



Shared Waters, Shared Future

Northeastern Illinois Regional Water
Supply Sustainability Workshops

Workshop logistics

- Today's workshop will be recorded.
- Closed captioning is enabled.
- We will be using the chat to hear from you throughout the workshop.
- We will be using a live polling tool called Mentimeter.
- Following today, we will share the slides with you and post the recording and materials to the **Shared Waters, Shared Future** website: cmap.is/water-workshops

Utility climate and drought preparedness

June 3, 2026



**Shared Waters,
Shared Future**
Northeastern Illinois Regional Water
Supply Sustainability Workshops

**Using the chat,
please share your:**

- Name
- Title
- Organization





Shared Waters, Shared Future

Northeastern Illinois Regional Water
Supply Sustainability Workshops

Partners



The Chicago Metropolitan Agency for Planning (CMAP) is our region's comprehensive planning organization. For decades, CMAP has conducted water supply planning to advance efforts that promote sustainable use of our water supplies.



Illinois-Indiana Sea Grant (IISG) is a federal-university partnership (NOAA, U of I, Purdue) focusing on research, education, and outreach for 104 miles of southern Lake Michigan shorelines.



Funding acknowledgment: *Shared Waters, Shared Future* is funded by the Illinois Department of Natural Resources Office of Water Resources. We appreciate Wei Han, P.E., Ph.D., Water Supply Program Manager, and the department's commitment to water supply planning.

Workshop series



Collaborating with water utilities and local governments (February 18)



Creating a water sustainability plan (April 23)



Addressing utility climate and drought preparedness (June 3)



Modernizing Illinois' well impact review process (September 10)



Understanding water governance and management in Illinois (November 12)



**Shared Waters,
Shared Future**

Northeastern Illinois Regional Water
Supply Sustainability Workshops

Workshop 2 summary

- Explored water supply sustainability planning, including how communities can move from understanding water supply challenges to developing practical water sustainability plans.
- Scan the QR code to:
 - Read the recap blog
 - Watch the recording
 - Access materials



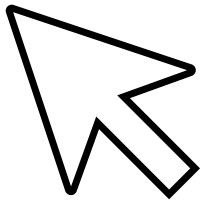
Today's agenda

- Understanding climate and drought conditions
- Five-minute break
- Climate and water utility planning
- USEPA's Strengthening Water Infrastructure for Tomorrow (SWIFT)
- Wrap-up and what's next

Which best describes your primary role?

Respond via Mentimeter:

Click the link in
the chat



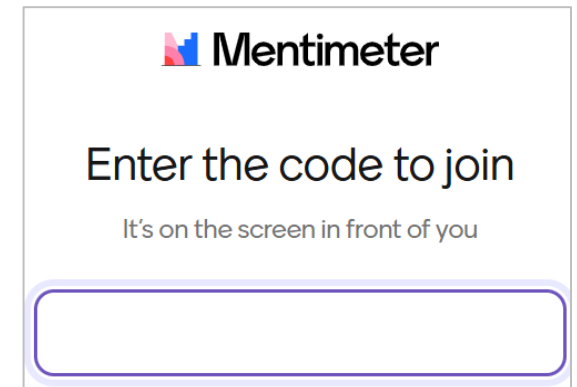
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Scan the QR
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or

Join at menti.com
Code 8161 2527

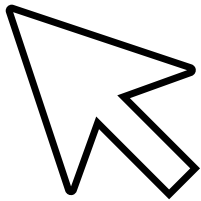


Understanding climate and drought conditions

How familiar are you with drought monitoring tools and resources?

Respond via Mentimeter:

Click the link in
the chat



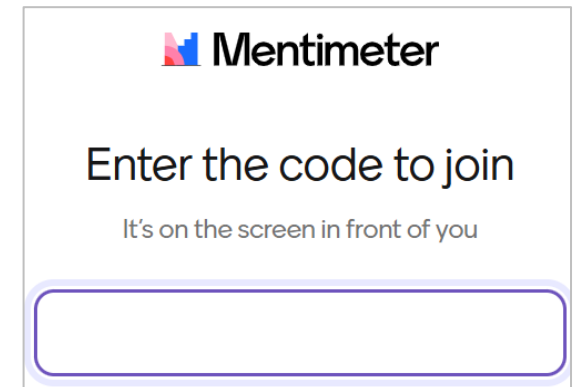
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Scan the QR
code



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code 8161 2527



Agenda

- **Drought in northeastern Illinois: Impacts, monitoring, and data availability:** Molly Woloszyn, M.S., Midwest regional drought information coordinator, Cooperative Institute for Research in Environmental Sciences (CIRES)
- **Changing climate conditions and drought dynamics in Illinois:** Trent Ford, Illinois state climatologist
- **Groundwater monitoring resources of McHenry County:** Scott Kuykendall, Water resources specialist, McHenry County Planning and Development

Speakers



Molly Woloszyn, M.S.

Midwest regional drought information coordinator
Cooperative Institute for Research
in Environmental Sciences



Trent Ford, Ph.D.

Illinois state climatologist
University of Illinois Prairie Research
Institute



Scott Kuykendall

Water resources specialist
McHenry County Planning and
Development

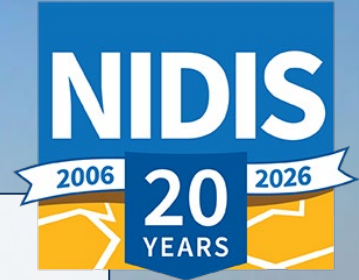
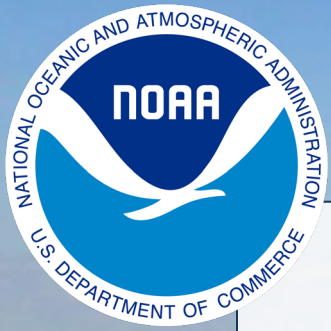
Speaker



Molly Woloszyn, M.S.

Senior associate scientist, University of Colorado-Boulder Cooperative Institute for Research in Environmental Sciences

Midwest regional drought information coordinator, Cooperative Institute for Research in Environmental Sciences (CIRES)



National Integrated Drought Information System (NIDIS)

Drought in Northeastern Illinois: Impacts, Monitoring, and Data Availability

Molly Woloszyn, M.S.

Midwest Regional Drought Information Coordinator

Cooperative Institute for Research in
Environmental Sciences (CIRES)

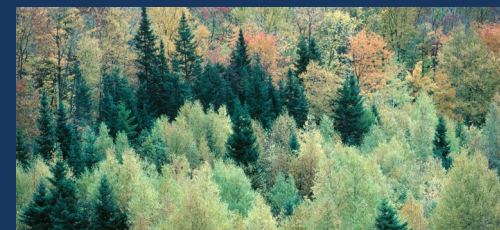
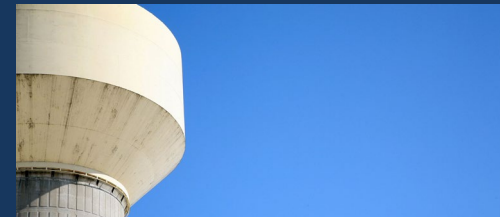
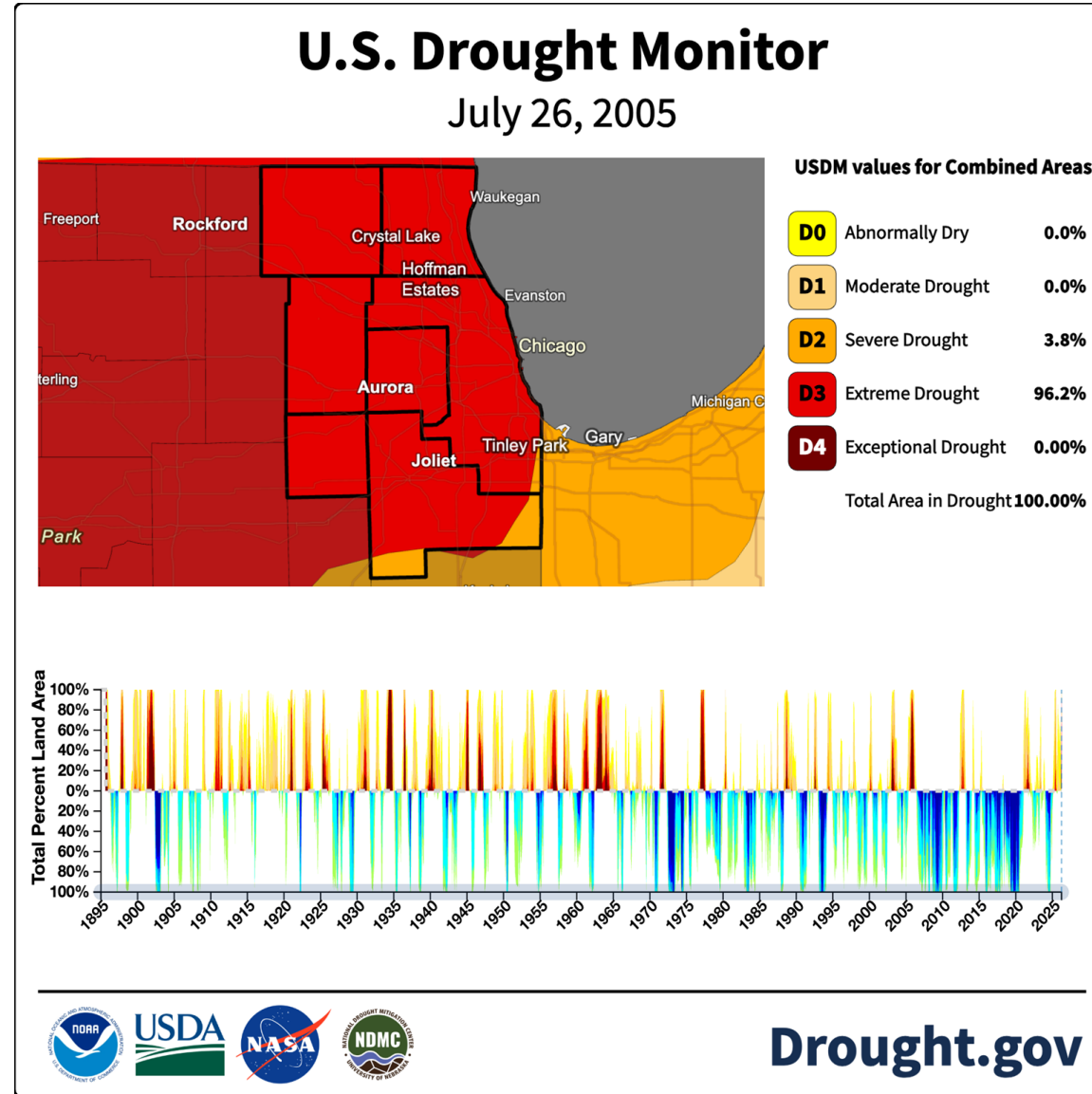


The Economic and Human Costs of Drought

Drought can lead to a wide range of environmental, social, and economic impacts.

Northeastern Illinois

- Water vulnerabilities
- Urban forests and vegetation stress
- Heat/drought combo
- Foundation issues
- Air quality issues
- Wildlife impacts



Different types of drought require different types of monitoring data.



Meteorological Drought

When dry weather patterns dominate an area.



Agricultural Drought

When crops become affected by drought.



Hydrological Drought

When low water supply becomes evident in the water system.



Ecological Drought

When natural ecosystems are affected by drought.



Flash Drought

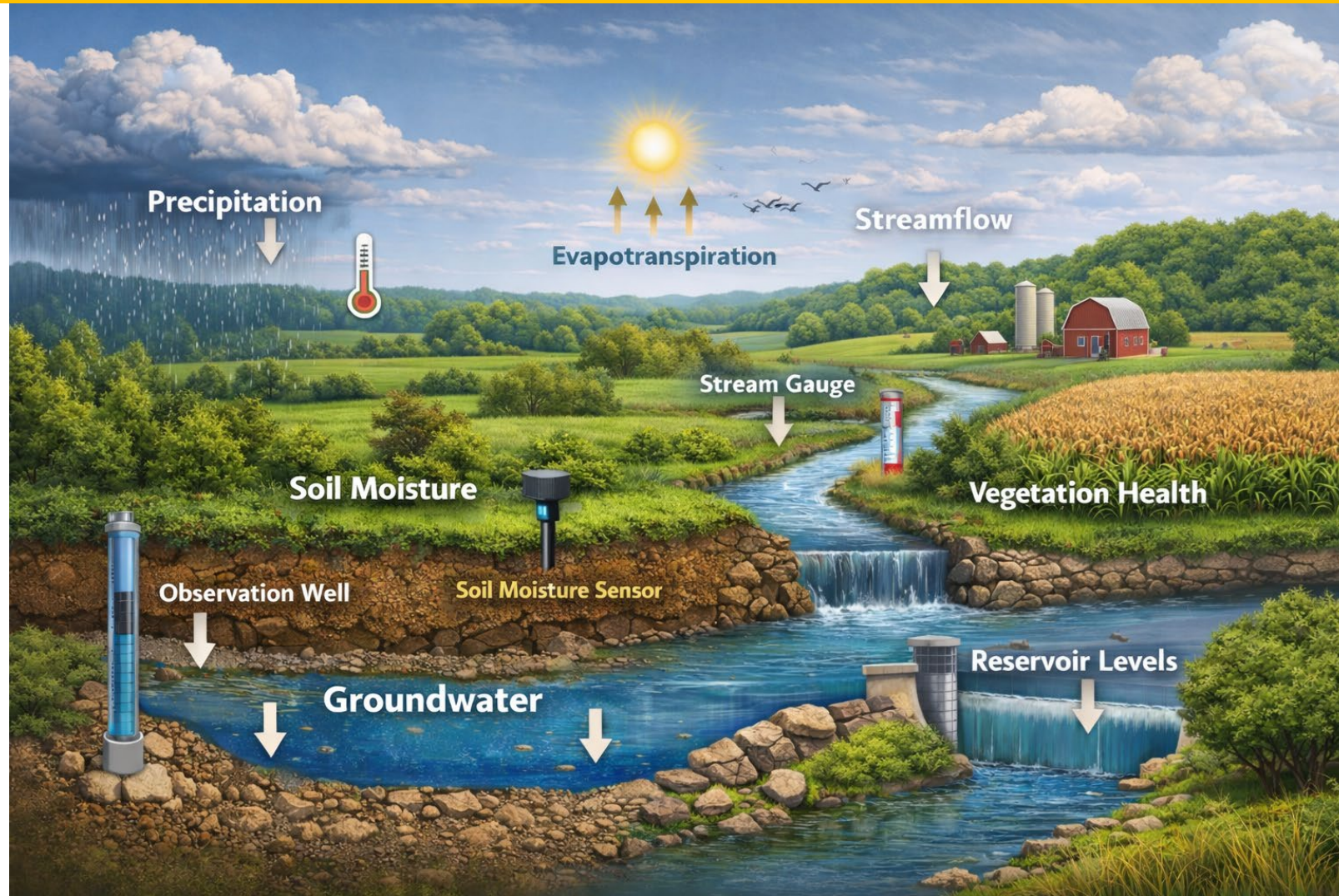
The rapid intensification of drought conditions.



Socioeconomic Drought

When the supply and demand of commodities are affected.

Monitoring drought is complex and involves tracking multiple datasets and indicators across the entirety of the water cycle.



Why is Accurate Drought Monitoring and Assessment Important?

Plays a vital role in supporting communities and sectors in preparing for, mitigating, and responding to drought.

- Helps identify which areas are most vulnerable – allowing for **more effective, targeted relief efforts**.
- Precise monitoring allows for **faster, more effective, and targeted response** to drought conditions.
 - For example: helps water managers decide when and where to conserve water.
- **Inaccurate assessment** can lead to **economic inequities and maladaptation**.



Drought Monitoring Resources



U.S. Drought Portal (Drought.gov)



The screenshot shows the Drought.gov homepage. At the top, there are logos for NOAA and NIDIS, and the text "Drought.gov National Integrated Drought Information System". Below the logos is a search bar and social media icons. A navigation menu includes "Data and Maps", "By Sector", "By Location", "Research and Learn", "About", and "News and Events". The main content area features a featured article titled "A Dry, Warm January Leaves the West With the Worst Snowpack in Decades" with a sub-headline "A January dry spell resulted in most states receiving 50% or less of normal precipitation. Combined with above-normal temperatures and sunny days, this resulted in little snow accumulation and some snowmelt across the West. Read more in this snow drought status update." To the right, there are "FEATURED NEWS AND ARTICLES" including "Puerto Rico & Virgin Islands Drought Update", "Drought in 2025 in 14 Graphics", and "New Tool Overcomes Hawai'i's Climate Complexity to Improve Drought Monitoring". At the bottom, there is a section titled "How is drought affecting your neighborhood?" with a search input field for "Enter Zip Code, City, County, or State".

About

- The U.S. **government's authoritative** drought information website.
- **One-stop shop** for data, decision-support products, resources, and information on drought.
- **Interactive and customizable** maps and data.

Advancing Drought Science and Preparedness Across the Nation

The National Integrated Drought Information System (NIDIS) is a multi-agency partnership that coordinates drought monitoring, forecasting, planning, and information at national, tribal, state, and local levels.

Midwest Drought.gov Statistics



512,786 views to Midwest state pages since 2023.



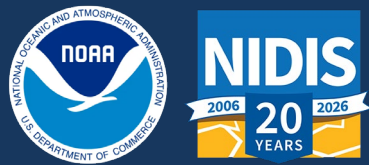
51,685 views on Midwest Drought Status updates since 2023.



2,367 people are subscribed to our drought alert emails across the nine Midwest states.

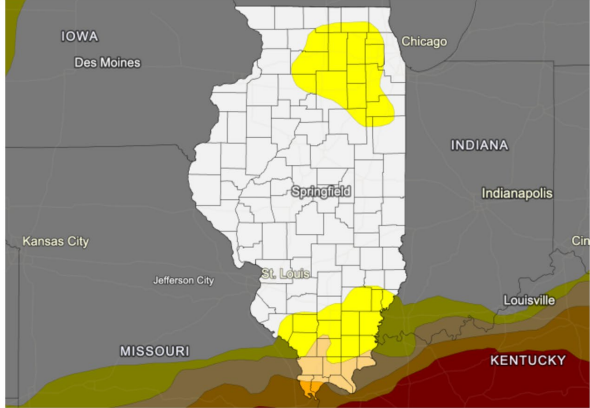
The screenshot shows the "Current Conditions" section of the Drought.gov website. It features a "U.S. Drought Monitor" map with tabs for "30-Day Precipitation" and "30-Day Temperature". The map displays drought severity across the United States, with colors ranging from yellow (moderate) to red (severe). The map is interactive, with zoom in (+) and zoom out (-) buttons, and a search icon. At the bottom, there are tabs for "CONUS", "Alaska", "Hawaii", and "PR/USVI".

Drought.Gov: Illinois State Page



Developed in consultation with the **Illinois State Climate Office** and other state partners.
 Access to **variety of datasets and products** to give a picture of drought across the state.
 Highlights **state government drought resources**.

U.S. Drought Monitor: Illinois

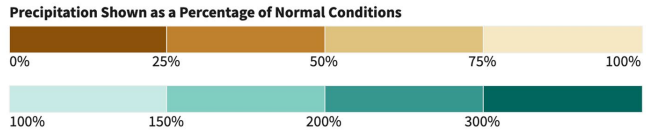
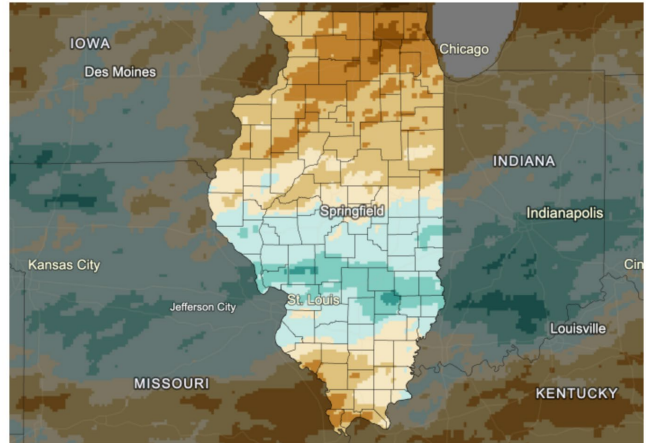


Drought & Dryness Categories	% of IL
D0 - Abnormally Dry	20.4%
D1 - Moderate Drought	3.7%
D2 - Severe Drought	0.5%
D3 - Extreme Drought	0.0%
D4 - Exceptional Drought	0.0%
Total Area in Drought (D1-D4)	4.1%

Source(s): NDMC, NOAA, USDA, NASA
 Data Valid: 05/19/26

Drought.gov

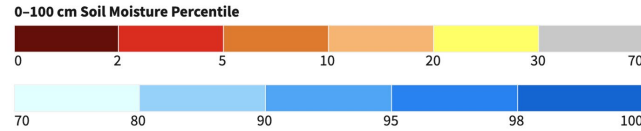
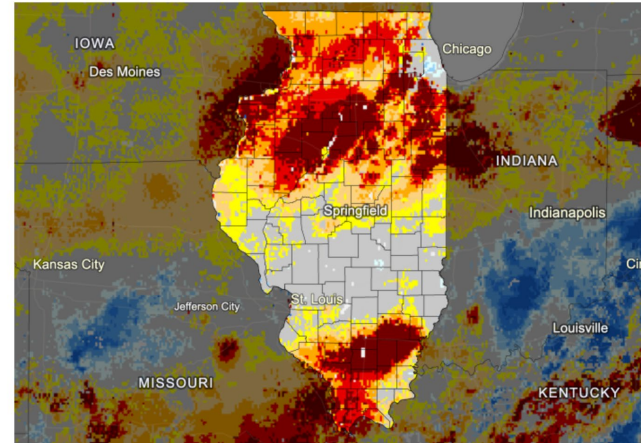
30-Day Percent of Normal Precipitation



Source(s): UC Merced
 Data Valid: 05/19/26

Drought.gov

NASA SPoRT-LIS 0-100 cm Soil Moisture Percentile



Source(s): NASA
 Data Valid: 05/25/26

Drought.gov

Illinois State Drought Resources

State Drought Websites:

[Illinois State Water Survey | Illinois Drought](#)

State Drought Agency:

[Illinois Department of Natural Resources | Water Supply](#)

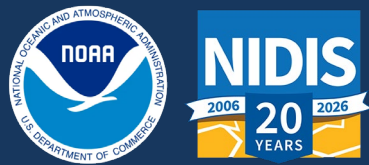
State Drought Plan:

[State of Illinois Drought Preparedness and Response Plan \(2011\)](#)

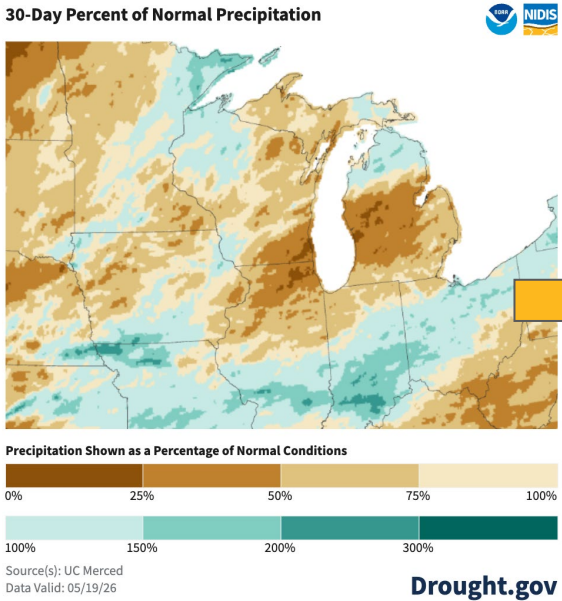
State Climate Office:

[Illinois State Climatologist](#)

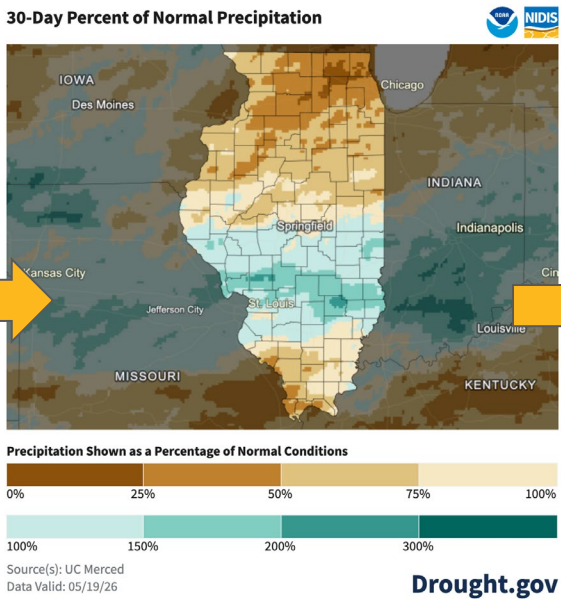
Drought.Gov: Drill Down to Local Scale



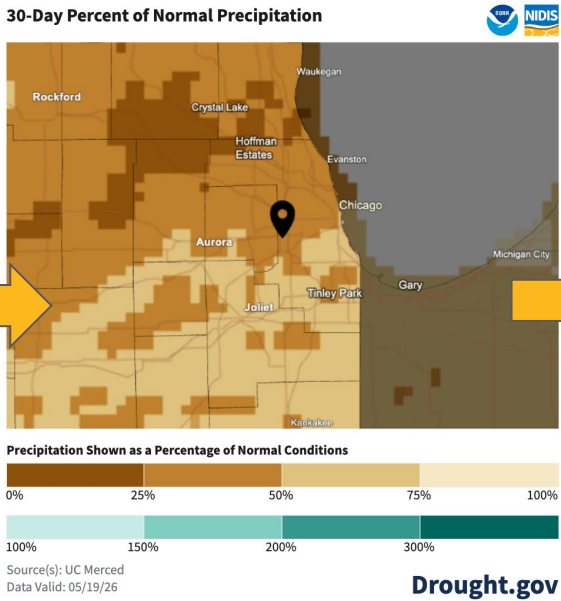
Regional



State



County



Local

Conditions for Chicago, IL (Cook County)

On This Page

View resources for your state
ILLINOIS RESOURCES

Get notified when conditions change
SIGN UP FOR ALERTS

Precipitation (Total)
Total precipitation (past 7 days): **1.34 in**
↑ 1.14 in more than the previous 7 days.
Data Valid: 05/25/2026

Temperature (Maximum)
Average max temperature (past 7 days): **67.83 °F**
↓ 8.22 °F less than the previous 7 days.
Data Valid: 05/25/2026

- U.S. Drought Monitor
- Population in Drought
- Precipitation/Temperature + Records
- Streamflow
- Soil Moisture

- Agriculture in Drought
- Air Quality Index
- 1-Day, 7-Day, Monthly, Seasonal Precipitation and Drought Outlooks
- Historical Conditions

Receive Local Drought Alerts



Sign up to directly receive an email when drought conditions change at your location, or when drought conditions are forecasted to change.

NATIONAL CONDITIONS > ILLINOIS > DUPAGE COUNTY

Drought Conditions for Dupage County

On This Page +

Get notified when conditions change

SIGN UP FOR ALERTS

U.S. DROUGHT MONITOR CATEGORY CHANGE



National Integrated Drought Information System

[Drought.gov](https://drought.gov)

U.S. Drought Monitor Conditions Worsened for Champaign, Illinois

Conditions for 61821, Champaign, Illinois worsened from No Drought to Abnormally Dry (D0), according to this week's U.S. Drought Monitor.

The Climate Prediction Center's June Drought Outlook, released on May 31, 2022, predicted that drought conditions would not develop in June.

[View More Champaign Drought Conditions](#)

Local Drought Alerts

- U.S. Drought Monitor: Current Drought Conditions**
Receive alerts when local drought conditions improve or worsen, according to the U.S. Drought Monitor.
WEEKLY (WHEN CONDITIONS CHANGE)
- U.S. Drought Outlooks: Predicted Future Drought**
Receive alerts when NOAA's Climate Prediction Center releases its 1-month and 3-month drought outlooks each month.
BI-MONTHLY

U.S. Drought Monitor (USDM)

What is the USDM?

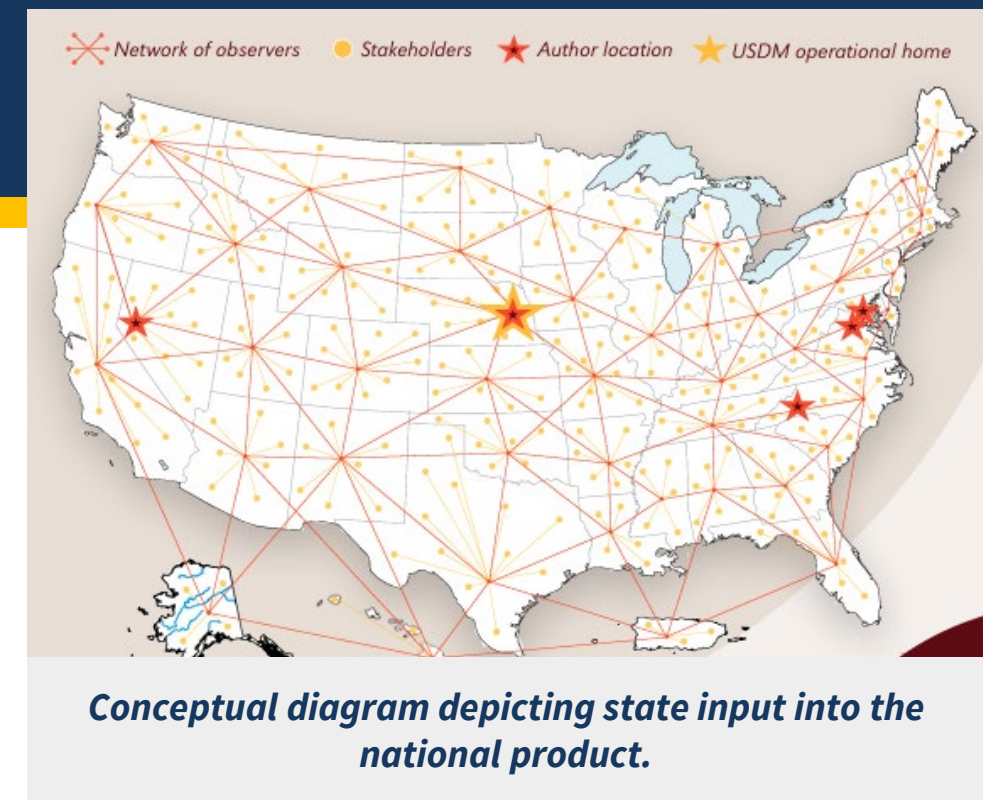
A map released every Thursday showing where drought is and how bad it is across the U.S.

How is the USDM created?

Each week, a USDM author creates the map **with input from state teams/local experts** using observational, satellite, and/or modeled datasets for a variety of indicators.

Why is the USDM important?

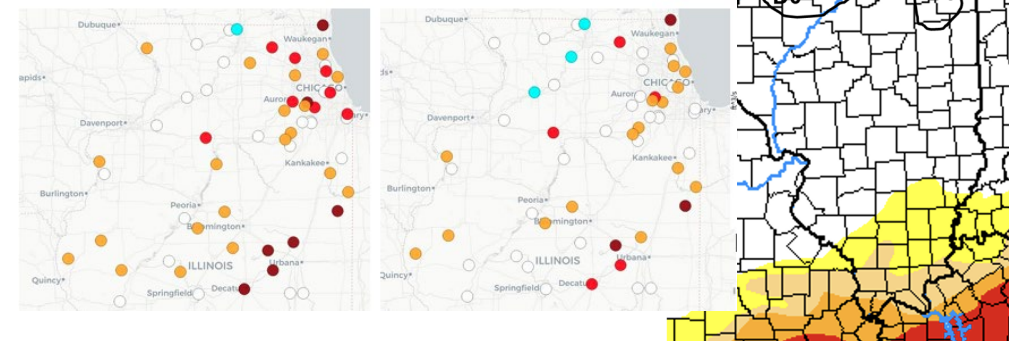
- USDA uses the USDM as a trigger for **drought assistance programs** to help agricultural producers recover from drought.
- State agencies may use the USDM for **drought declarations to trigger state relief actions.**



Recommendations

- Introduce D0 in northern and north-central Illinois

Streamflow





Year-to-Date

Year-to-Date (time slider)

2018 - Yesterday

Total CMOR Reports

816

Filter Options Impact Categories

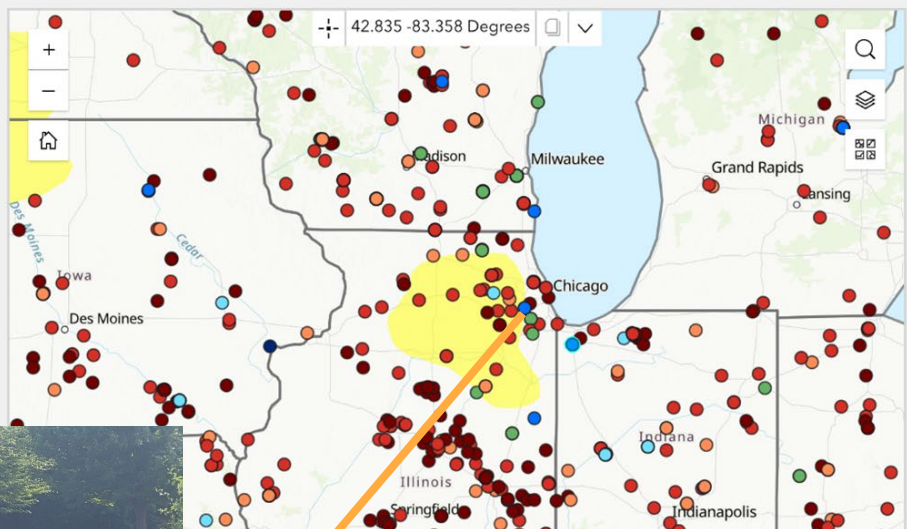
Year to Date

Past 7 Days

Past 30 Days

Custom Date Range

5/26/21 X and 5/26/26 X



**DuPage County, Illinois
June 17, 2023**

“Water is usually significantly higher by several feet.”



NATIONAL DROUGHT MITIGATION CENTER
UNIVERSITY OF NEBRASKA

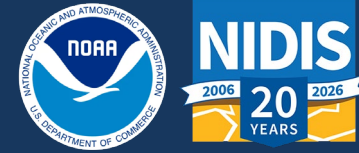
Report Your Local Drought Impacts

It is **really important to know what is happening on-the-ground** for drought monitoring, response, and planning.

Two ways to report:

- **Condition Monitoring Observer Reports (CMOR):** A system for anyone to report their conditions on the ground across many sectors.
- **Go To:** go.unl.edu/cmor_drought
- If you are a **CoCoRaHS observer**, you can submit a **“Condition Monitoring Report”**

National Integrated Drought Information System (NIDIS)

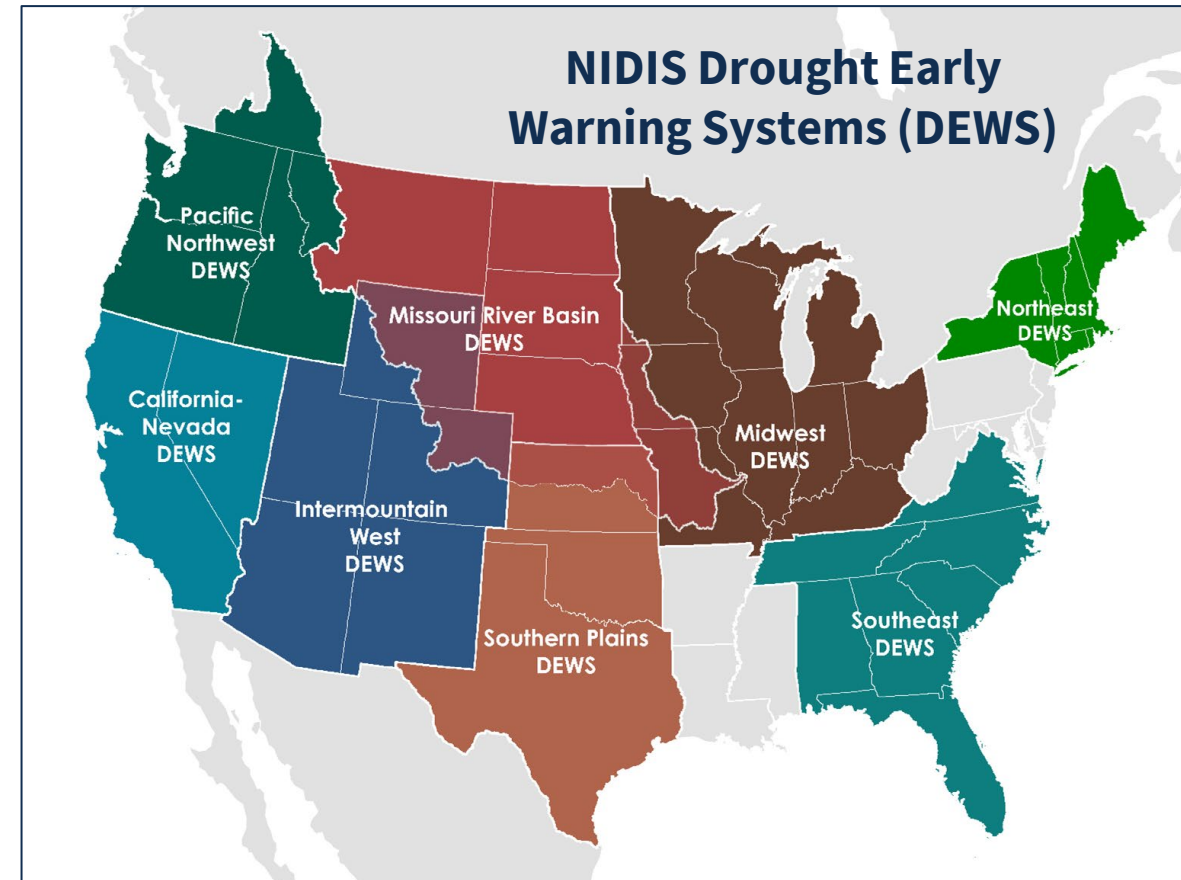


NIDIS is a **multi-agency partnership** that coordinates drought monitoring, forecasting, planning, and information across the country.

How do we do this work?

- Coordinating Regional Drought Early Warning Systems
- Delivering drought information
- Improving drought prediction and forecasting
- Supporting drought planning and preparedness
- Strengthening collaboration and coordination
- Leading the U.S. Drought Portal: www.drought.gov

Enable the Nation to move **from a reactive to a more proactive** approach to managing drought risks and impacts.



What is a Drought Early Warning System (DEWS)?

Helps improve the capacity of farmers, ranchers, water suppliers, wildfire managers, and other decision makers to **plan for, forecast, monitor, and cope with the impacts of drought.**

This is accomplished through a **network of partners** that work together to prepare a region for drought.



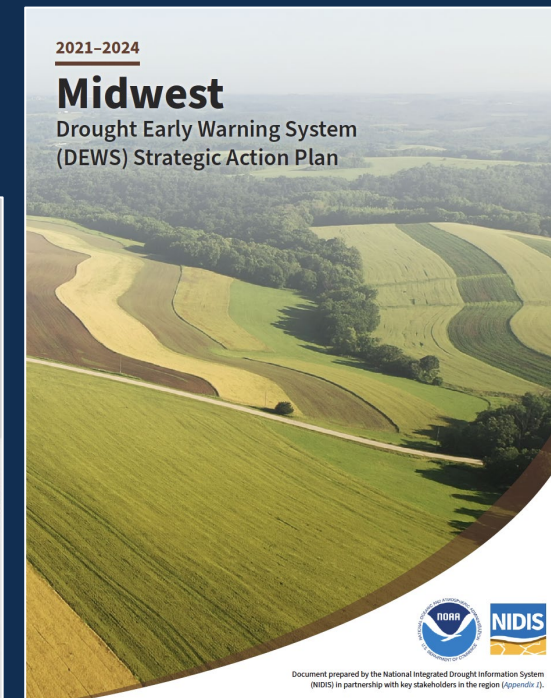
Midwest DEWS In Action

A Regional Drought Early Warning System (DEWS):

- Provides **forums for sharing information and experiences with managing drought.**
- **Delivers information** through newsletters, Drought Status Updates, webinars, Drought.gov.
- **Documents the gaps, needs, and opportunities** identified by the network of partners to advance drought early warning in the region.
- **Integrate the latest science** to inform decision-making.

A network of partners:

- State and local agencies
- State drought monitoring teams
- Academia/researchers
- Federal agencies/regional offices
- NGOs, non-profit organizations
- Private sector



Midwest DEWS In Action

Delivering Information: Drought Status Updates

Communicate a potential area of concern for drought expansion and/or development within a region based on recent conditions and the upcoming forecast.

Delivering Information: Webinars



**Drought in the Midwest
Webinar: Conditions, Outlooks,
and Resources**

Thursday, June 4 at 2 p.m. CT/3 p.m. ET

Current Drought Conditions and Impacts
Aaron Wilson | State Climate Office of
Ohio/Ohio State University

Drought Outlook Information
Darrin Hansing | NOAA National Weather
Service Central Illinois

**Climate Data at Your Fingertips: An
Introduction to cli-MATE**
Melissa Widhalm | Midwestern Regional
Climate Center/Purdue University

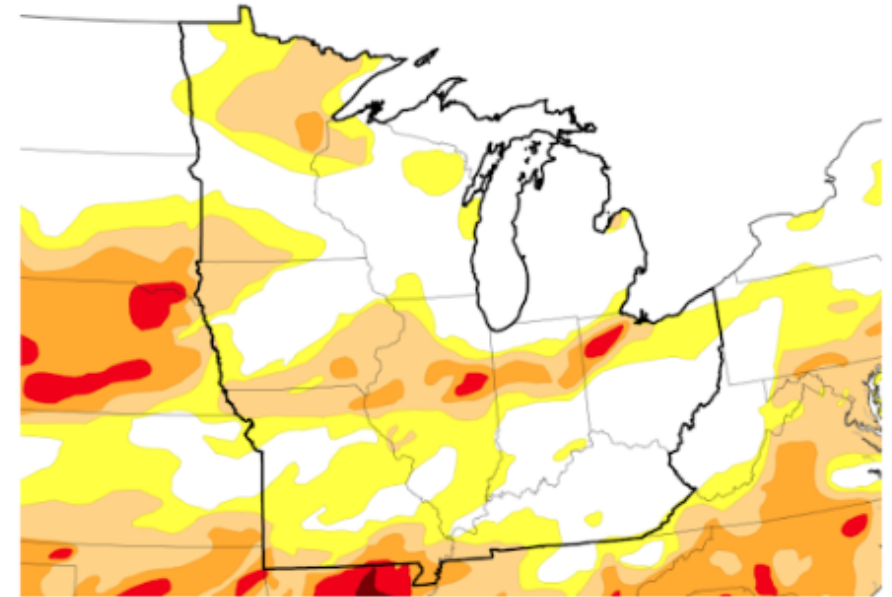
Drought.gov



March 26, 2026

Midwest Needs Sustained, Above-Normal Rain in Coming Months to Improve Persistent Hydrological Drought Conditions

U.S. Drought Monitor



U.S. Drought Monitor



Source(s): NDMC, NOAA, USDA, NASA
Data Valid: 03/24/26

Drought.gov

Thank You!

Molly Woloszyn
Regional Drought
Information Coordinator
molly.woloszyn@noaa.gov



www.drought.gov

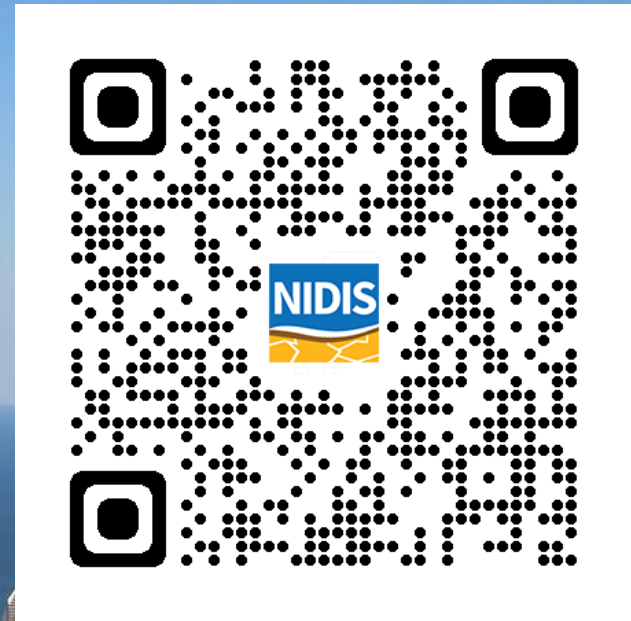


**National Integrated Drought
Information System**



**@NOAADrought
@ClimateMolly**

Sign Up for NIDIS
Newsletters



Speaker



Trent Ford, PhD

Illinois state climatologist

University of Illinois Prairie Research Institute

CLIMATE RESOURCES FOR PREPAREDNESS & ASSESSMENT

Trent Ford

Illinois State Climatologist

Illinois State Water Survey, Prairie Research Institute, University
of Illinois, Urbana-Champaign

I ILLINOIS
Illinois State Water Survey
PRAIRIE RESEARCH INSTITUTE

I UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN
School of Earth, Society & Environment
Department of Climate, Meteorology & Atmospheric Sciences



June 3, 2026

Past Weather & Climate Data

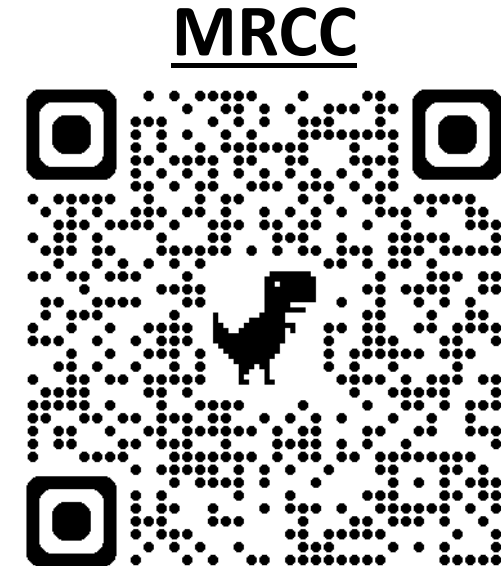
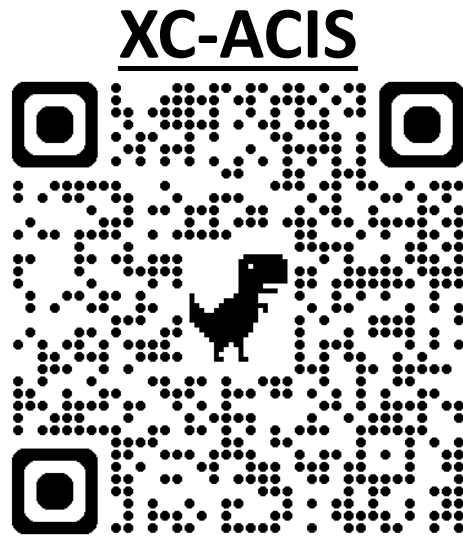


Weather Station Observations from National Weather Service

- Thousands of stations run by the NWS - Daily temperature, precipitation, evaporation, wind, humidity, etc.
- Some stations have been operating since late 1800s

Ideal Use

- Monitor weather, understand past conditions (“normal” and extremes), measure change
- Understanding variability and quantifying risk**



NWS Weather Station Data Access Points

- XM-ACIS: <https://xmacis.rcc-acis.org/>
- MRCC: <https://mrcc.purdue.edu/CLIMATE-change/station/daily-b2d>
- Iowa Environmental Mesonet: <https://mesonet.agron.iastate.edu/request/daily.phtml>
- NOAA NCEI: <https://www.ncei.noaa.gov/products/land-based-station/cooperative-observer-network>
- MRCC: <https://mrcc.purdue.edu/CLIMATE-change/hourly/station/subdaily>
- Iowa Environmental Mesonet: <https://mesonet.agron.iastate.edu/request/download.phtml>
- NOAA NCEI: <https://www.ncei.noaa.gov/products/land-based-station/automated-surface-weather-observing-systems>

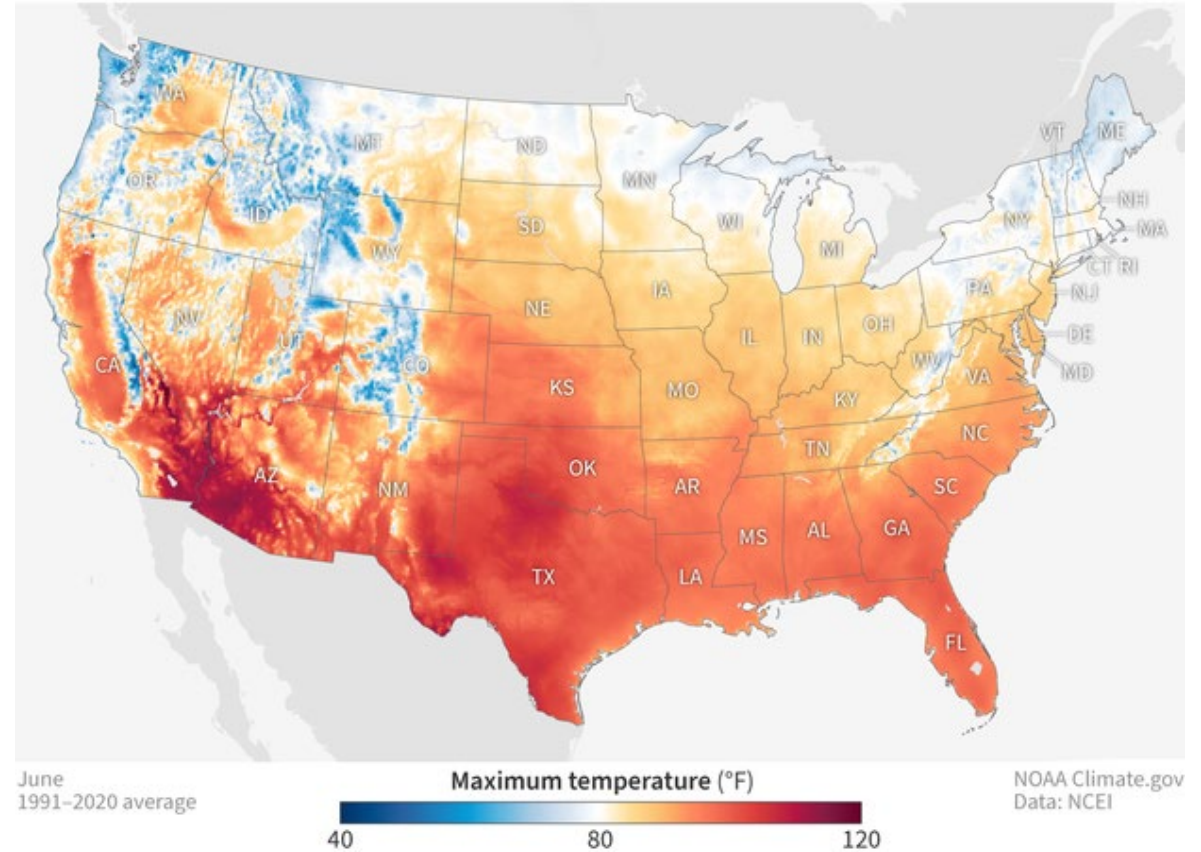
Things to Remember:

- Data are specific to a single station
- Some systems are more refined than others
- Missing observations are a common problem, handled differently by different systems
- The past is not always predictive of the future



Gridded Observed Weather & Climate Datasets

- Spatially and temporally consistent and exhaustive (i.e., no missing data!)
- Many options for temperature and precipitation, fewer for other variables
- Many datasets go back to the 1960s or so, monthly data go back to 1800s
- Easier to access and use – especially for areas (e.g., counties, municipalities, watersheds, etc.)
- Climate Data is rapidly moving to gridded datasets for work and assessment



Other Gridded Observed Data Access Points

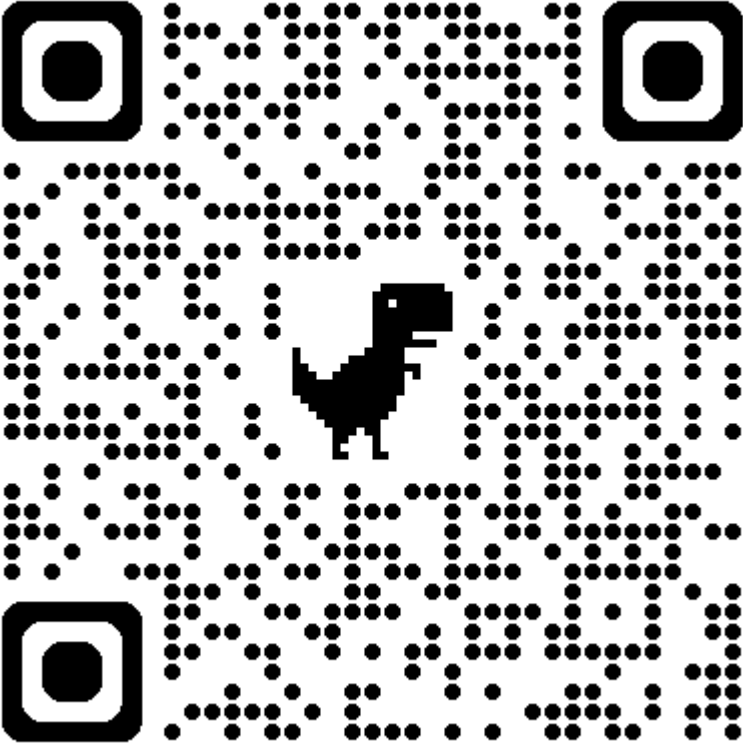
- Google Earth Engine: <https://developers.google.com/earth-engine/datasets/tags/climate>
- GridMet: <https://www.climatologylab.org/gridmet.html>
- NOAA nClimGrid: <https://www.ncei.noaa.gov/products/land-based-station/nclimgrid-daily>
- DayMet: <https://daymet.ornl.gov/>

Things to Remember:

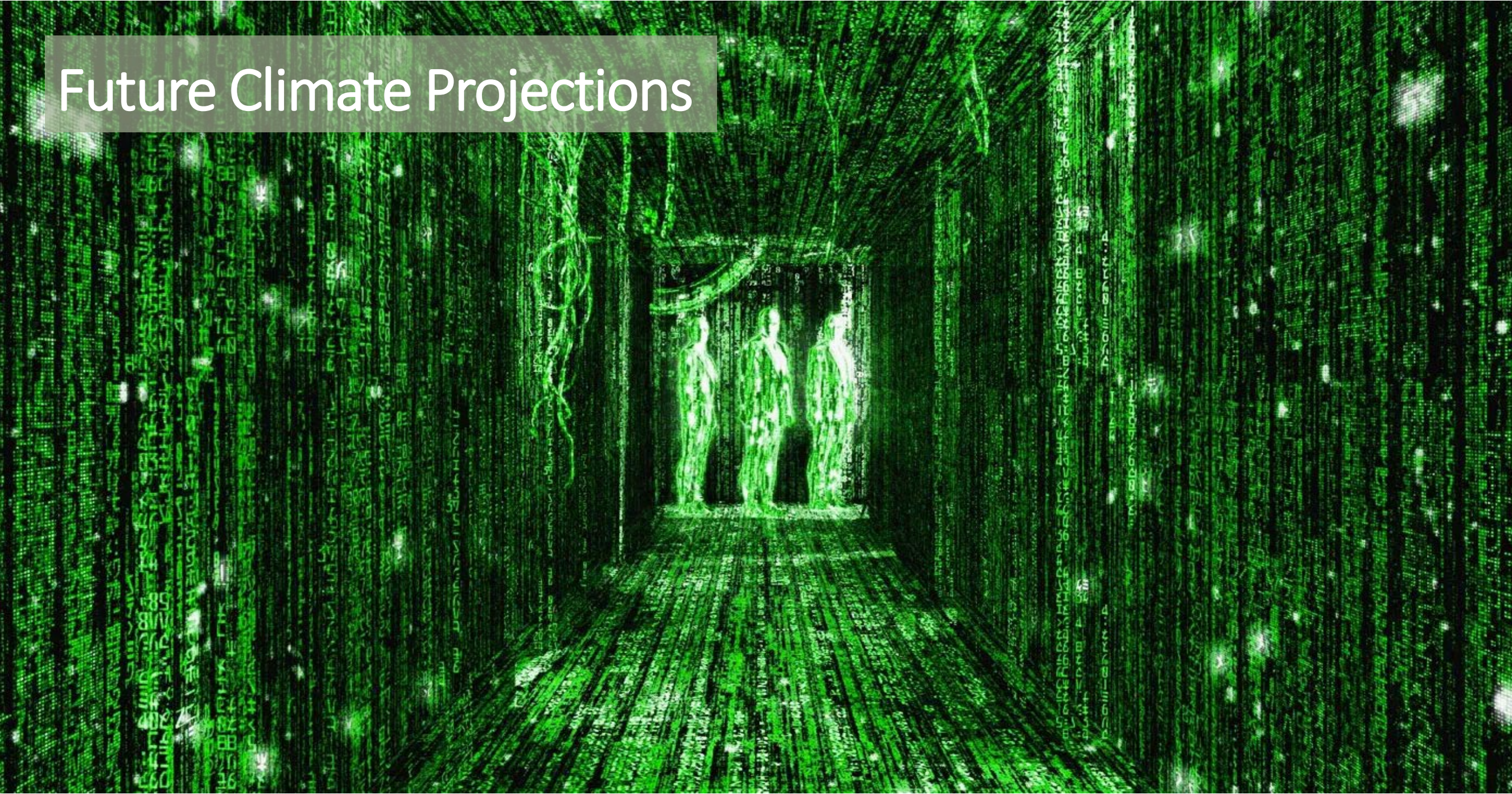
- Interpolation varies – some datasets may be better for certain applications than others
- Finer resolution does not necessarily mean better
- Extremes may be underestimated or “smoothed” in gridded data

Gridded Weather & Climate Datasets – Observed

Climate Engine

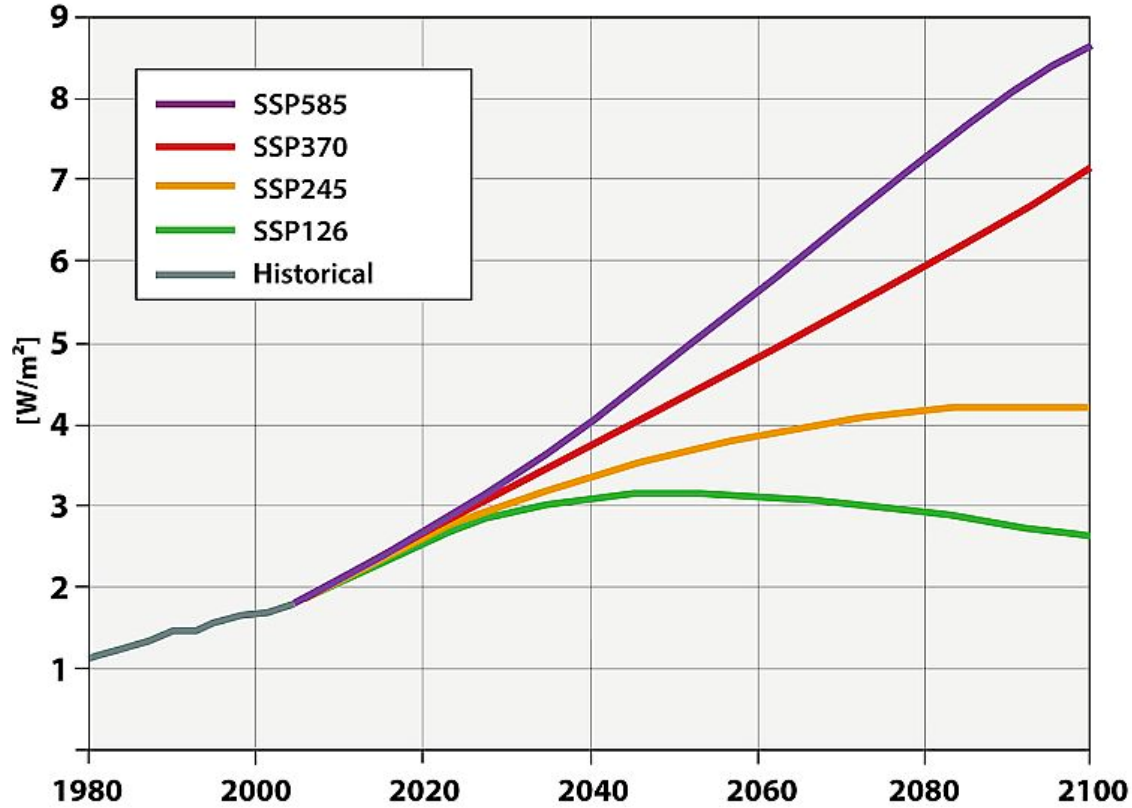


Future Climate Projections



Future Scenarios: Response

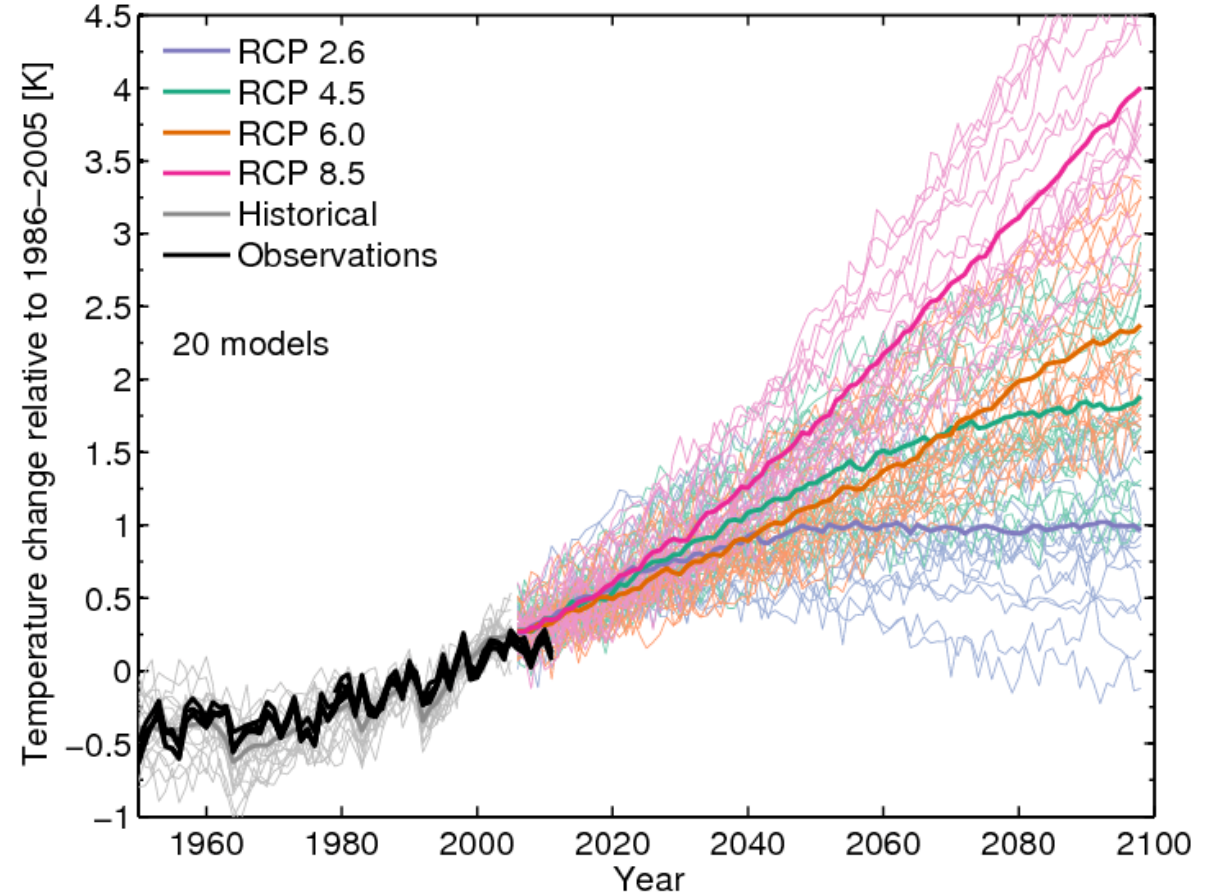
CMIP6 Scenarios - Anthropogenic Radiative Forcing [W/m^2]



After O'Neill et al., 2016

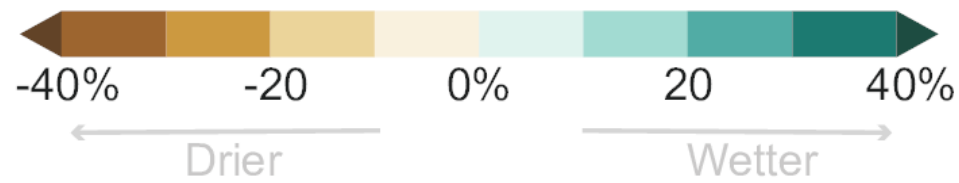
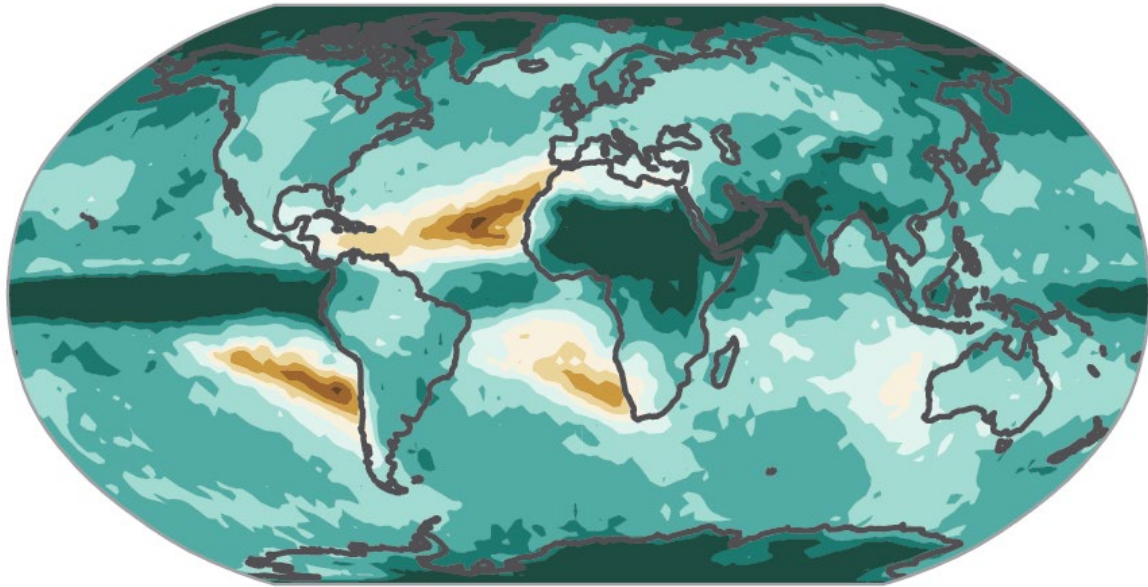
© DKRZ

CMIP5 projected changes in global mean temperature

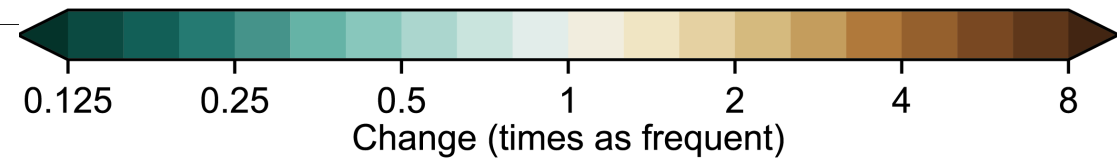
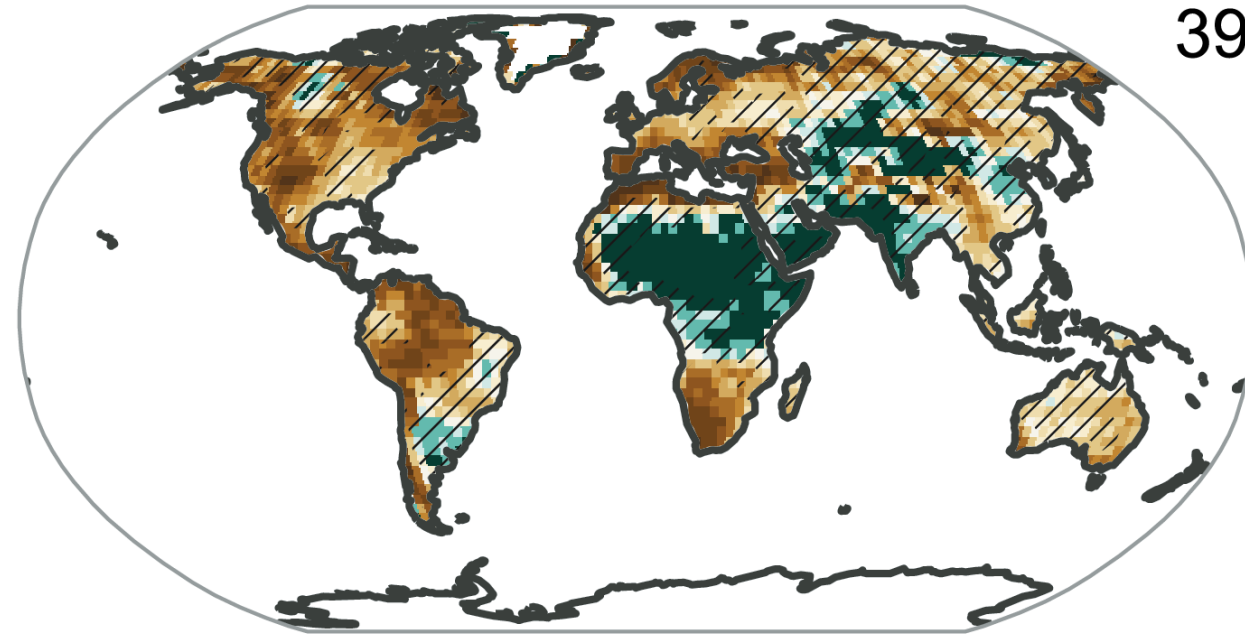


Future Scenarios: Local Response

Extreme rain

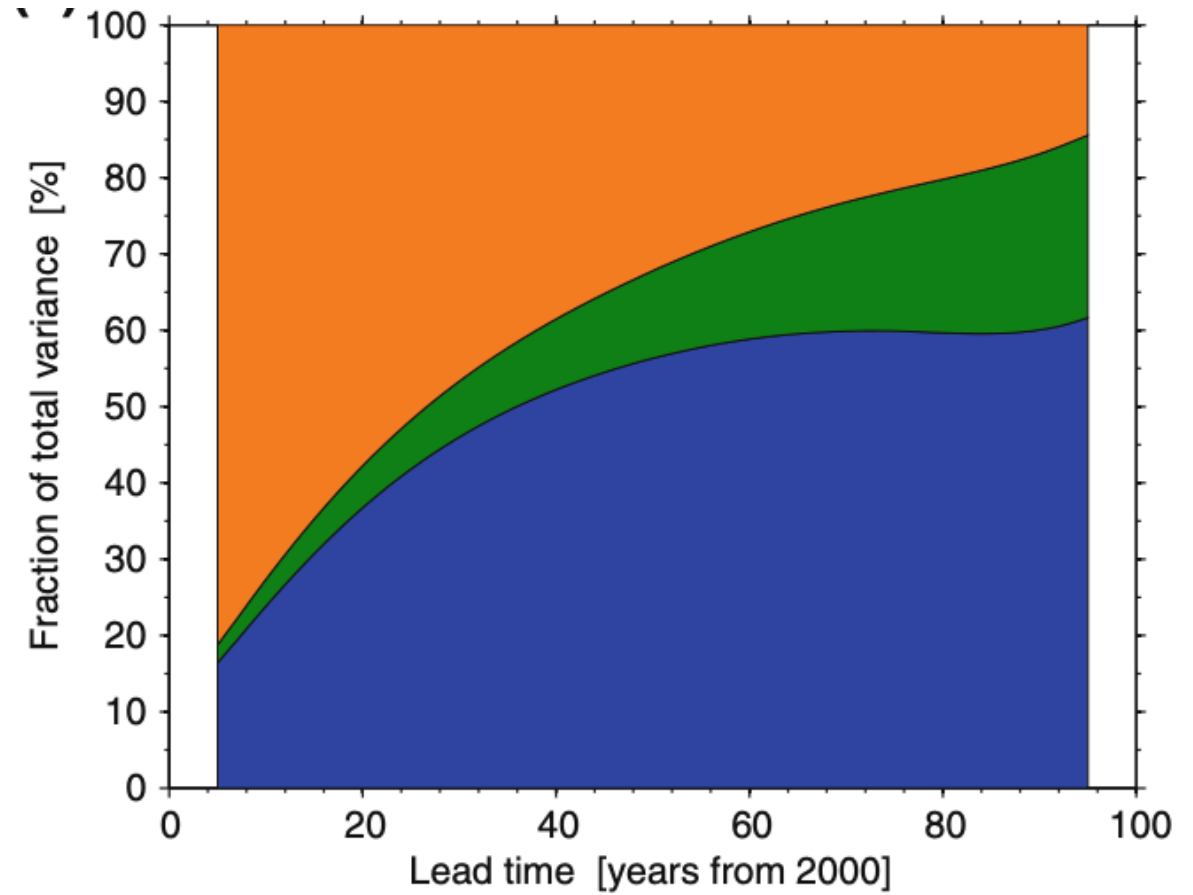


Droughts



Future Climate Data – Uncertainty Sources

- Scenario Uncertainty (~5)
- Model Uncertainty (~20)
- Weather Uncertainty (~10-100)
- If you want to know Precipitation in Naperville
- ~500 possible futures



Other Considerations & Access Points to Popular Datasets

- Computational and storage capacity
- Shared Socioeconomic Pathways (SSPs)

- NASA NEX-GDDP: <https://www.nccs.nasa.gov/services/data-collections/land-based-products/nex-gddp>, https://developers.google.com/earth-engine/datasets/catalog/NASA_GDDP-CMIP6

- LOCA2: <https://loca.ucsd.edu/loca-version-2-for-north-america-ca-jan-2023/>

- Star ESDM: <https://www.depts.ttu.edu/csc/data/>

- Argonne ClimRR: <https://climrr.anl.gov/>

- WorldClim: <https://www.worldclim.org/data/cmip6/cmip6climate.html#>

How does increasing the resolution affect the number of grid cells?

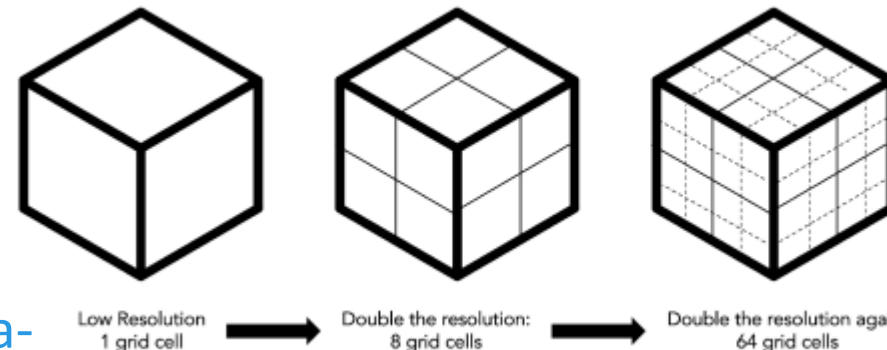


Image: University of Minnesota Climate Adaptation Partnership, 2023

Source: Minnesota Climate Adaptation Partnership

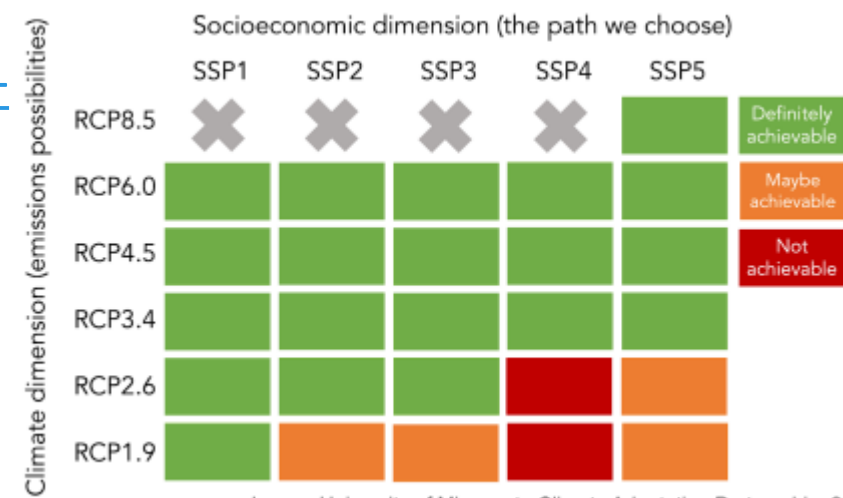


Image: University of Minnesota Climate Adaptation Partnership, 2023

Gridded Weather & Climate Datasets – Observed & Reanalysis

Argonne CLMRR



Climate Mapping for Adaptation



Questions?



Trent Ford, PhD

Illinois state climatologist

University of Illinois Prairie Research Institute

Speakers



Scott Kuykendall

Water resources specialist

McHenry County Planning and Development

Groundwater Monitoring Resources of McHenry County



Scott Kuykendall

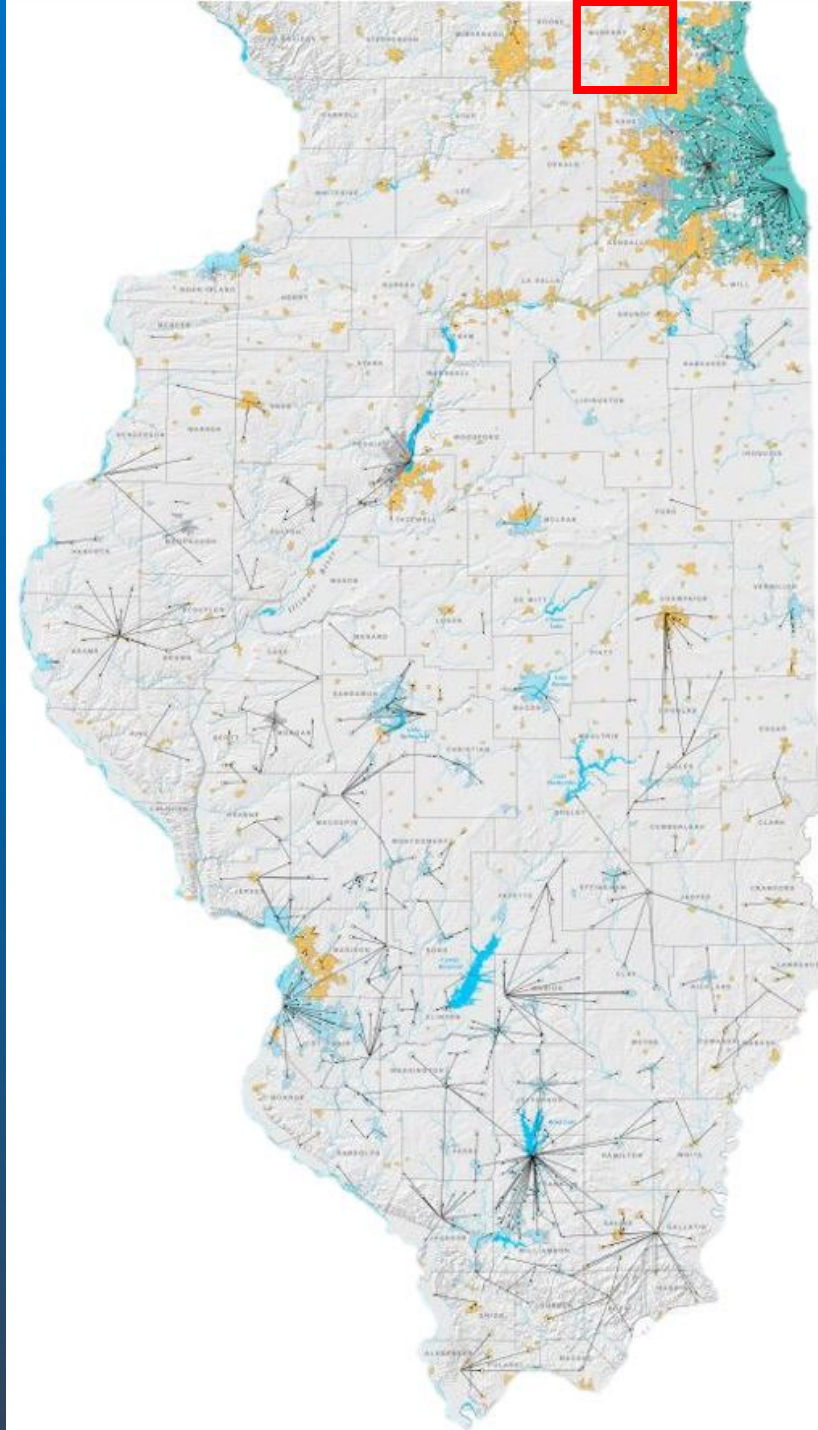
Water Resources Specialist

McHenry County Planning and Development

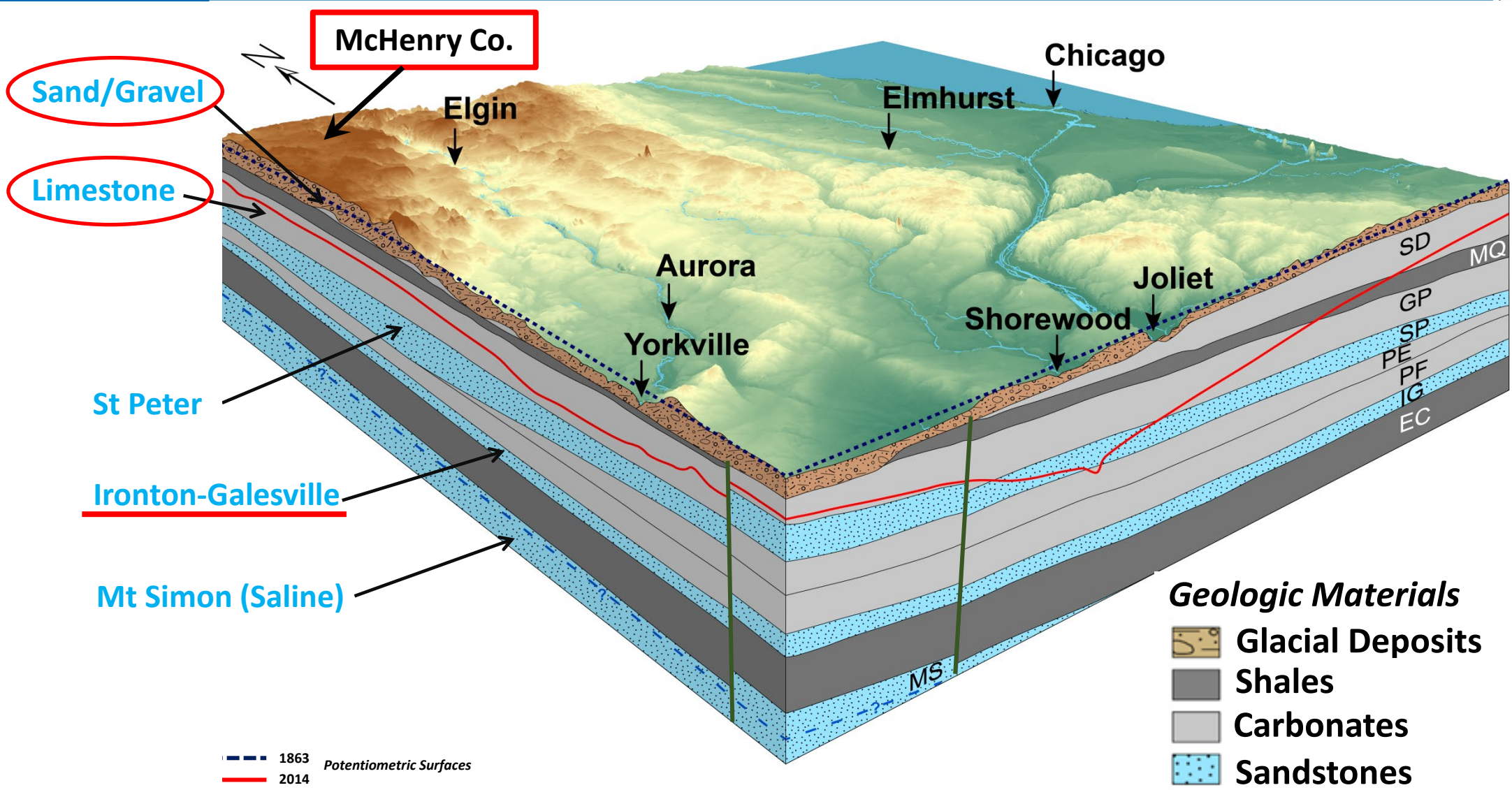
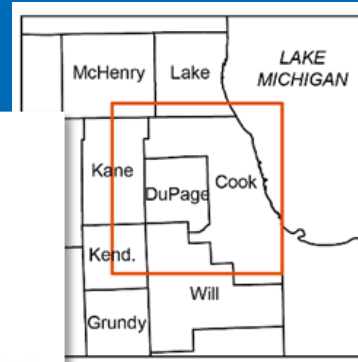
DISTRIBUTION OF PUBLIC WATER USE IN ILLINOIS

Illinois Drinking Water Comes From:

- Groundwater
- Lakes
- Rivers
- Reservoirs

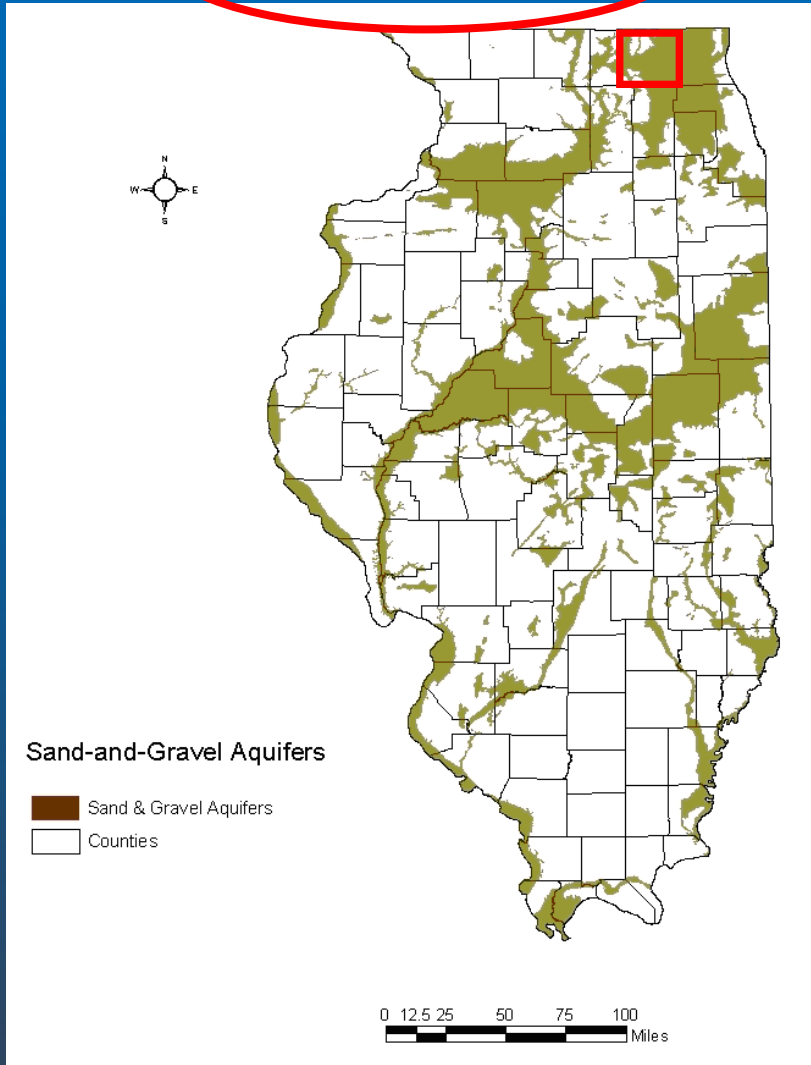


McHENRY COUNTY GROUNDWATER AQUIFERS

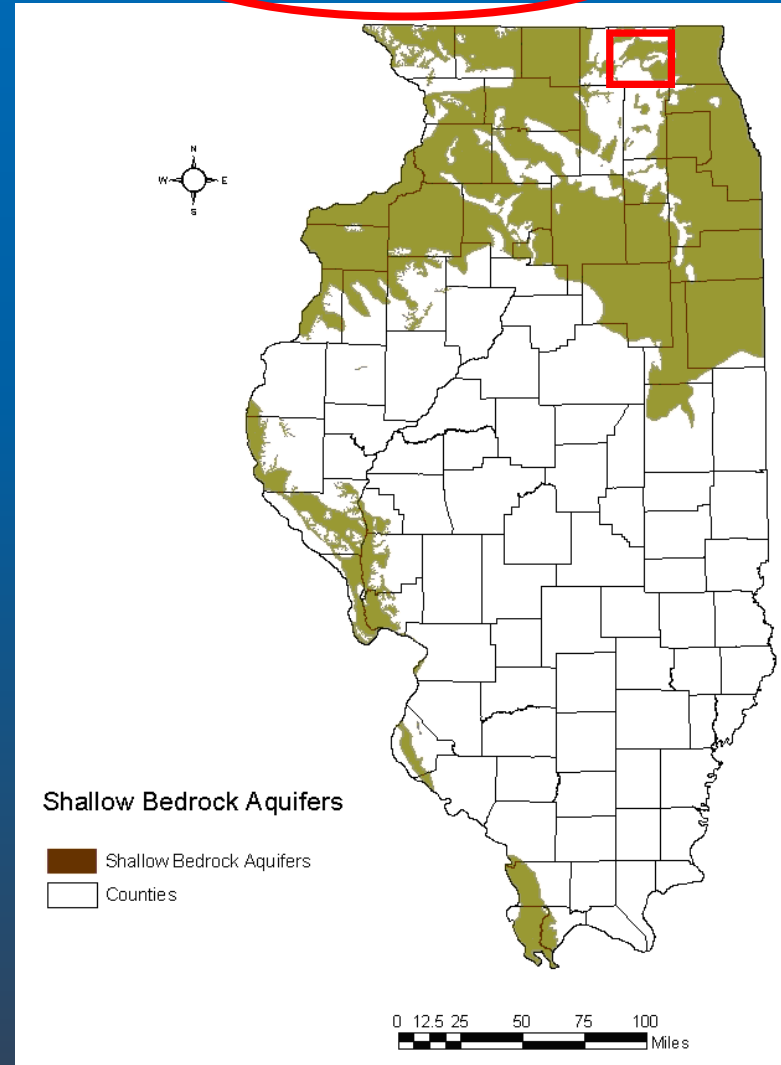


GROUNDWATER AQUIFER DISTRIBUTION IN ILLINOIS

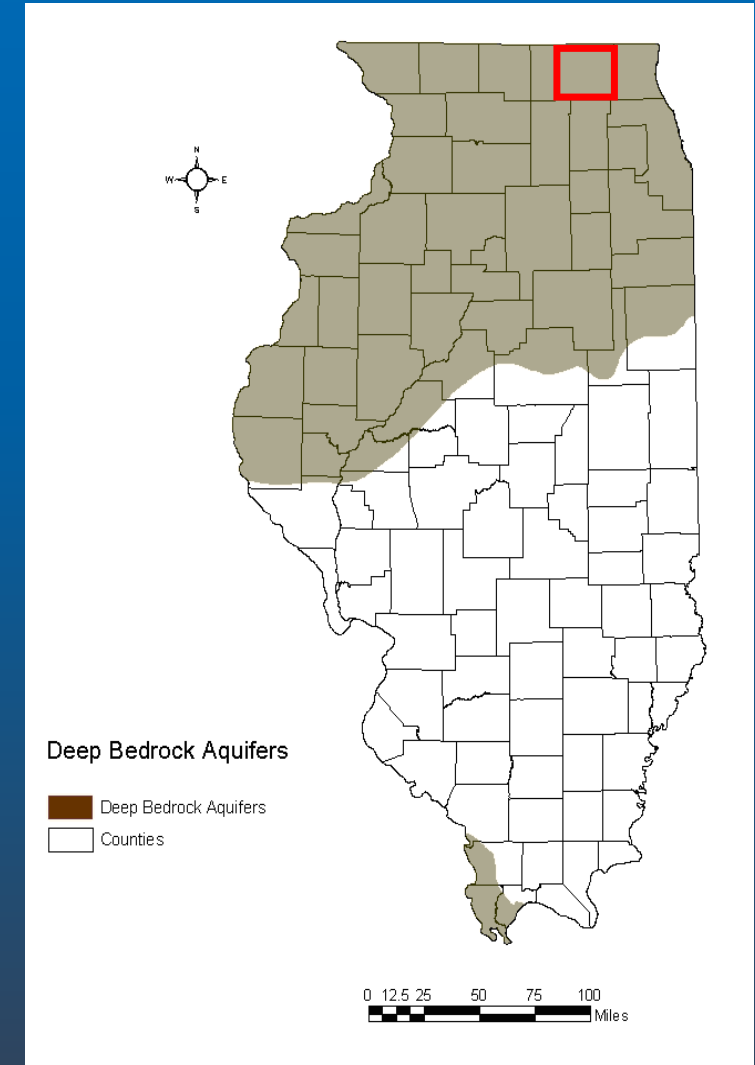
Sand & Gravel



Limestone



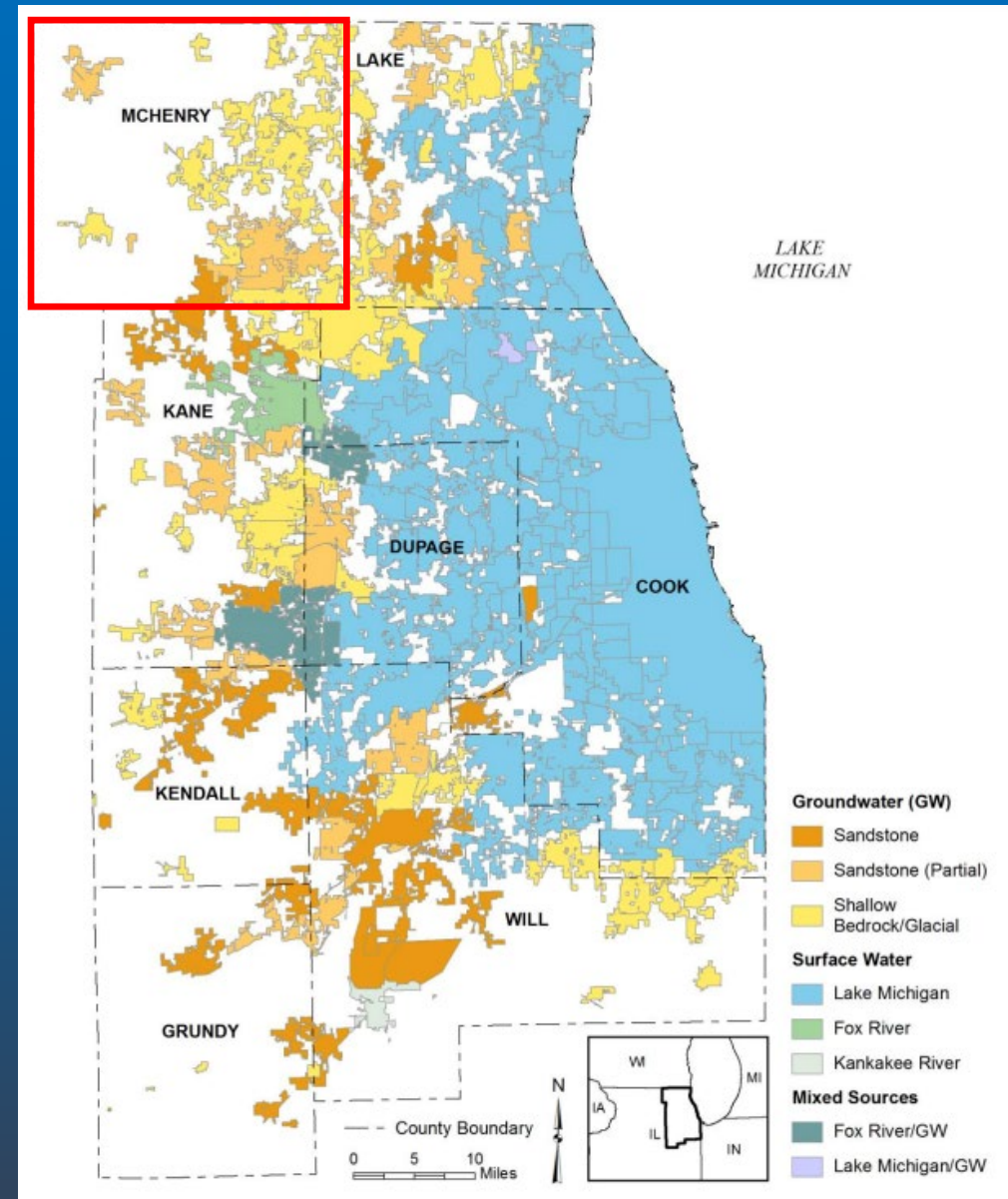
Sandstone



SOURCES OF WATER USE IN CHICAGO REGION

- Lake Michigan
- Groundwater
- Fox River and Groundwater
 - Elgin
 - Aurora

**McHenry County
100% Groundwater !**

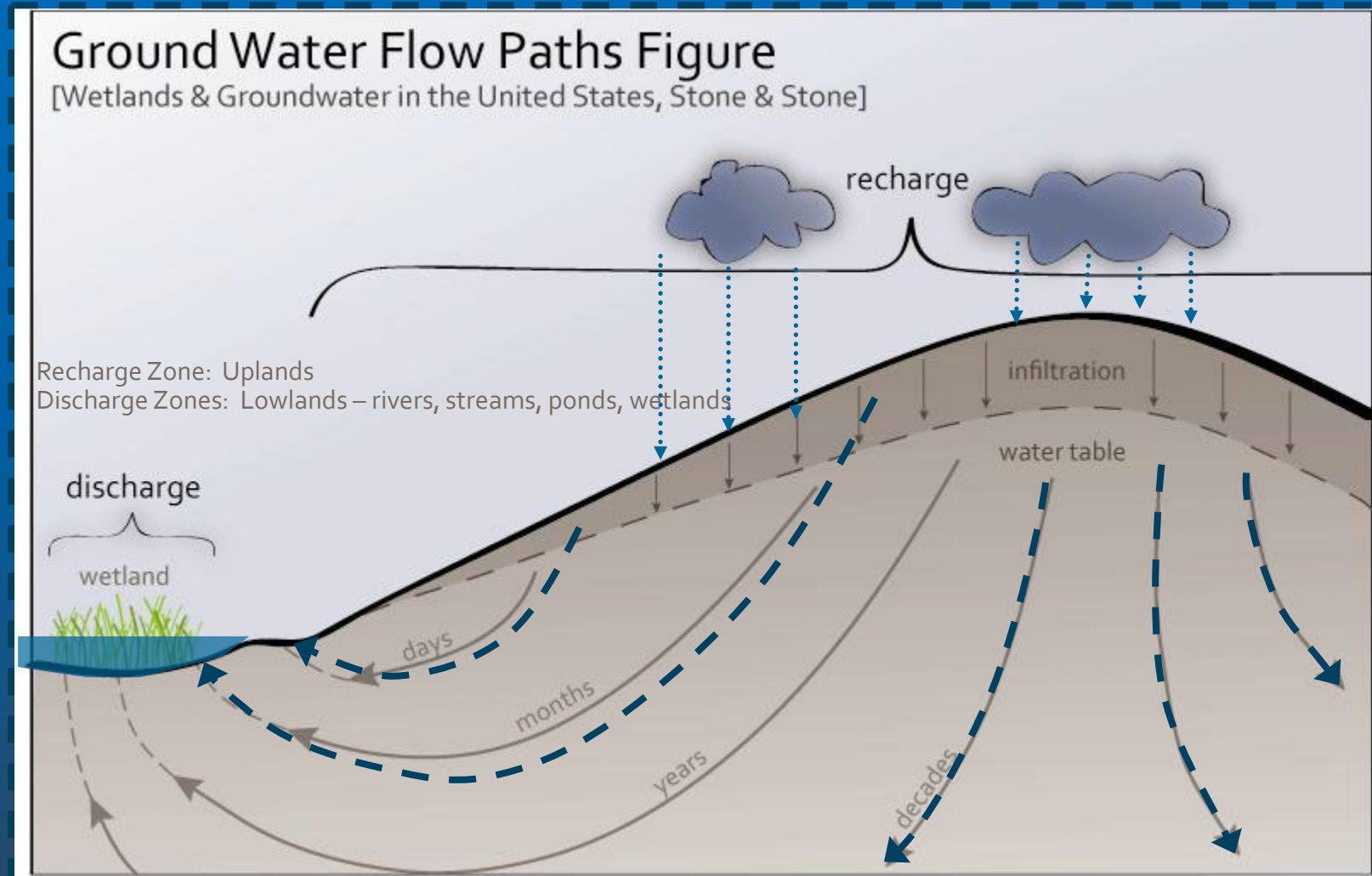


OUR WATER RESOURCES ARE VULNERABLE...

- **Over-Consumption** (finite supply)
- **Pollution** (air, land, in ground)
- **Flooding** (runoff exceeds capacity for infiltration, infrastructure, receiving waters)
- **Drought** (supply decreases/demand increases)

NATURAL HYDROLOGY

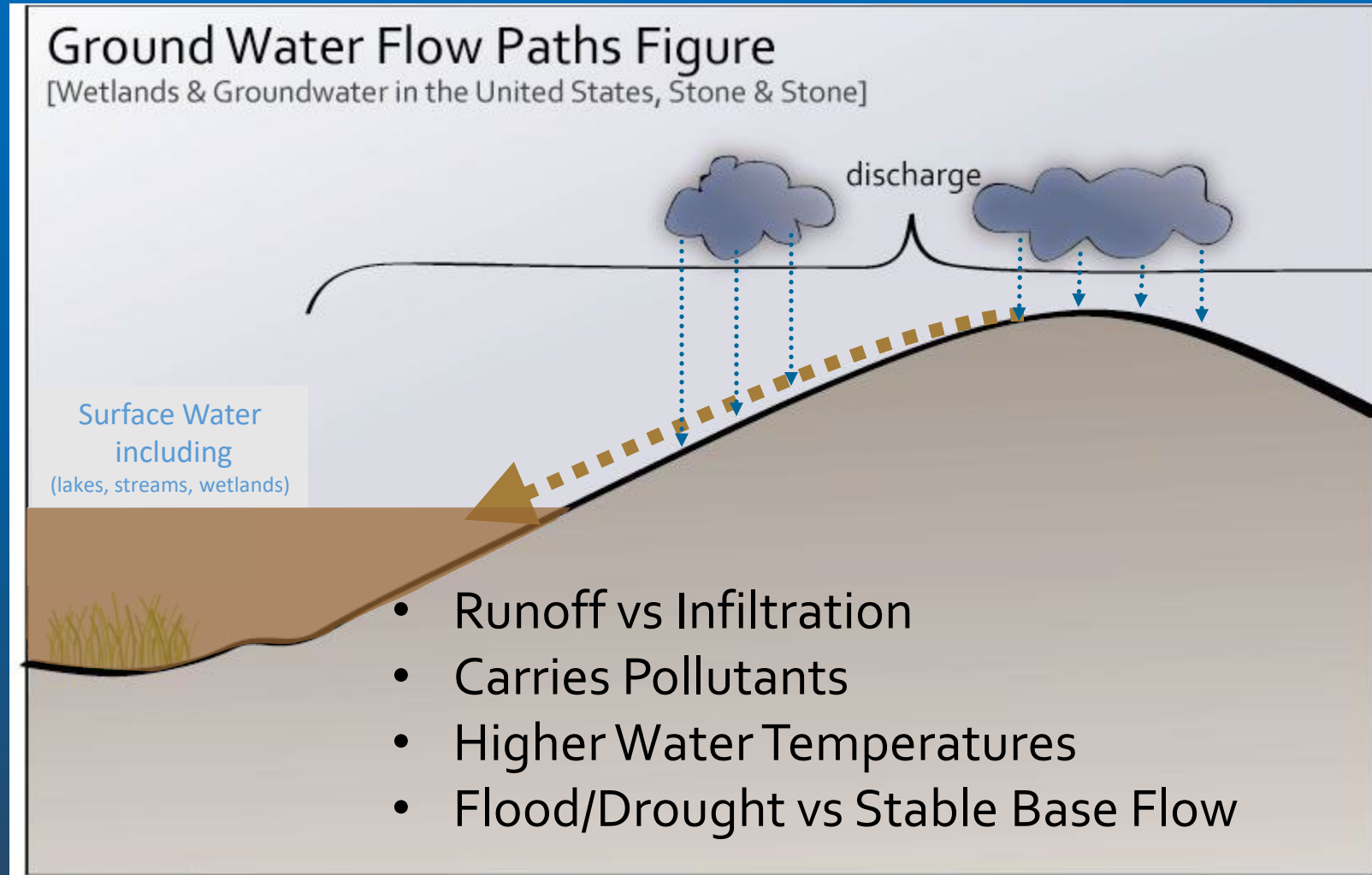
Slide courtesy of James Patchett



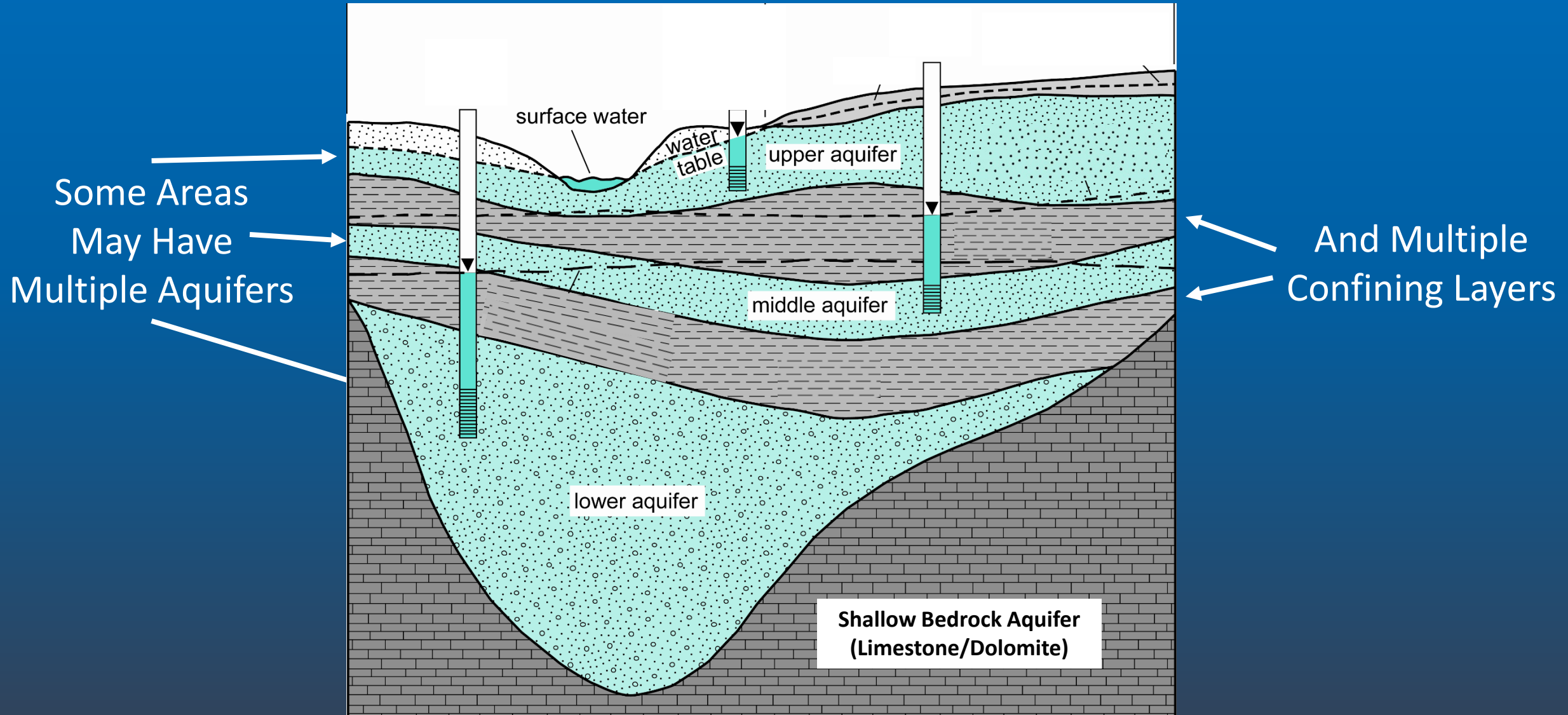
- Naturally cooled
- Naturally cleaned
- Steady baseflow
- Limited evaporation

Constant, clean discharge flows, year-round to sustain stable surface water hydrology with constant water temperature and chemistry

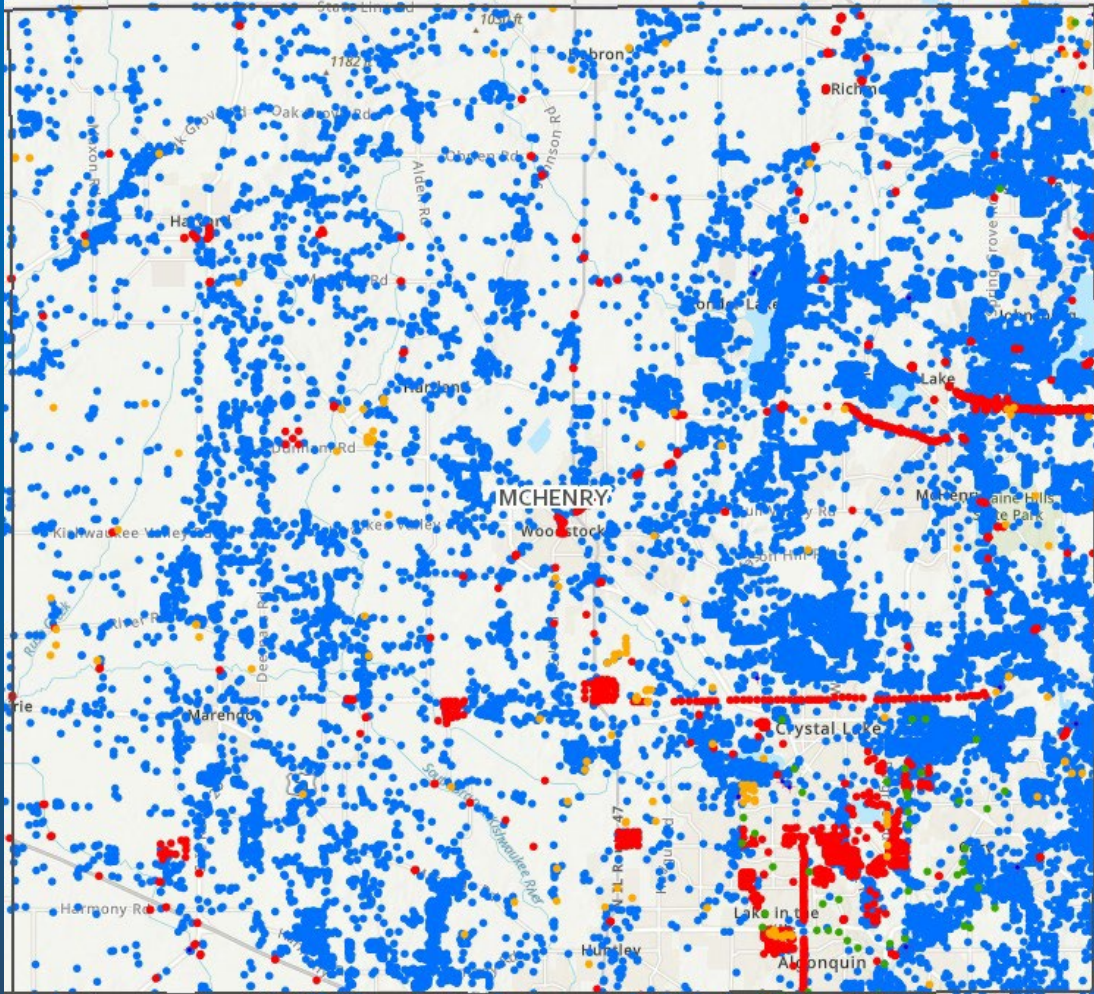
- Thermal pollution
- Sediment
- Oils and greases
- Heavy metals
- Toxic chemicals
- Fertilizers
- Pesticides
- Salts
- Septic waste
- Animal waste
- Bacteria
- Etc...



SAND AND GRAVEL AND SHALLOW BEDROCK AQUIFERS

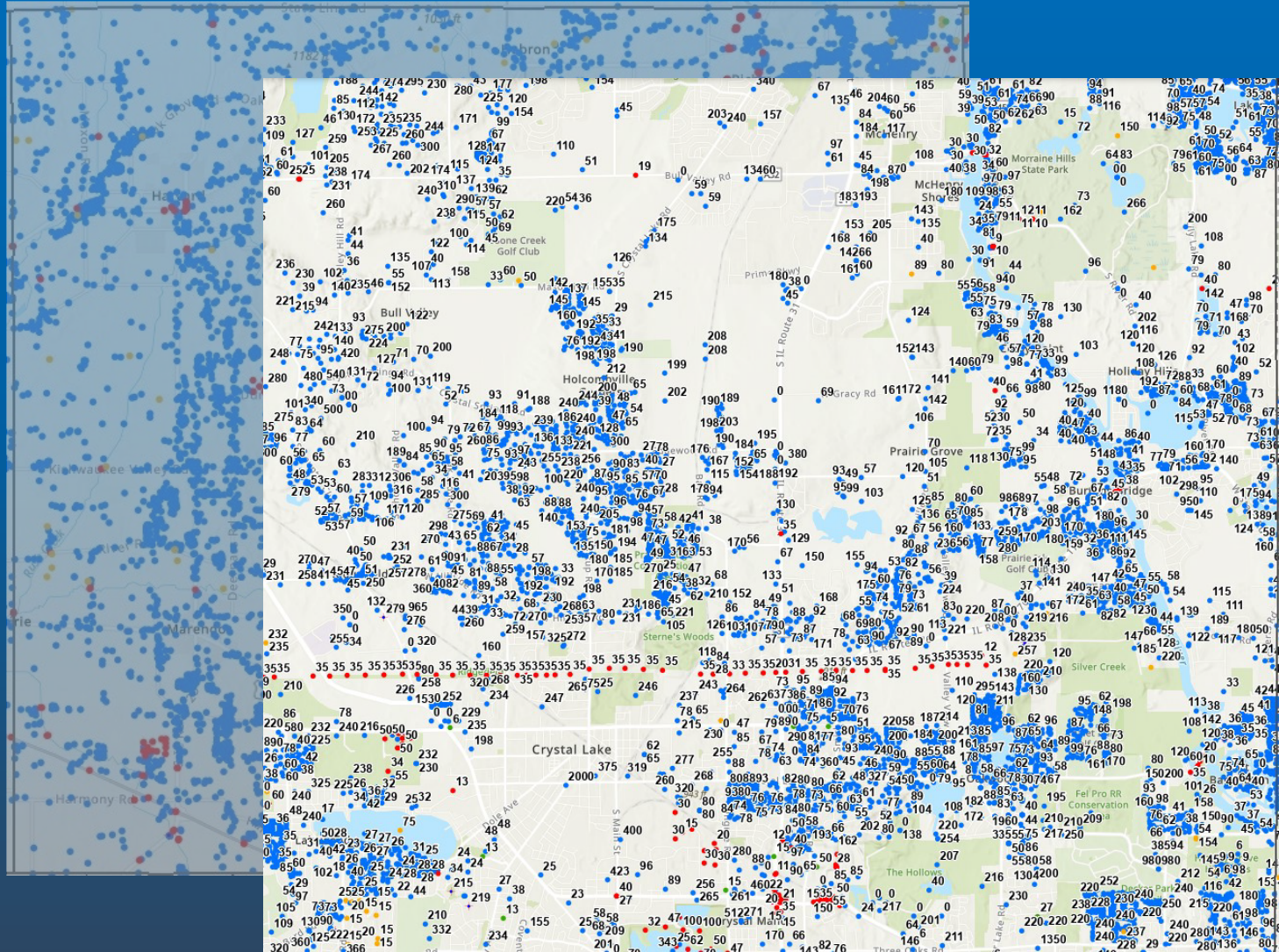


GROUNDWATER WELLS IN MCHENRY COUNTY



There are records for over
20,000 private wells
in McHenry County

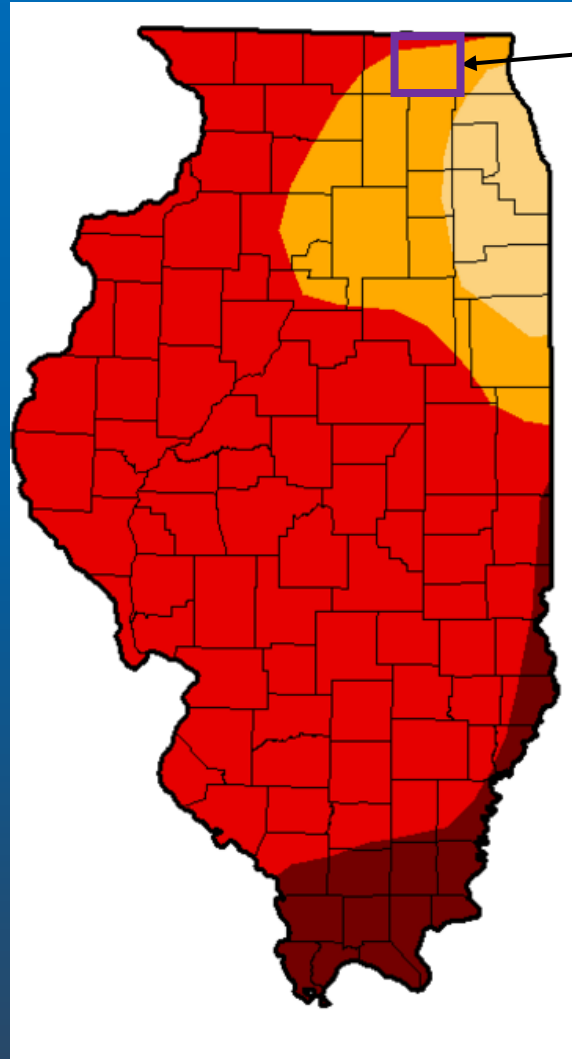
GROUNDWATER WELLS IN MCHENRY COUNTY



Most of these wells:

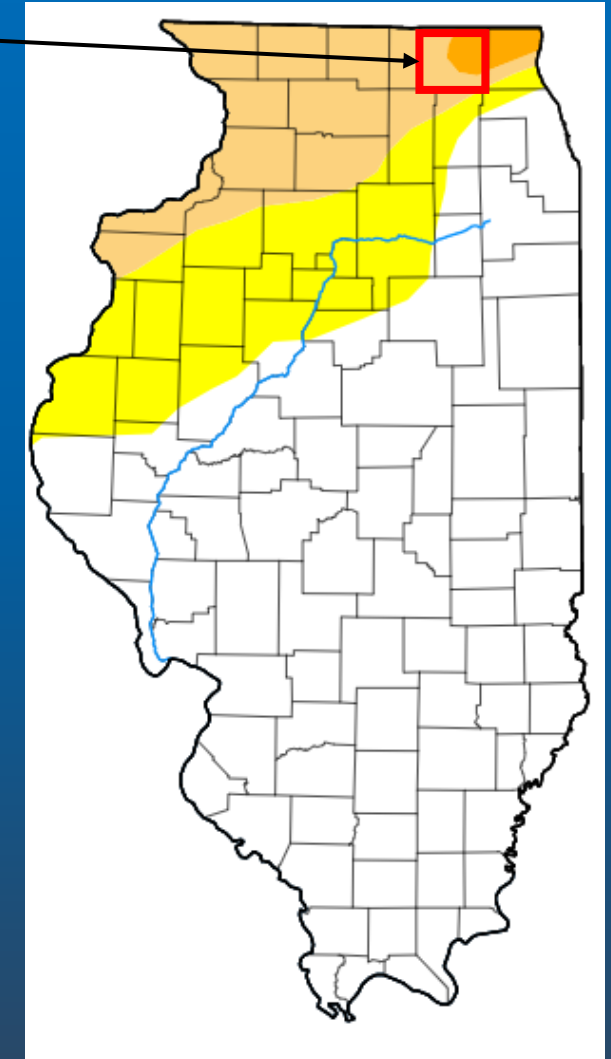
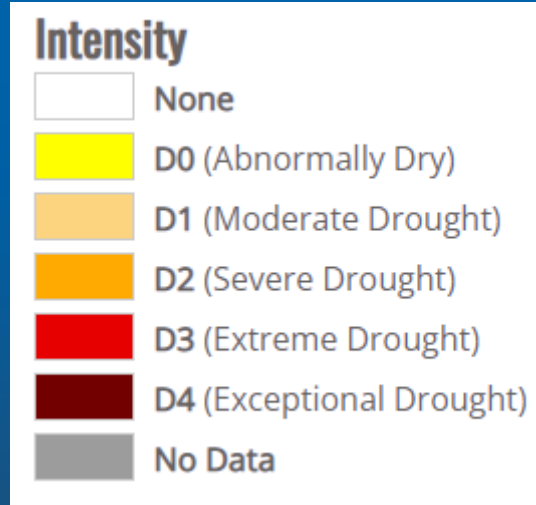
- Between 8' to 300' deep
- Draw water from the sand and gravel or shallow bedrock (limestone) aquifers

DROUGHT CONDITIONS IN 2012 AND 2022



August 7, 2012

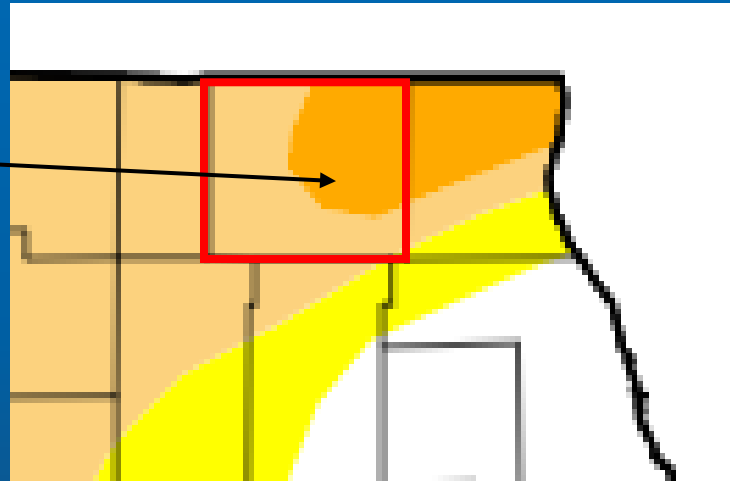
McHenry County



March 30, 2022

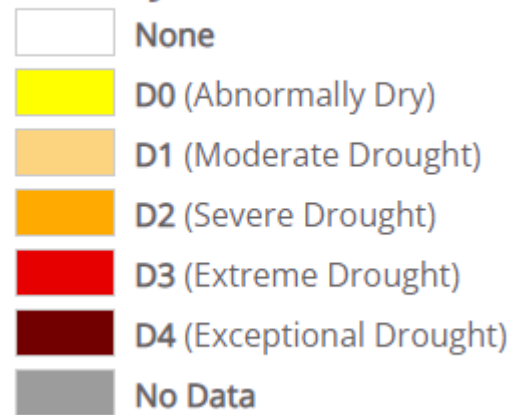
SEVERE DROUGHT CONDITIONS IN MCHENRY COUNTY 2020, 2021 AND PART OF 2022 (DROUGHTS RETURNED IN 2023, 2024, & 2025)

McHenry County



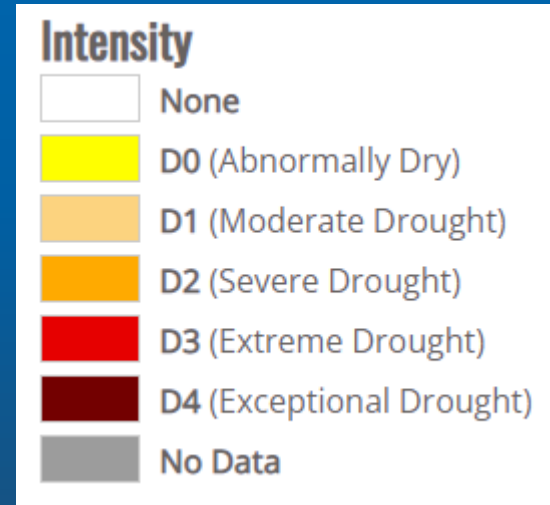
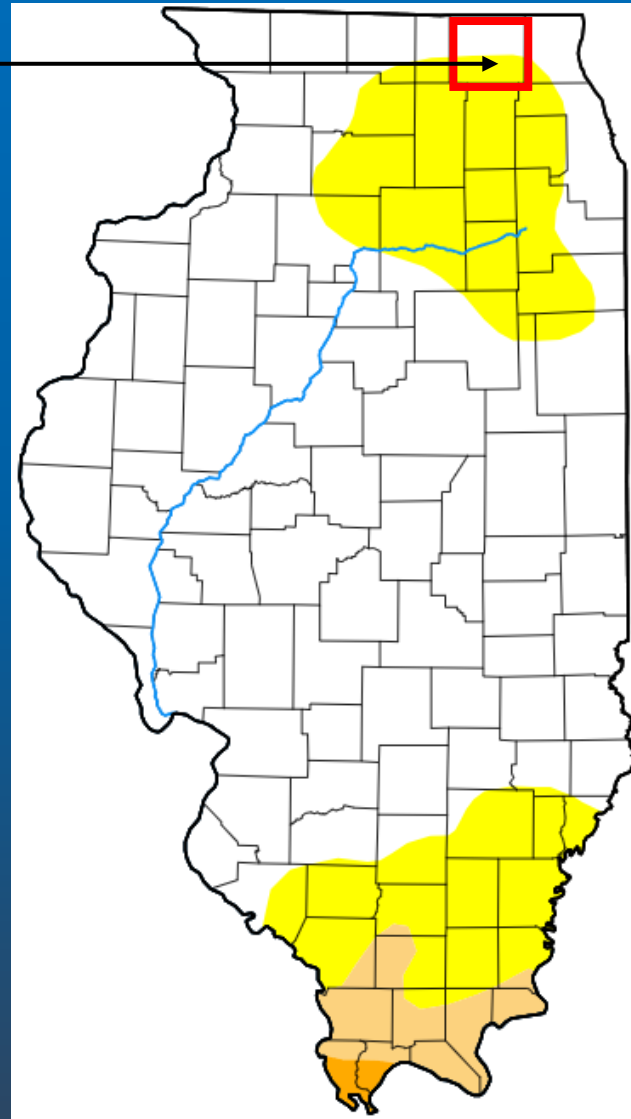
Drought fluctuated between Moderate, Severe, and Extreme Drought for several years

Intensity



DROUGHT CONDITIONS NOW

McHenry County



5-26-2026

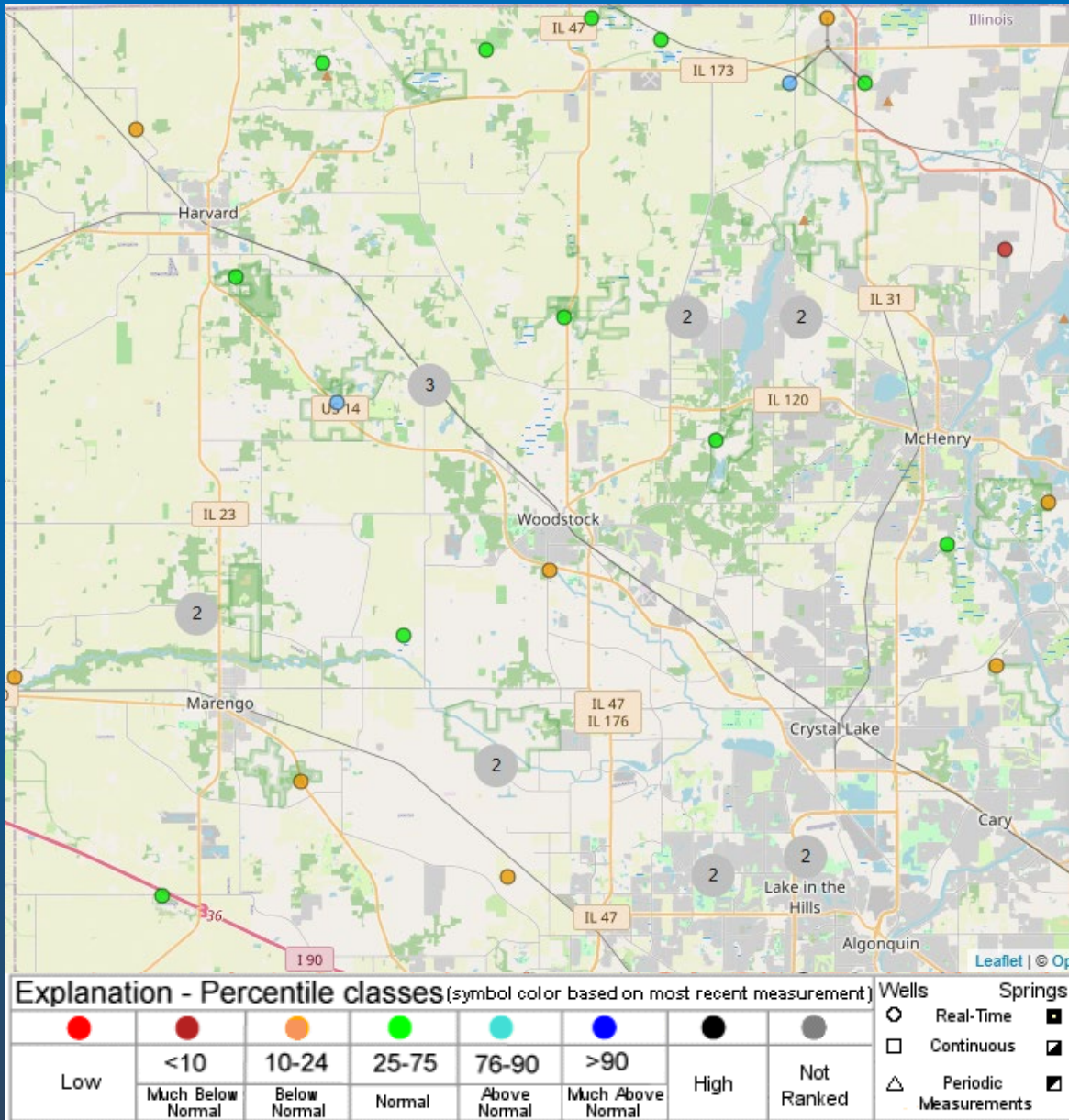
U.S. Drought Monitor

GROUNDWATER MONITORING WELL NETWORK (2009)

www.mchenryH2O.com



- Network of 37 Active Monitoring Wells
- Measure Water levels Every 15 Minutes
- Transmits Data To USGS Satellites
- USGS Maintains Data Online



5-26-2026

USGS Water Quality Monitoring

2010 Study



Prepared in cooperation with the McHenry County, Illinois

Hydrogeology and Water Quality of Sand and Gravel Aquifers in McHenry County, Illinois, 2009–14, and Comparison to Conditions in 1979



Prepared in cooperation with McHenry County, Illinois

Water Quality of Sand and Gravel Aquifers in McHenry County, Illinois, 2020 and Comparisons to Conditions in 2010



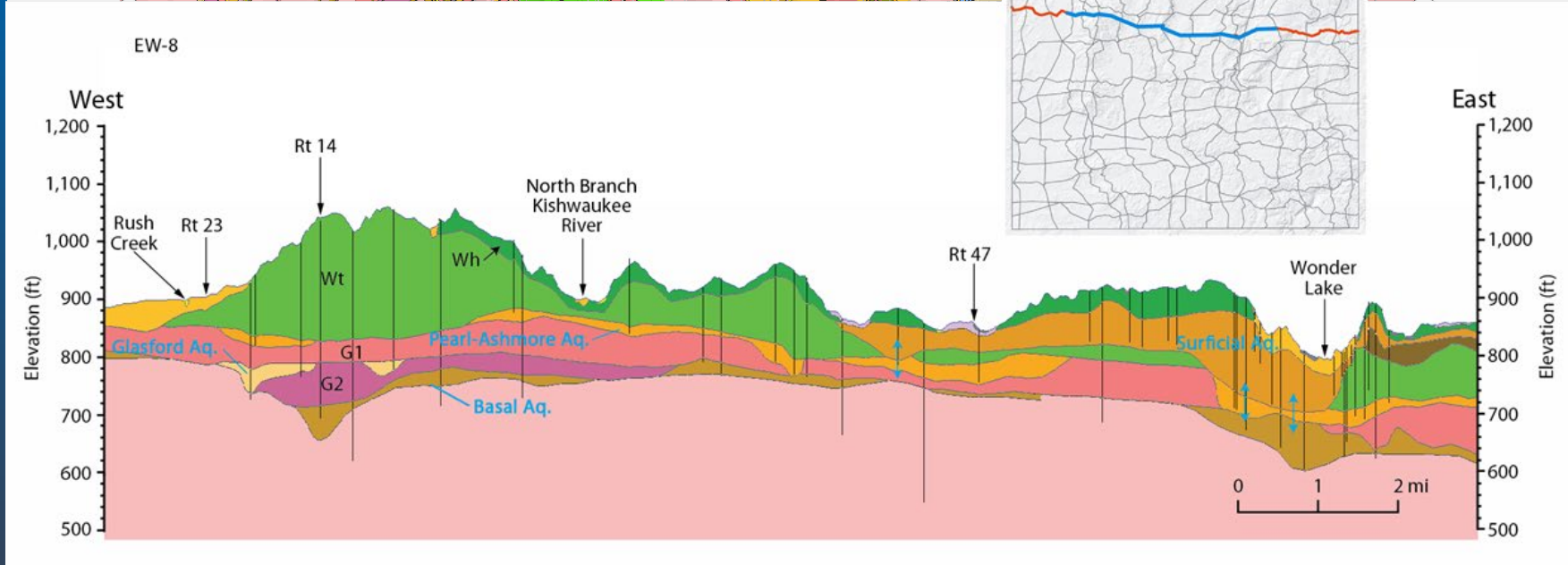
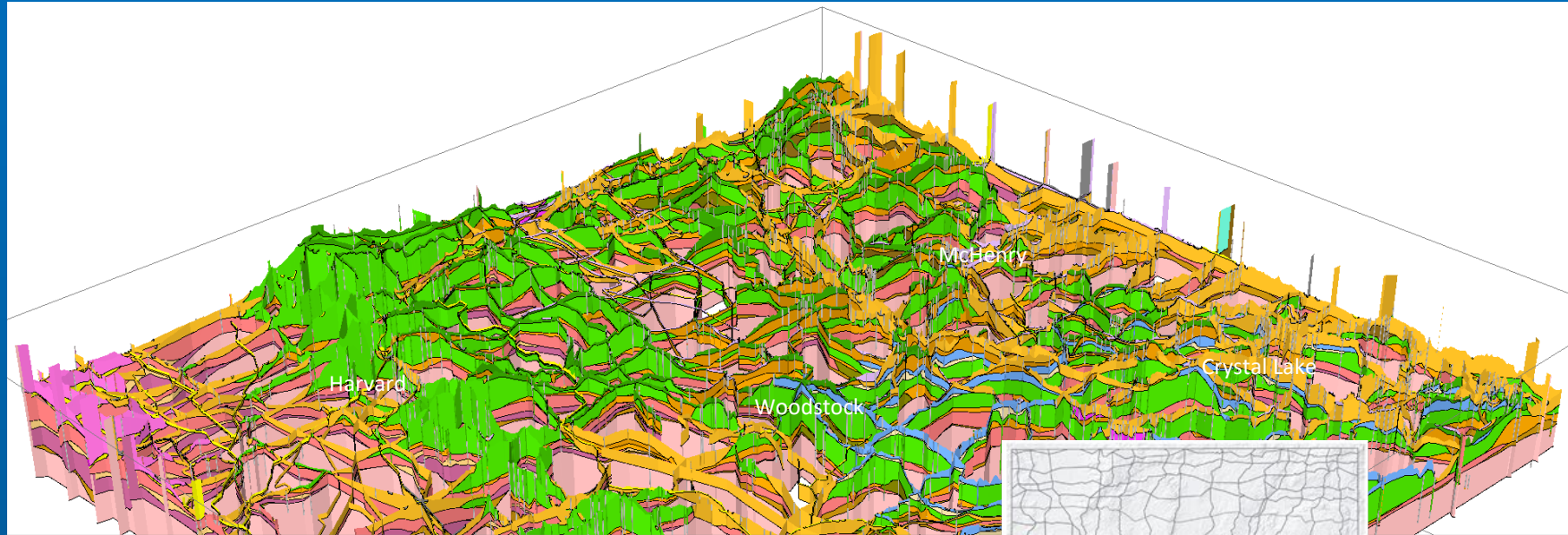
Scientific Investigations Report 2022–5110

U.S. Department of the Interior
U.S. Geological Survey

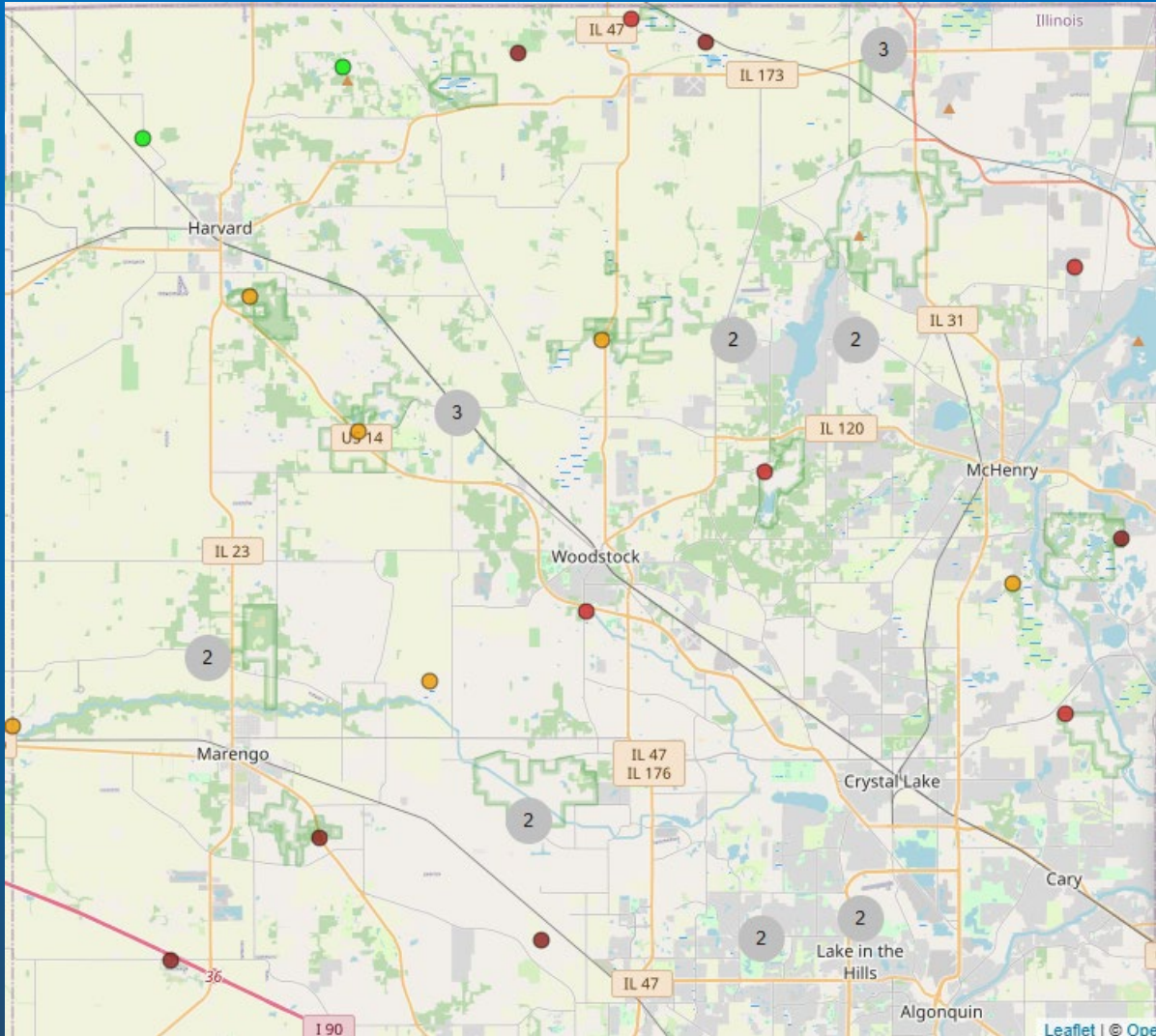
2020 Study

- Well network is monitored for water quality every 10 years
- USGS conducted water quality sampling in 2010 & 2020
- 2020 study added sampling for Contaminants of Emerging Concern at 12 wells
- 2020 study also collected samples at several wells to use for exploratory testing of PFAS

3D Geologic Mapping for McHenry County

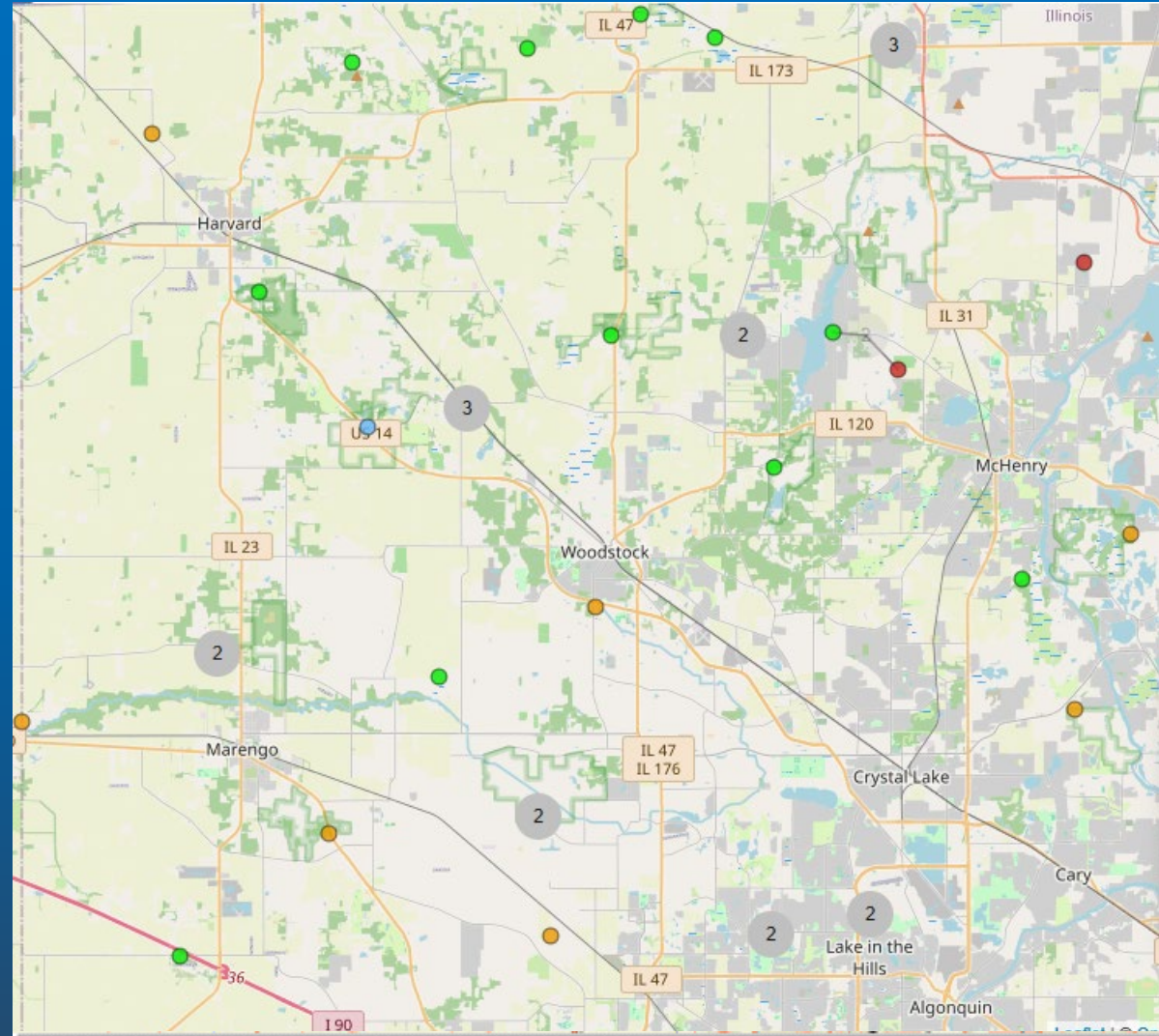


GROUNDWATER MONITORING WELL NETWORK (CHANGING WATER LEVELS)



Explanation - Percentile classes (symbol color based on most recent measurement)								Wells		Springs	
●	●	●	●	●	●	●	●	○	□	■	■
Low	<10	10-24	25-75	76-90	>90	High	Not Ranked	○	□	■	■
	Much Below Normal	Below Normal	Normal	Above Normal	Much Above Normal			○	□	■	■
								△			■
								Real-Time	Continuous		Periodic Measurements

11-3-2025



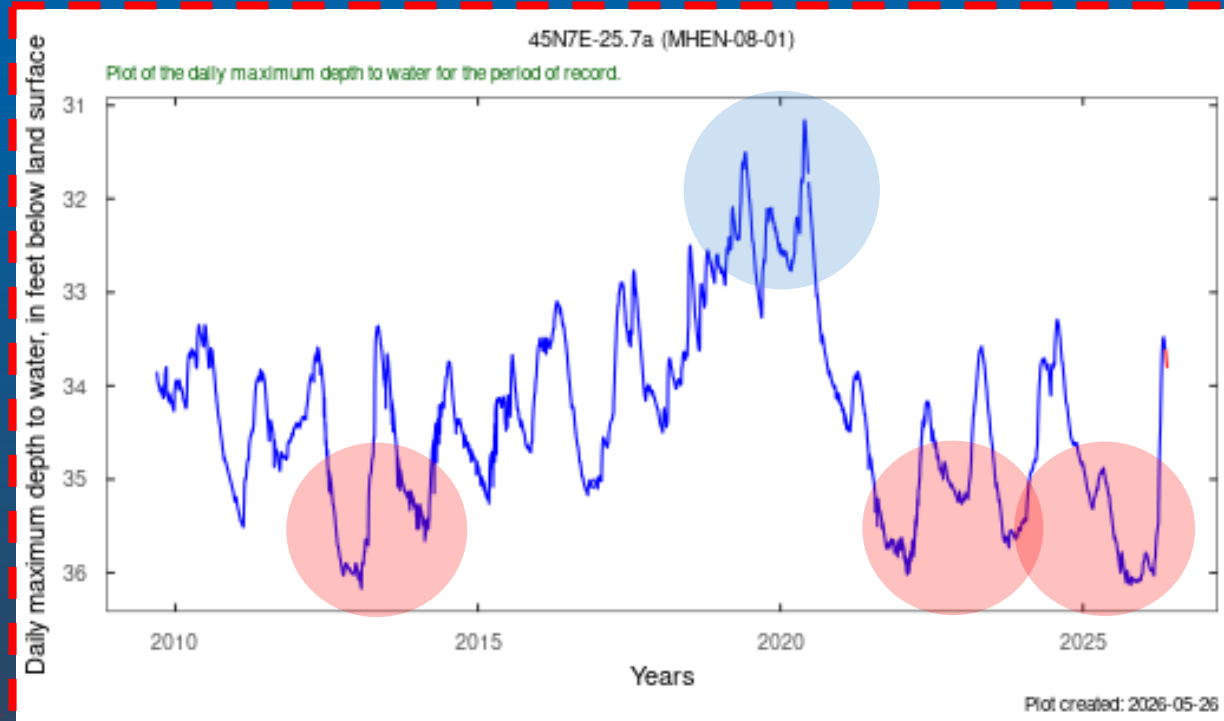
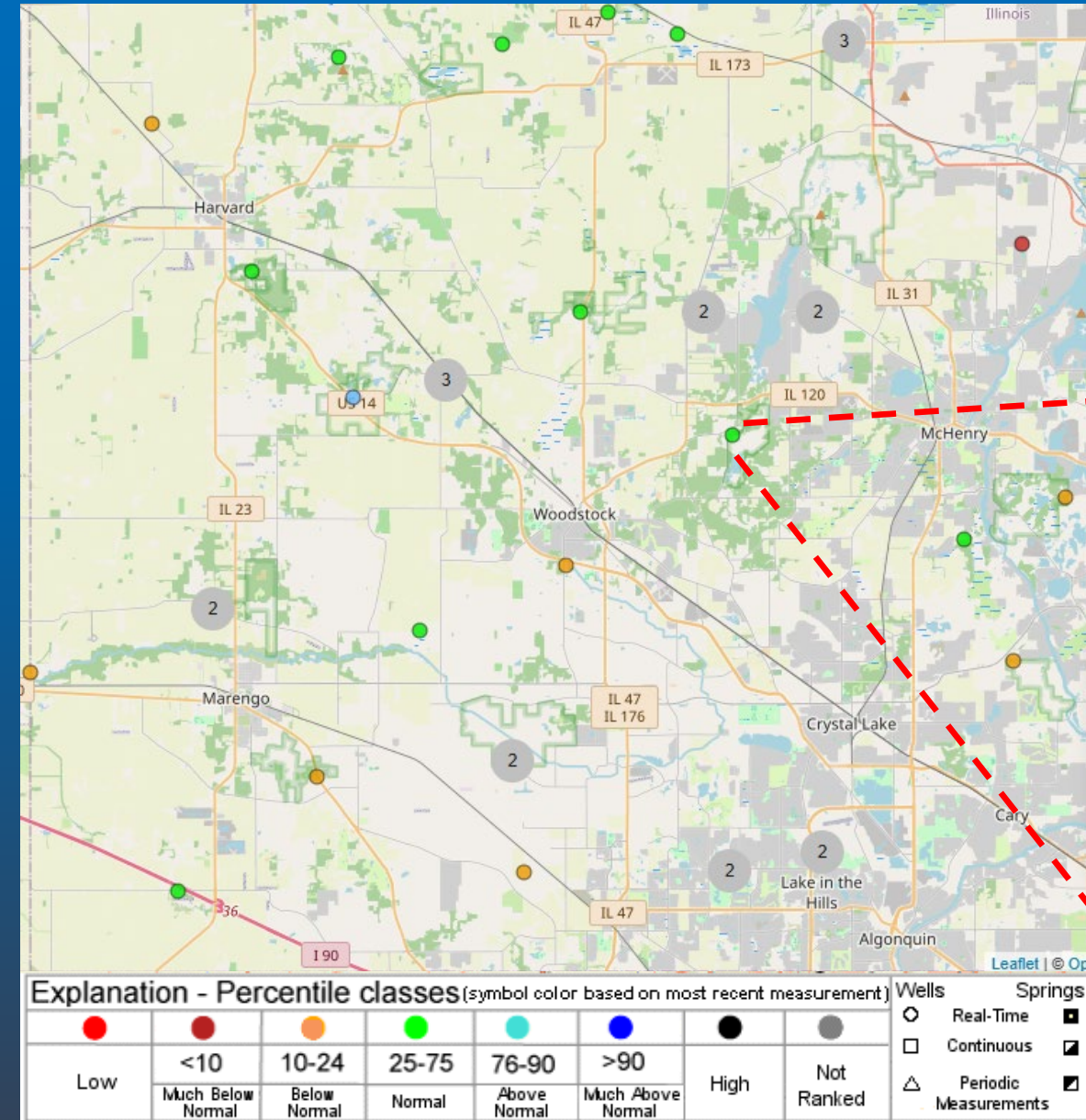
Explanation - Percentile classes (symbol color based on most recent measurement)								Wells		Springs	
●	●	●	●	●	●	●	●	○	□	■	■
Low	<10	10-24	25-75	76-90	>90	High	Not Ranked	○	□	■	■
	Much Below Normal	Below Normal	Normal	Above Normal	Much Above Normal			○	□	■	■
								△			■
								Real-Time	Continuous		Periodic Measurements

5-26-26

McHENRY COUNTY GROUNDWATER MONITORING WELL NETWORK

www.mchenryH2O.com

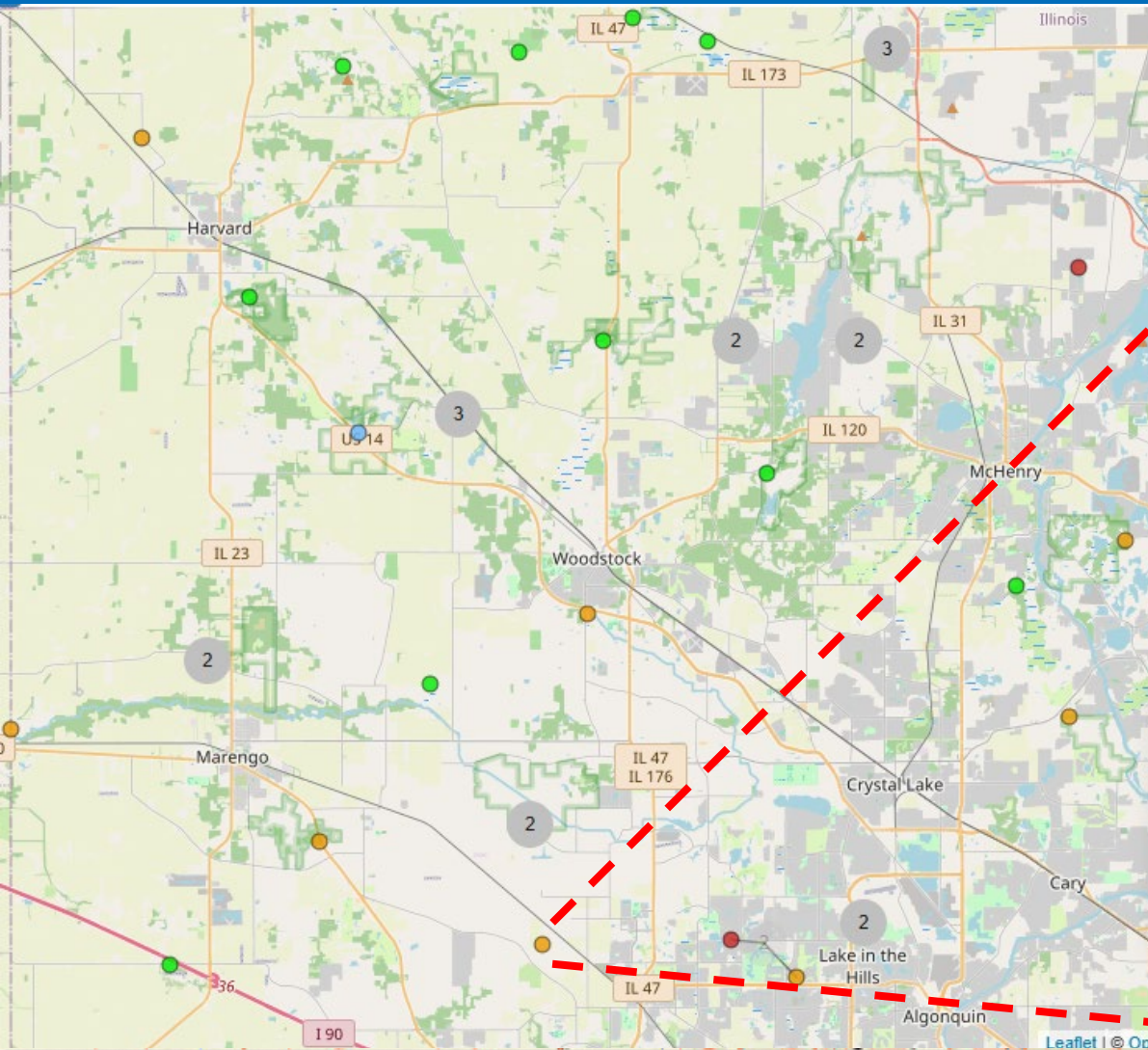
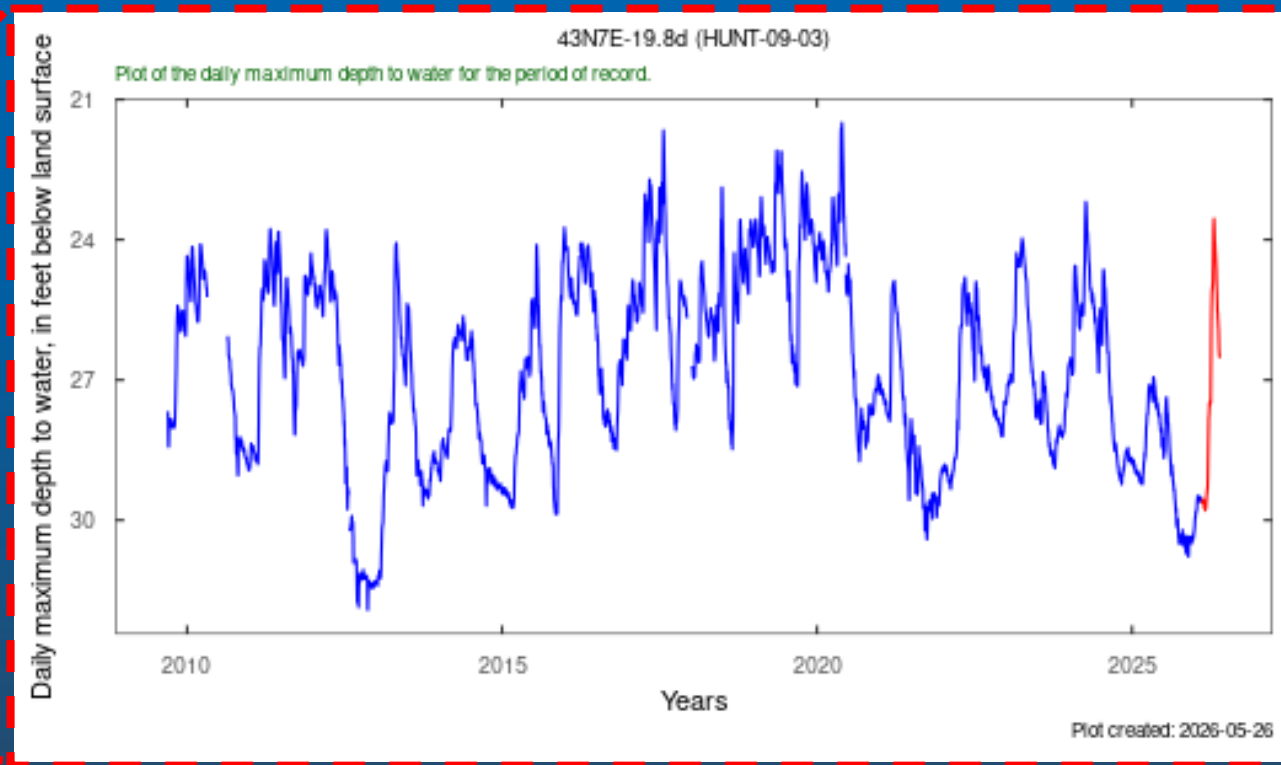
CAPTURED DATA FROM 2009 TO THE PRESENT
INCLUDING MULTIPLE MAJOR DROUGHTS AND
AN EXTENDED PERIOD OF EXTREME PRECIPITATION



5-26-26

GROUNDWATER LEVELS

McHenry County Groundwater Monitoring Wells
43N7E-19-8d (HUNT-19-03) - 150.7'



Explanation - Percentile classes (symbol color based on most recent measurement)							Wells		Springs	
● Low	● <10	● 10-24	● 25-75	● 76-90	● >90	● High	● Not Ranked	○ Real-Time	■	
	● Much Below Normal	● Below Normal	● Normal	● Above Normal	● Much Above Normal			□ Continuous	■	
								△ Periodic Measurements	■	

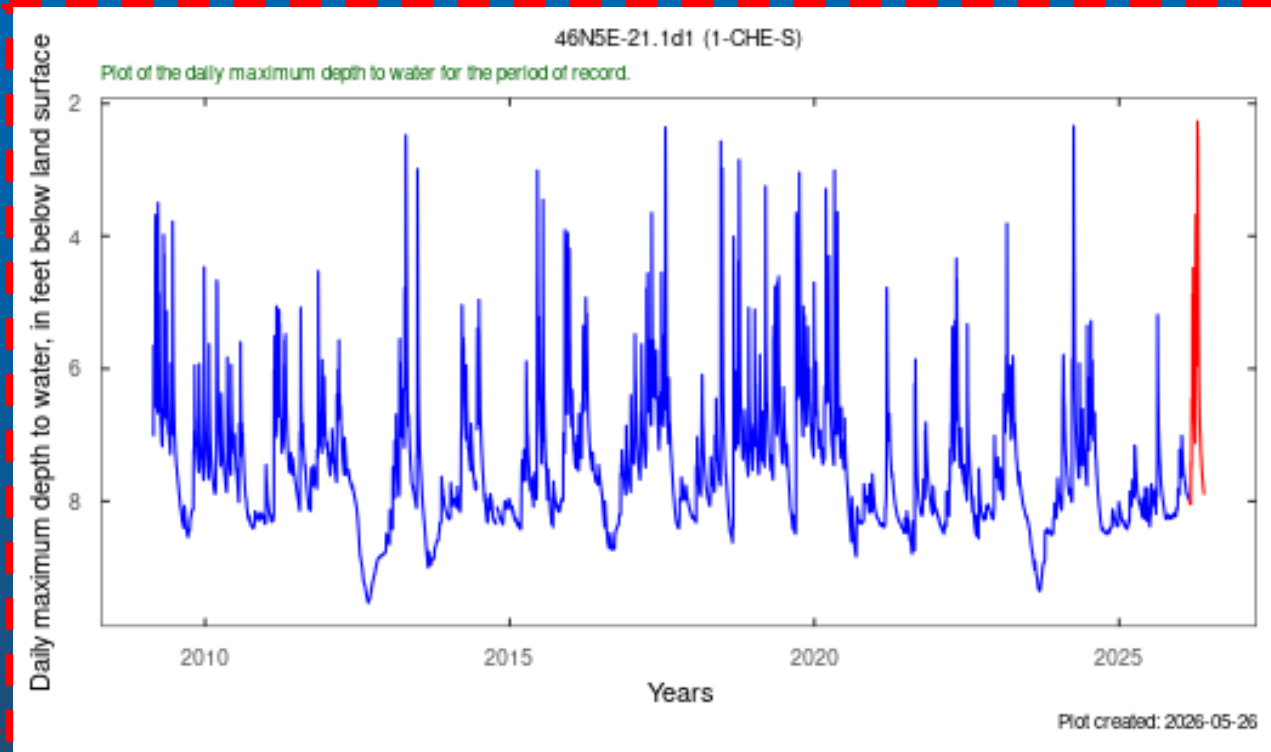
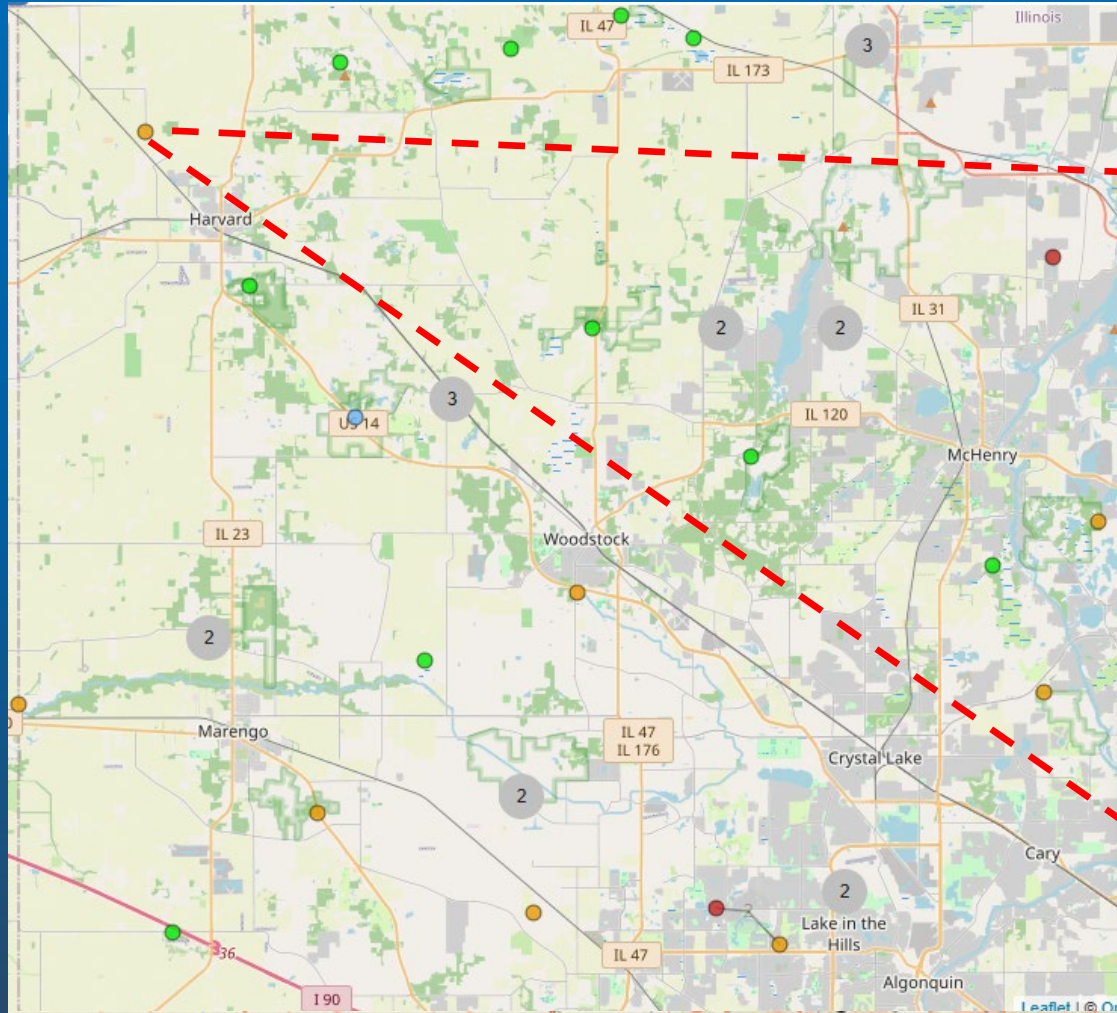
5-26-2026

USGS

GROUNDWATER LEVELS

www.mchenryH2O.com

McHenry County Groundwater Monitoring Wells 46N5E-21.1d1 (1-CHE-S) - 40.3'



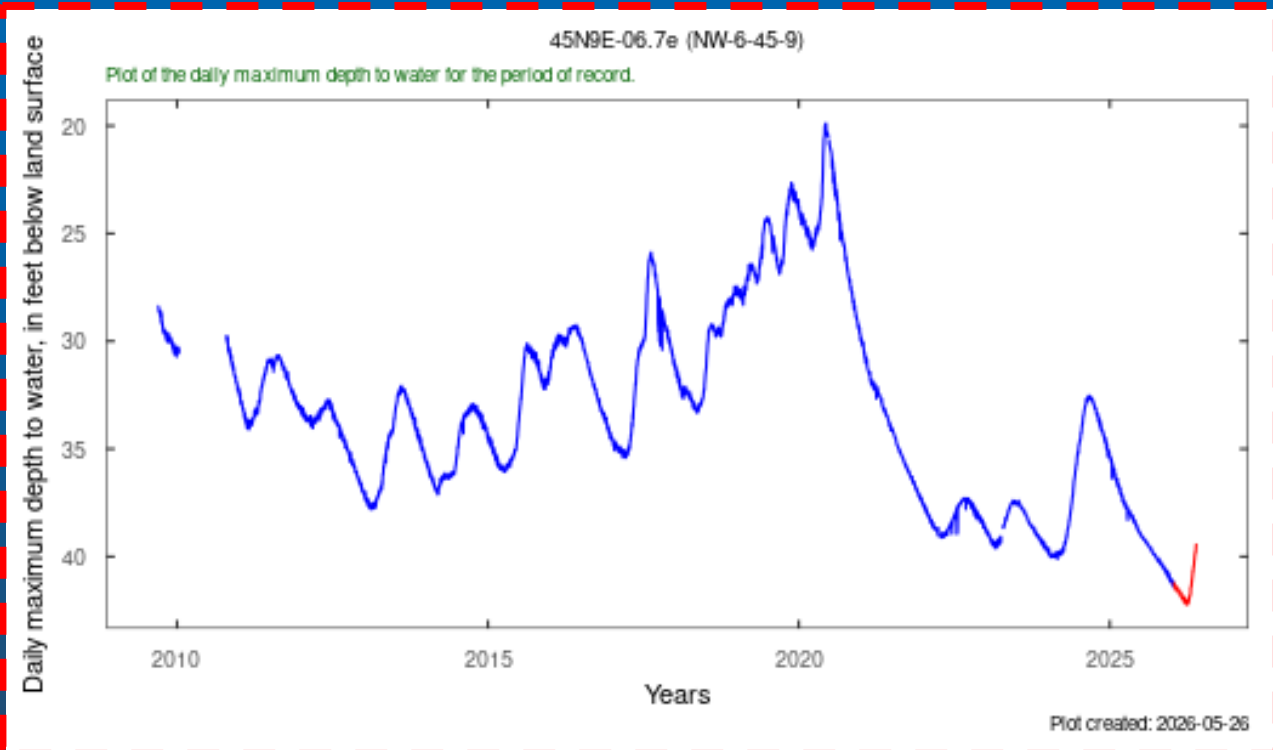
5-26-2026

USGS

Explanation - Percentile classes (symbol color based on most recent measurement)							Wells		Springs	
●	●	●	●	●	●	●	○	□	■	▲
Low	<10	10-24	25-75	76-90	>90	High	Real-Time	Continuous	Periodic Measurements	Not Ranked
	Much Below Normal	Below Normal	Normal	Above Normal	Much Above Normal					

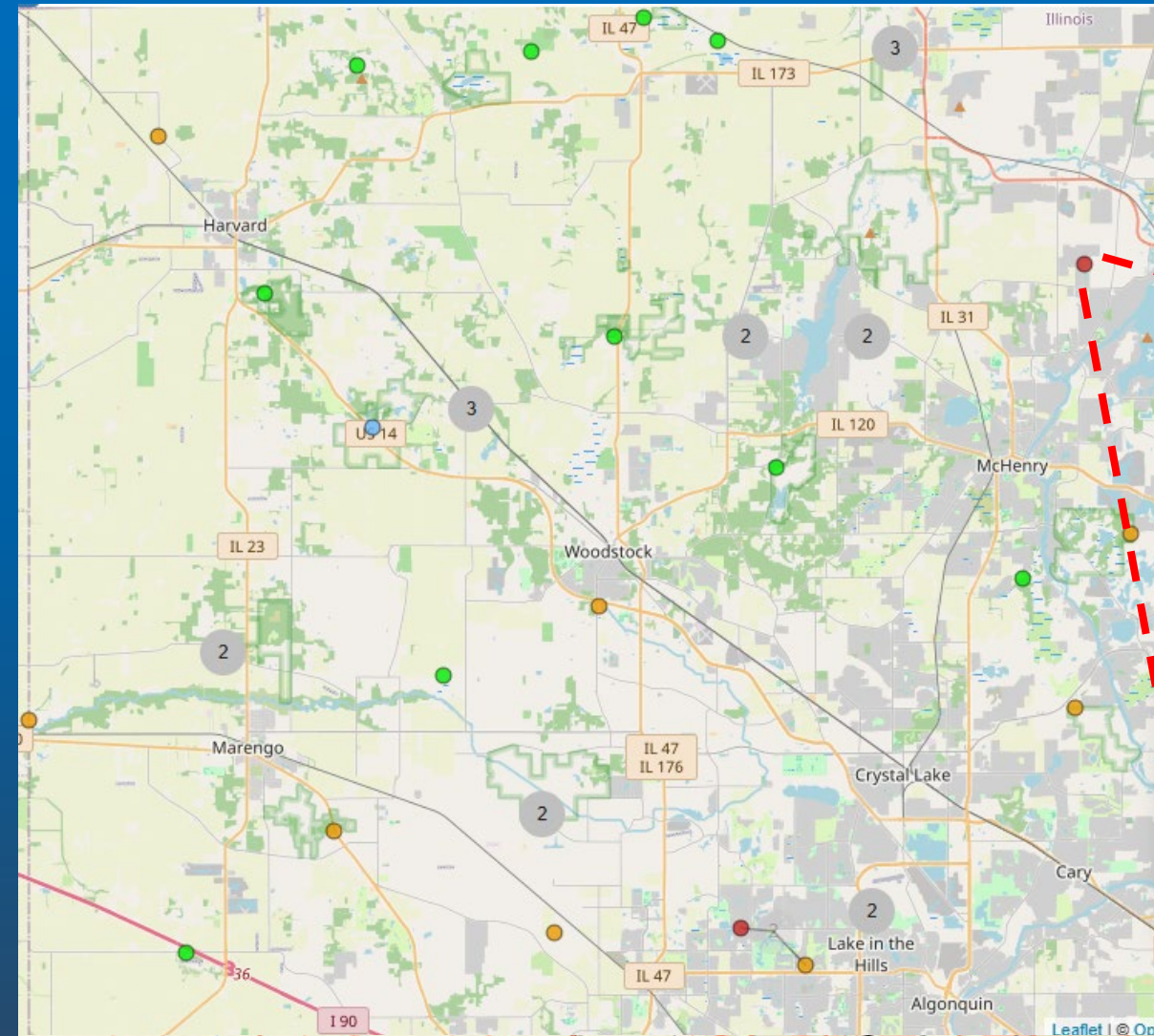
GROUNDWATER LEVELS

McHenry County Groundwater Monitoring Wells
45N9E-06.7e (NW-6-45-9) - 73.0'



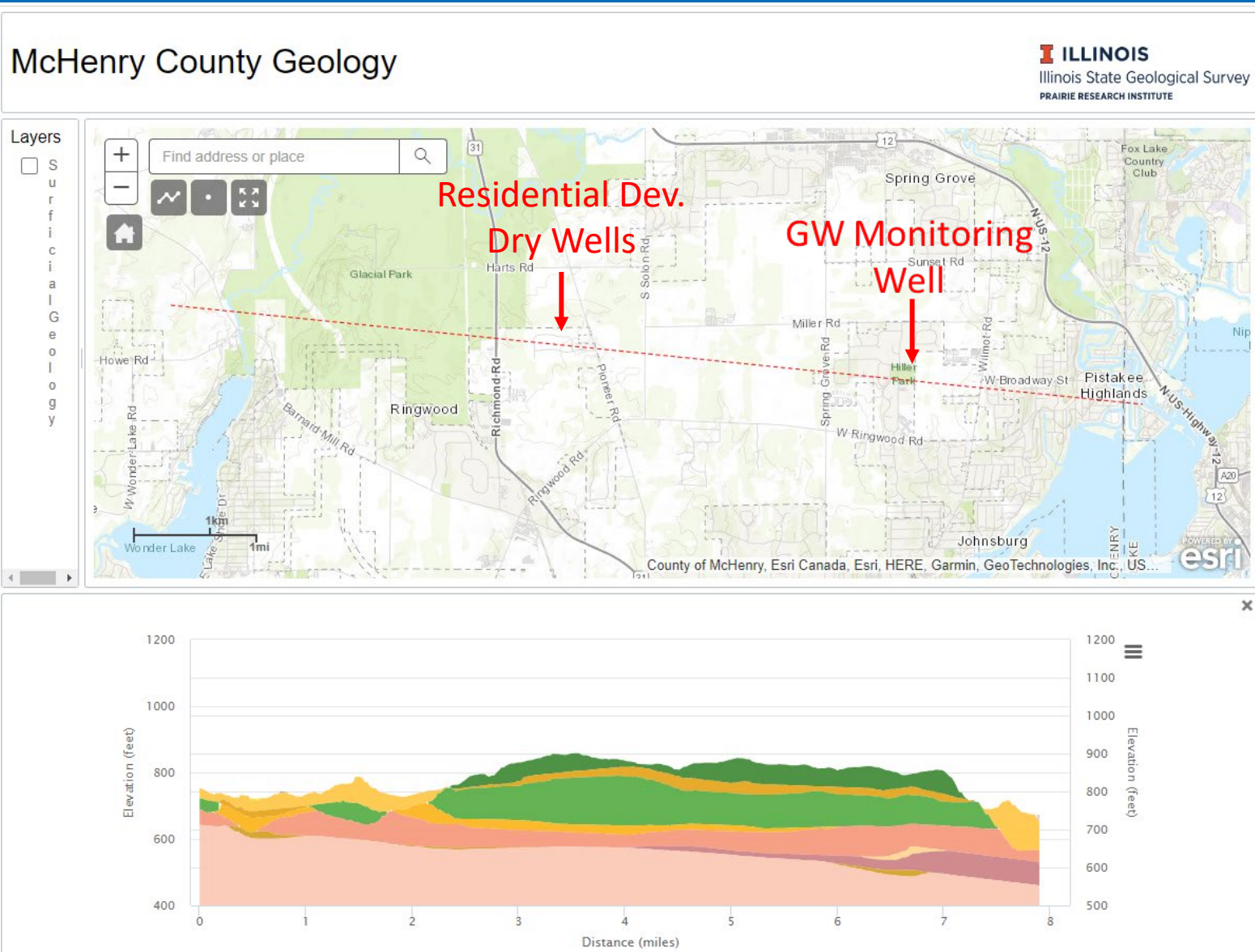
5-26-2026

USGS

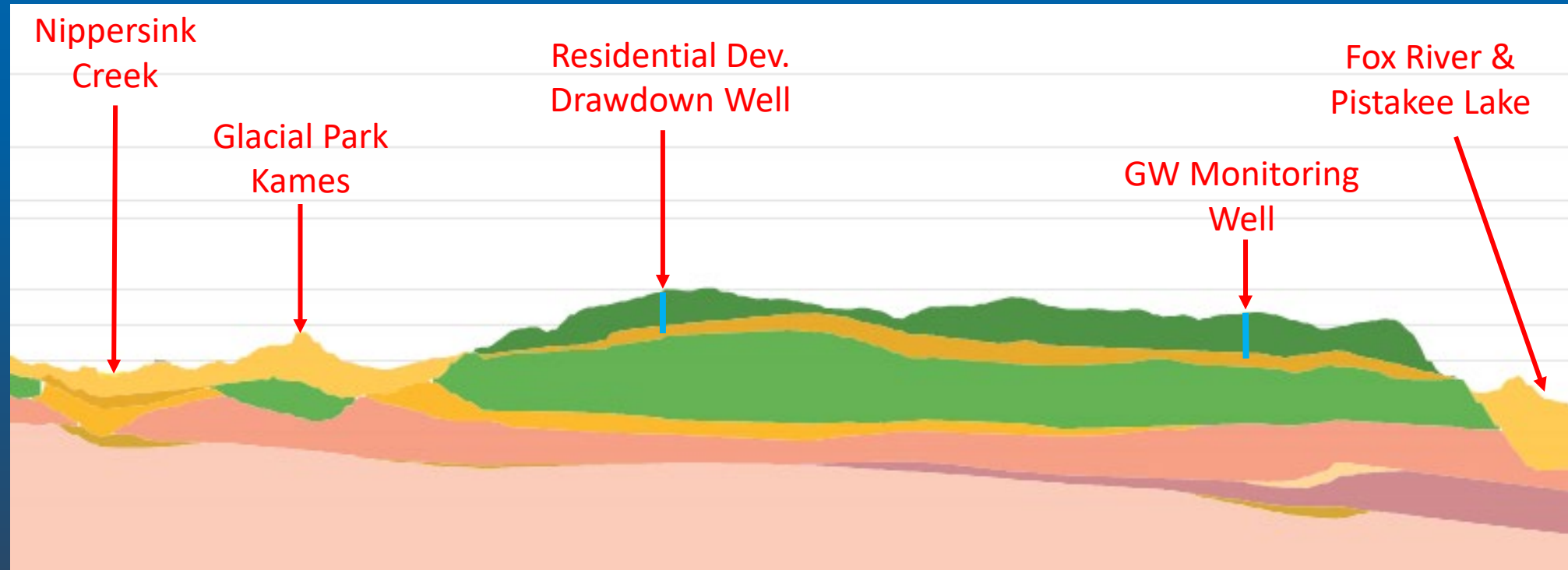


Explanation - Percentile classes (symbol color based on most recent measurement)						Wells		Springs	
●	●	●	●	●	●	●	●	■	■
Low	<10	10-24	25-75	76-90	>90	High	Not Ranked	○	■
	Much Below Normal	Below Normal	Normal	Above Normal	Much Above Normal			□	■
								△	■
								Periodic Measurements	

McHENRY COUNTY 3-DIMENSIONAL MAPPING

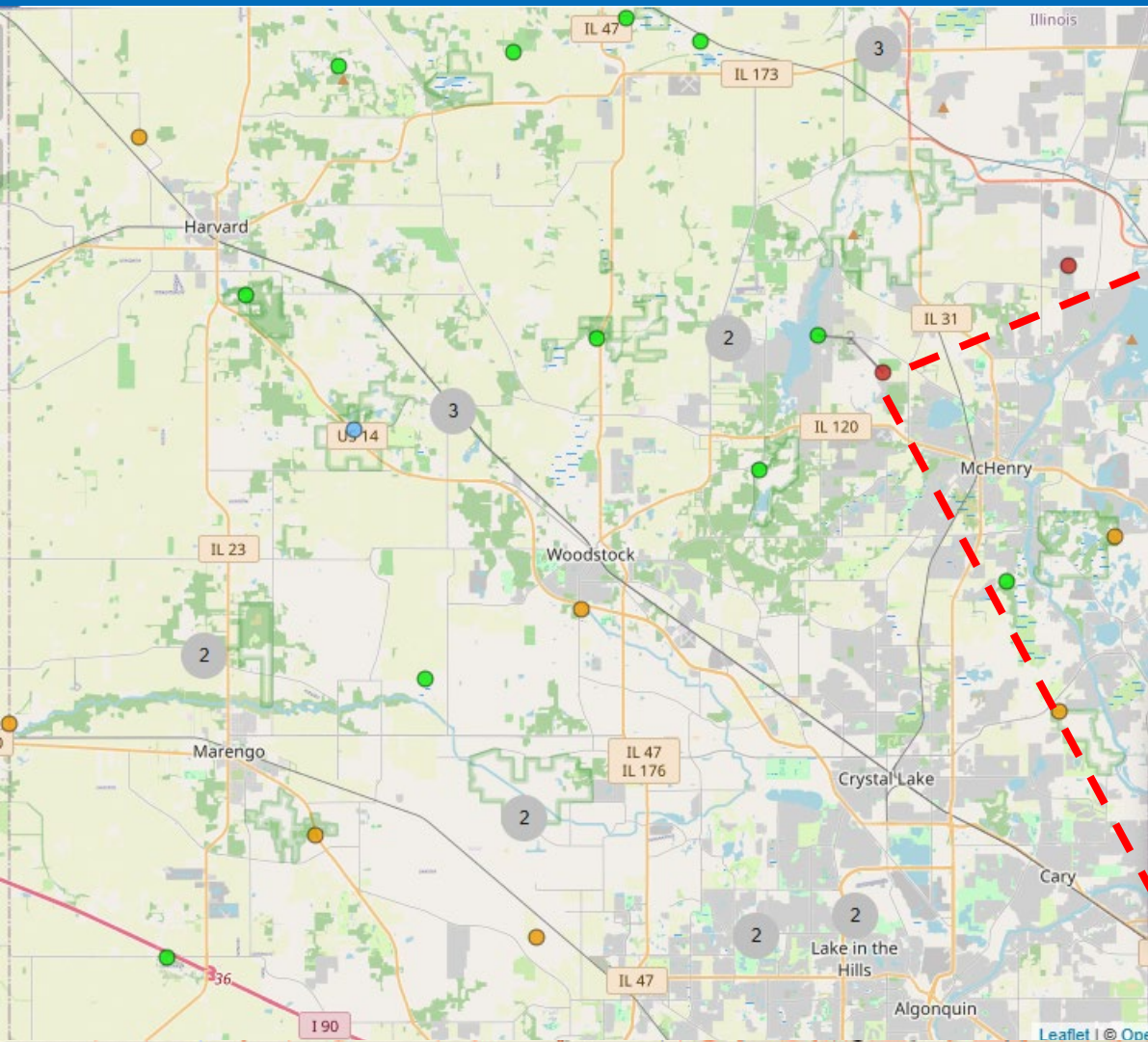


McHENRY COUNTY 3-DIMENSIONAL MAPPING



GROUNDWATER LEVELS

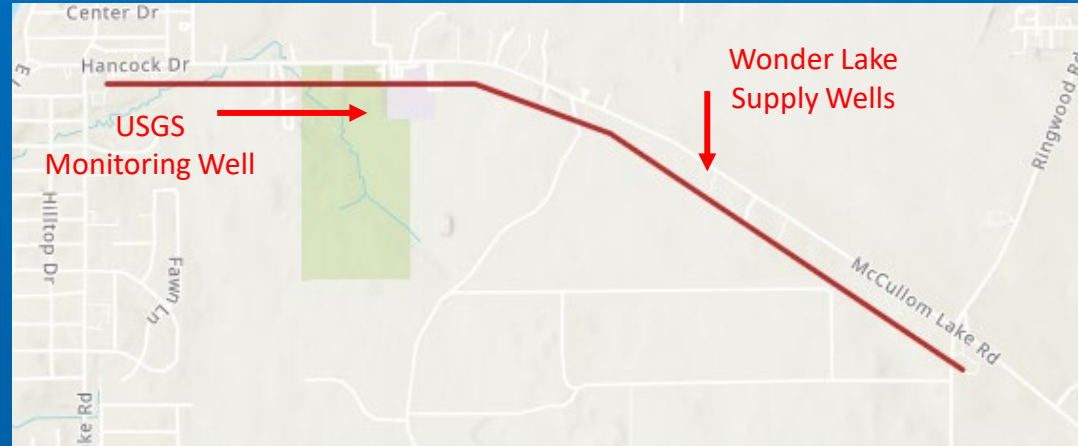
McHenry County Groundwater Monitoring Wells 45N8E-17.7h2 (9-MCH-D) - 180.0'



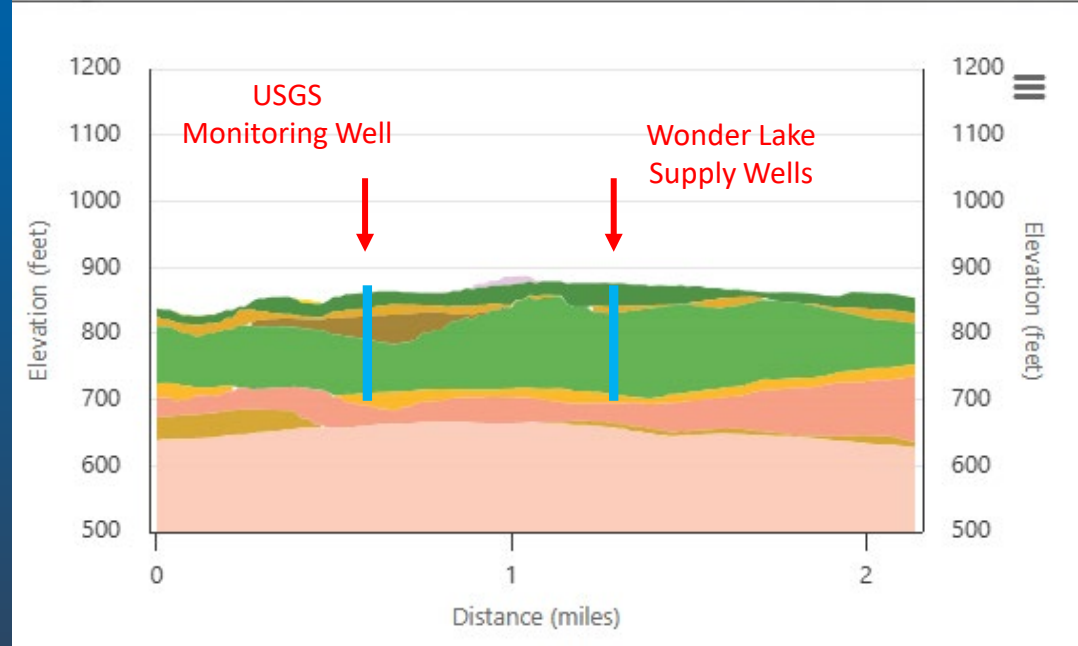
5-26-2026

Explanation - Percentile classes (symbol color based on most recent measurement)							Wells		Springs	
●	●	●	●	●	●	●	○	□	△	■
Low	<10	10-24	25-75	76-90	>90	High	Real-Time	Continuous	Periodic Measurements	
	Much Below Normal	Below Normal	Normal	Above Normal	Much Above Normal	Not Ranked				

McHENRY COUNTY 3-DIMENSIONAL MAPPING



METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS



Questions?



Scott Kuykendall

McHenry County Water Resources Specialist

815-334-2863

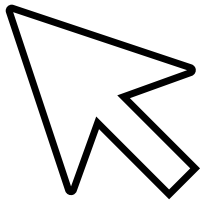
SHKuykendall@mchenrycountyil.gov

[www.mchenryH₂O.com](http://www.mchenryH2O.com)

How familiar are you with drought monitoring tools and resources?

Respond via Mentimeter:

Click the link in
the chat



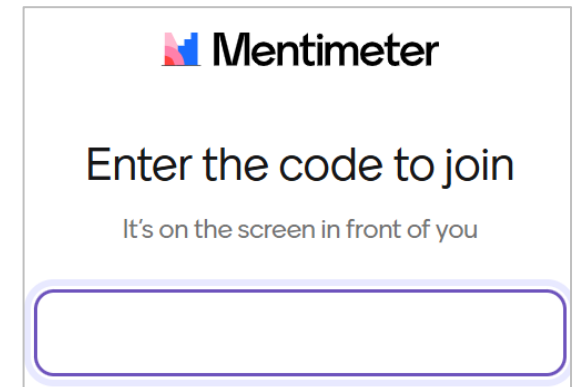
or

Scan the QR
code



or

Join at menti.com
code 8161 2527



Climate and water utility planning

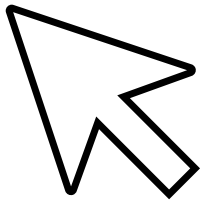
Agenda

- **AWWA M71: Adaptive management strategies for utilities:**
Rachel Duncan, senior engineer, Carollo Engineers
- **Preparing for drought with AWWA's M60 manual:** Lisa Maddaus, principal water resources engineer, Maddaus Water Management

How familiar are you with the AWWA M71 Manual (Climate Action Plans)?

Respond via Mentimeter:

Click the link in
the chat



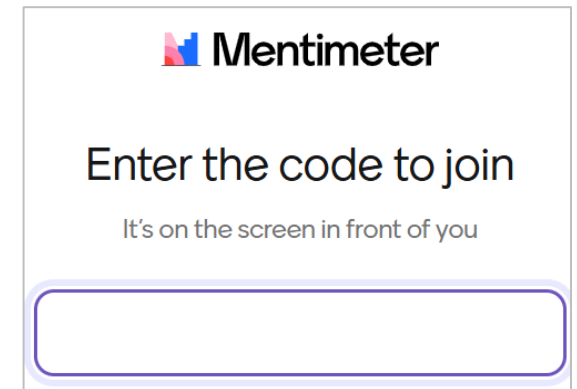
or

Scan the QR
code



or

Join at menti.com
code 8161 2527



Speaker



Rachel Duncan, PE, ENV SP

Senior engineer

Carollo Engineers

AWWA M71: Climate Action Plans

Adaptive Management Strategies for Utilities

Rachel Duncan, PE

AWWA Climate Change Committee Chair, M71 Update Co-Chair

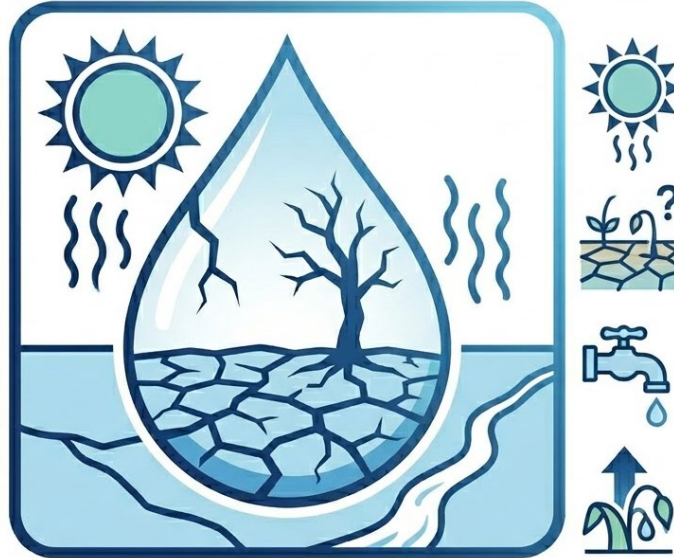
June 3, 2026

Climate Threats to Water Supply in the Midwest



WATER QUALITY:

- Higher temps + extreme precip → increased watershed pollutants, toxic algal blooms, invasive species



WATER QUANTITY:

- Extreme heat + extreme drought → decreased water availability and increased water demand



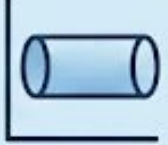







VULNERABLE INFRASTRUCTURE:

- Aging infrastructure + extreme storms → threats to operational reliability

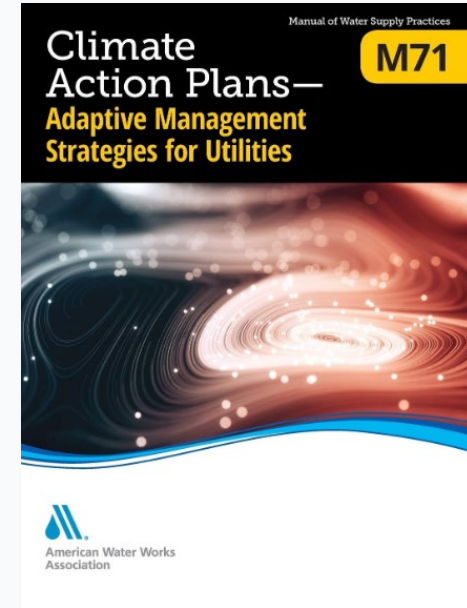
How do we engineer for reliability when historical weather and climate data is no longer a safe predictor?

Engineering for the “Cone of Uncertainty”

	TRADITIONAL ENGINEERING	ADAPTIVE MANAGEMENT
BASELINE DATA	 <p>Stationarity (historical weather distribution)</p>	 <p>Non-stationarity (shifting distributions)</p>
FUTURE PROJECTIONS	 <p>Plans for a “Cylinder of Certainty” (single predictable outcome)</p>	 <p>Plans for a “Cone of Uncertainty” (multiple future scenarios)</p>
DESIGN APPROACH	 <p>Builds fixed capacity with a static safety factor</p>	 <p>Builds flexible, incremental redundancy</p>
RISK MANAGEMENT	 <p>Relies on emergency response to unforeseen extremes</p>	 <p>Integrates probabilistic risk directly into the Capital Improvement Program (CIP) ✨</p>

Purpose of the AWWA M71 Manual

- Chapter 1 – Introduction
- Chapter 2 – Purpose and Audience
- Chapter 3 – Science of Climate Change
- Chapter 4 – Principles of Engineering Science
- Chapter 5 – What is a Climate Action Plan (CAP)?
- Chapter 6 – Why Do Utilities Need a CAP?
- Chapter 7 – How Do Utilities Develop a CAP and Keep it Current?
- Chapter 8 – Stakeholder Involvement and Public Participation
- Chapter 9 – Estimating the Cost of a CAP
- Chapter 10 – Case Studies of CAPs and Adaptation Measures
- Chapter 11 – Summary and Conclusions



M71 Core Objective

"To provide clear guidance for water utilities of all sizes to proactively assess climate risks, design resilient responses, and optimize resource spend."

Demystifying the Climate Action Plan (CAP)

✓ What a CAP IS

A long-term, dynamic guide built to manage climate risks.

- ✓ **Mitigation Framework:** Plans to actively track and reduce greenhouse gas emissions.
- ✓ **Vulnerability Shield:** Measures to prepare critical facilities for severe droughts and floods.
- ✓ **Operational Guide:** Adjusts operational routines to meet evolving regulatory standards.



It does not replace existing emergency, energy, or investment plans.

- ✓ **An Emergency Response Plan:** It doesn't detail 24–48 hour disaster response operations.
- ✓ **An Energy Audit:** It isn't a simple list of facility lighting and pump motor efficiency swaps.
- ✓ **A Standard CIP List:** It is risk-informed, not a checklist of standard pipeline upgrades.

Operational Components of a Robust CAP

Hardening Assets

Physical modifications to secure facilities against natural hazards.

Example: Elevating sensitive electrical enclosures above projected flood levels.

Utility Operations

Adjusting day-to-day procedures to maximize resource flexibility.

Example: Proactively shifting pumping regimes during prolonged regional heatwaves.

Carbon Control

Tracking, projecting, and mitigating utility GHG footprints.

Example: Transitioning vehicle fleets to hybrid/EV models and installing solar arrays.

Integrating these components reduces overall utility vulnerability and avoids costly, fragmented responses.

Setting Up for Success: Key Logistics



Utility Team Focus

Establish a dedicated planning team with strong pathways for management support and clear authorization structures.



Base Knowledge

Deliver fundamental "Climate Science 101" sessions to align terminology, risk tolerance indices, and plan metrics.



Communications

Build a proactive engagement plan that addresses political, regulatory, and direct public concerns early in the process.

The Business Case for Creating a CAP

- ✓ **Unlocks Funding:** Including comprehensive climate metrics greatly increases scoring on competitive federal and state grant applications.
- ✓ **Protects Bond Ratings:** Proves to credit agencies that the system has analyzed long-term climate vulnerabilities and possesses a funded strategy to address them.
- ✓ **Drives Collaboration:** Shares modeling expenses, leverages adjacent water grids, and creates regional consistency during extreme weather.



ROI of Adaptation

Every \$1 invested in proactive infrastructure hardening saves \$4 to \$6 in emergency post-disaster repairs.



Developing an Adaptation Plan

The step-by-step structure to design, prioritize, and initiate localized utility resilience programs.

The Seven-Step Adaptation Journey

Step 1 Characterize Hazards

Map historical events
& projected climate
paths.

Step 2 & 3 Assets & Vulnerability

Audit infrastructure
sensitivity & bypass
capacity.

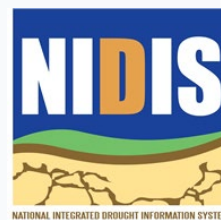
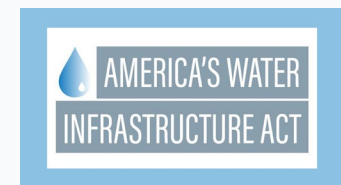
Step 4 & 5 Identify & Prioritize

Determine co-
benefits & multi-
criteria metrics.

Step 6 & 7 Plan & Take Action

Integrate actions into
utility CIP budgets.

Process is Adapted From:



Step 1: Categorize Climate Threats – Audit Historical Hazard Footprints

Start with past regional disruptions to calibrate your risk model:

- ✓ **NOAA Storm Database:** Review storm types, county-level dates, and property loss summaries since 1950.
- ✓ **Local Operator Logs:** Trace previous power failures, high-inflow events, and chemical dosage spikes.
- ✓ **Federal Inventories:** Intersect data from USGS stream flow histories and FEMA damage claims.

Historical Limitation

Reviewing past data is essential, but *historical stationarity is no longer a reliable predictor*. We must pair history with projected future paths.

Key Lesson: Past record-breaking storms are becoming the new baseline.

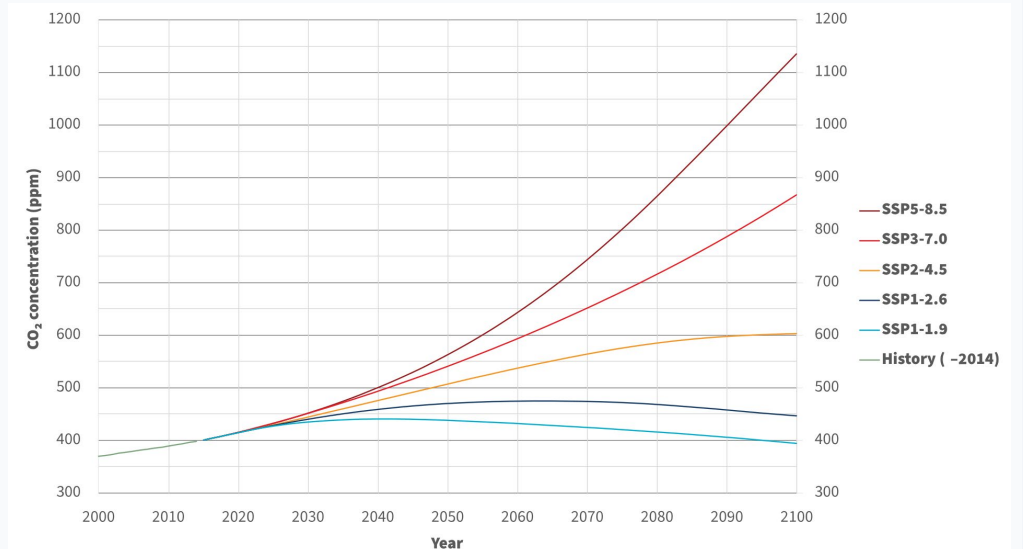
Step 1: Characterize Climate Threats: Harnessing Climate Projections

Utilize Global Climate Models (GCMs) and downscaled datasets:

- ✓ **NOAA or EPA Tools:** Leverage NOAA's Climate Data Online or USGS's National Climate Change Viewer to gather downscaled climate data.
- ✓ **National Assessments:** Access macro-level insights customized for Midwest and Plains environmental shifts.
- ✓ **Regional Teams:** Consult local climate science hubs and state offices to align planning assumptions.

Navigating GCM Uncertainty

Establish a coordinated "Risk Tolerance Range" with key decision-makers to balance optimistic vs. severe climate emissions trajectories.



Steps 2: Categorize Assets

1. Exposure

Physical presence within projected risk boundaries.

"Is our primary lift station inside the shifting 100-year floodplain?"

2. Sensitivity

Degree to which an asset is disrupted during a hazard.

"Are control panels positioned on the floor where they will submerge?"

3. Adaptive Capacity

System ability to cope or bypass during a crisis.

"Do we have auto-transfer backup power or wet-well storage?"

 **Core Strategy Focus: We cannot control climate exposure. We must focus on reducing sensitivity and raising adaptive capacity.**

Step 3: Characterize Vulnerabilities

$$\text{Vulnerability} = (\text{Exposure} \times \text{Sensitivity}) - \text{Adaptive Capacity}$$

To make this formula actionable, the M71 manual suggests mapping this math through two distinct assessment paths:

- ✓ **Qualitative Mapping:** High-level matrix assessments to identify major vulnerabilities across multiple facility sectors.
- ✓ **Quantitative Modeling:** Stress-testing system capabilities under specific climate percentiles.

Prioritizing Risks

Evaluating which vulnerabilities are critical requires collaborative stakeholder feedback. Prioritization metrics should balance:

- Consequence & Likelihood of physical failure.
- Presence of intersecting non-climate stressors.
- Impacts to economically vulnerable communities.

Step 4: Identify Adaptation Strategies

Developing robust strategies requires sorting options into strategic portfolios:

1. Develop

Define project-specific modifications alongside institutional policy shifts (e.g., land-use regulations).

2. Combine

Combine single measures into regional portfolios that secure multiple layers of system redundancy.

3. Evaluate

Evaluate how each portfolio performs under moderate vs. severe GCM projections.

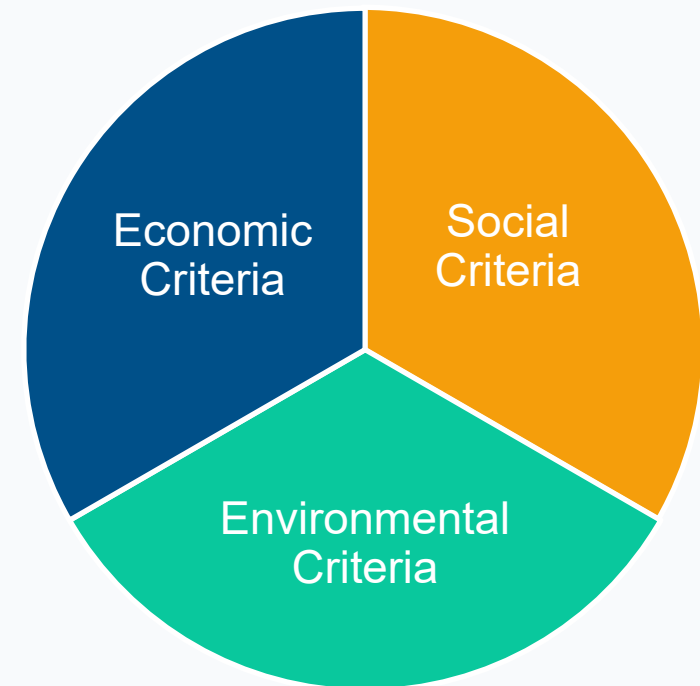
Step 5: Prioritize Adaptation Strategies

Quantifying co-benefits strengthens the business case for utility investments:

- ✓ **Social Gains:** Elevates local green spaces, enhances public recreation, and protects downstream water.
- ✓ **Environmental Capital:** Protects wetland habitats, sequestering carbon while naturally buffering severe floods.
- ✓ **Funding Scopes:** Increases eligibility for state environmental grants and conservation funding.

Multi-Objective Criteria

To compare portfolios transparently, weight quantitative and qualitative factors using Multi-Criteria Decision Analysis:



Steps 6 & 7: Implementation & Action

6. Develop Implementation Plan

Integrating prioritized adaptation measures into existing utility systems rather than remaining standalone exercises:

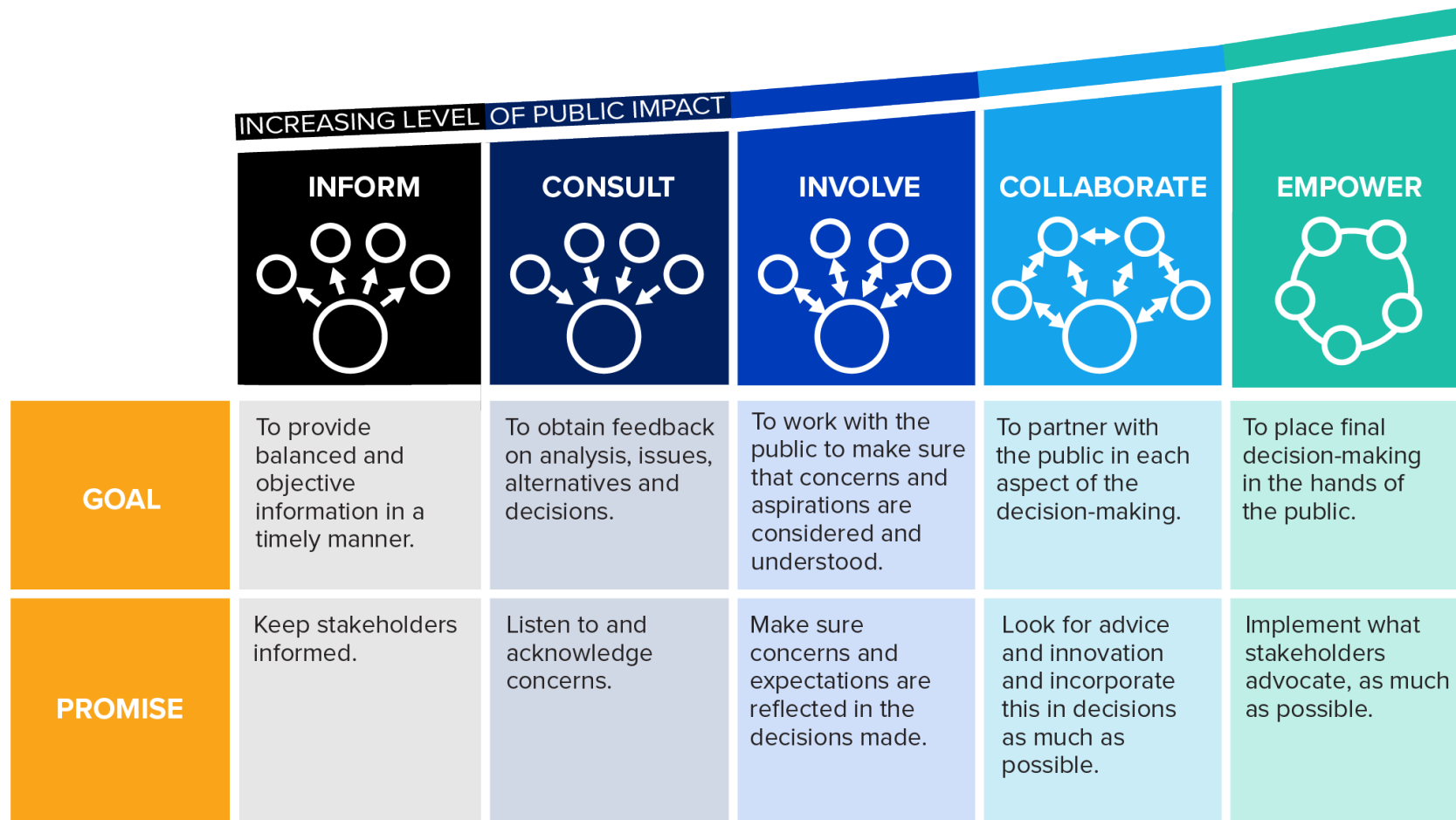
- Map out clear timelines matching 5-year CIP cycles.
- Identify collaborative, regional scale projects.
- Secure early commitments for federal grant funding.

7. Launch & Monitor

Put the plan into action. The M71 framework emphasizes that action must be paired with constant monitoring of climate indicators:

- Review and update key climate metrics annually.
- Track programmatic and capital expenditure performance.
- Refine modeling assumptions as climate science improves.

Communicating Risk to the Public



Proactive Shift: Effective engagement shifts the utilities from reactively explaining rate hikes to proactively collaborating on planned investments



Case Study: Oklahoma Comprehensive Water Plan

A real-world look at translating macro-scale climate projections into localized hydrologic resilience models.

Oklahoma Comprehensive Water Plan (OCWP)

🎯 The Core Goal

To provide safe, reliable, and sustainable long-term water supply for all Oklahomans over a multi-decade planning horizon by bridging global climate science with local hydrologic realities.

1. Gap Analysis

Systematically evaluates future water supply constraints by projecting long-term supply capacities directly against evolving municipal, industrial, and agricultural demands.

2. Climate Modeling

Translates global climate models (GCMs) into local impacts, specifically analyzing how rising temperatures compound evapotranspiration losses across the state.

3. Resource Assessment

Quantifies physical availability shifts within core water sources, measuring regional streamflow reductions and critical groundwater table depletion.

4. Infrastructure Guidance

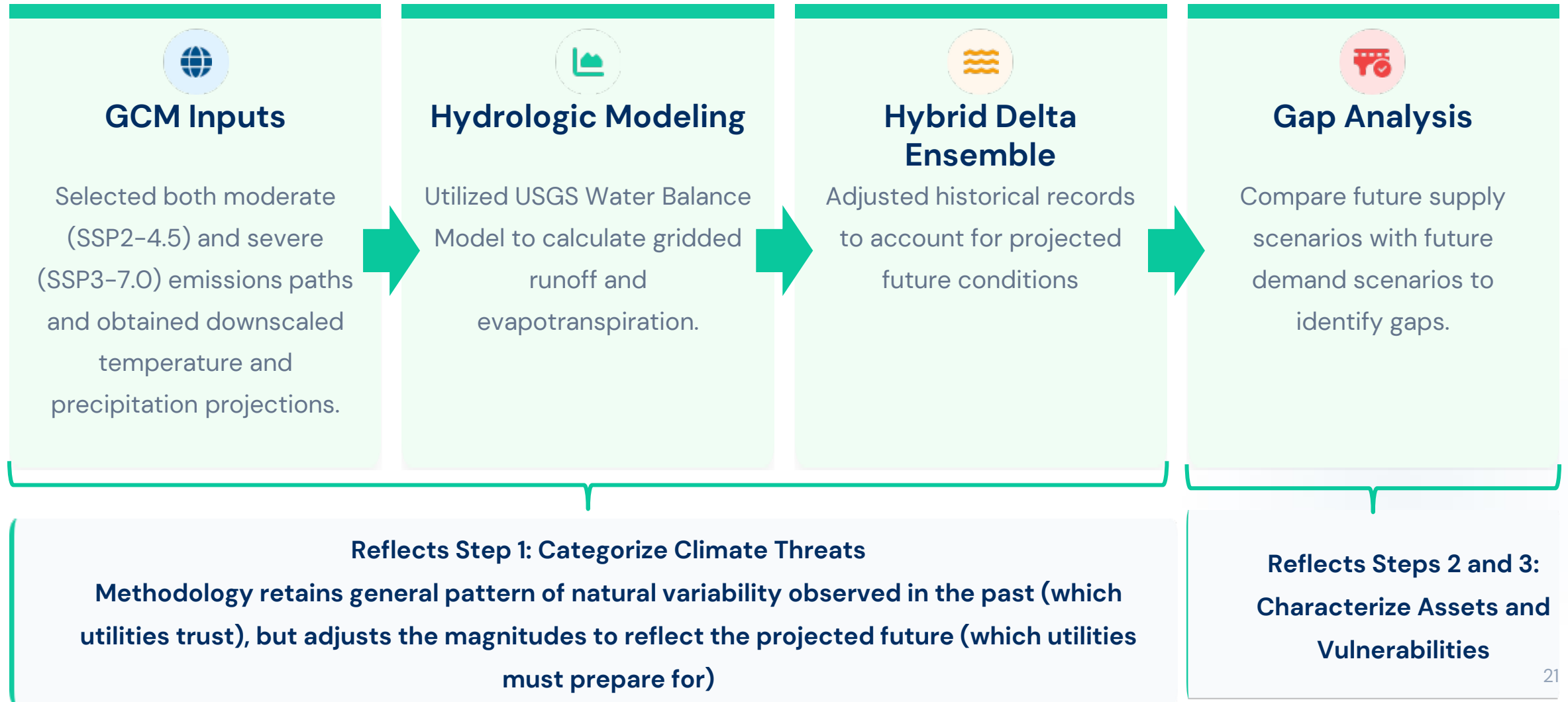
Supplies water managers with the defensive risk screening and stress-testing datasets required to justify resilient, cost-effective capital investments.

Outcome: Projected Regional Operational Shortages

System Metric	Projected Impact	Primary Driver
Surface Water Streamflow	Projected reductions of 0% to 30% by 2075	Higher temperatures & evapotranspiration
Groundwater Recharge	Decreases of up to 30% in central aquifer zones	Increased evapotranspiration
Median Water Shortages	2% to 5% increase (most basins)	Climate-driven supply/demand imbalance
Maximum Water Shortages	Up to 25% increase (Northwest Region)	Demand increases & supply constraints

 *Critical Driver: Midwest water scarcity is driven by compounding temperatures accelerating evaporation, not just lack of rain.*

Process: The Climate-to-Hydrology Engine



Thank you

AWWA M71: Adaptive Management
Strategies for Utilities

Rachel Duncan, PE

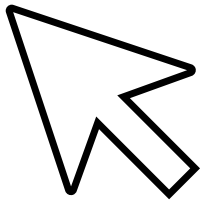
AWWA Climate Change Committee Chair, M71 Update Co-Chair

rduncan@carollo.com

How familiar are you with the AWWA M60 Manual (Drought Preparedness and Response)?

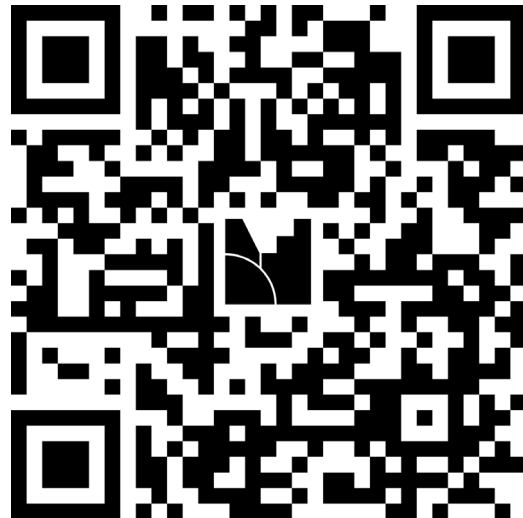
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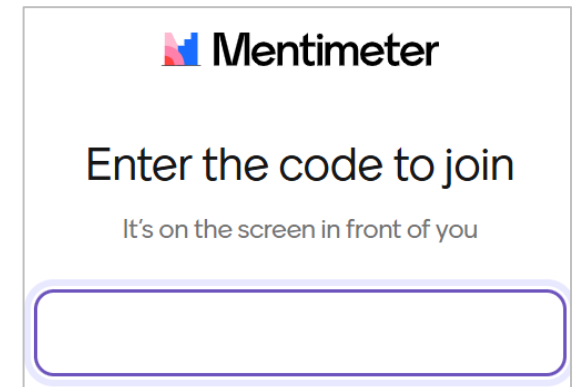
or

Scan the QR
code



or

Join at menti.com
code 8161 2527



Speaker



Lisa Maddaus, PE

Principal water resources engineer

Maddaus Water Management

Preparing for Drought with AWWA's M60 Manual

LISA MADDAUS, P.E.

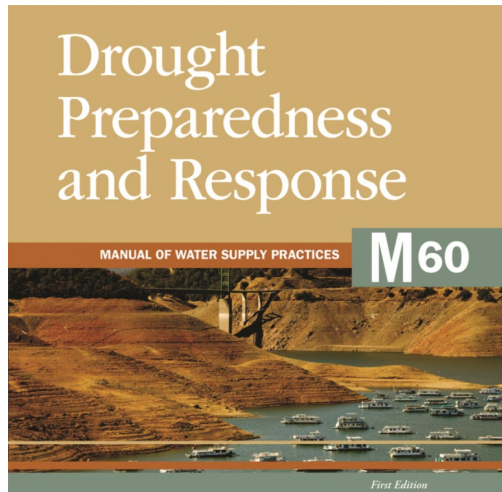
AWWA WORKSHOP SERIES

JUNE 3, 2026



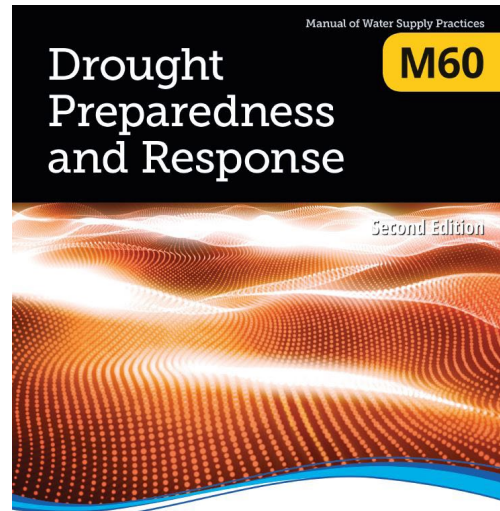
MADDAUS WATER MANAGEMENT
Making a Difference in the World of Water™

AWWA M60 Drought Preparedness and Response Manual of Best Practices




American Water Works
Association
The Authoritative Resource on Safe Water®

Advocacy
Communications
Conferences
Education and Training
Science and Technology
Sections




American Water Works
Association

- Version 1 released in 2011
- Since its release we have seen major droughts in Texas, the Midwest, and California
- Time was ripe to update and expand the manual
- Maintained basic 7 Step structure
- Version 2 released in June 2019

2nd Edition Primary Authors

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ONE	Form a Water Shortage Response Team
TWO	Forecast Supply in Relation to Demand
THREE	Balance Supply and Demand: Assess Mitigation Options
FOUR	Establish Triggering Levels
FIVE	Develop Staged Demand Reduction Program
SIX	Adopt the Plan
SEVEN	Implement the Plan

The Seven Steps

Step 1 – Form a Water Shortage Response Team: Coordinate, Cooperate, Communicate



WITHIN AGENCY



AMONG AGENCIES,
TRIBAL ENTITIES



REGIONALLY



COMMUNITY

Set priorities



Avoid irretrievable loss of natural resources



Restrict less essential uses before essential uses



Affect individuals in small groups before affecting large groups or the public as a whole



Minimize adverse financial effects



Implement extensive public information and media relations programs

Example of Principles from 2016 Denver Water Drought Response Plan



Maintain Momentum

- Appoint Leader and Team
- Start by December 1
- Public information campaign
- Prepare through winter/spring *regardless of precipitation*
- Supplemental supply agreements
- Plan for interconnections
- Modify and test computer programming and billing format
- New staff and equipment as needed

Step 2 – Forecast Supply in Relation to Demand:

Examples of Data to be Collected

Supply

- Collect supply data (surface, groundwater, recycled, transfers, etc) for past five years or longer and for drought of record
- Regularly review agreements that give the supplier the ability to provide or receive supplemental supplies during a shortage

Demand

- Collect monthly data by customer class for last five years.
- Consider changes in population or uses that might affect demand.

Examples of Data Analyses to be Conducted

Supply

- Develop a range of projections for next five years for all supplies
- Consider scenarios without augmentation, worst case, increased uncertainty & variability for all supplies

Water Quality

- Analyze impacts of changes in supply on water quality in supplier and customer distribution systems
- Consider need for additional treatment or infrastructure for blending
- Consider budget impacts

Demand

- Project dry-year demand w/o a demand reduction program in place
 - Evaluate monthly demand by customer class by month - inside use by low-use month(s)
 - Consider water demand of special needs customers

Bottom Line

To be prepared, you need to know:

- How much water you can expect to have – weather/climate forecast
- How much water you have – supply availability
- How much water you expect to need – demand forecast

Carry out analyses of past data to answer the questions

- How does supply look? What are the sources? How is the infrastructure?
- How does demand in a normal year look? Demand in a dry year? Demand by customer type?
- Can you meet the demand *without supplemental supplies*?
- How does supply and demand look in a worst case scenario? Including disasters that could affect supply?

Catastrophic Supply Interruptions

Think about direct and indirect effects

Coordinate as needed with the utility Emergency Response Plan

EARTHQUAKES	FIRES	FLOODS
SYSTEM FAILURES	POWER OUTAGES	WATER CONTAMINATION

Step 3 – Balance Supply and Demand

When there is a shortage, the options are to....

Augment Supply

- Leverage existing assets (via flexibility or infrastructure upgrades)
- Increase supplier side efficiency
- Expand portfolio with new sources
- Seek opportunities to collaborate with other agencies



Reduce Demand

- Provide public information and education
- Enact restrictions (e.g., water waste ordinance, landscape irrigation)
- Modify pricing
- Consider rationing and **allocation**

Have a Plan to Enforce Requirements

Water Code Enforcement Team and Community

- Primarily educational
- Citations occur after first or second warning
- Community support

Fines *billing based*

- Repeat offenders require action
- Excess use charge

Flow Restrictors

- Repeat offenders undermine equity
- Provide health and safety flow



Landscape Ordinance Violations

Water Code Violation Visits

YEARLY	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
No violation found	28	41	33	46	230	764	1124
Wasting water	6	11	11	18	47	98	191
Prohibited watering	2	4	2	8	126	67	219
Owner's leak	11	3	6	11	22	31	84
Charity car wash	0	1	7	2	4	2	16
TOTAL	47	60	59	95	429	962	1652

San Antonio, Texas

Step 4 – Establish Triggering Levels:

Examples of Triggers

- Projected supply at a pre-defined level
- Water quality changes
- Supply interruption
- Environmental changes
- Regional agreements

Consider Triggers by Source

- Groundwater
- River Supplies
- Surface Water Storage
- Combined Sources of Supply

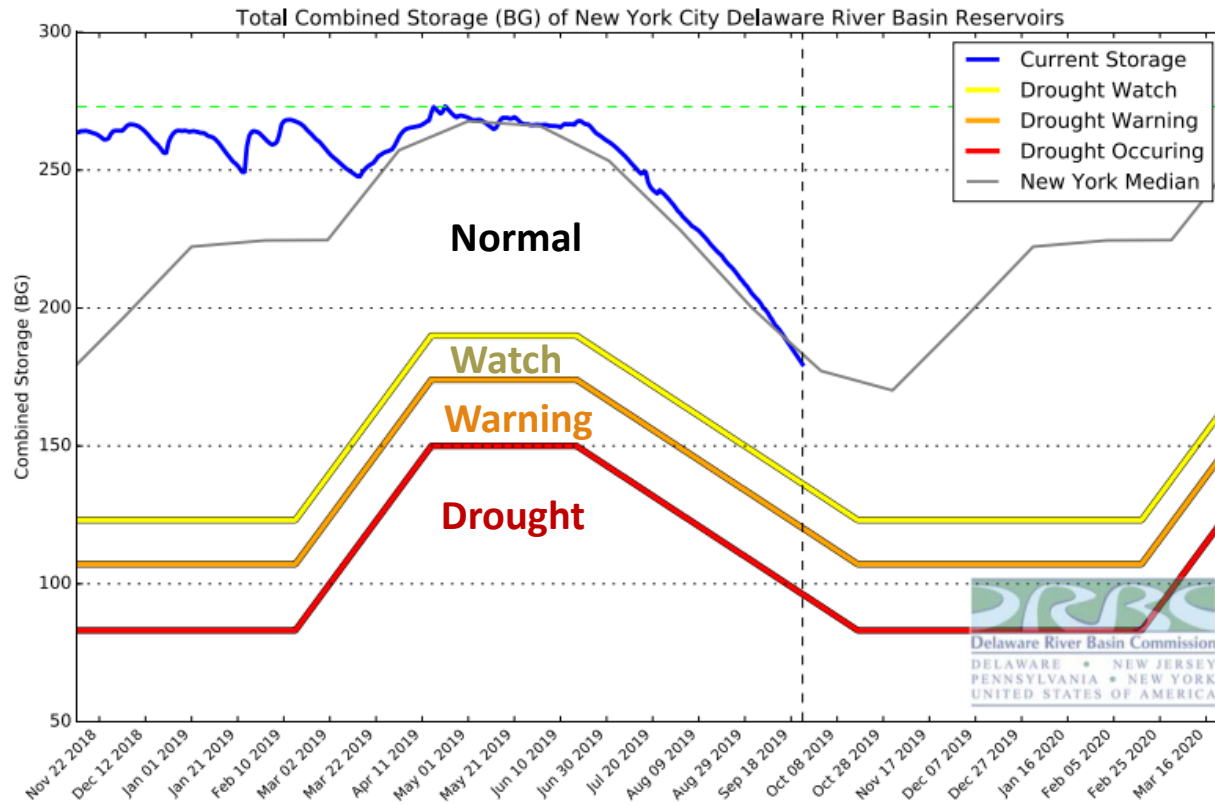
Supply based trigger

Example of triggers at a one-source agency

Reservoir storage less than	Drought Stage	Water Use Reduction Goal
80%	Stage 1	10-15%
65%	Stage 2	15-25%
40%	Stage 3	25-40%
25%	Stage 4	40%+

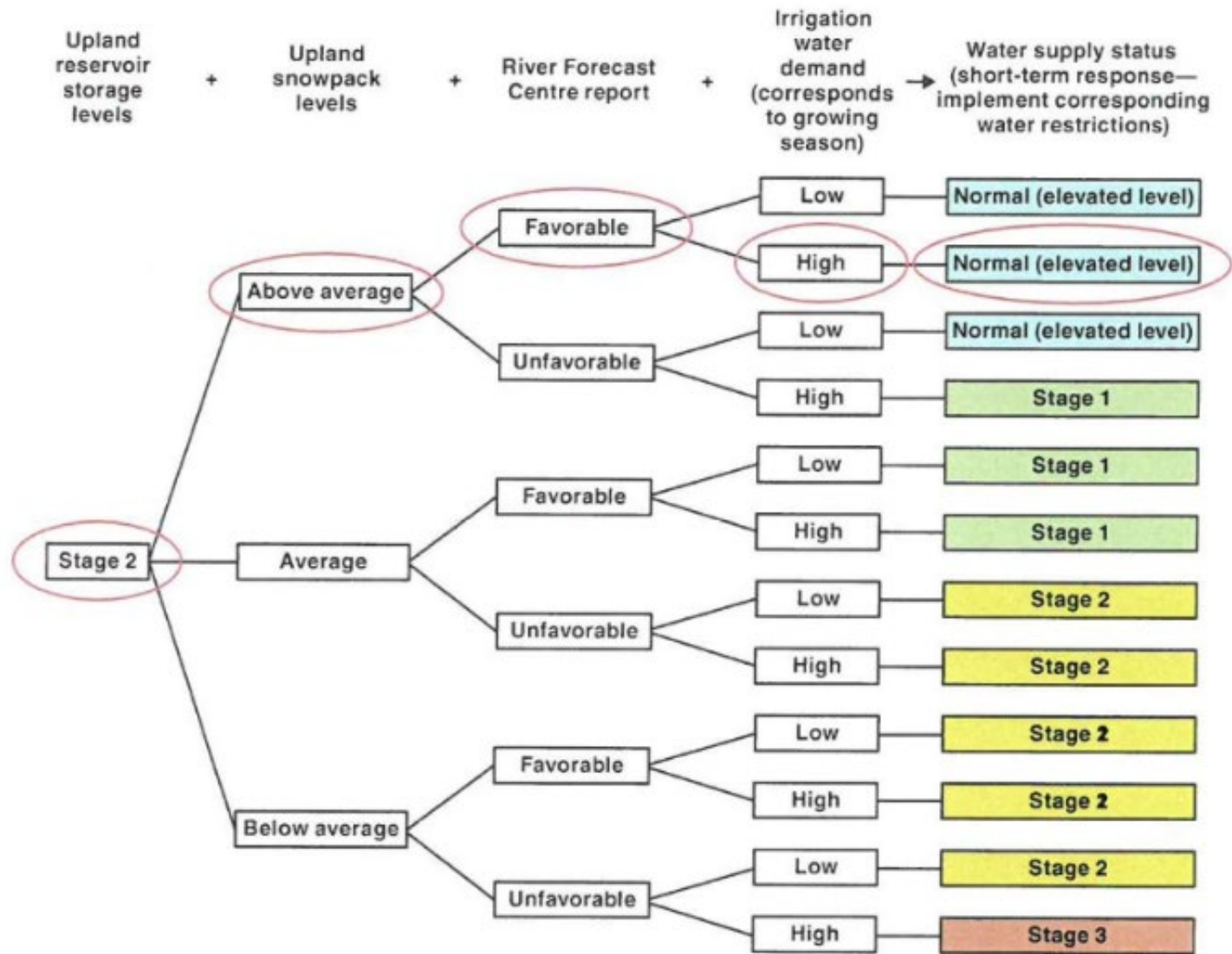
New York City Delaware River Basin Storage

9/23/2019



Usable Storage	Cannonsville	Pepacton	Neversink	Total	BG above drought watch = 43.4	BG below median = 3.7
BG	50.2	102.6	26.8	179.6	BG above drought warning = 59.4	BG below one year ago = 63.5
%	53.7	73.7	77.2	68.2	BG above drought = 83.4	

Seasonal rule curves tied to system storage and based on past droughts



Multiple Source Decision Tree

Trigger Mechanism Considerations

Causes of delays

- Pressure on Board often from business community, developers, agriculture
- Supplier is not ready
- Ill defined triggers

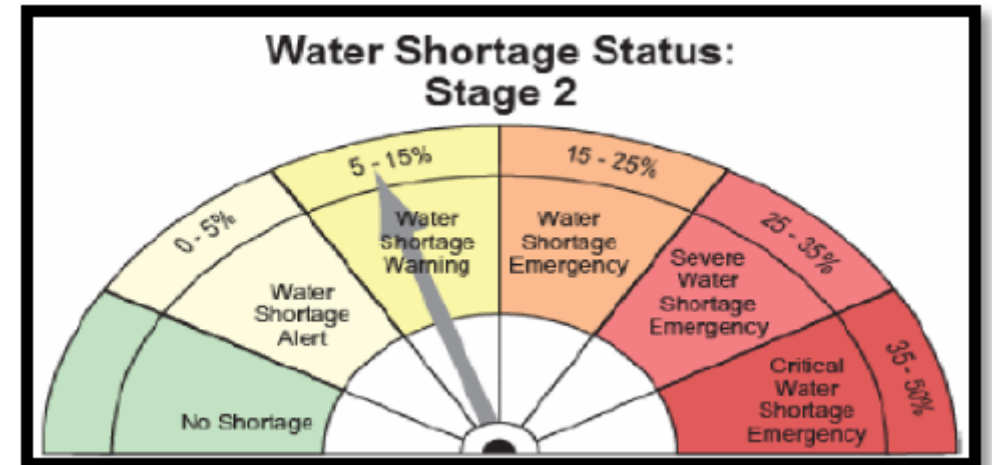
Include flexibility to:

- Move up or down two Stages
- Stay at a Stage and modify demand reduction program *For smaller or greater reduction than needed*
- Provide a consistent message with local agencies

Step 5 – Develop a Staged Reduction Program: Establish Stages

Example Stages with demand reduction goals

Stage	Water Shortage	Demand reduction goal
1	Minimum	10 - 15%
2	Moderate	15 - 25%
3	Severe	25 - 40%
4	Critical	40+%



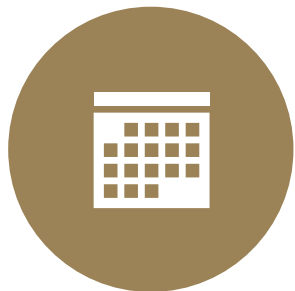
Criteria for Demand Reduction Action During a Water Shortage



Timing: can the measures/actions produce results in time?



Magnitude of savings: Will enough water be saved?



Season: are the actions/measures relevant to the time of year?



Costs: How severe are the cost implications of the measures to the customer, relative to the need for action?

Evaluate Demand Reduction Measures



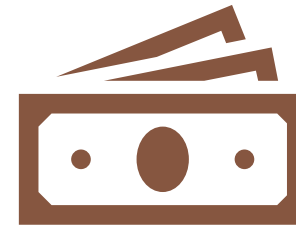
Methods that reduce demand: *supported by demand reduction actions*

Public Information Campaign

Restrictions

Pricing

Allocations



Prioritize methods:

Water savings

Lead time required to activate measure

Direct and indirect costs

Legal or procedural requirements for
implementation

Example Actions



Stage 1 - Voluntary

Initiate public information campaign
Advertise toilet, appliance, equipment rebate programs
Request 20 gallon-a-day per person reduction
Suggest shorter showers, no hosing of hard surfaces



Stage 2 - Restrictions with enforcement

Intensify public information, assistance programs
Restrict irrigation to morning and evening
No run-off, three times per week watering
Water by request in restaurants
Increase rates

Example Actions



Stage 3 - Mandatory + More Direct Customer Outreach

- Limit days of irrigation
- Tiered pricing with significant price jumps
- Establish allocations
- Provide customer on-site assistance
- Provide multiple demand reduction programs
- Provide customer / business training programs



Stage 4 - Mandatory

- Mandatory/critical
- Intensify all efforts
- Manage consumption to stay within water allotments
- Landscape irrigation restrictions
- Fines

Things to think about

Estimating savings can be a challenge

- Savings may vary from month to month, difficult to predict
- Savings can be scaled to the normal year demand curve

Supplier may enter Stage before customers implement

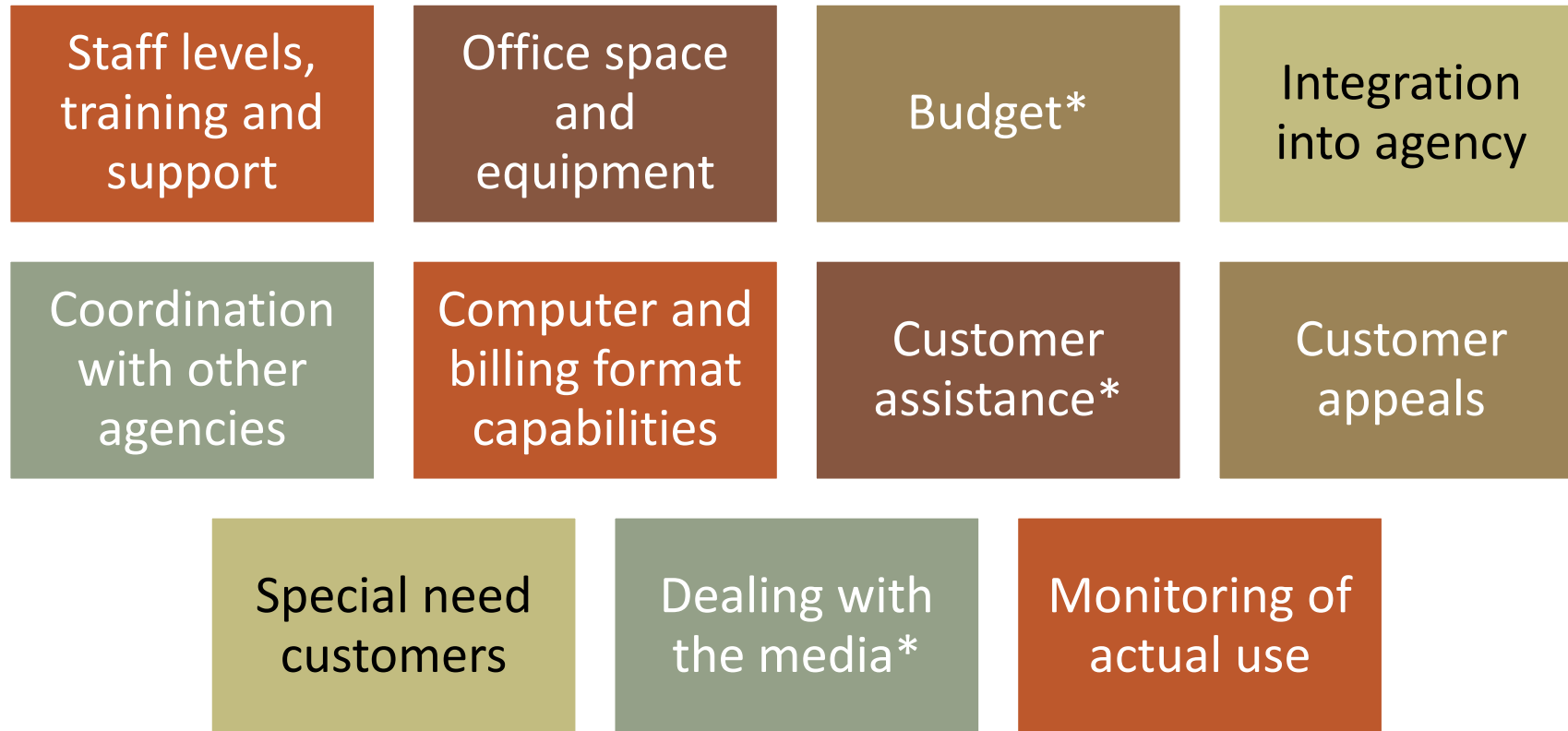
Messaging

- Cooperate with local and regional water suppliers to avoid inconsistent drought messages

Beware of the “lag”

- Customer awareness reduced by bi-monthly billing
- Build lag time in triggers
- Leap-frog Stage if lag time is long or not recognized
- Lag time could result in draw down of next year’s reserves and unnecessary economic losses

Step 6 & 7 – Adopt the Plan and When Time Comes Implement the Plan



Thank You!

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MADDAUS WATER MANAGEMENT

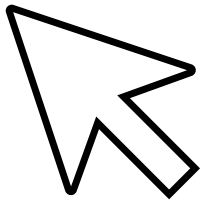
Making a Difference in the World of Water™

Questions

After today's session, how likely are you to explore the M71 manual (Climate Action Plans) or the M60 Manual (Drought Preparedness and Response)?

Respond via Mentimeter:

Click the link in
the chat



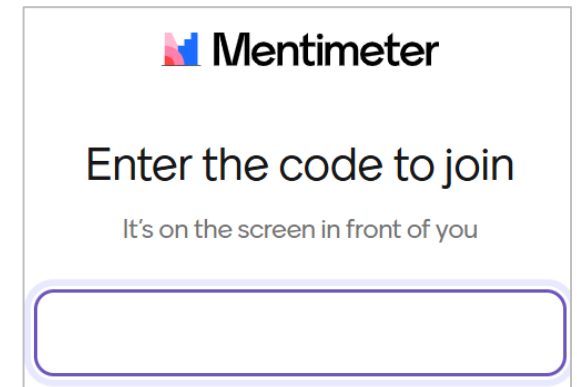
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Join at menti.com
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USEPA's Strengthening Water Infrastructure for Tomorrow (SWIFT)

Agenda

- **SWIFT overview and technical assistance process:** Cary McElhinney, source water protection coordinator, USEPA Region 5
- **Utility case study: Central Lake County Joint Action Water Agency:** Grant Wollert, director of operations, Central Lake County Joint Action Water Agency

Speaker



Cary McElhinney

Source water protection coordinator

U.S. Environmental Protection Agency Region 5

Strengthening Water Infrastructure for Tomorrow (SWIFT) Initiative



SWIFT's Mission

- Provide **drinking water, wastewater, and stormwater utilities** with the assistance needed to **increase resilience to natural hazards** and disasters
- Promote a clear understanding of **natural hazard threats** and their impacts to **vulnerable assets**
- Help utilities identify **resilient strategies** that can reduce system risk to natural hazards
- Assist utilities in making **risk-informed** infrastructure and investment decisions

Find SWIFT Online: <https://www.epa.gov/waterutilityresponse/strengthening-water-infrastructure-tomorrow-swift>



EPA SWIFT Website

- Request Technical Assistance
- Access Hazard Maps, Risk Assessment Tools, and other resources
- Register for Upcoming Workshops & Webinars



From Top to Bottom: Water Replenishment District in Southern CA; Water Sanitation Area in Cincinnati, OH; Water Treatment Plant in San Diego, CA

Technical Assistance from US EPA



EPA RealWaterTA

**Strengthening Water Infrastructure
for Tomorrow (SWIFT)**

Environmental Finance
Centers (EFCs)

Get the Lead Out (GLO)
Initiative

Cybersecurity TA

Tackling Emerging
Contaminants (TEC)

Water Engineering
Support TA (WEST)

Closing America's
Wastewater Access Gap

Training & TA for
Small Systems

Why Request SWIFT Technical Assistance for my Utility?

I need help:

- **Understanding my hazard risk**, asset vulnerability, and potential financial consequences to my utility and community
- **Identifying and prioritizing strategies** that help prevent infrastructure damage from natural disasters and reduce the risk of service disruptions
- **Communicating how my infrastructure project increases resilience** and safeguards our community's water/wastewater services during emergencies
- **Justifying project costs on my funding application** by demonstrating the potential return on investment that these projects could deliver
- **Connecting with State, Regional, and/or Federal funding partners** to learn about financing options for my resilient infrastructure project
- Updating my utility's **Risk and Resilience Assessment (RRA)** or **Emergency Response Plan (ERP)**



From Top to Bottom: Becker, D., Flooding in Cedar Rapids, IA; Christmann, G., Palm Trees During a Hurricane ; Lashley, S., Lake Michigan waves at St. Joseph North Pier Lighthouses following superstorm Sandy

Technical Assistance (TA) Approaches

Utilities can tailor their TA process to receive **one or more** of the following four approaches, based upon their needs:



NATURAL HAZARD DATA

Understand natural hazard risks
Design scenarios for risk assessments



BASELINE RISK ASSESSMENT

Assess infrastructure risk to natural hazards
Quantify threats, vulnerability, and consequences



RESILIENT STRATEGIES & COST-BENEFITS

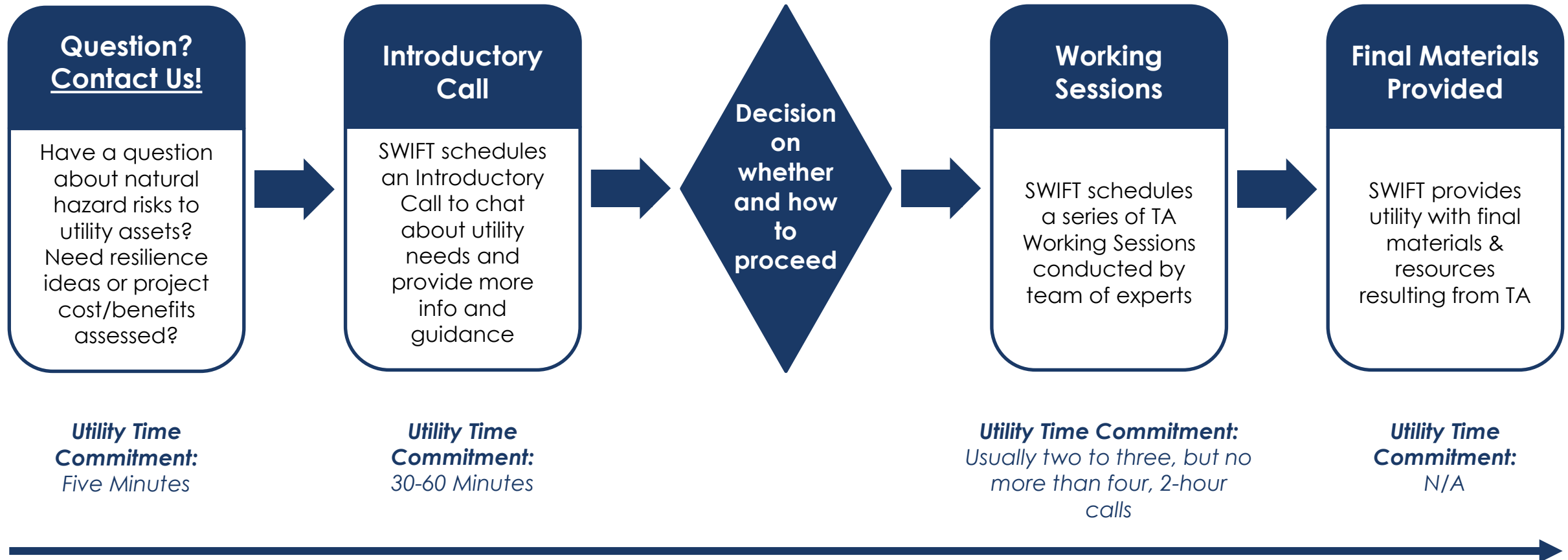
Evaluate cost-benefits of resilient strategies
Compare risk reduction and prioritize projects



FUNDING OPTIONS

Support funding opportunities
Connect with partner programs

SWIFT Technical Assistance (TA) Timeline



Entire process spaced out across 2-3 months

Real Outcomes from Utilities using SWIFT TA to Assess Drought & Flood Risk

Illinois | Drought – Conducted a risk assessment to evaluate options for modifying their intakes to reduce the risk from a roughly 50-year drought. Risk results **provided a strong resilience and business case** for these options to inform their budget decisions and presentations to the board to fund projects.

North Carolina | Flooding – Reevaluated stormwater projects previously rejected by FEMA's Hazard Mitigation Grant Program for not clearly demonstrating resilience benefits. Risk results **provided a strong resilience and business case for FEMA application.**

Illinois | Flooding – Evaluated changes to their existing raw water pump station that would increase resilience to damaging flood events. The potential increase in resilience from replacing the station with an elevated, hardened structure project will be **cited in future grant and loan proposals.**



From Top to Bottom: Becker, D., Flooding in Cedar Rapids, IA; Christmann, G., Palm Trees During a Hurricane ; Lashley, S., Lake Michigan waves at St. Joseph North Pier Lighthouses following superstorm Sandy

Tools & Resources

Tools

- [Vulnerability Self-Assessment Tool \(VSAT\)](#)
- [Resilience Strategies Guide \(RSG\)](#)
- [Water Cybersecurity Assessment Tool \(WCAT\)](#)

Technical Assistance Opportunities

- [SWIFT Technical Assistance](#)
- [Real Water Technical Assistance \(RealWaterTA\)](#)

Natural Hazard Resources

- [Hazard Resilience Guides](#)
- [Natural Hazard Maps](#)

Other Resources

- [Funding Water Sector Resilience](#)
- [Federal Funding for Water and Wastewater Utilities in National Disasters \(Fed FUNDS\)](#)
- [Emergency Response Plan Template and Instructions](#)



How to Request FREE Technical Assistance from EPA SWIFT

Who can receive SWIFT TA?

- Drinking water, wastewater, and/or stormwater utilities/systems of any size nationwide (small, rural, and Tribal communities encouraged to apply!)

Send us a message online!

- <https://www.epa.gov/waterutilityresponse/forms/contact-us-about-strengthening-water-infrastructure-tomorrow-swift>
- Scan the QR code below or email Ramming.Audrey@epa.gov



Speaker



Grant Wollert

Director of operations

Central Lake County Joint Action Agency

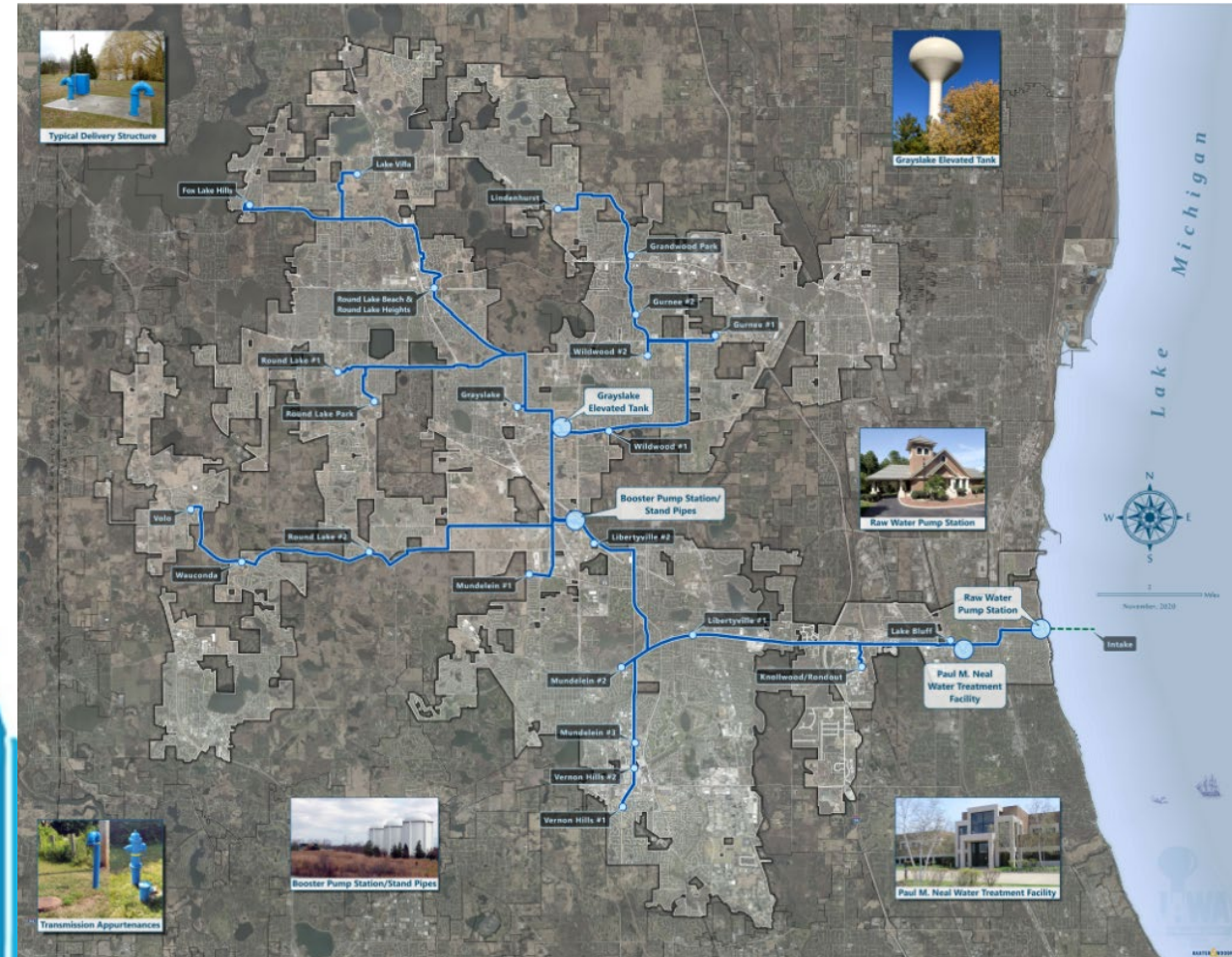
Central Lake County Joint Action Water Agency

2026 SWIFT Program Technical Assistance



Wholesale Water Treatment Plant

- Established in 1992
- Located in Lake Bluff, IL
- Rated for 50 MGD**
- Serve 285,000 customers
- 13 members/19 communities
- ~55 miles of pipeline
- ~100 square miles

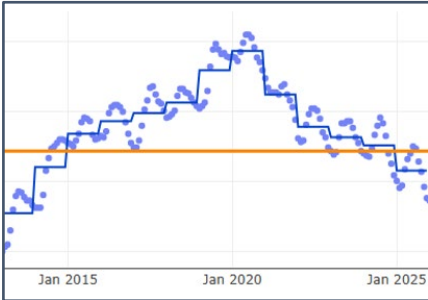


Source Water: Lake Michigan

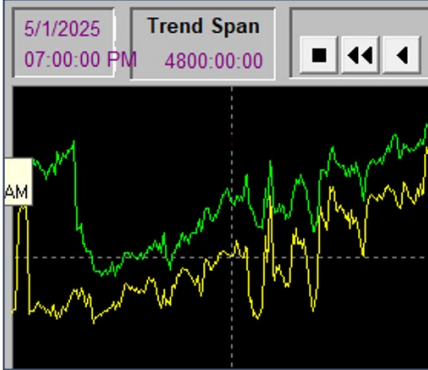


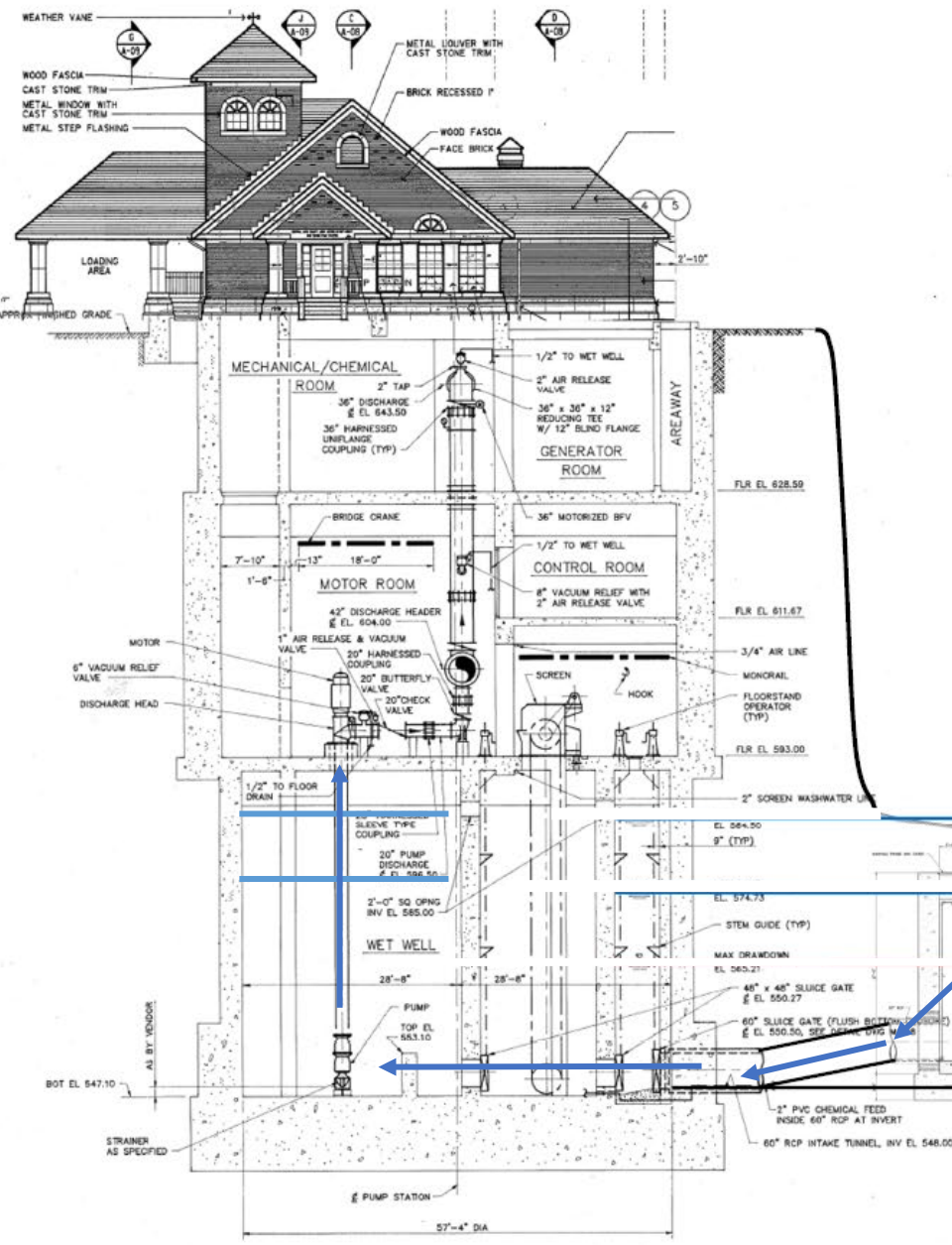
SWIFT Identified Concerns:

Lake Level



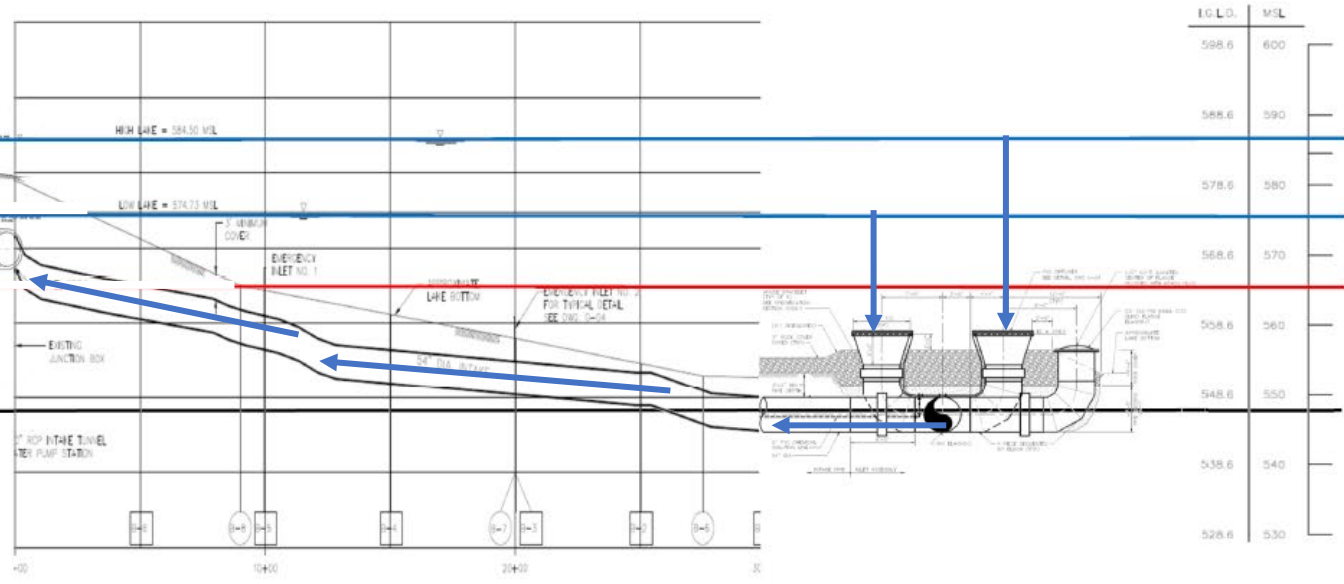
Lake Temperature





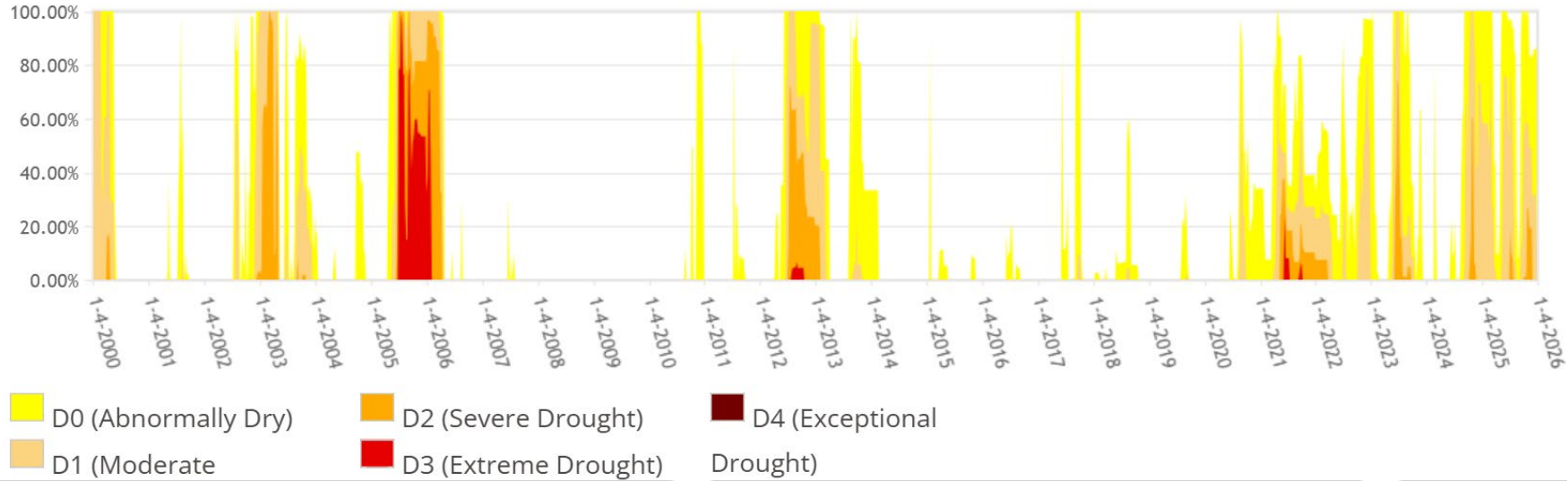
Raw water supply is directly impacted by head provided by lake level and the friction head loss through the intake

Deeper water = more flow

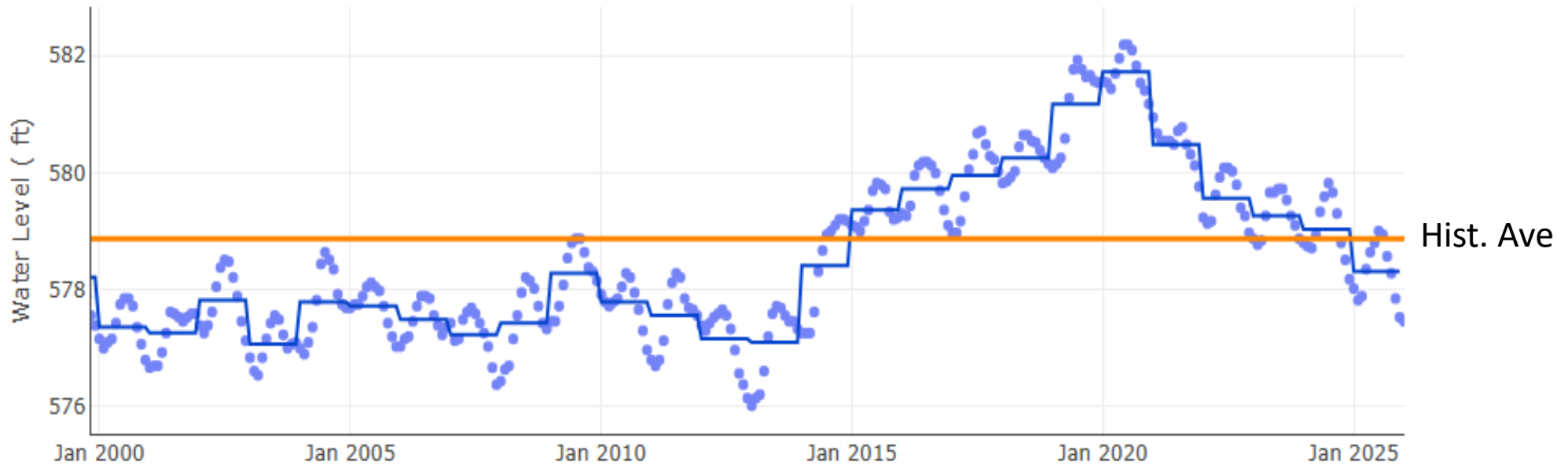


Concern #1: Lake Levels - Ongoing Drought in Lake County

Northeast, IL (1102) Climate Division Percent Area in U.S. Drought Monitor Categories



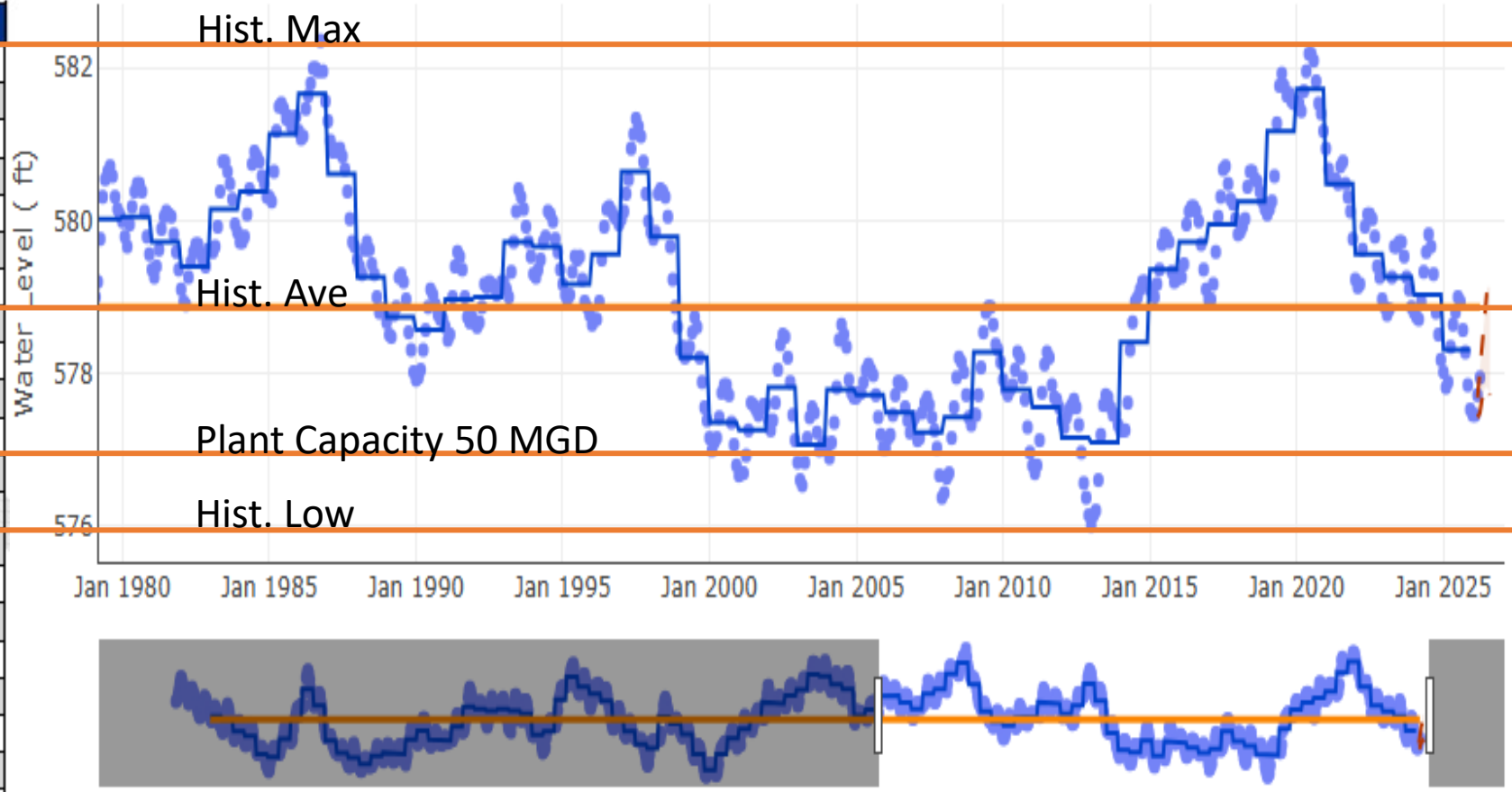
Lakes Michigan and Huron Water Levels



Lakes Michigan and Huron Water Levels

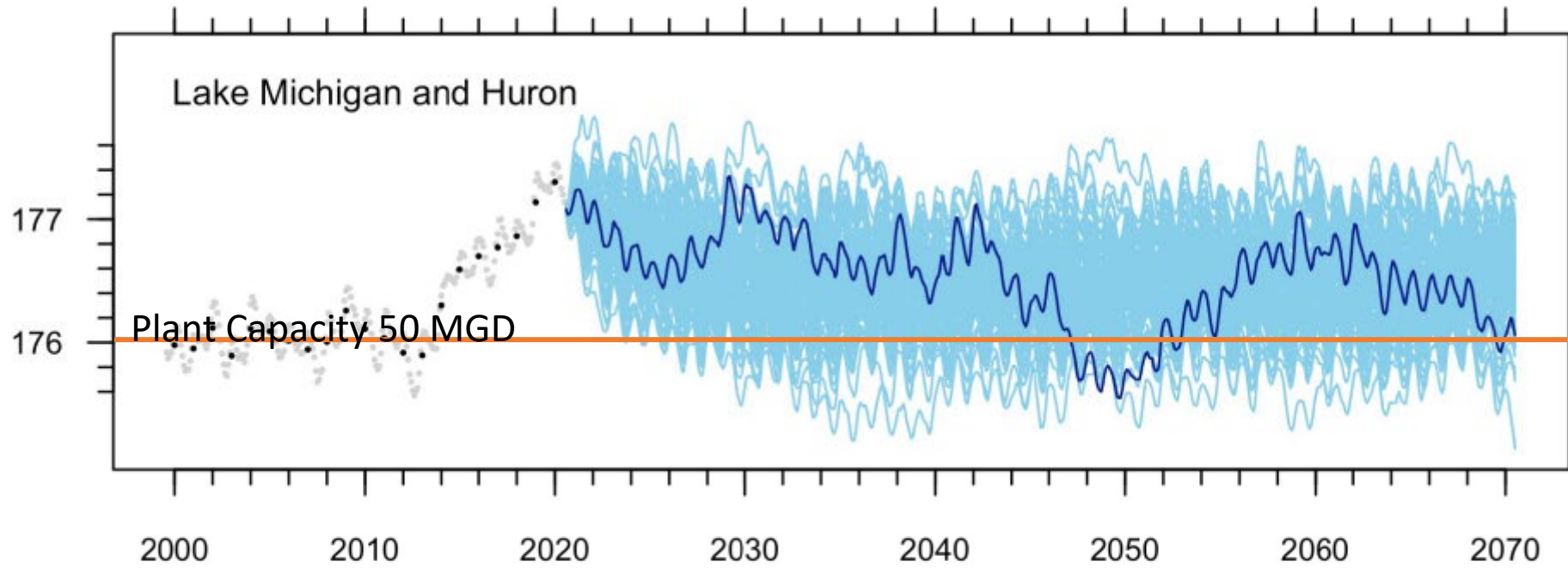


Lake Michigan Level (IGLD)	Raw Water System Capacity
582.0	66.5 MGD ¹
581.5	66.5 MGD ¹
581.0	65.0 MGD ¹
580.5	63.3 MGD ¹
580.0	61.6 MGD ¹
579.5	59.9 MGD ¹
579.0	58.0 MGD ¹
578.5	56.1 MGD ¹
578.0	54.2 MGD ¹
577.5	52.2 MGD ²
577.0	50.1 MGD
576.5	48.0 MGD
576.0	45.8 MGD
575.71 (MIN. MKE 1/4/2013)	44.4 MGD
575.29 (MIN. CH 2/28/1964)	42.4 MGD
575.0	41.0 MGD
574.5	38.4 MGD
574.0	35.7 MGD
573.5	32.8 MGD
573.0	29.6 MGD
572.5	26.1 MGD
572.0	22.2 MGD



Do we need to address this? How?

Water Surface Elevation (meters)

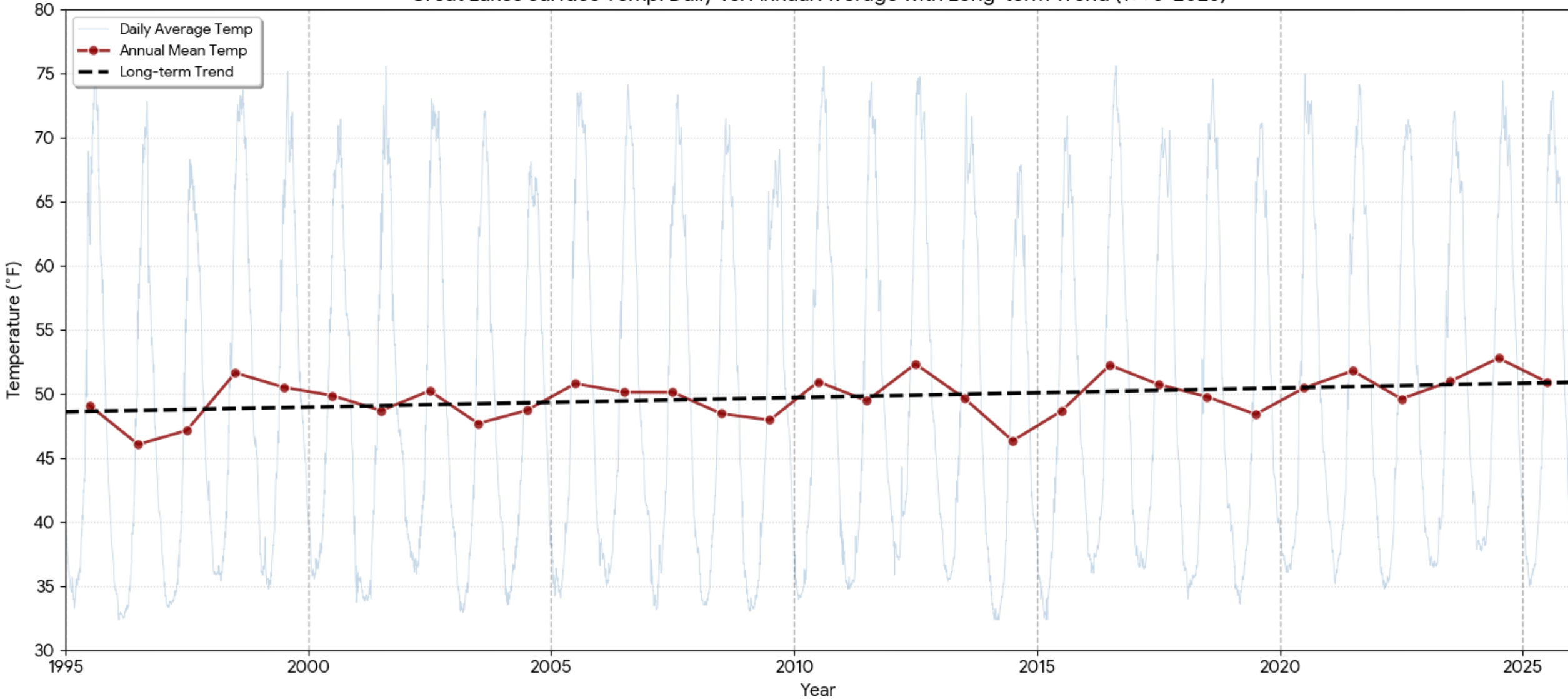


Year

*Andrew Gronewold, Ph.D., P.E.
University of Michigan*

Concern#2 Lake Temperatures – Great Lakes Warming Up

Great Lakes Surface Temp: Daily vs. Annual Average with Long-term Trend (1995-2025)

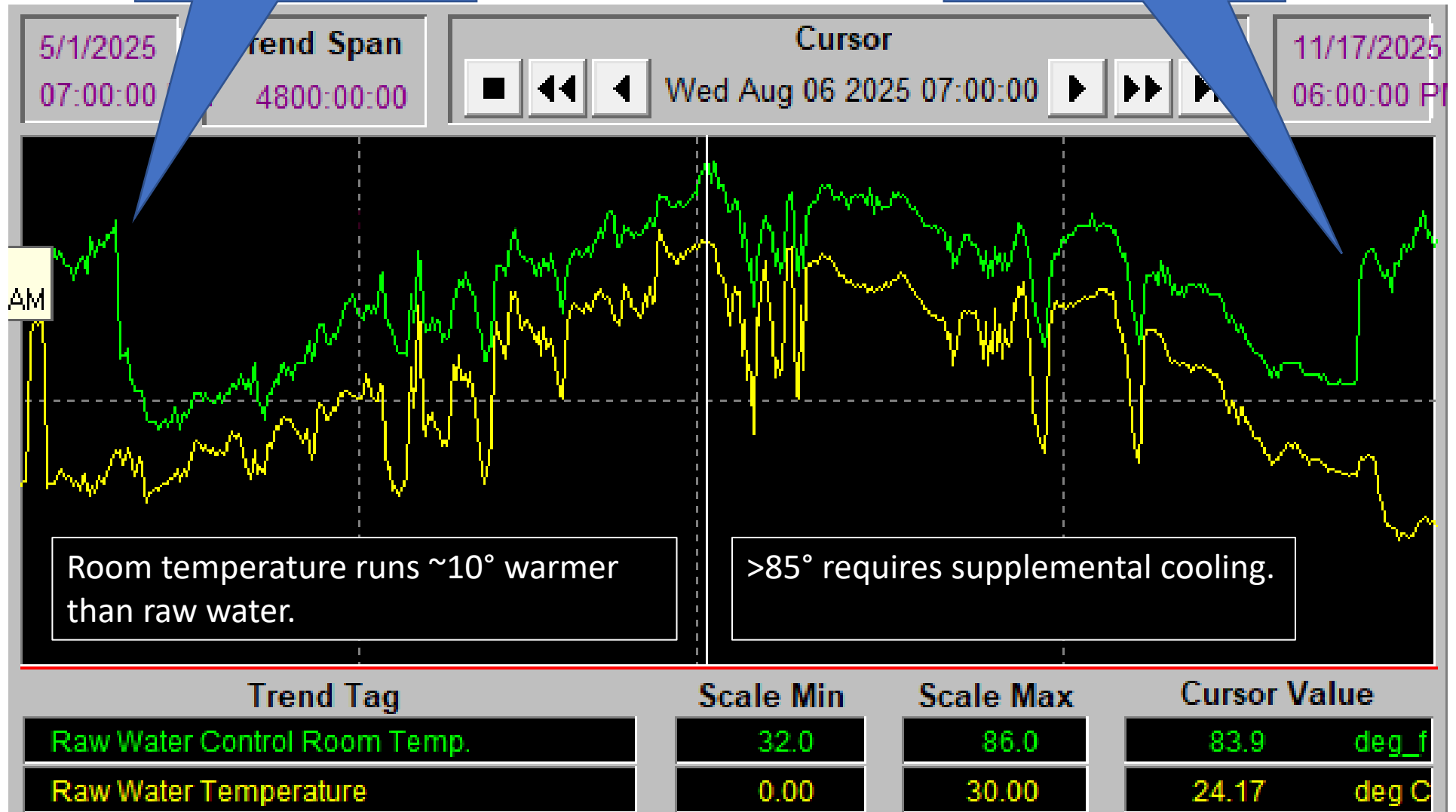






Start raw water cooling

End raw water cooling



Central Lake County Joint Action Water Agency

Natural Hazard Risk Assessment Report

LAKE BLUFF, ILLINOIS

COUNTERMEASURES

CLCJAWA identified one countermeasure for each of the named critical assets to reduce the vulnerability of the intake system and the pump station HVAC from drought:

- **Raw Water Intake System:** Constructing a new raw water intake 8,000 feet offshore at a depth of 60 feet, with a 54-inch diameter steel pipe transmission line (no tunneling), would ensure future flow projections expected once Village of Lake Zurich joins the membership and operability even during extreme low lake levels. A mechanical grate cleaner would automate cleaning intake screens and reduce the need for diver intervention in potentially hazardous conditions.
- **Raw Water Pump Station HVAC:** Implementation of a hybrid temperature system that combines lake-water heat exchange with mechanical chillers and boilers would provide redundancy, eliminate reliance on emergency rentals, automate response, and minimize outage duration.

Table 1: Annualized Costs for Potential Countermeasures

Potential Countermeasure	Capital Cost	O&M Cost	Annualized Cost
Raw Water Intake (New)	\$57,000,000	\$250,000	\$7,277,584
Hybrid Temperature System	\$7,000,000	\$70,000	\$933,037

MONETIZED RISK

Table 5: Baseline and Improvement Risk Assessment Comparison for the Raw Water Intake System

	Baseline	Improvement
Annual Threat Likelihood (T)	2.5%	2.5%
Vulnerability Likelihood (V)	81%	3%
Economic Consequences (C)	\$4,653,999,000	\$362,109,000
Monetized Risk (R)	\$94,243,480	\$271,582

Table 6: Baseline and Improvement Risk Assessment Comparison for the Raw Water Pump Station HVAC

	Baseline	Improvement
Annual Threat Likelihood (T)	100%	100%
Vulnerability Likelihood (V)	24%	3%
Economic Consequences (C)	\$777,045,000	\$159,648,000
Monetized Risk (R)	\$186,490,800	\$4,789,440

DISCUSSION

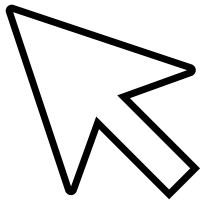
CLCJAWA can use the information obtained from this technical assistance assessment to inform proposals for additional technical assistance, grants or loans, and to strengthen the case for investments in resilience-building countermeasures. The utility may also revisit its risk assessment to explore the financial consequences of additional assets or other natural hazards.

Questions

Could your utility or community benefit from a SWIFT resilience assessment or technical assistance process?

Respond via Mentimeter:

Click the link in
the chat



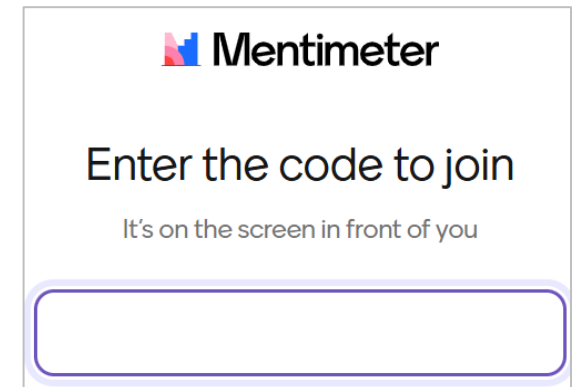
or

Scan the QR
code



or

Join at menti.com
code 8161 2527



Wrap up and what's next

Thank you for joining us!

- Today's workshop was recorded.
- Once processing is complete, the recording and materials will be posted on the **Shared Waters, Shared Future** website:
cmap.is/water-workshops

Continue the conversation



Modernizing Illinois' well impact review process (September 10)



Understanding water governance and management in Illinois (November 12)

Thank you



Chicago Metropolitan
Agency for Planning

The Chicago Metropolitan Agency for Planning (CMAP) is our region's comprehensive planning organization. For decades, CMAP has conducted water supply planning to advance efforts that promote sustainable use of our water supplies.



Illinois-Indiana Sea Grant (IISG) is a federal-university partnership (NOAA, U of I, Purdue) focusing on research, education, and outreach for 104 miles of southern Lake Michigan shorelines.



Funding acknowledgment: *Shared Waters, Shared Future* is funded by the Illinois Department of Natural Resources Office of Water Resources. We appreciate Wei Han, P.E., Ph.D., Water Supply Program Manager, and the department's commitment to water supply planning.



Shared Waters, Shared Future

Northeastern Illinois Regional Water
Supply Sustainability Workshops