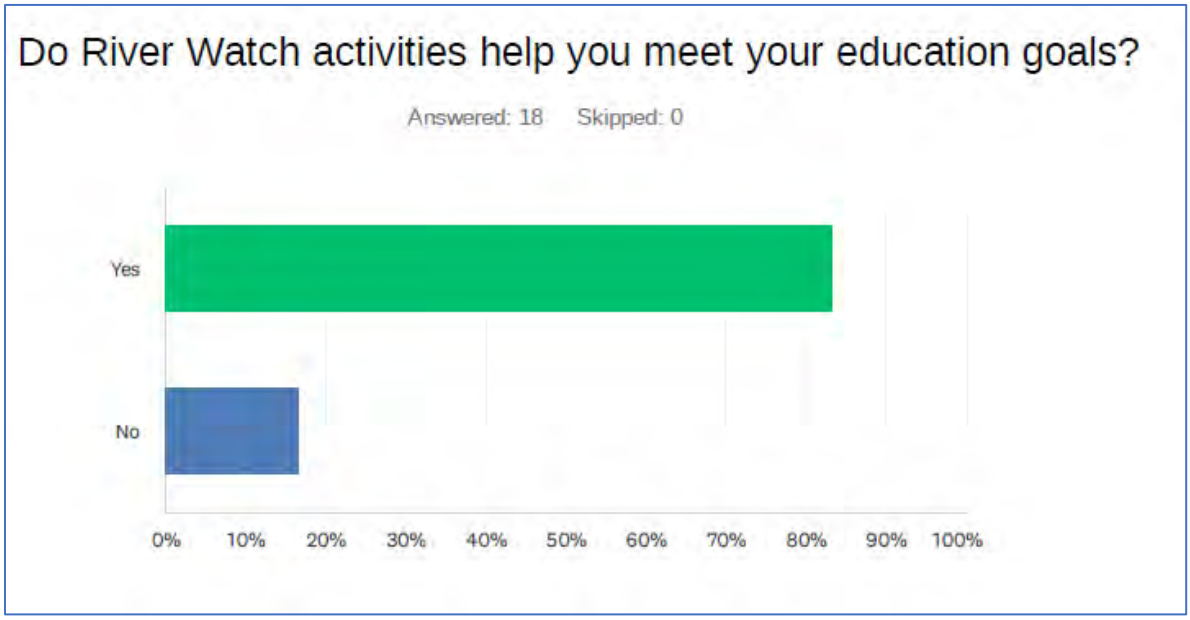
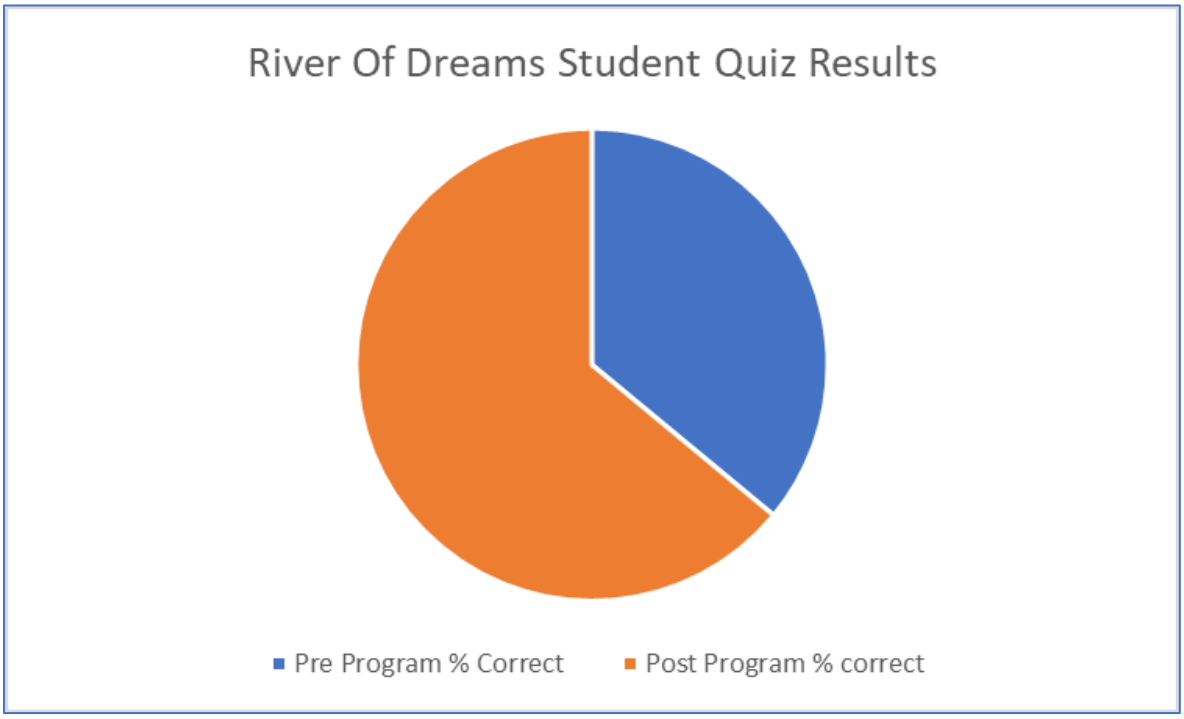


Figure 5.



Student pre and post-quizzes were given during classroom sessions for ROD. Students were asked a series of questions related to watershed/river terminology and pollution sources. Post-activity correct response rates increase by 30%. Student quiz response results are shown below (Figure 6).

Figure 6.



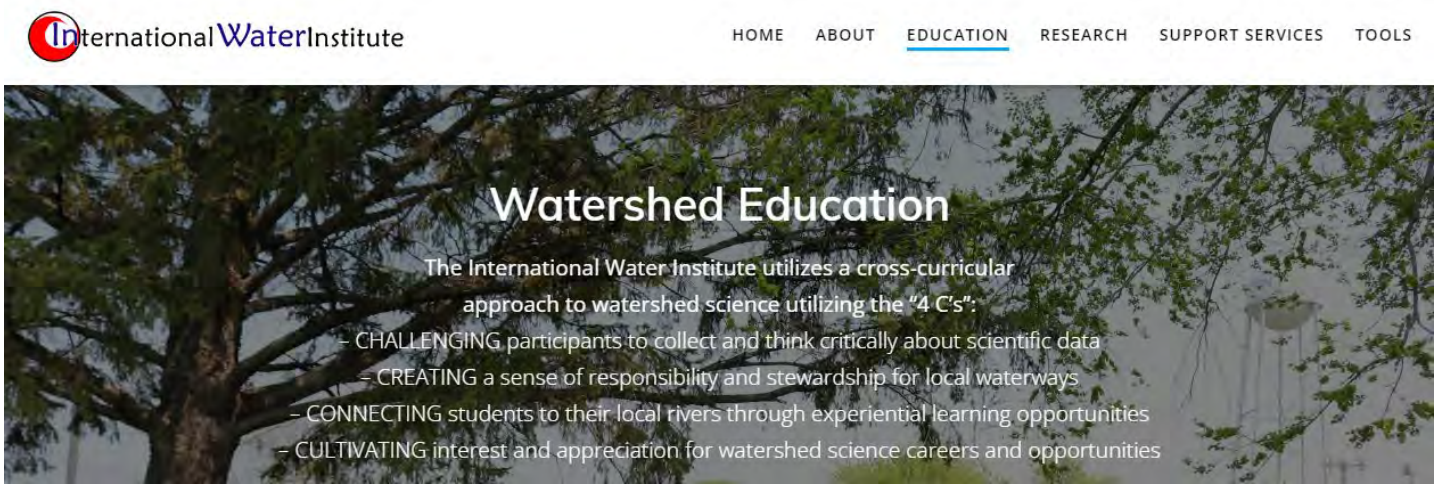
Future Activity Recommendations

Eligible RW grant activities should target elementary through high school-aged students, teachers, and youth groups. Examples of effective RW program opportunities suited to a local school, community, and watershed needs are listed below.

- *Water Quality Monitoring:* Collect and record conditions at local rivers and streams using state-of-the-art scientific methods and equipment.
- *Biological Monitoring*: Macroinvertebrate monitoring provides additional insights into watershed and ecosystem health.
- *River Explorers:* Guided kayak excursions on local rivers to observe and document watershed conditions.
- *Annual Teacher and Student Training:* proper sampling techniques, data analysis and provide access to resources and experts in current watershed issues.
- *River Watch Forum:* Annual event challenging students to learn and share about emerging local watershed issues.
- *Real-Time Monitoring:* Students build, deploy and maintain real-time water quality monitoring stations. Data analyzed and used to characterize stream water quality.
- *River of Dreams:* A cross-curriculum watershed education program tailored to elementary students. Participants learn watershed terminology and how their sub-watershed fits into their River Basin.

Information and Education Outputs

The Red River Basin RW Program has been an ongoing program for 28 years and has developed numerous information and education outputs throughout the years. Recent outputs including training materials, videos, virtual activities, education opportunities, and newsletters can be explored on the International Water Institute Education Website.



ATTACHMENT A
RED RIVER BASIN RIVER WATCH
2022 - 2023 Clean Water Fund Project Work Plan

Project Description: brief description/summary of proposed project

MN Legislative Clean Water Fund funding ($300,000) to the Red River Watershed Management Board for the River Watch Program. River Watch (RW) enhances watershed understanding and awareness for tomorrow's decision-makers through direct hands-on, field-based experiential watershed science. Schools throughout the Red River of the North Basin participate in a variety of unique and innovative watershed engagement opportunities suited to their school, community, and watershed needs.

Project start date: April 1, 2022 ***Project end date: June 30, 2024***

Non-point source pollution is the leading source of water quality impacts on rivers and lakes. In the Red River Valley, as elsewhere in Minnesota, citizen involvement is crucial to identifying and reducing problems from non-point source pollution. This project will build on the foundation of the existing Red River Basin River Watch program.

The River Watch program will be delivered through an effective working partnership between local schools and communities; local, state, and federal agencies; and academic institutions throughout the Red River Basin (https://iwinst.org/mesmerize/watershed-education/). The Red River Watershed Management Board (RRWMB) will be the project sponsor with lead coordination and project management provided by the International Water Institute.

Project location:

Major watersheds:	Mustinka, Bois De Sioux, Otter Tail, Buffalo River; Upper Red River of the North, Marsh, Sandhill, Clearwater, Red Lake, Thief, Snake, Grand Marais, Tamarac, Two, and Roseau	Hydrologic unit codes:	09020101, 09020102, 09020103, 09020106, 09020104, 09020107, 09020301, 09020303, 09020304, 09020305, 09020306, 09020309, 09020311, 09020312, 09020314
Counties:	Kittson, Roseau, Marshall, Red Lake, Pennington, Polk, Beltrami, Clearwater, Mahnomen, Norman, Clay Becker Ottertail, Wilkin, Grant, Stevens, Traverse and Big Stone		

River Watch teams engage in water quality monitoring, scientific research and education initiatives across the Red River Basin, extending the amount of data available for assessing our watershed health and contributing to improved awareness and involvement in watershed management.

Work Tasks in bold below followed by *measurable outcomes in italics* directly below task.

RIVER OF DREAMS: Engage elementary students in River of Dreams (ROD) a hands-on education program focused on the valuable river resources of the Red River Basin. Provide integrated classroom and outdoor experiences that; build awareness of river ecosystems and watershed connections, increase student capacity to make informed decisions about their environment and instill a sense of place about the uniqueness of their local watershed—historic, economic, and ecological

Work tasks/*Measureable outcomes***:**

Secure participation and implement ROD activities in 80 elementary classrooms in the Red River Basin.

- *School contacts. Solicit classrooms to be involved. Identify lead teacher and determine the number of students to be involved. Completed April 2022 (40 classrooms) and March 2023 (40 classrooms).*
- *School classrooms sessions. Hold classrooms sessions to present materials and go over program expectations. Completed April 2022 (40 classrooms) and April 2023 (40 classrooms).*
- *Field sessions with ROD participants. Release of individual ROD canoes and review of watershed lessons learned by students. Completed June 2022 (40 sessions) and June 2023 (40 sessions).*
- *Teacher evaluation of implementation, problems, and highlights of ROD activities, as well as pre/post surveys of students. Completed December 2023. Results will be reported as part of Final Report due June 30, 2024.*

Purchase ROD materials, assemble classroom packets and Data entry.

- *Purchase classroom resources; books, art supplies, canoes and canoe labels. Ongoing completed November 2023.*
- *Package classroom resources for delivery including canoe assembly. Ongoing completed November 2023.*
- *Create canoe pages and enter canoe tracking information into the ROD database. Ongoing completed November 2023.*

RED RIVER EXPLORERS PADDLING PROGRAM: Increase awareness and knowledge of local land use and watershed connections through a Red River Explorers Paddling Program to allow RW teams and community members to "water-truth" streams in the Red River Basin, documenting local watershed conditions.

Work tasks/*Measureable outcomes***:**

Red River Explorers Paddling Program river route determinations to allow RW teams and community members to safely explore and document river conditions.

- *IWI paddling staff scout rivers at different water levels to assess safety and water levels needed for safe passage by RW student exploratory teams. Ongoing through 2023.*
- *Equipment and materials purchased for river trips and documenting field conditions. Completed July 2023.*

Lead 8 guided river ecology excursions in both 2022 and 2023 on various reaches of rivers in the Red River Basin.

- *Sixteen guided river ecology excursions in the Red River Basin, all utilizing GPS and mapping/photo documentation of baseline geomorphology and recreation conditions. Completed November 2023.*
- *Create and share information from river trips on IWI website via on-line map and multimedia reports. Reports may include the following; number of trip participants, river route and reaches covered, photo-documentation of river conditions, and a summary of observations by trip participants on river conditions and recreation suitability. Completed December 2023.*
- *Final Report to include river miles explored, number of participants and links to all of trip reports Completed June 30, 2024.*

Watershed Connections: Macroinvertebrates and outreach.

- *Provide macroinvertebrate monitoring resource materials and equipment for RW schools with assistance from IWI staff. Ongoing over contract period, completed December 2023.*
- *Produce and distribute a quarterly electronic newsletter that promotes watershed education and awareness in the Red River Basin. 8 newsletters developed over the contract period. Completed December 2023.*
- *Participate in 2-3 Red River Basin Water Festivals. Lead activities related to relevant watershed issues (water quality, flooding, groundwater, AIS). 500-700 grade school students each year. Completed November 2023.*
- *Provide ROD and River Explorer experiences at the White Earth Math and Science Academy and Lake Bronson 4-H camp. 1-2 events each year. Completed November 2023.*

<u>STEM ASSISTANCE</u>: Assist in provision of Science, Technology, Engineering and Math (STEM) education and engagement opportunities through watershed science.

Work tasks/*Measureable outcomes***:**

Provide professional teacher development through watershed inquiry and education opportunities. Regional fall kick-off events, incorporating team building skills, local watershed project presentations and data interpretation will be held for RW teachers and youth leaders. Summer training sessions will be held for teachers and RW team captains to provide extended learning opportunities on watershed topics such as river ecology, watershed connections, and biological monitoring.

- *2-3 regional fall kick-off events in both 2022 and 2023 two summer teacher and two summer youth training session. Summary report will be provided to document participants at regional kick-off events, topics covered, and evaluation comments from participants. A summary report will also be provided for the summer trainings*

documenting participation, materials presented, and evaluation summary from participants. Completed December 2023.

Utilize the annual River Watch Forum to provide exposure to relevant research topics and an opportunity to present findings from current research involvements. Provide opportunities for youth to engage in scientific research and outreach.

- *River Watch Forum presented in April 2022 and March or April 2023 with keynote speaker and concurrent sessions focused on emerging watershed education and research. Poster displays, written reports and/or video presentations of assigned research topics, service learning projects and special investigations by RW teams in collaboration with watershed partners. Completed April 2023.*
- *Summary report written to document participating RW teams/schools and highlighting awards and watersheds represented in research, with links to posters. To be completed by June 30, 2022 and June 30, 2023 and included in Final Report due June 30, 2024.*

Supplement stream monitoring activities with real-time continuous data collection. Provide opportunities for youth to engage in the construction, deployment and data analysis of continuous monitoring stations.

- *Solicit RW teams to be involved. Identify deployment locations for 10 continuous monitoring stations. Completed June 2022.*
- *School classrooms sessions. Hold 10 classroom sessions to present materials on deployment, maintenance and data downloading of monitoring stations. Completed December 2022.*
- *Field sessions to install monitoring stations. Deploy 10 stations. Completed June 2022 and June 2023.*
- *Field sessions to download data, perform station maintenance and remove for winter storage. Visit 10 monitoring stations two times per year (maintenance and removal). Completed November 2023.*
- *School Classroom sessions. Hold 10 data review sessions with RW teams using the continuous data as compared to grab sample data. Completed December 2023.*

OVERSIGHT: Project Management and Reporting

Work tasks/*Measureable outcomes***:**

Track project grant-related expenditures. Compile and organize invoices, pay bills and submit for expense reimbursements in a timely manner.

- *Grant-related expenditures tracked, bills paid and expense reimbursements submitted at least quarterly.*

Track objectives, tasks, and FTE to ensure outcomes are being met. Prepare and complete reports and results from the Red River Basin River Watch program as follows:

- *Interim report and initial evaluation to Commissioners of Education, MPCA and Legislative and Education Committees by February 15, 2023.*

- *Final report of project outcomes, budget/FTE, and final evaluation results by June 30, 2024 to all entities receiving February 15, 2023 report noted above.*
- *Annual site visit with MPCA project manager. Dates TBD.*

PROJECT BUDGET:

Total Budget		
Staff total cost*		*$238,900.00*
Travel reimbursement **		*$ 22,500.00*
Equipment and supplies		*$ 38,600.00*
	Total:	***$300,000.00***

***Estimated FTE**: 2.25 (Final Report shall include actual FTE)*

**** Staff rates shall not exceed the following:***	
Staff 1 rate: Monitoring and Education Spec. (1)	*$ 47*
Staff 2 rate: Monitoring and Education Spec. (2)	*$ 42*
Staff 2 rate: Project Specialist	*$ 72*
Staff 4 rate: Education and Monitoring Spec.	*$ 40*
Staff 5 rate: Monitoring and Ed Director	*$ 80*

***Mileage billed at current IRS Mileage Rate*