



Sustainability Challenges in Water-Rich Wisconsin

Adam Freihoefer
Wisconsin DNR Water Use Section



Within the Great Lakes Region



Drastic water-use changes proposed to steady White Bear Lake levels

State regulators say court order would require them to limit people to 55 gallons of water per day, and cut off other water users such as schools and businesses altogether.

By Greg Stanley and Jennifer Bjorhus Star Tribune | FEBRUARY 19, 2022 — 2:00PM



LEILA NAVIDI, STAR TRIBUNE

Michigan OKs Nestlé Water Extraction, Despite 80K+ Public Comments Against It

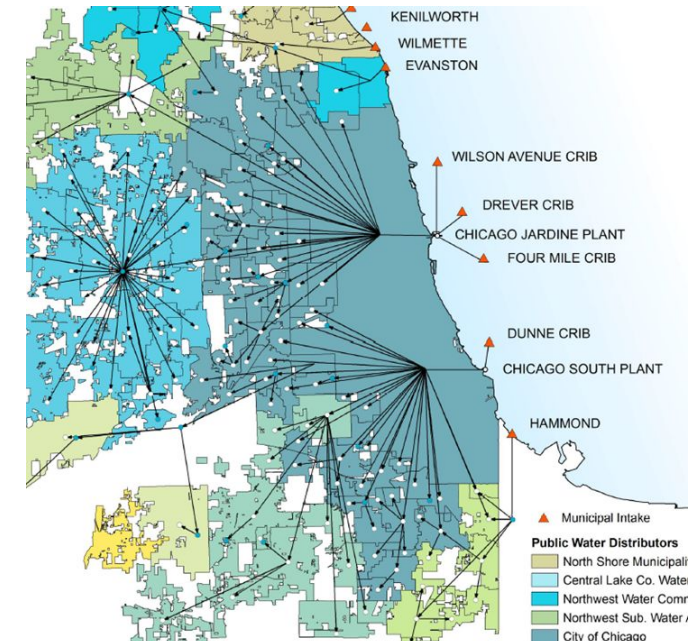
April 3, 2018 · 5:01 PM ET

BILL CHAPPELL



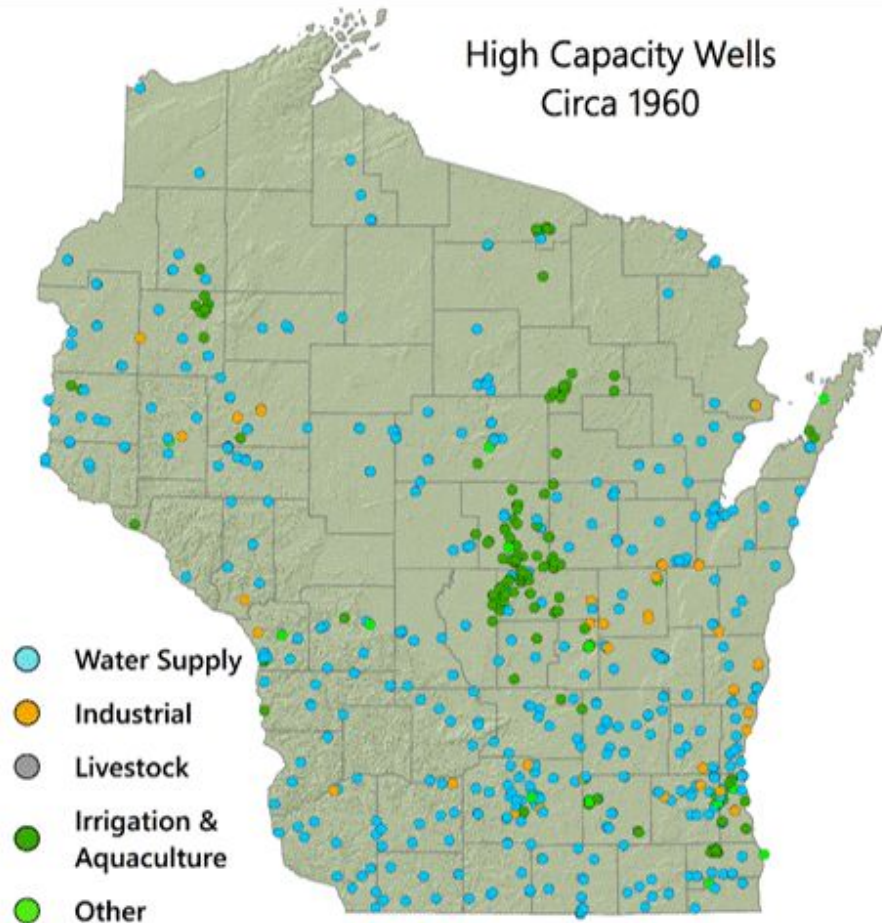
Chicago suburbs, running out of water, will tap Lake Michigan

Michigan Public | By Brett Walton
Published September 6, 2023 at 3:33 PM EDT



Source: Illinois State Water Survey

Meanwhile in Wisconsin...



Perrier didn't reckon on an angry citizenry when it looked to expand into the Midwest

Escape to Wisconsin. Play in our lakes, fish our rivers, and cavort in the famously kitschy water parks of Wisconsin Dells. Just don't try to take a drop of it home with you. Ninety-nine bottles of water on the wall. This, at least, is the stern message being sent by thousands of Wisconsin citizens to [...]

ENVIRONMENT Groundwater war pits Wisconsin farmers against fish

by Kate Pengaman/Wisconsin Center for Investigative Reporting July 23, 2013 Why you can trust Investigate Midwest



POLITICS

DNR plan for wells a major victory for business

Lee Bergquist Milwaukee Journal Sentinel
Published 11:00 p.m. CT June 9, 2016



Hearings for 2017 Wisconsin Act 10

Meanwhile in Wisconsin...

WPR



Aqua Mechanical (CC-BY)

Report: Hundreds Of High-Capacity Wells Are Drawing Down Lake Levels In Central Sands Region

DNR Draft Report Finds 2 Lakes Are Witnessing Significant Impacts

By Danielle Kaeding

Published: Wednesday, April 7, 2021, 6:30am

April 2021

WPR



The Wisconsin Supreme Court on Wednesday, June 9, 2021, at the Wisconsin State Capitol in Madison, Wis. *Angela Major/WPR*

Wisconsin Supreme Court Affirms DNR Authority To Restrict, Deny Farm Permits To Protect Water

The Court Ruled In Favor Of Environmental Groups, Local Residents Calling On The DNR To Act On CAFOs, High Capacity Well Permits

July 2021

Water Quantity Management in Wisconsin

State of Wisconsin



Date of enactment: April 22, 2004
Date of publication*: May 6, 2004

2003 Assembly Bill 926

2003 WISCONSIN ACT 310

(Vetoed in Part)

AN ACT to repeal 281.17 (1); to amend 23.11 (5), 281.35 (1) (a), 281.35 (1) (b) 2., 281.35 (4) (a) 2., 281.35 (4) (b) (intro.), 293.65 (3) and 299.05 (2) (b); and to create 20.370 (4) (cg), 20.370 (4) (ch), 20.370 (6) (cg), 281.34 and 281.35 (4) (a) 2m. of the statutes; relating to: regulation of high capacity wells, notification of well construction, groundwater quantity management, granting rule-making authority, and making appropriations.

The people of the state of Wisconsin, represented in senate and assembly, do enact as follows:

SECTION 1. 20.005 (3) (schedule) of the statutes: at the appropriate place, insert the following amounts for the purposes indicated:

2003-04 2004-05



DECEMBER 13, 2005

AGREEMENT

Section 1. The states of Illinois, Indiana, Michigan, Minnesota, New York, Ohio and Wisconsin and the Commonwealth of Pennsylvania hereby solemnly covenant and agree with each other, upon enactment of concurrent legislation by the respective state legislatures and consent by the Congress of the United States as follows:

GREAT LAKES—ST. LAWRENCE RIVER BASIN WATER RESOURCES COMPACT

ARTICLE 1 SHORT TITLE, DEFINITIONS, PURPOSES AND DURATION

Section 1.1. Short Title. This act shall be known and may be cited as the “Great Lakes—St. Lawrence River Basin Water Resources Compact.”

Section 1.2. Definitions. For the purposes of this Compact, and of any supplemental or concurring legislation enacted pursuant thereto, except as may be otherwise required by the context:

Adaptive Management means a Water resources management system that provides a

2021 WI 72

SUPREME COURT OF WISCONSIN

CASE No.: 2018AP59

COMPLETE TITLE: Clean Wisconsin, Inc. and Pleasant Lake Management District,
Petitioners-Respondents,
v.
Wisconsin Department of Natural Resources, Respondent-Appellant,
Wisconsin Manufacturers & Commerce, Dairy Business Association, Midwest Food Processors Association, Wisconsin Potato & Vegetable Growers Association, Wisconsin Cheese Makers Association, Wisconsin Farm Bureau Federation, Wisconsin Paper Council and Wisconsin Corn Growers Association, Intervenor-Co-Appellants,
Wisconsin Legislature, Intervenor.

ON CERTIFICATION FROM THE COURT OF APPEALS

OPINION FILED: July 8, 2021
SUBMITTED ON BRIEFS:
ORAL ARGUMENT: April 12, 2021

SOURCE OF APPEAL:
COURT: Circuit
COUNTY: Dane
JUDGE: Valerie Bailey-Rihn

JUSTICES:
DALLET, J., delivered the majority opinion of the Court, in which ZIEGLER, C.J., ANN WALSH BRADLEY, and KAROFKY, JJ., joined. REBECCA GRASSL BRADLEY, J., filed a dissenting opinion, in which ROGGENSACK, J., joined.

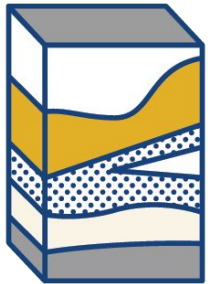
Challenges in Wisconsin's Water Quantity

How does the water budget and specifically water use impact Wisconsin's waters?

Deposit

- Precipitation
- Groundwater & Surface Water

Inflow



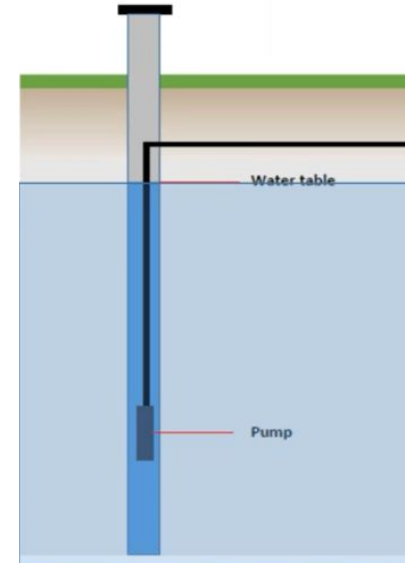
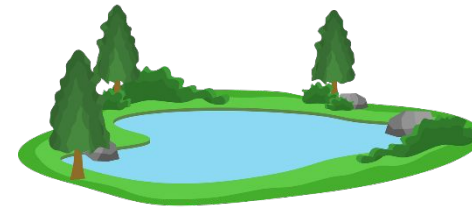
Balance

- Baseflow
- Lake Levels
- Groundwater Levels

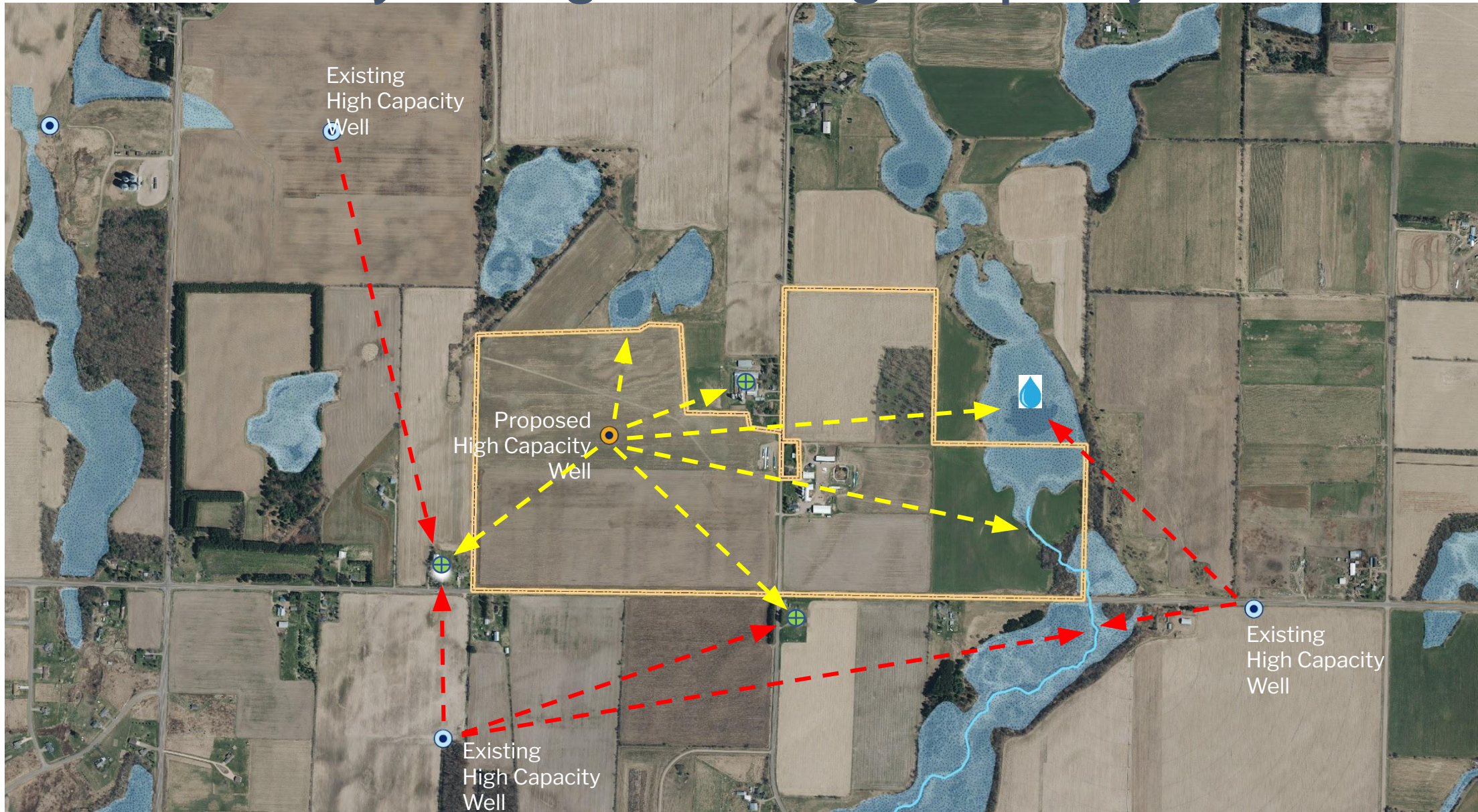
Withdrawals

- Evapotranspiration
- Runoff
- Pumping
- Groundwater & Surface Water

Outflow



Water Quantity Management: High Capacity Wells



Challenges

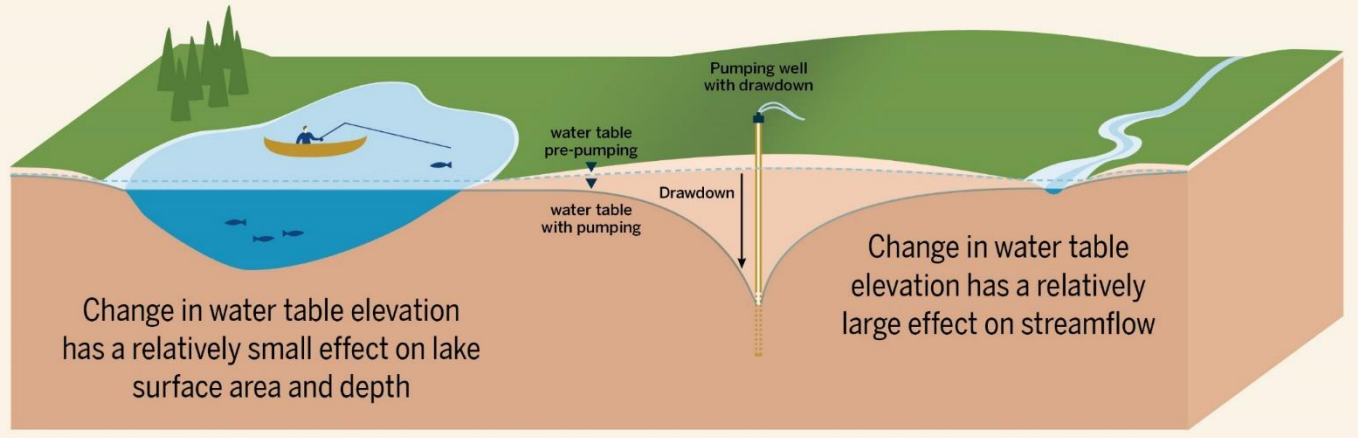
1. Uncertainty in decision making
2. Water availability due to geology, water quality
3. Addressing complex conditions with analytical approaches
4. Role of climate vs. withdrawals



Challenge: Impact Uncertainty & Risk

Resource Dependent Risk

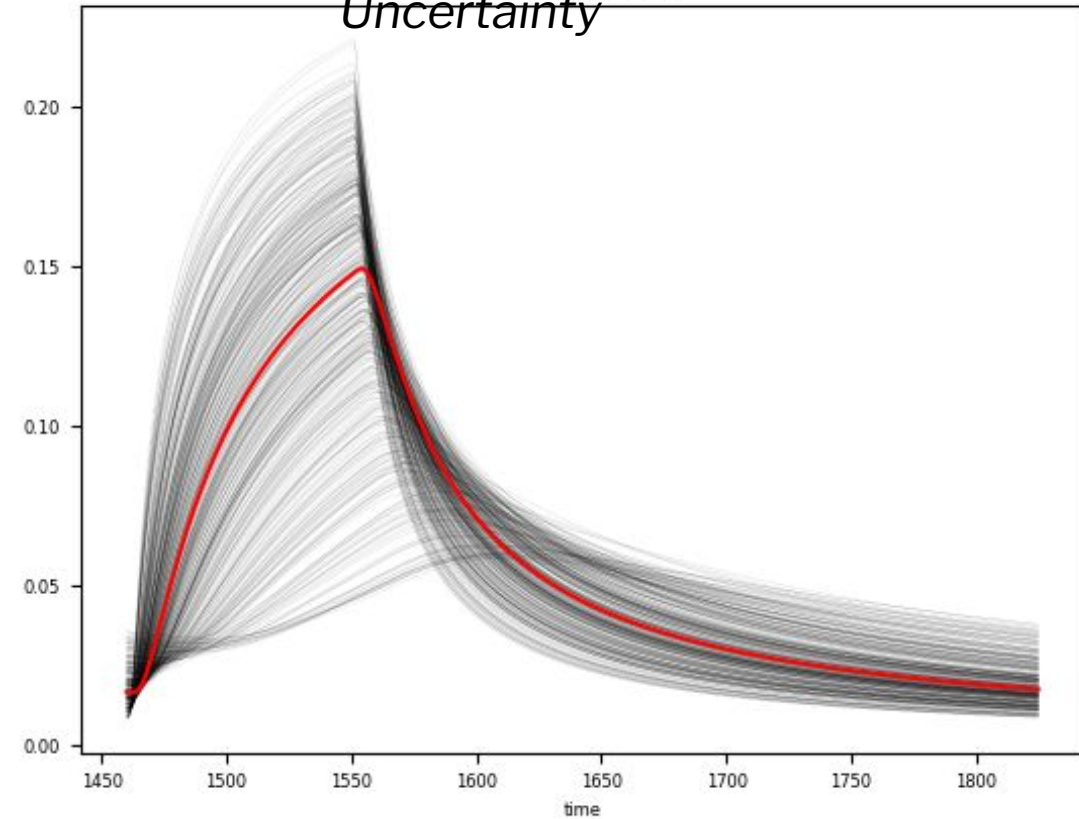
Relative Impact of a Pumping Well on a Lake and a Stream



Stream depletion can vary depending on assumed:

- pumping rate
- aquifer parameters
- time period
- fraction intercept

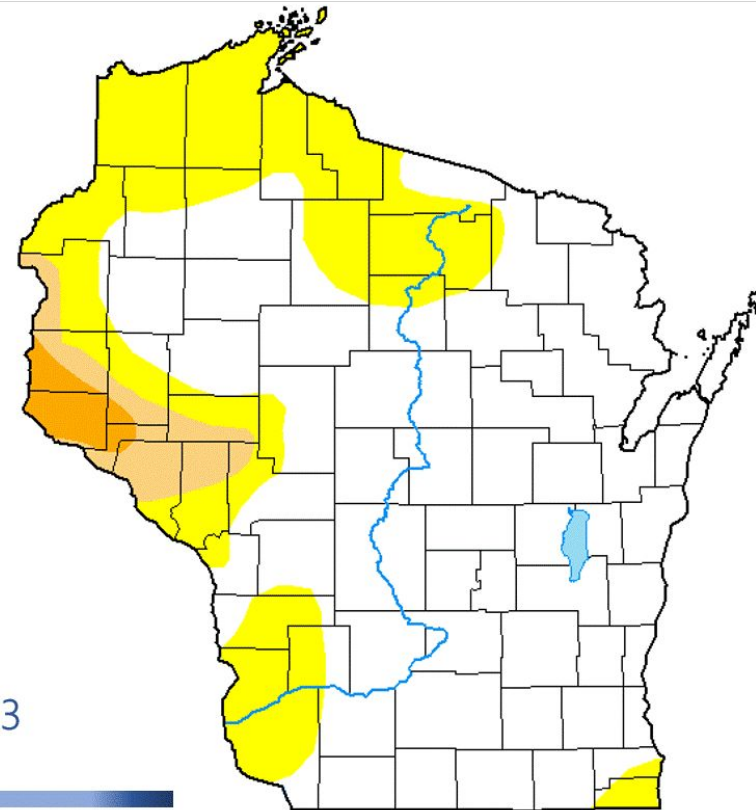
Quantifying Uncertainty









Challenge: Role of Climate vs. Withdrawals



2017 – 2020 Statewide Groundwater Flooding Event



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

Brad Pugh
CPC/NOAA

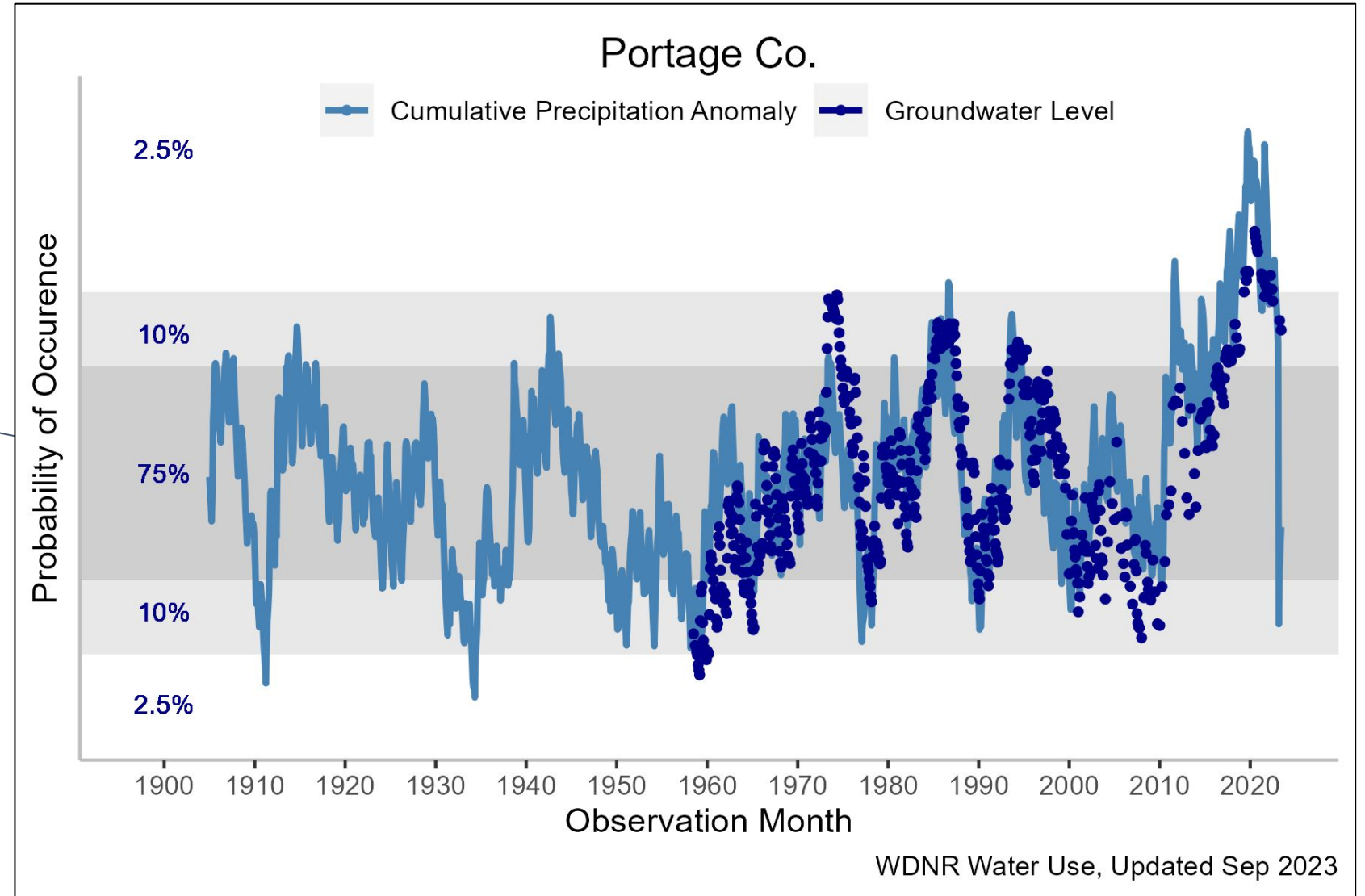
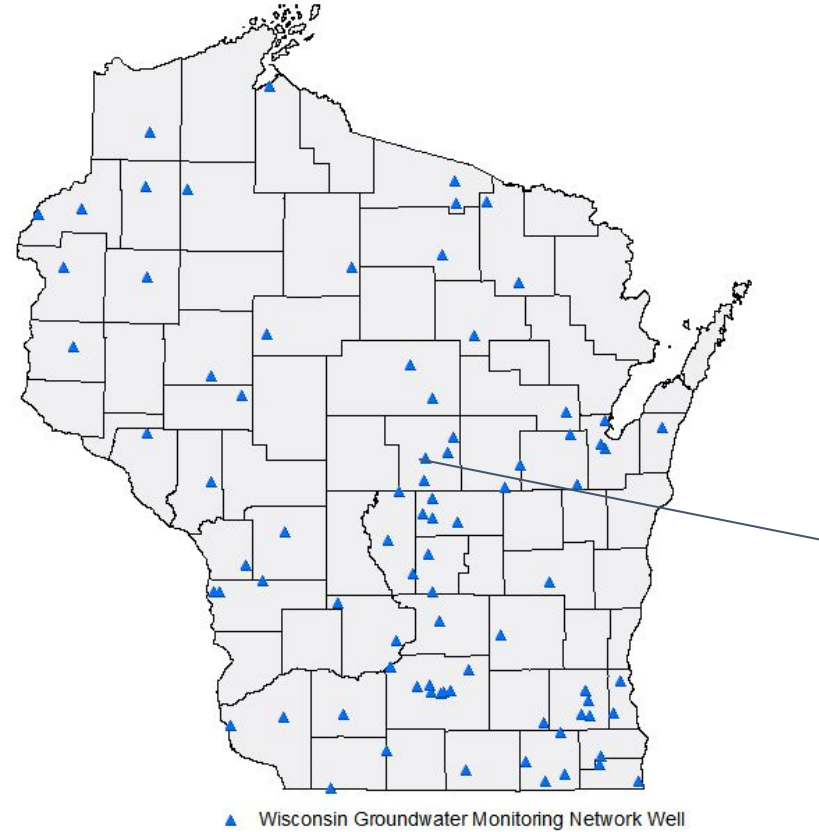


droughtmonitor.unl.edu

January 3, 2023

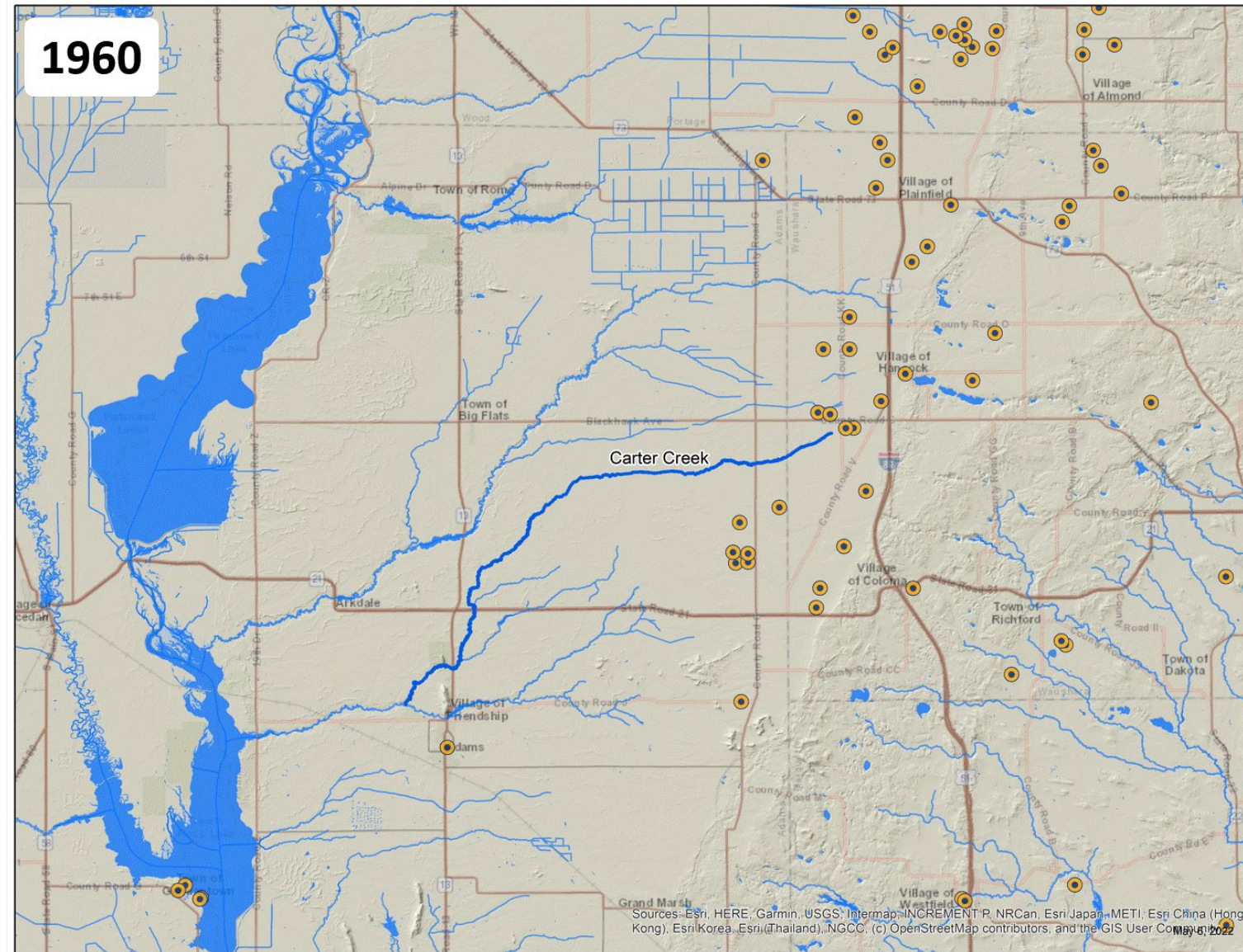


Challenge: Role of Climate vs. Withdrawals

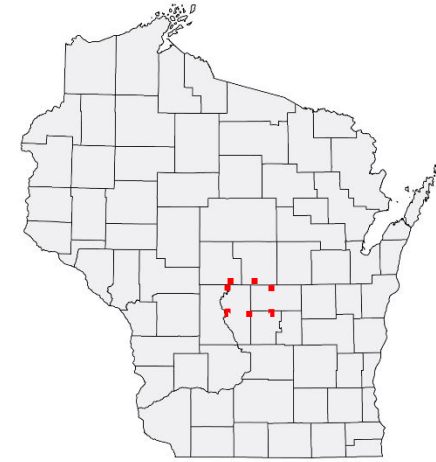


Challenge: Role of Climate vs. Withdrawals

1960

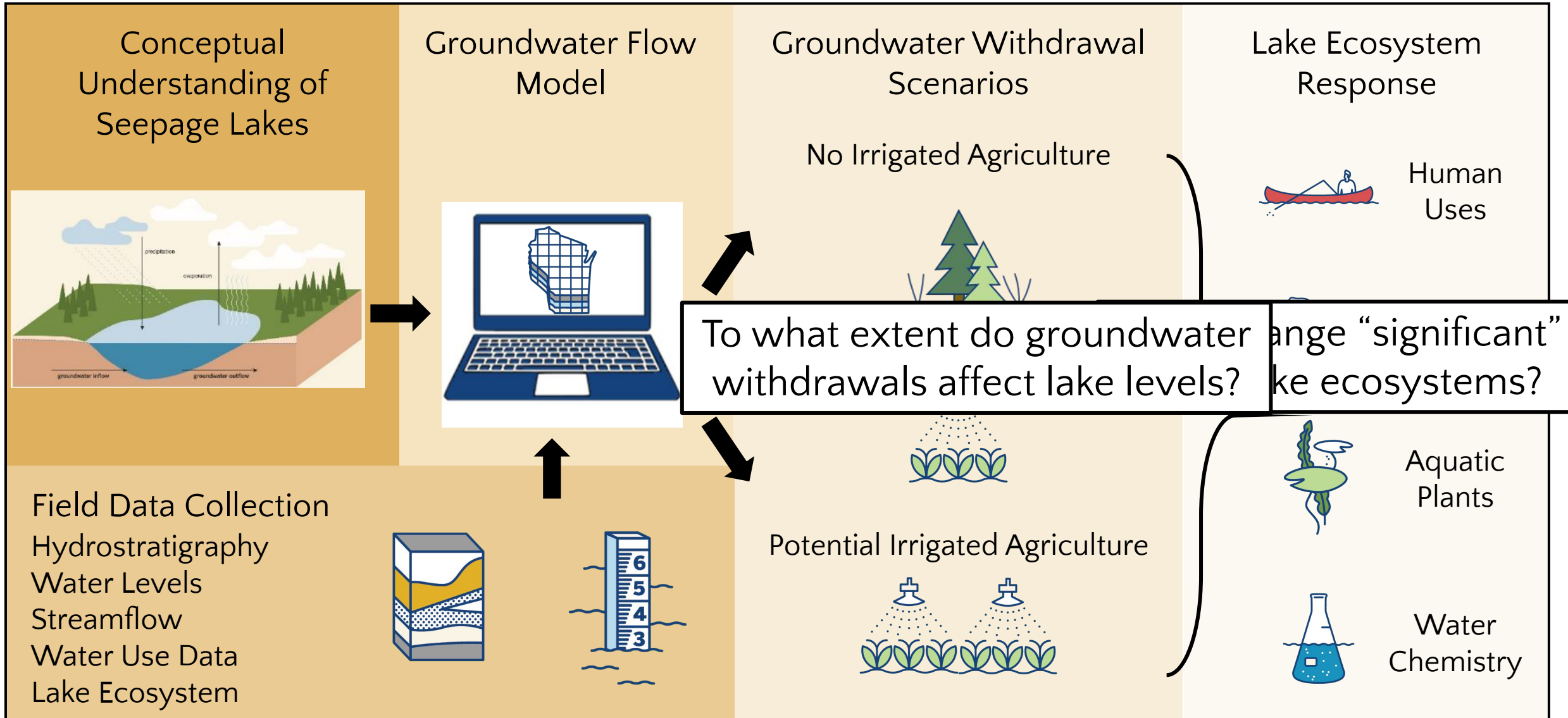


Carter Creek
Trout Stream
Exceptional Resource
Water

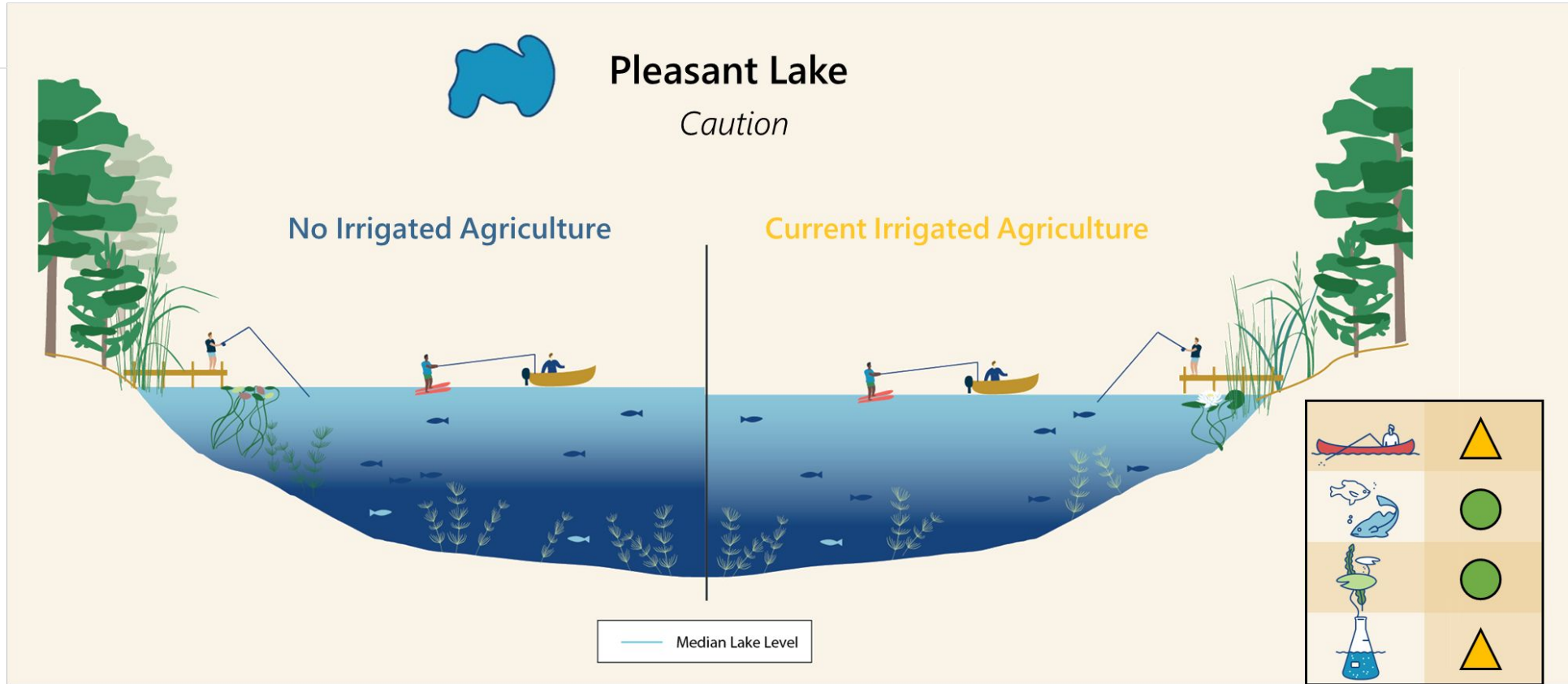


Carter Creek (July 2023)
Jessica Haucke, UW-Stevens
Point

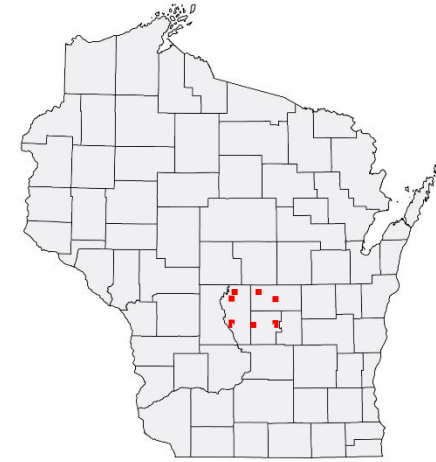
Challenge: Thresholds for Potential Harm



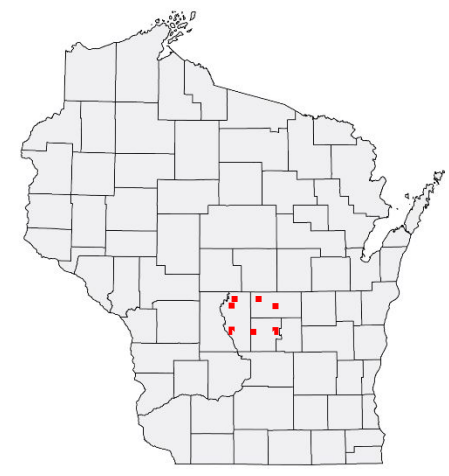
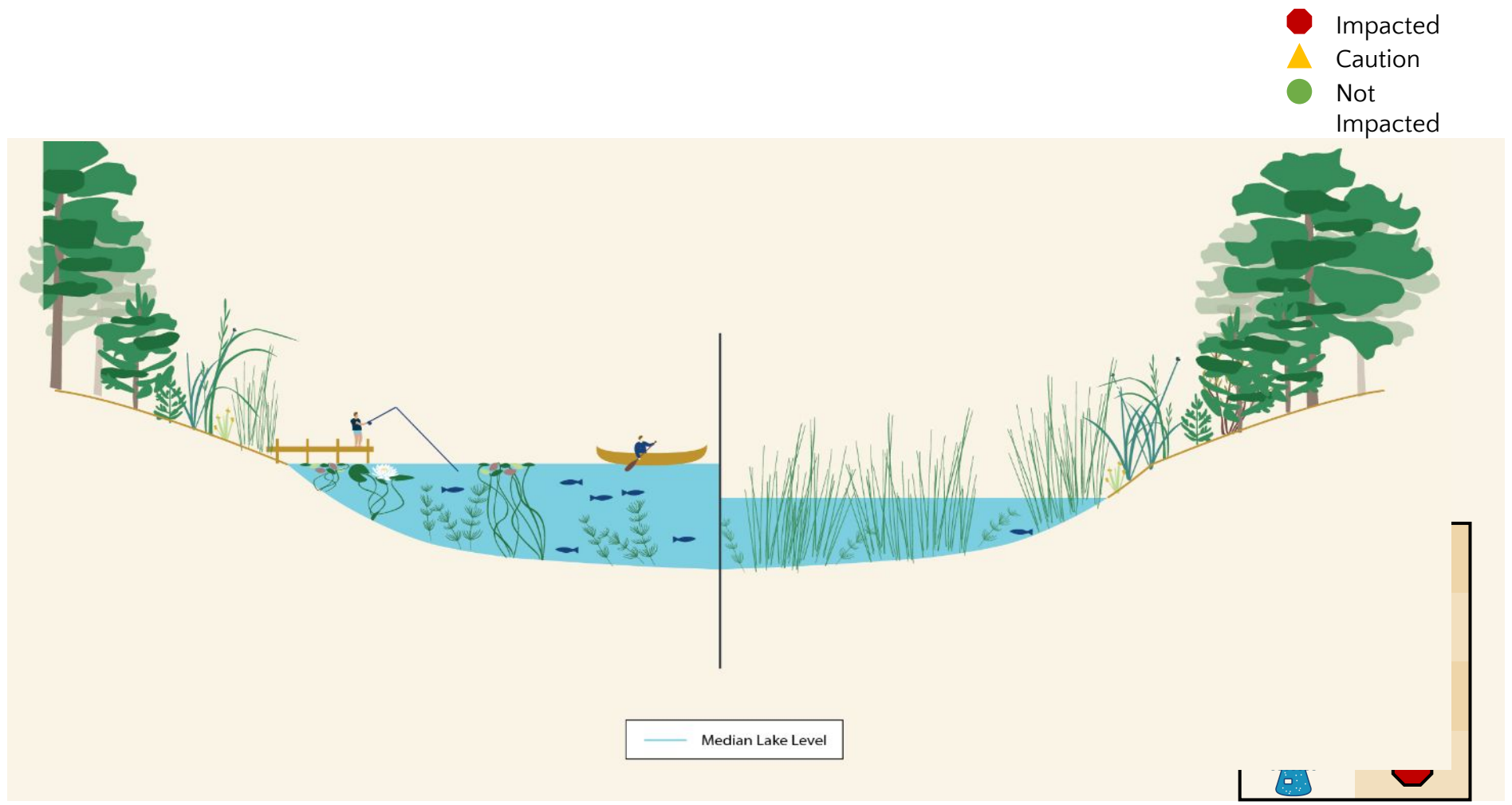
Challenge: Thresholds for Potential Harm



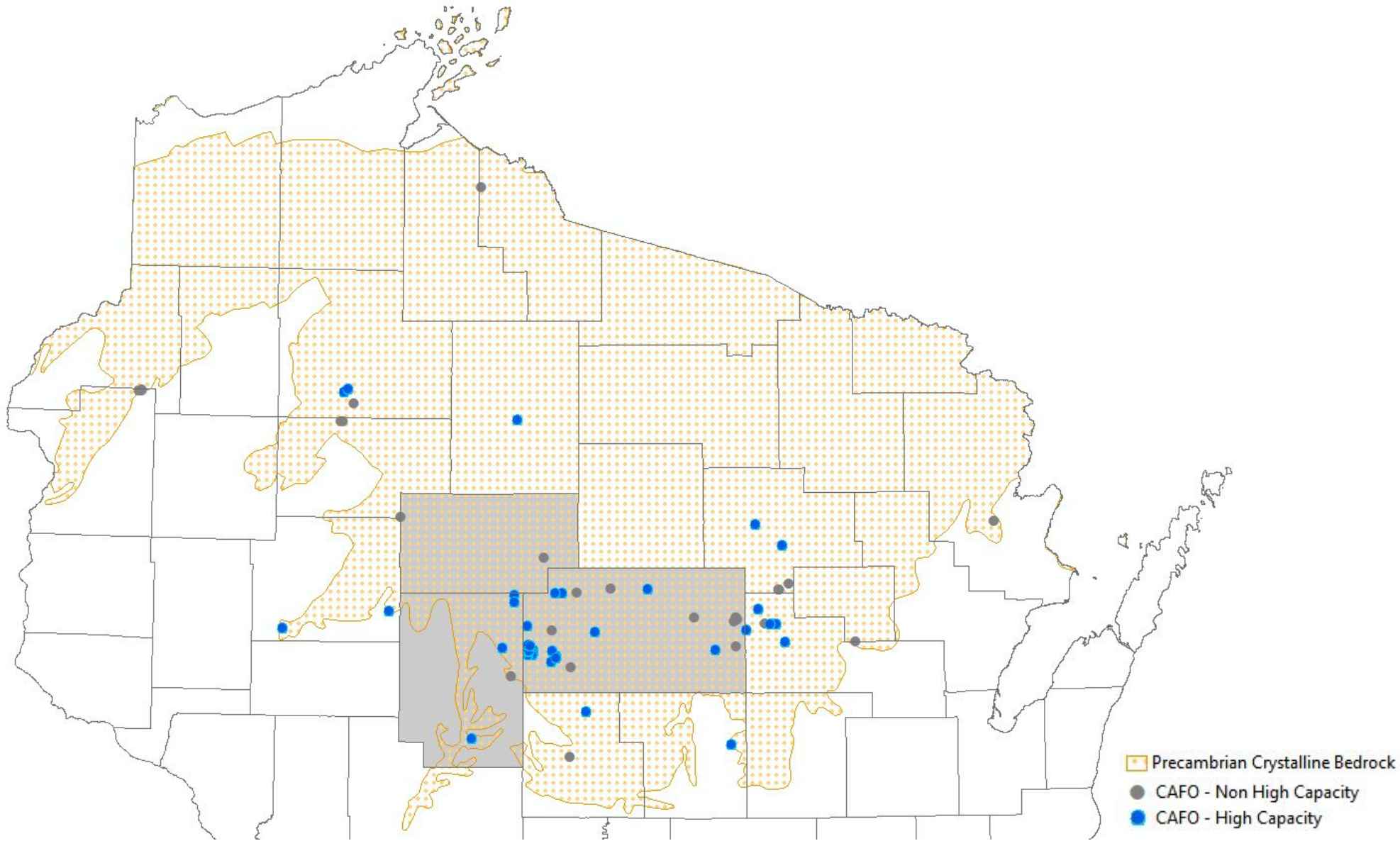
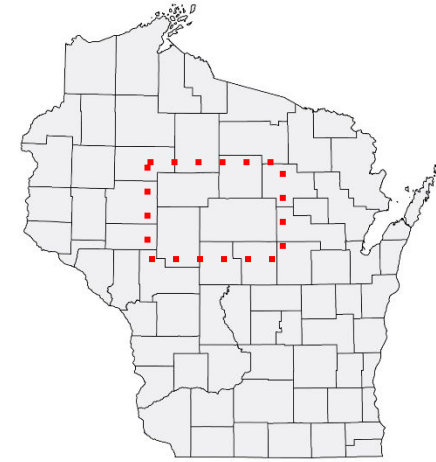
- Impacted
- ▲ Caution
- Not Impacted



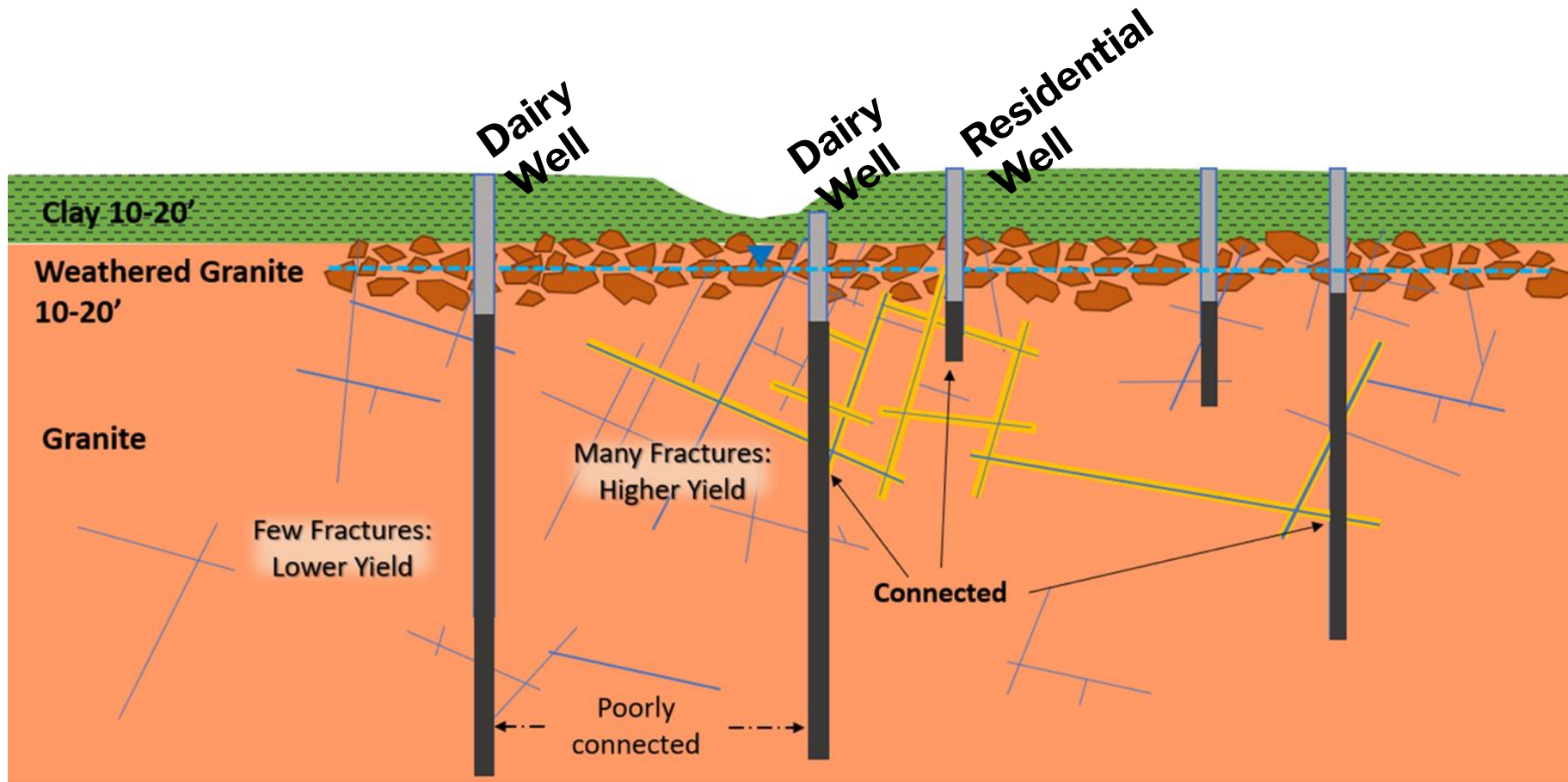
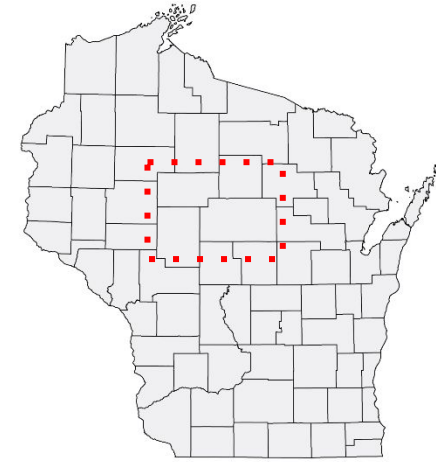
Challenge: Thresholds for Potential Harm



Challenge: Water Availability & Dairy Expansion

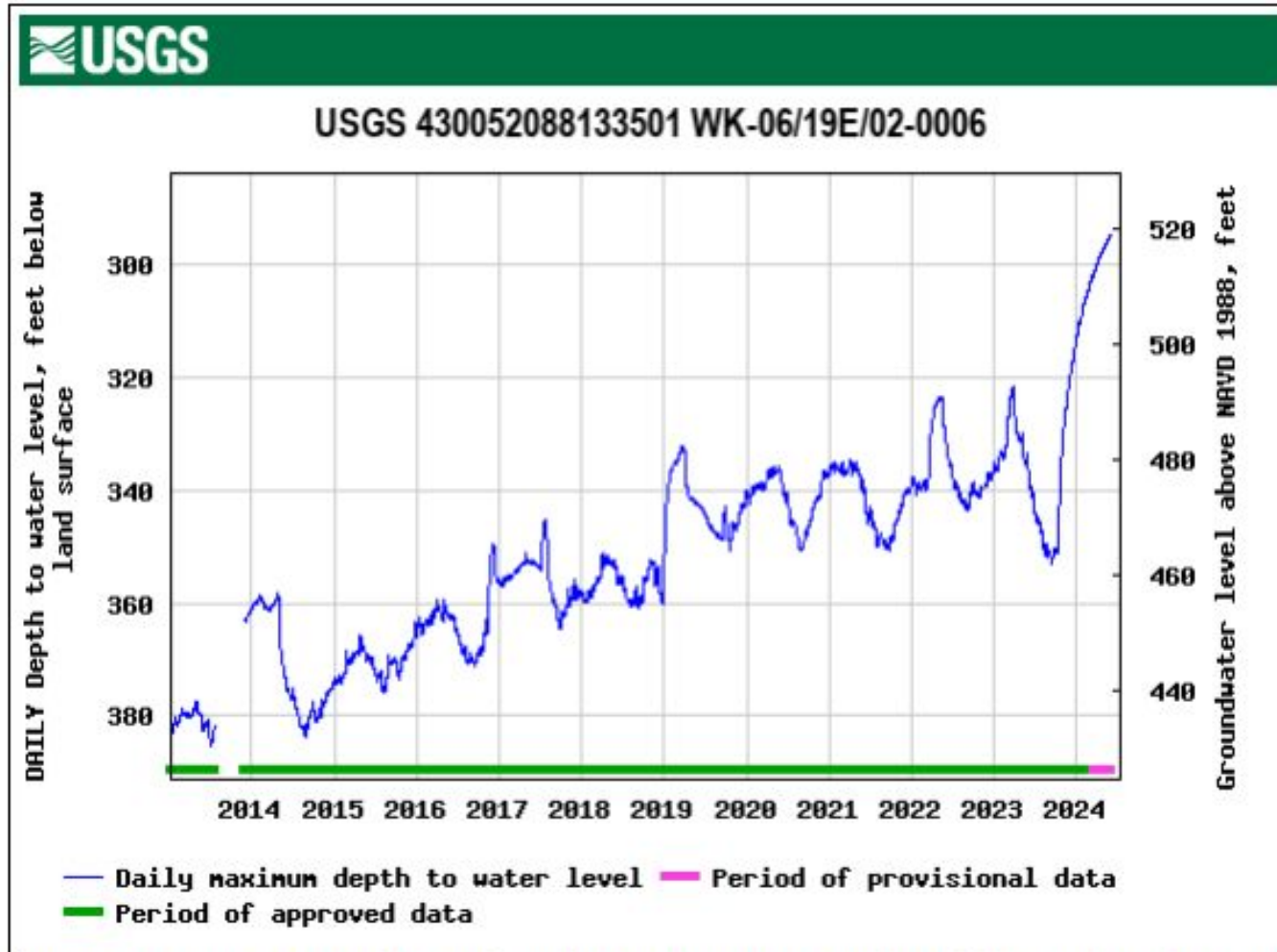
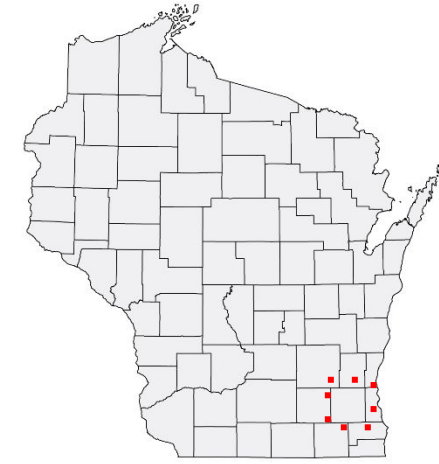


Challenge: Water Availability & Dairy Expansion



- ✓ Estimating future use
- ✓ Private well inventory
- ✓ Downhole geophysics
- ✓ Site specific monitoring well networks

Challenge: Water Availability & Water Quality



- Switch from deep aquifer wells to Lake Michigan water supply for the City of Waukesha, WI to eliminate radium issues.
- 55-ft rebound in aquifer in 9 months

Figure 4. USGS Groundwater level monitoring network well located in the City of Waukesha monitoring water levels in the deep sandstone aquifer. The water level in this well has risen 55 feet between October 2023 and May 2024.

Opportunities & Recommendations

- Scale appropriate management (per Central Sands Lakes Study)
- Collaboration with:
 - agencies and institutions across Wisconsin & Upper Midwest to develop methods & tools.
 - landowners and other stakeholders to understand their view of the issue.
- Education. Establish a common understanding of the problem.
- Going beyond the science
 - Policy
 - Communications
 - Economics
- Long-term monitoring (water use & water resources)



Photo: Mecan River, Central Sands

CONNECT WITH US

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@WI_DNR



/WIDNRTV



"WILD WISCONSIN:
OFF THE RECORD"

Water Quantity Management in Wisconsin



Water Use
Registration &
Reporting



High
Capacity
Wells



Water
Resources
Inventory



Diversions &
Water Use
Permitting



Water
Conservation
& Efficiency

Program supported

by:

- Hydrogeologists
- Research Scientist
- Policy Analysts
- Data Analyst
- Monitoring Coordinator

