

USGS Role in Streamgaging (& Forecasting) in MN

MN Department of Natural Resources-LGU meeting

April 17, 2024

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Minnesota River at Jordan, MN - Flood of September 2010

Topics

- ▣ Role of USGS
- ▣ Streamgaging process
- ▣ Collaborations & partners
- ▣ Partnership & Funding of Streamgages

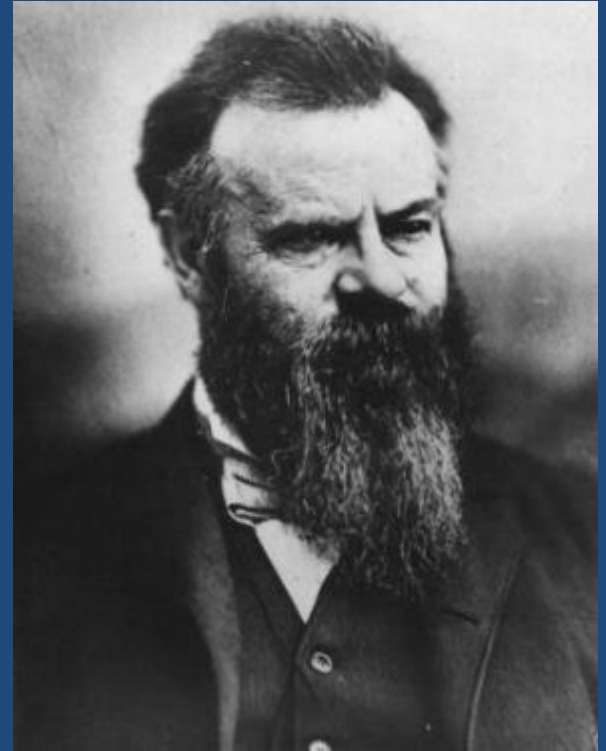


What the USGS does

- ▣ An **independent** fact-finding agency that **collects, monitors, analyzes, and provides scientific understanding** about natural resource and natural hazard conditions and issues.
- ▣ The value of the USGS to the Nation rests on its ability **to carry out studies on a national scale and to sustain long-term monitoring** and assessment of natural resources and hazards.

USGS and streamflow

- 1860s-70s:
 - Eastern farmlands losing fertility
 - Industrial developmt needed resources
 - Western US being settled
- “USGS” was proposed to study west’s geologic & economic resources
- Powell led surveys of west for geology & paleontology
- He recognized water was west’s most valuable resource & need to inventory
- 1st USGS streamgage in Embudo, NM in 1889
- USGS established training center for engineers in art of streamgaging



John Wesley Powell
Director of USGS



Streamflow Monitoring in the USGS



How high? Low?

How much?

When?

How frequent?

Trends?

Many uses and users of data

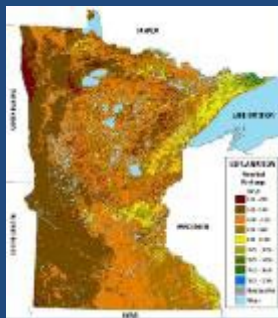
- ▣ Immediate or years later
- ▣ Flood, low flow or all flow
- ▣ Seasonal or year around
- ▣ ...
- ▣ We often don't know who will use or how our data will be used
- ▣ Some examples

Hydrologic Monitoring

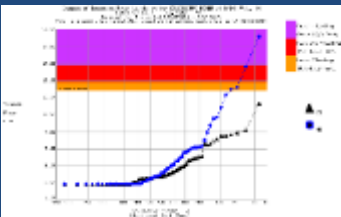
Collecting data that are accurate, reliable, unbiased, consistent & timely is the foundation of everything we do.



Flood documentation



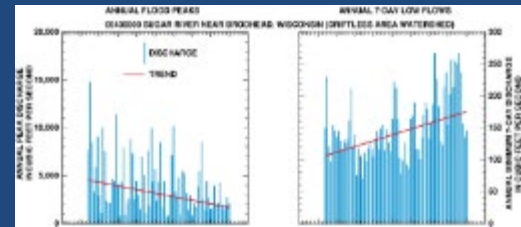
GW Recharge analysis



Flood forecast support and flood-inundation mapping



USGS MN Streamgauge Network



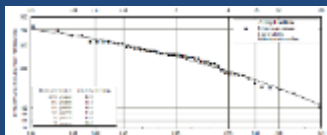
Trends in floods.....and low flow



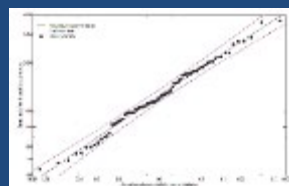
Water supply



Hydropower regulation



Low-flow frequency analysis



Flood frequency

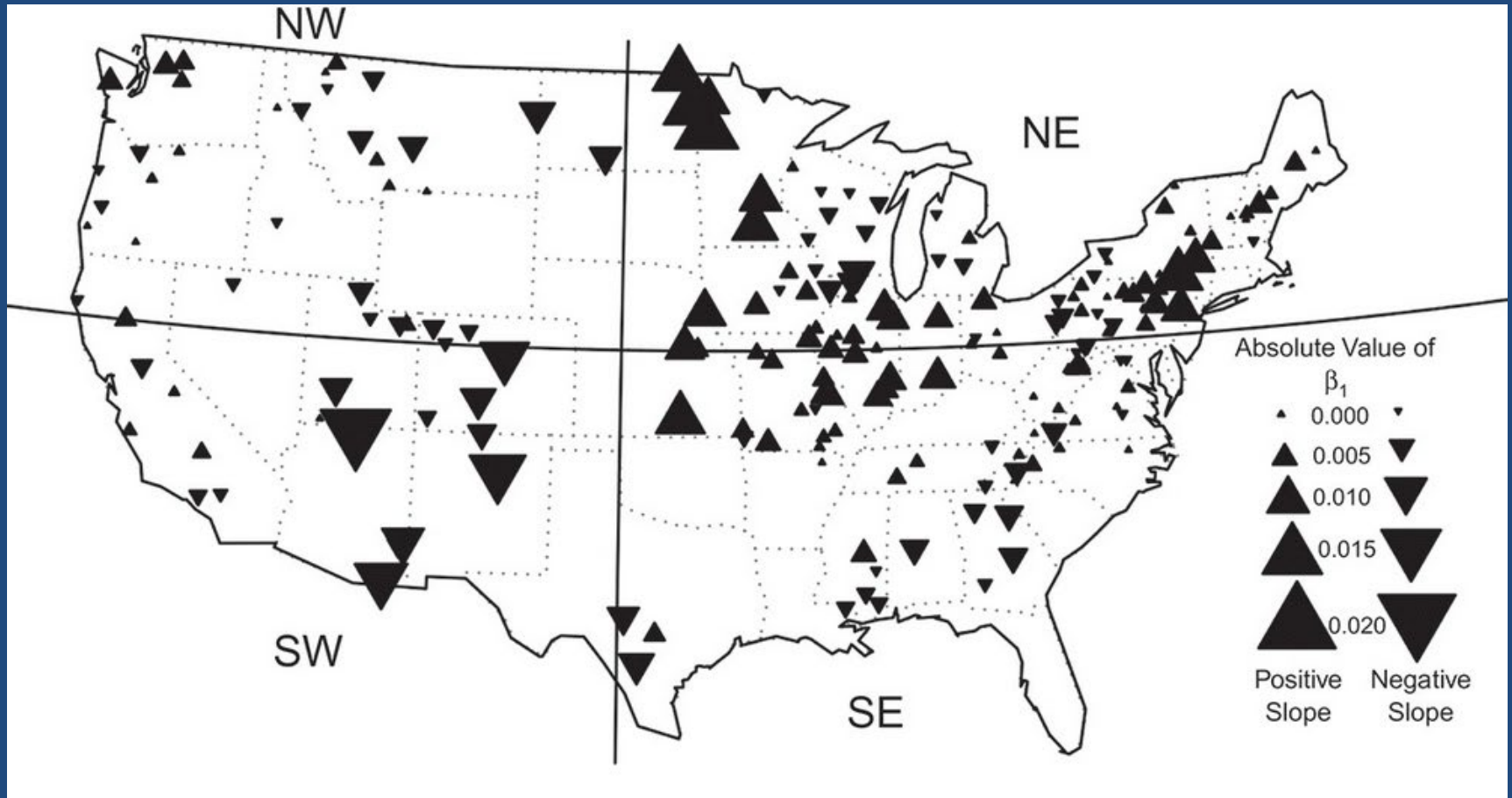


Sediment and bedload



Water Quality

Streamflow trends compared nationally



Trends in magnitude of annual streamflow peaks at 200 long-term streamgages, Hirsch and Ryberg, 2012

<http://www.tandfonline.com/doi/full/10.1080/02626667.2011.621895>

2012 Flood in Northeast MN

CITY OF THOMPSON

Photo courtesy of MN-DOT

“Insurers say they’re grappling with a shift in the state’s weather patterns...since 1998. Minnesota has ranked in the top three states for insured catastrophe losses in 2007 and 2008 alongside disaster magnets such as Texas, Louisiana and California.”

Insurers say they're tired of rolling the dice with Mother Nature and losing, but critics say rate increases have gone too far.

By JENNIFER BJORHUS • jenniferbjorhus@startribune.com

Homeowners insurance premiums are soaring in Minnesota, and consumers can expect more rate shocks ahead as insurance companies wager that a run of worse-than-usual weather will continue.

Increases that average 10 to 12 percent this year come on the heels of rate hikes averaging 7 percent last year and 8 percent in 2010, according to a Star Tribune analysis of company filings. That has added \$200 to \$300 a year to the average policy.

Insurers say they're grappling with a shift in the state's weather patterns, an eruption of tornadoes, straight-line winds and hailstorms that have lashed

Minnesota since 1998. Minnesota ranked in the top three states for insured catastrophe losses in 2007 and 2008 alongside disaster magnets such as Texas, Louisiana and California.

"In 20 of my years in the business I have never seen increases like this," said Roberta Gibbons, an independent agent at St. Louis Park-based Dyste Williams. "But then again, I've never seen storm claims like we've had in Minnesota."

Skeptics aren't convinced that weather trends justify the size of the increases, particularly since many companies are also whittling away at how much they'll cover. It's debatable whether Minnesota's storm pat-

Insurance continues on A17 ►

State & regional agencies known* to use streamgage data

- ▣ **DNR**
 - Permitting, water allocations, well head protection
 - Fisheries & restoration
 - Climatology office
- ▣ **DOT**
 - Flood frequencies to design bridges & culverts
 - Monitor scour
- ▣ **MPCA**
 - WQ impairments and assessments
- ▣ **HSEM**
 - Flood mitigation and documentation
- ▣ **BWSR**
- ▣ **MDA: pesticide and nutrient monitoring and transport**
- ▣ **MDH:**
 - Contaminant transport
 - Climate adaptation planning
- ▣ **EQB: reports**
- ▣ **Commerce Dept: flood documentation**
- ▣ **MN Geological Survey: products**
- ▣ **Met Council Environmental Serv.**
- ▣ **Metropolitan Mosquito Control**
 - When and where to treat
- ▣ **University of MN, MNSCU: research**
- ▣ **Science Museum of MN: research**
- ▣ **Pipeline Safety**
- ▣ **Public Safety Department**
- ▣ **Tourism**
- ▣ **State & Federal legislators**

Directly fund streamgages, currently or recently

*USGS doesn't always know who uses our data, only those who contact us

Topics

- ▣ Role of USGS
- ▣ Streamgaging process
- ▣ Collaborations & partners
- ▣ Partnership & Funding of Streamgages



Two components of data needed for basic streamgaging

1. Stage of stream

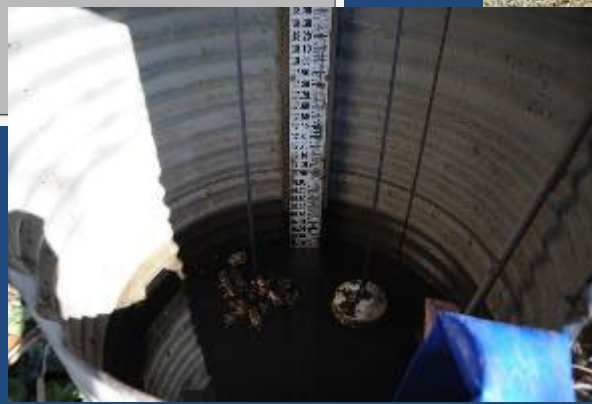
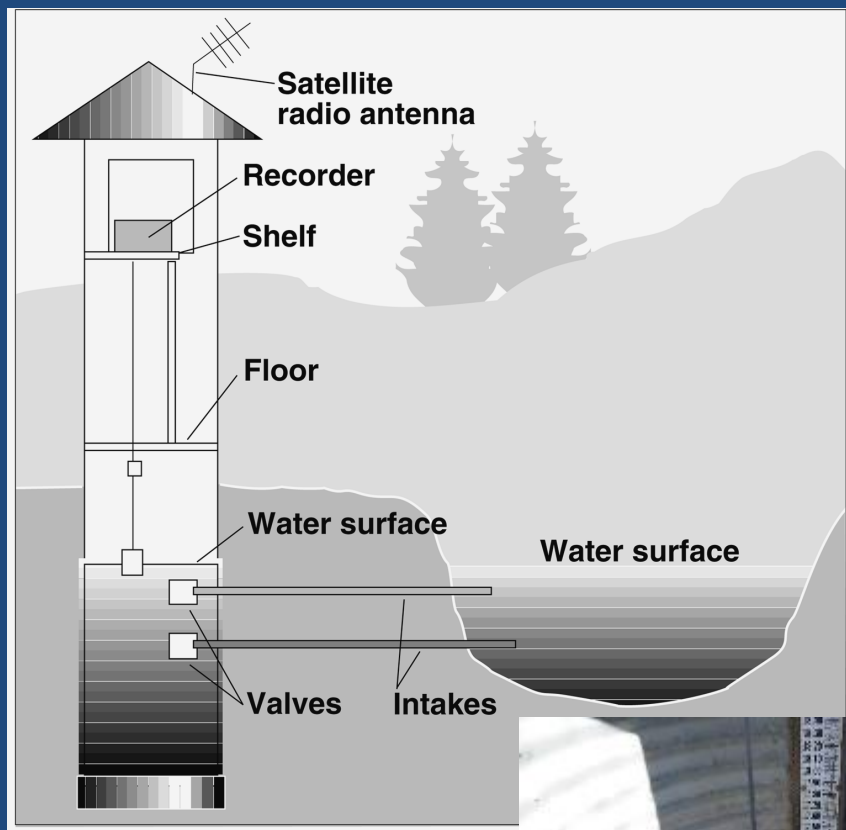
“gage height” or “river level”

2. Streamflow or discharge

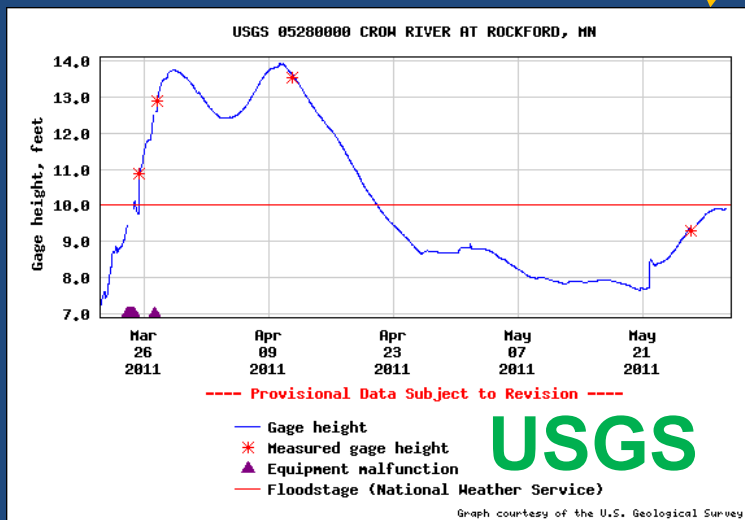
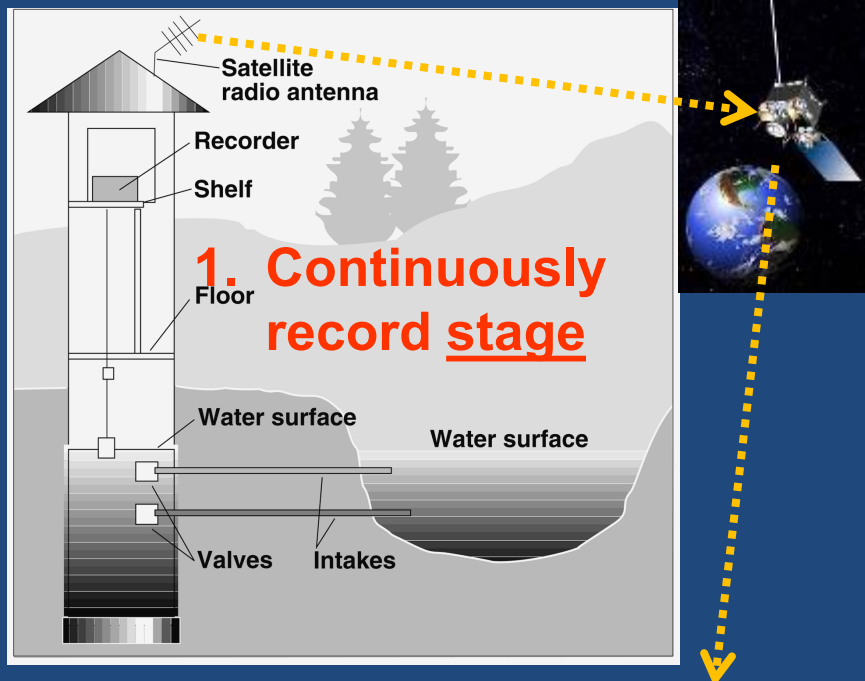
volume of water flowing in the river past a given location, as rate



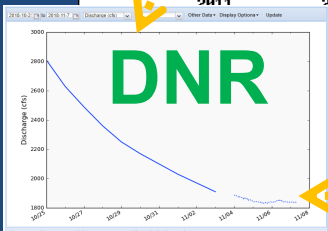
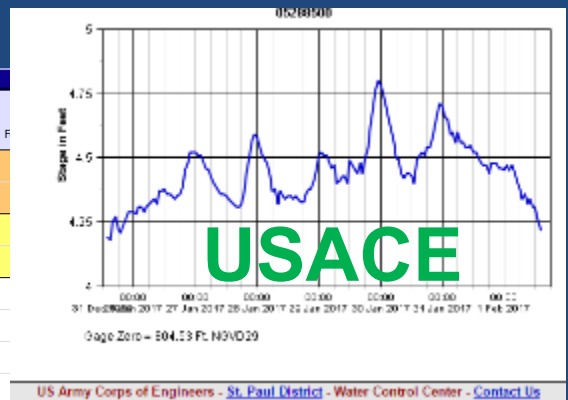
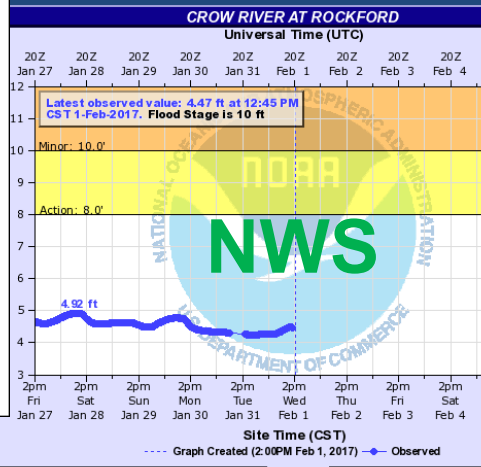
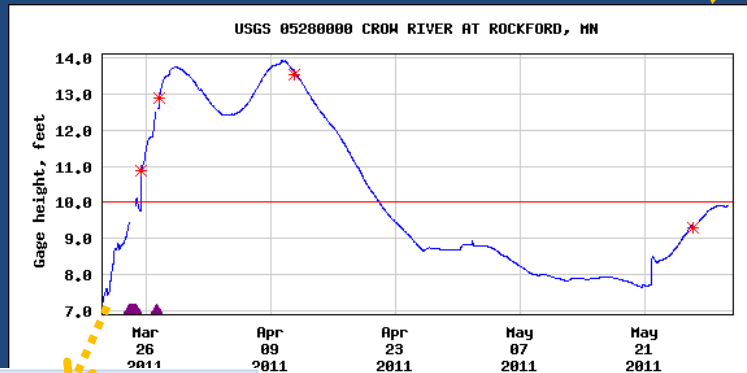
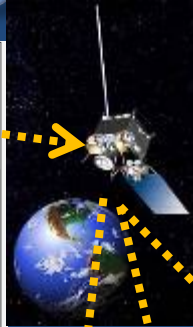
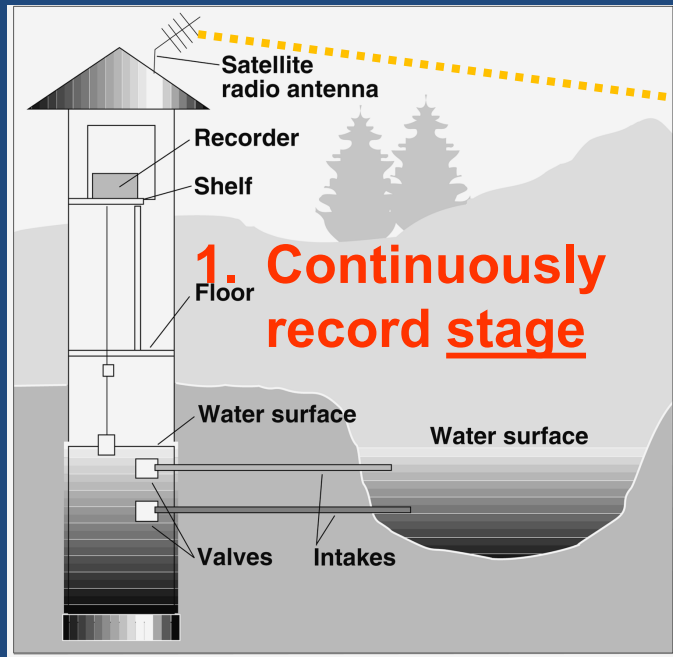
Stilling well streamgauge



Streamgaging Process



Streamgaging Process



Provisional Data Subject to Revision ---

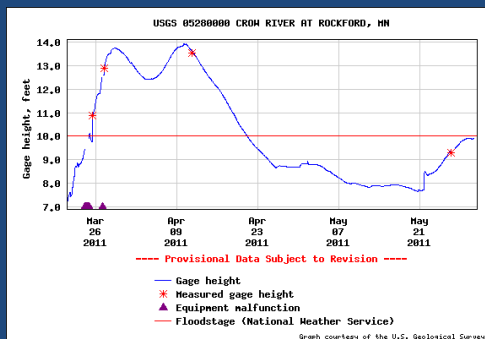
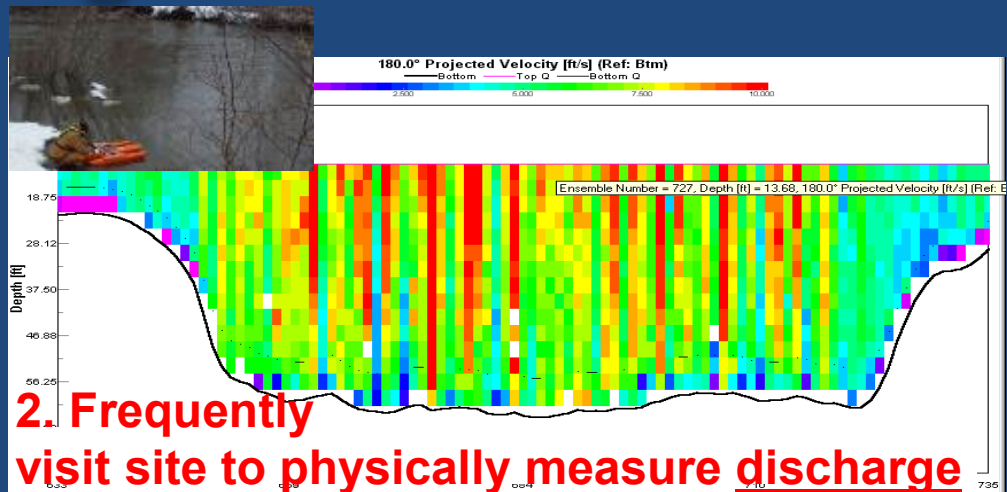
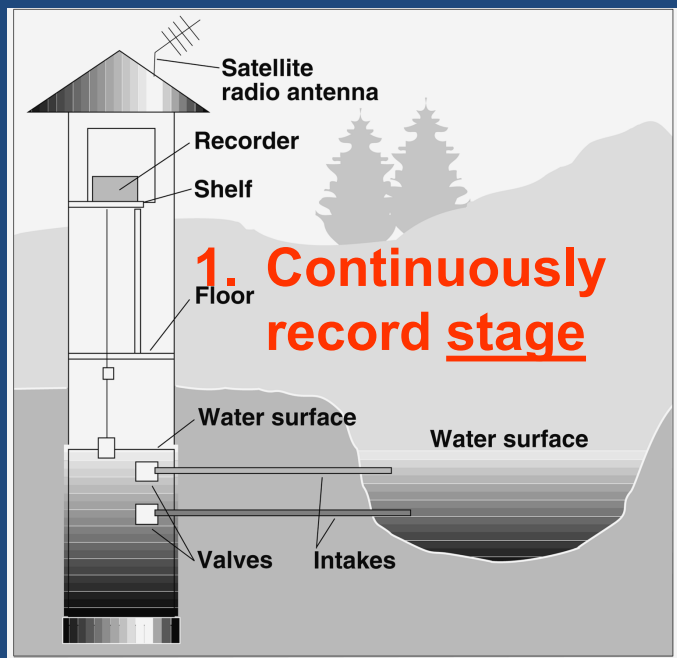
- Gage height
- Measured gage height
- Equipment malfunction
- Floodstage (National Weather Service)

USGS

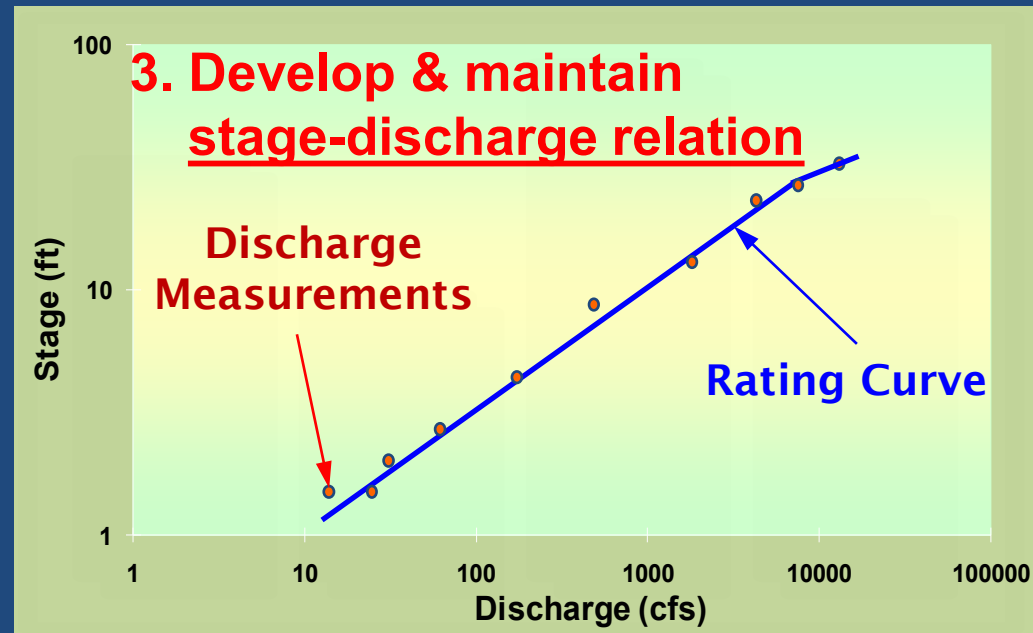
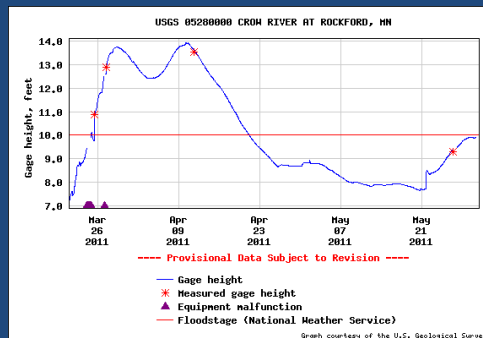
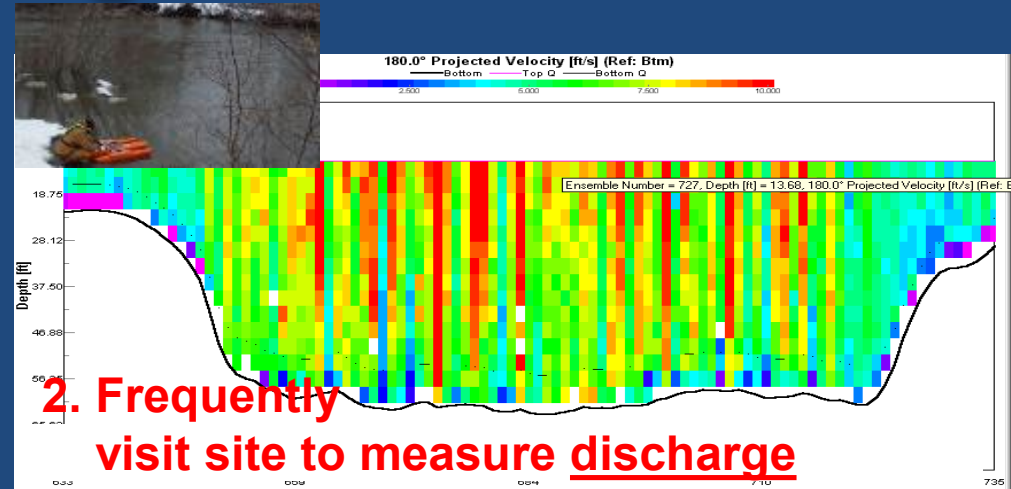
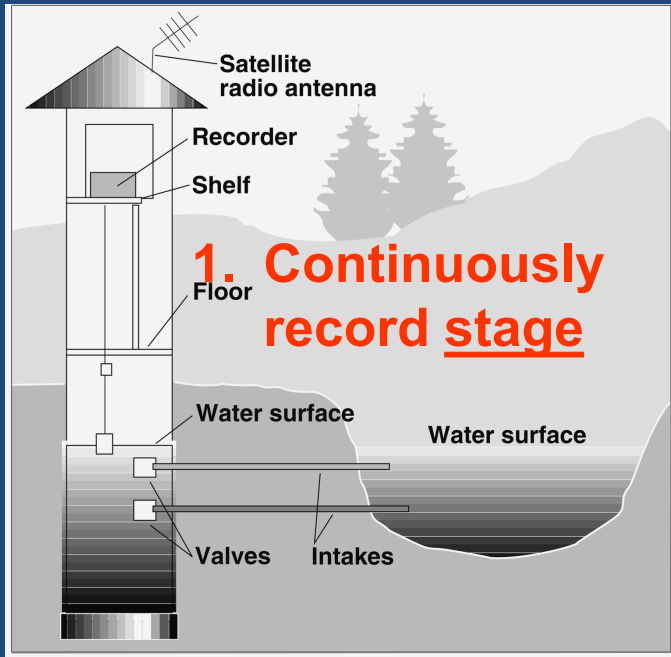
Graph courtesy of the U.S. Geological Survey



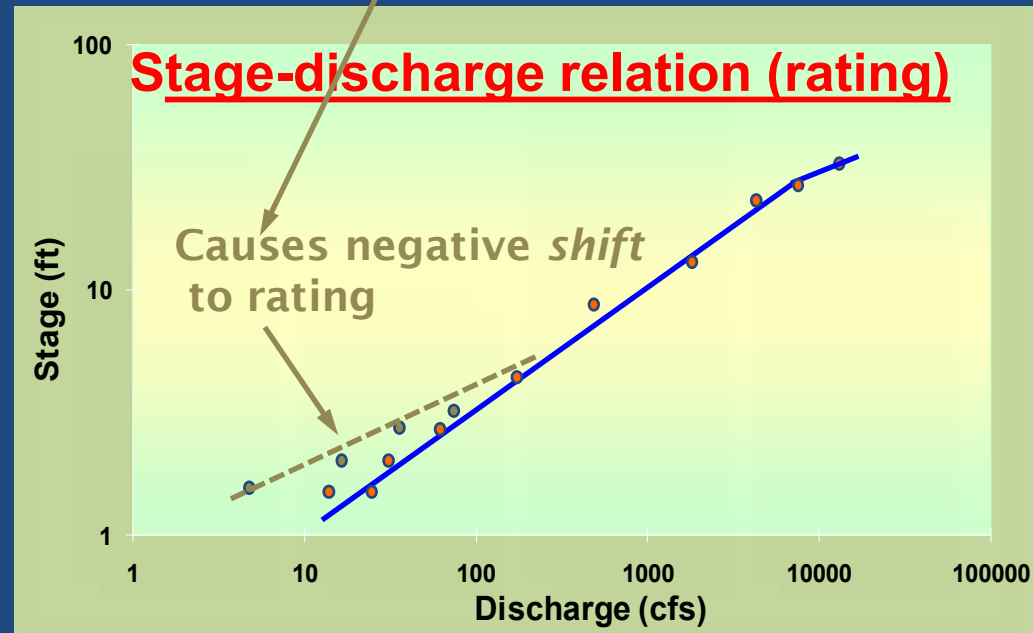
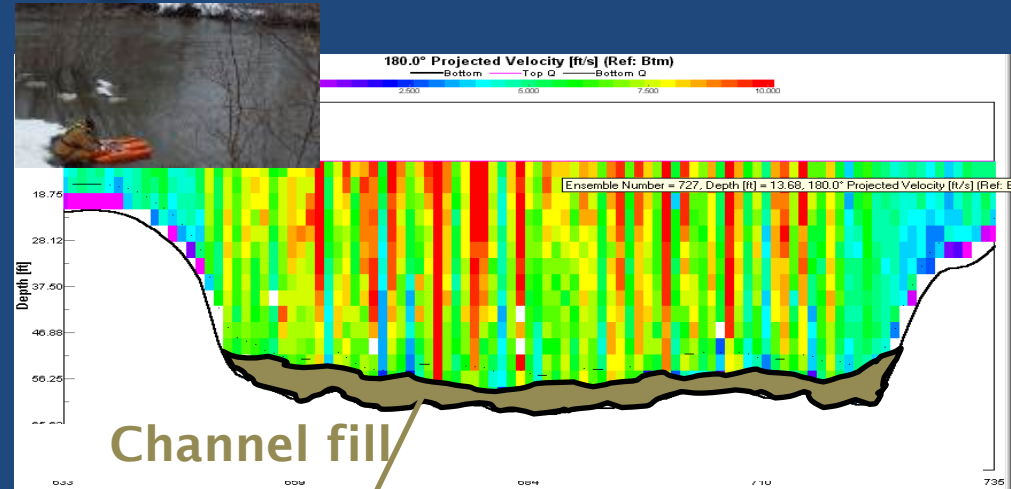
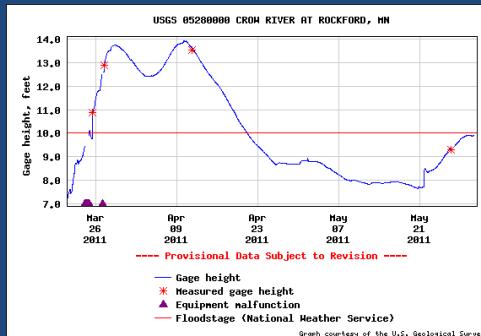
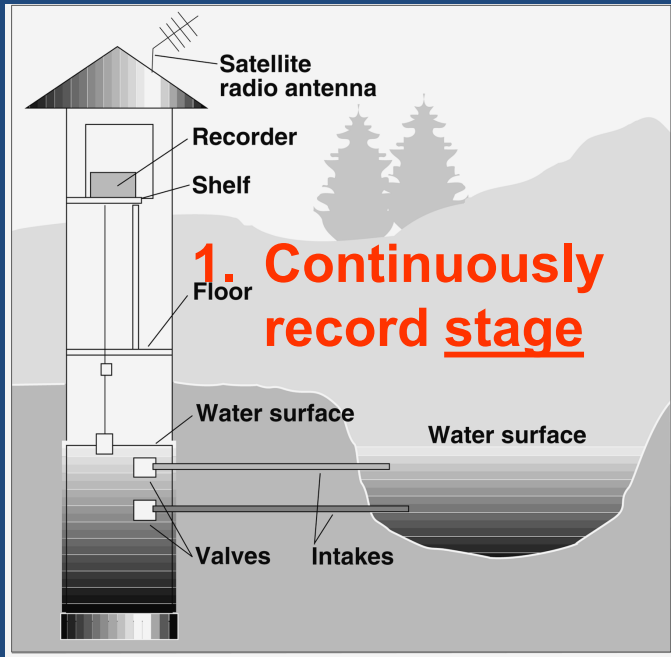
Streamgaging Process



Streamgaging Process

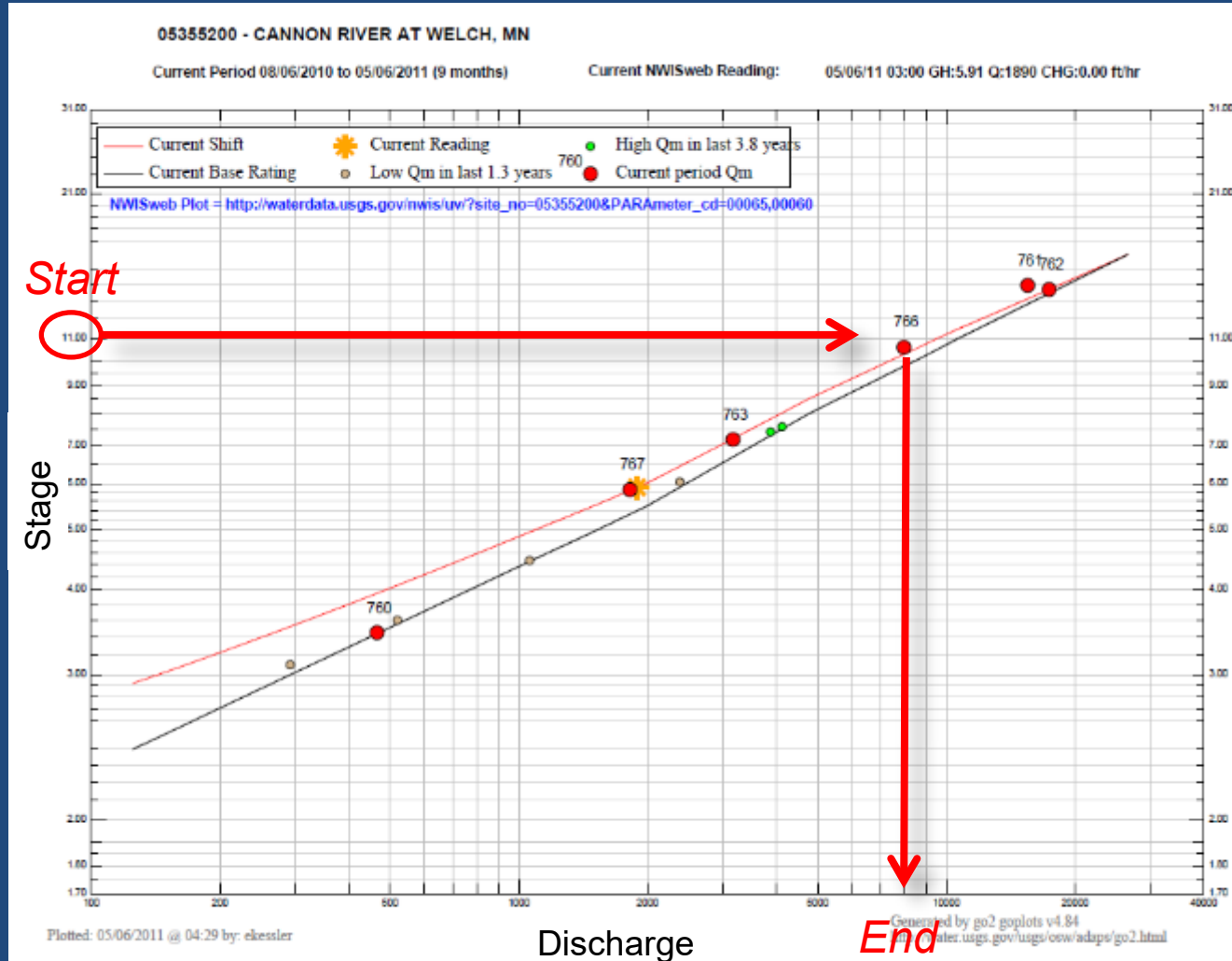


Streamgaging Process



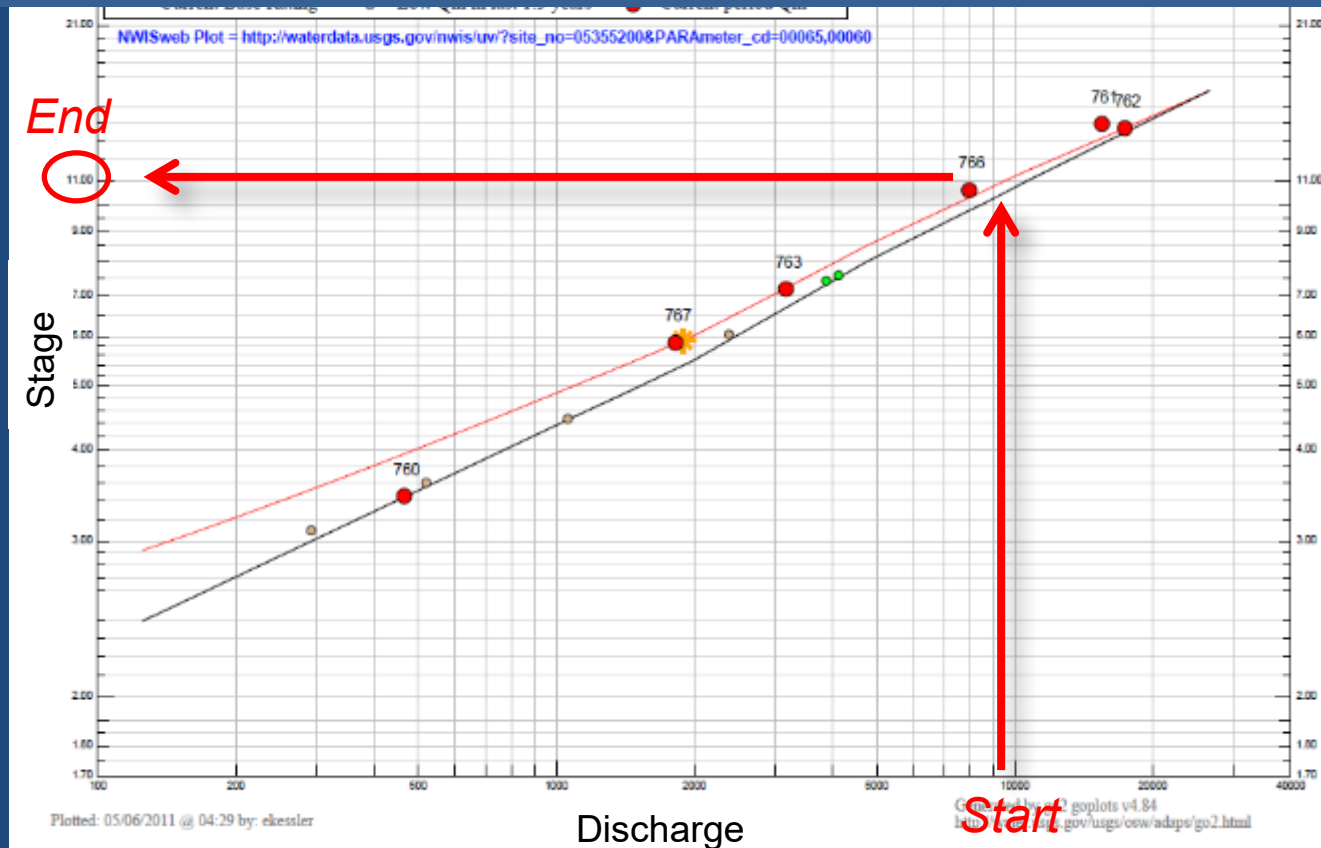
USGS and NWS use rating curves in fundamentally different ways!

USGS uses recorded stage to calculate discharge that passed



USGS and NWS use rating curves in fundamentally different ways!

The NWS models rain & snowmelt runoff (and data from upstream gages) to estimate how much water will pass your site, *then* uses rating to predict river's peak



Go to http://waterdata.usgs.gov/nwis/uw?site_no=05355200&PARAMeter_cd=00065,00060 to view the plot.

Agency staff meet regularly to collaborate and improve flood communication and response



Rapid Communication Tools



James Fallon

October 23, 2012

Chanhassen, MN

Mississippi Valley Tri-Agency Meeting

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

Collaboration also ongoing at Federal, State and local levels

- ▣ USACE's Winter planning & NWS's spring flood outlook meetings
- ▣ Gage relocation meetings



Topics

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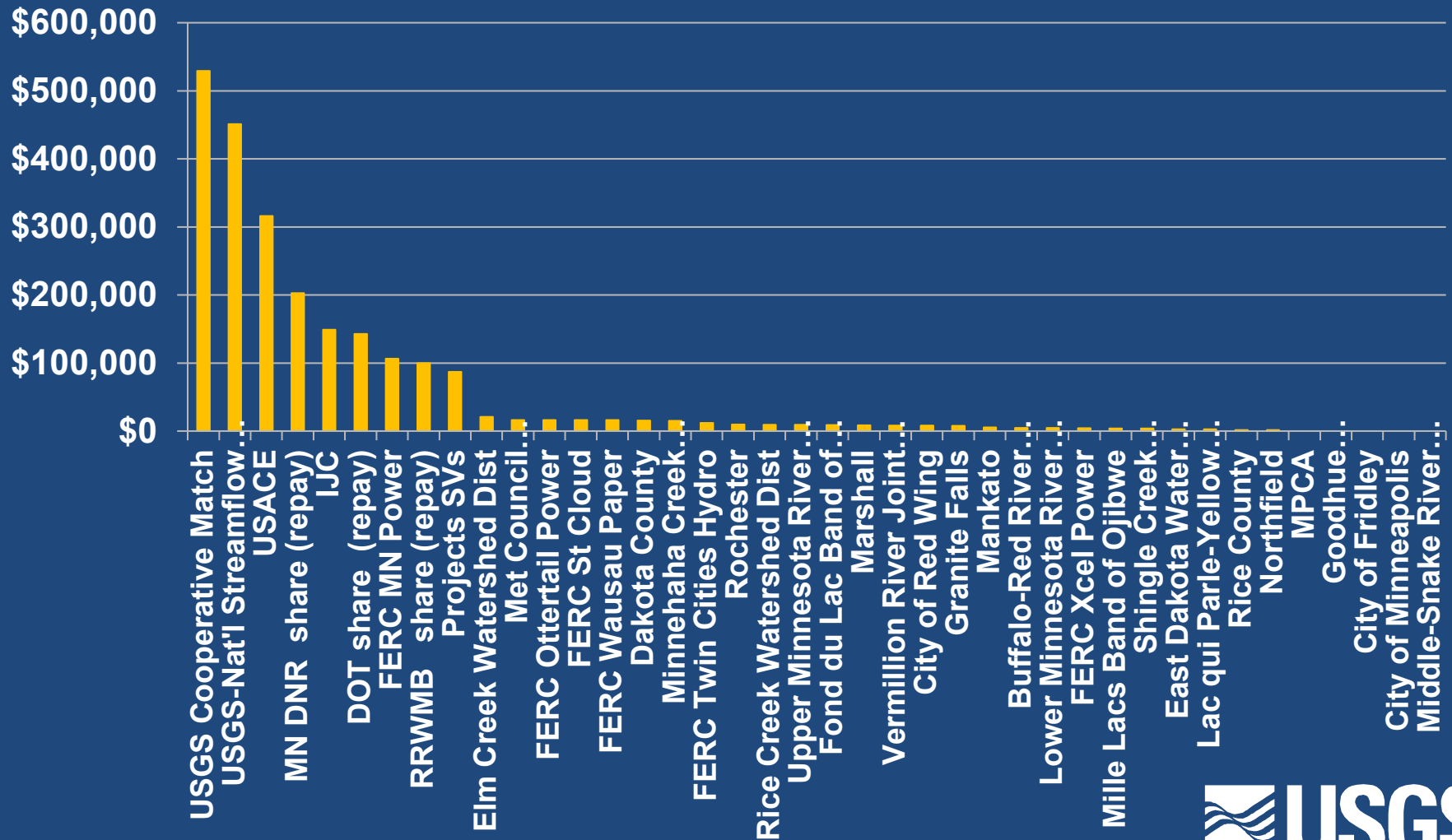


Streamgaging Is a Partnership

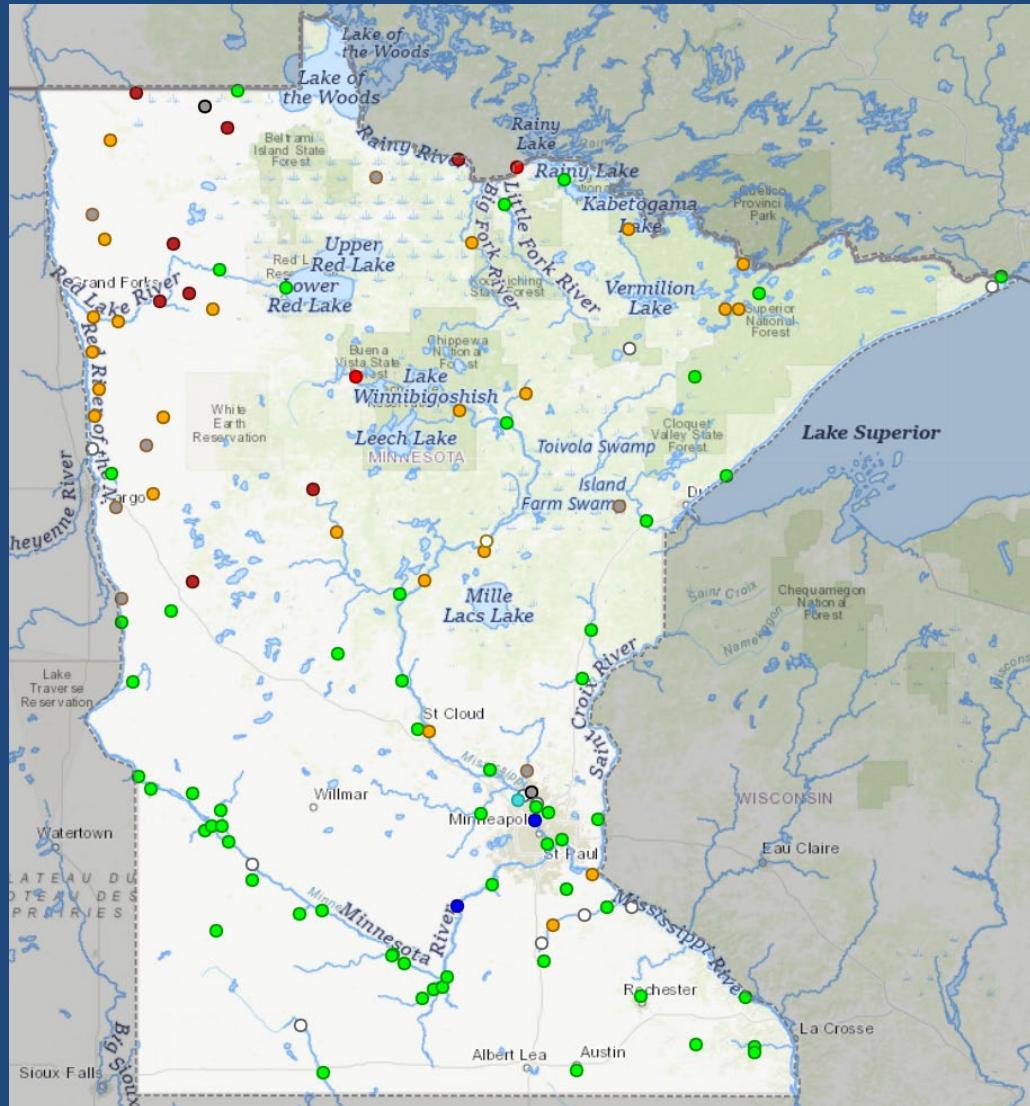
- ▣ USGS & local partners fund streamgages
- ▣ USGS:
 - Operates & maintains gages
 - Makes field measurements
 - Processes, QAs, publishes & archives data
 - Feeds data updates to NWS, COE, etc
 - Integrates data into other studies
- ▣ Local partners (& others) use data for their needs
- ▣ NWS uses data for forecasting

Streamgauge Funding & Partners

Streamgauge funding in MN by cooperator or source (about 40)

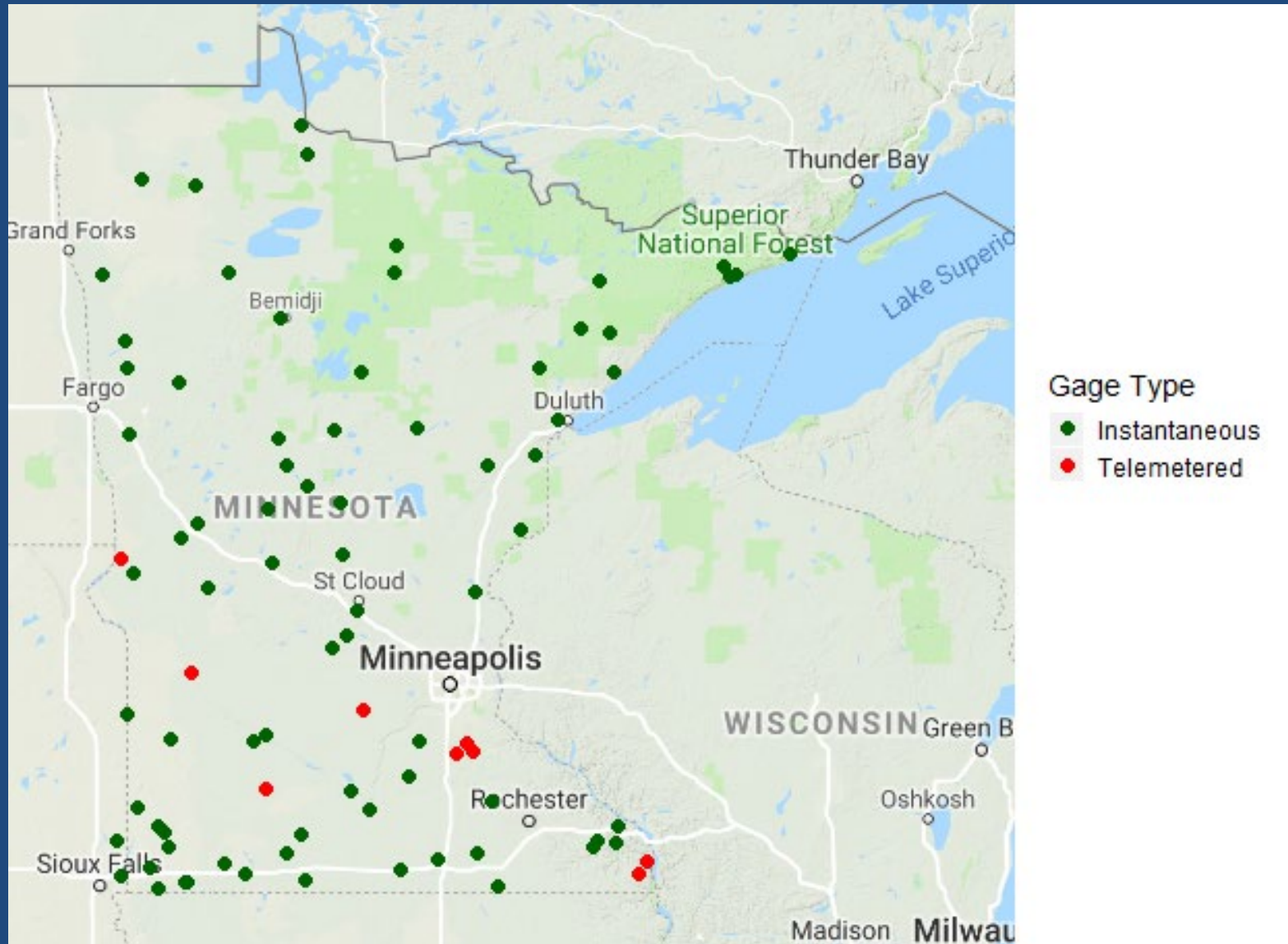


117 continuous recording discharge streamgages



<https://dashboard.waterdata.usgs.gov/app/nwd/>

81 peak-recording (mostly non-telemetered) gages



How are streamgages funded?

- **Cooperative Matching Funds**
 - A way to ensure USGS work has local relevance.
 - Match was 50/50 with State, Regional, Local & Tribal (taxing) agency and tribes
 - Funding flat ~last 15 years so typically around 20-25% in MN
- **Other Federal Agencies (USGS cannot match)**
 - In MN: USACE, IJC, Hydropower Licensees (FERC)
- **Pass through**
- **Federal Priority Streamgage Funding**
 - National network of Federally funded gages
 - Newer program started in 2000 when Congress learned gages with Federal interest were being cut due to state and local budget issues
 - Specific criteria for gage to qualify. Includes NWS River Forecast Points
 - Criteria recently expanded and in Open Season so working with Federal and local agencies currently

If you're interested in streamgaging in your community

- **Meet to discuss needs**
 - Invite a group of agencies that might be interested in the location data users; see if we can make stone soup
 - Invite NWS
- **Joint Funding Agreement**
 - JFAs are not contracts but contain wording that either party can withdrawal from agreement with 90 days notice
 - JFAs can be annual or up to 5-years long
 - Can be modified as needs change

Questions?



Minnesota DNR Stream Gage Network

Ryan Whittaker | Monitoring Hydrologist

Agenda

- Overview of WMS Unit
- What is a Stream Gage?
- Equipment at a Gaging Station
- Discharge Measurements
- Rating Curves
- DNR Stream Gage Network
- DNR Products



Water Monitoring & Surveys Unit

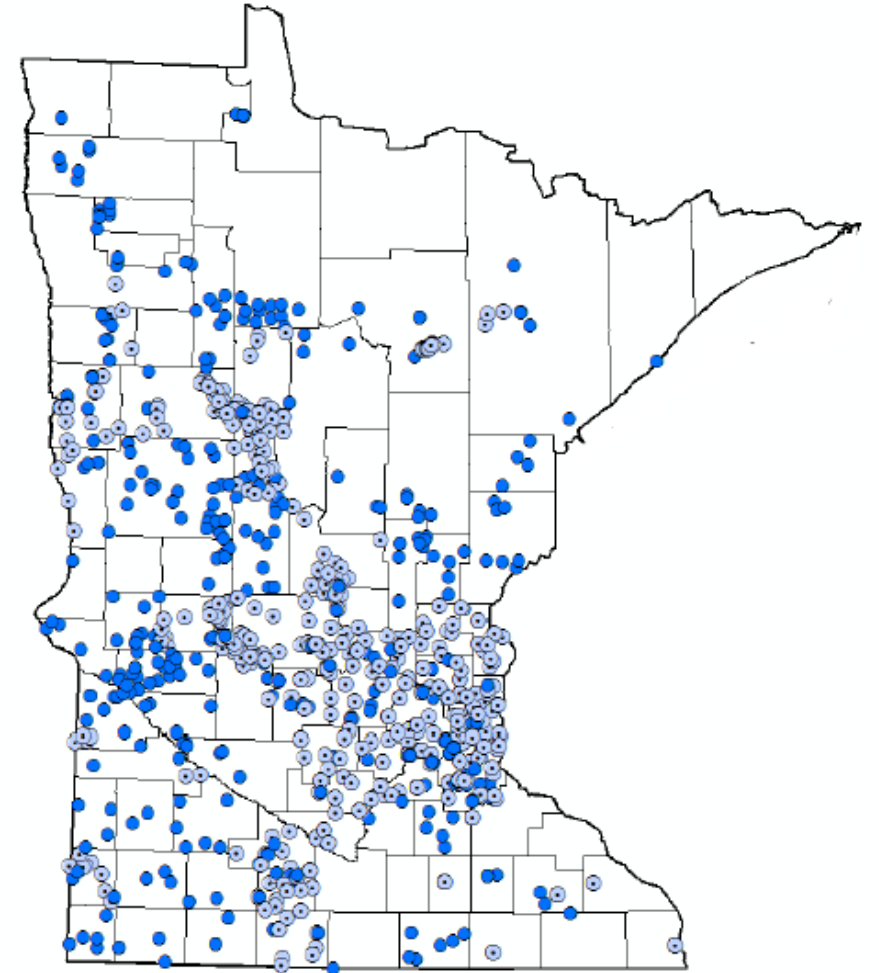
Divisions

- [Ecological and Water Resources](#)
- [Enforcement](#)
- [Fish and Wildlife](#)
- [Forestry](#)
- [Lands and Minerals](#)
- [Parks and Trails](#)

- **Ecosystem Management and Protection:** Scientific and Natural Areas, Invasive Species, Nongame Wildlife, Conservation Management, Rare Resources, Minnesota Biological Survey
- **Conservation Assistance and Regulation:** Water Regulation, Land Use, Environmental Review, Dam Safety and Permits
- **Inventory, Monitoring and Analysis:** Hydrogeology/Groundwater, Lake Ecology, River Ecology, [Water Monitoring and Surveys](#)
- **Strategic Information Systems:** Business Operations, Communications and Planning, Information Technology

Observation Well Network

- Approximately 1,140 active observation wells
- Approximately 750 wells with data loggers
- Contracts with SWCDs to measure/download
- Cooperate with USGS NGWMN, grants
- Goal for network is 1,500 wells, 40 per year
- Cooperative Groundwater Monitoring Network
- <https://www.dnr.state.mn.us/waters/cgm/index.html>



- Approximately 900 lake gages statewide
- Volunteers and Lake Association readers
- <https://www.dnr.state.mn.us/lakefind/index.html>

Home > [LakeFinder](#) > LakeFinder - Lake Page

Lake Reports

Fisheries Lake Survey
Water Access Sites
Fish Stocking
Ice In/Out
Fish Consumption
Water Levels

Water Quality
Lake Health

Lake Maps

Water Clarity
Lake Depth
Recreation Compass
Google Earth/KML

Fish Minnesota

Fishing regulations
Buy a fishing license
Learn more

Green (34007900)

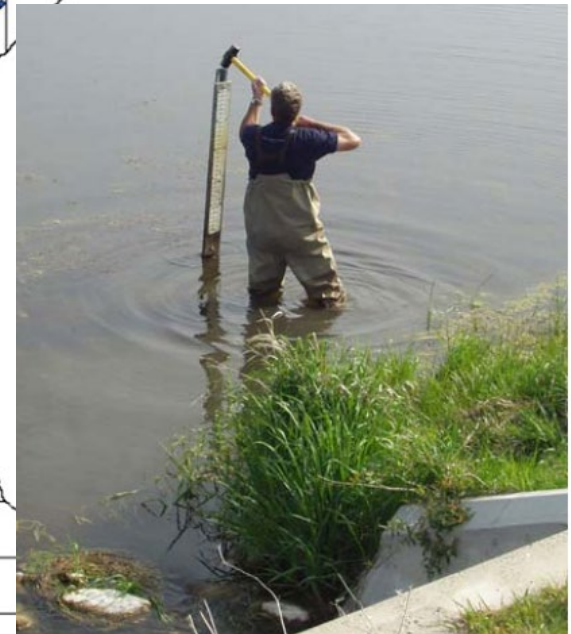
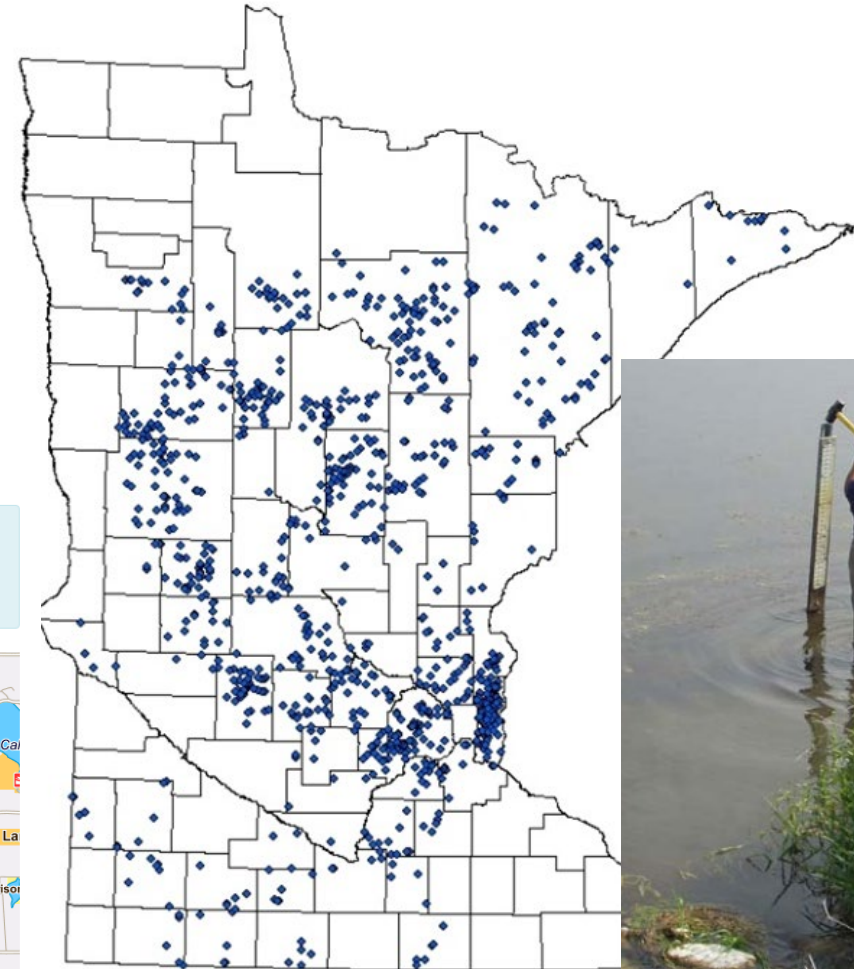
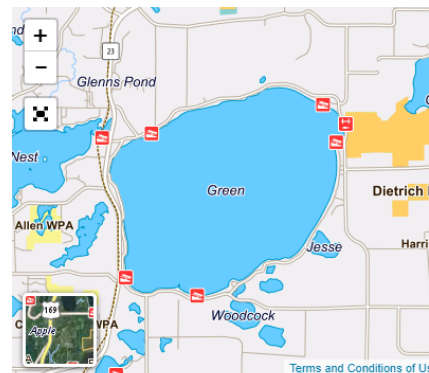
Fish consumption advisory
Read about [fish consumption guidelines](#) provided by the Minnesota Department of Health for this waterbody.

ID: 34007900
County: [Kandiyohi](#)
Near: Spicer
Border water: No
Sentinel Lake: No

Size and depth

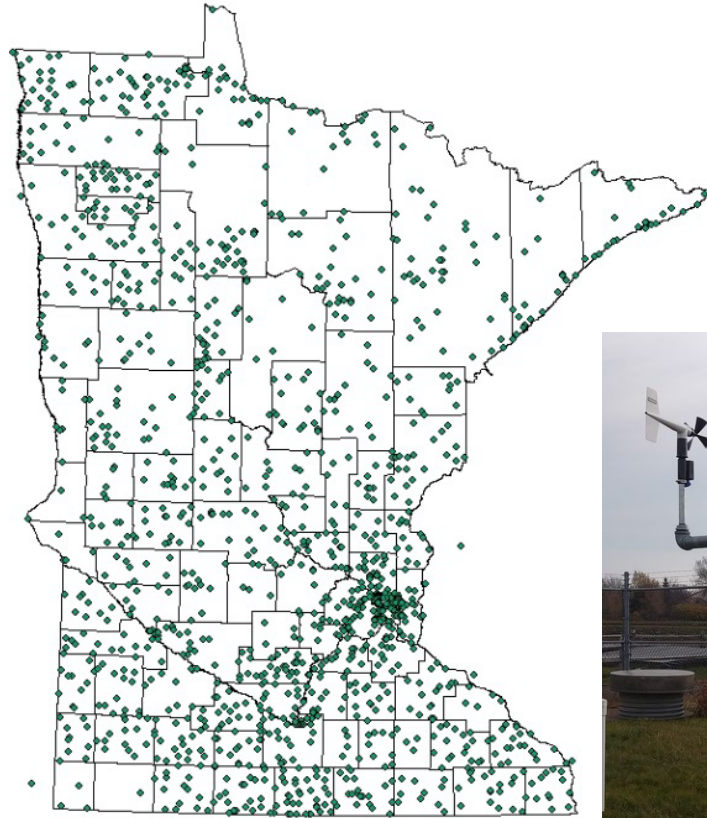
Area: 5569.03 acres
Littoral Area: 2035 acres
Shore length: 12.01 miles
Mean depth: 21 feet
Maximum depth: 110 feet

Fish species: black bullhead, black crappie, bluegill, brown bullhead, channel catfish, green sunfish, hybrid sunfish, largemouth bass, muskellunge, northern pike,



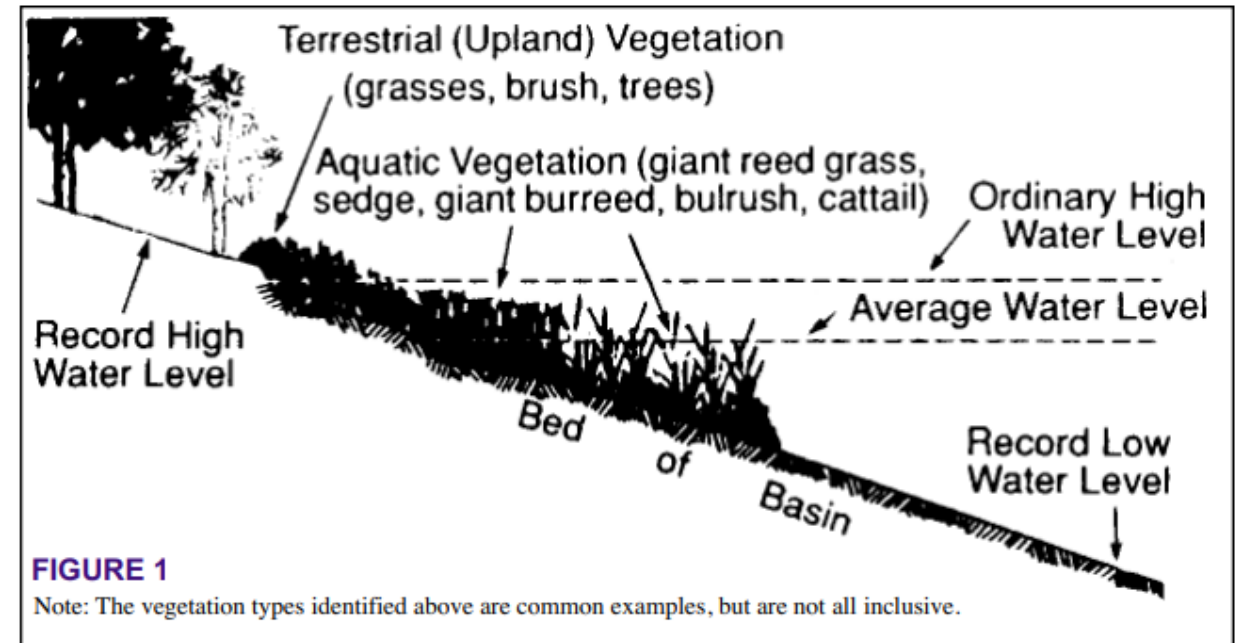
State Climatology Office

- Manages, analyzes, and disseminates MN climate information
- MNGage Precipitation Network
- Mesonet Climate Stations
- State Drought Plan
- Lake Ice Out
- <https://www.dnr.state.mn.us/climate/index.html>



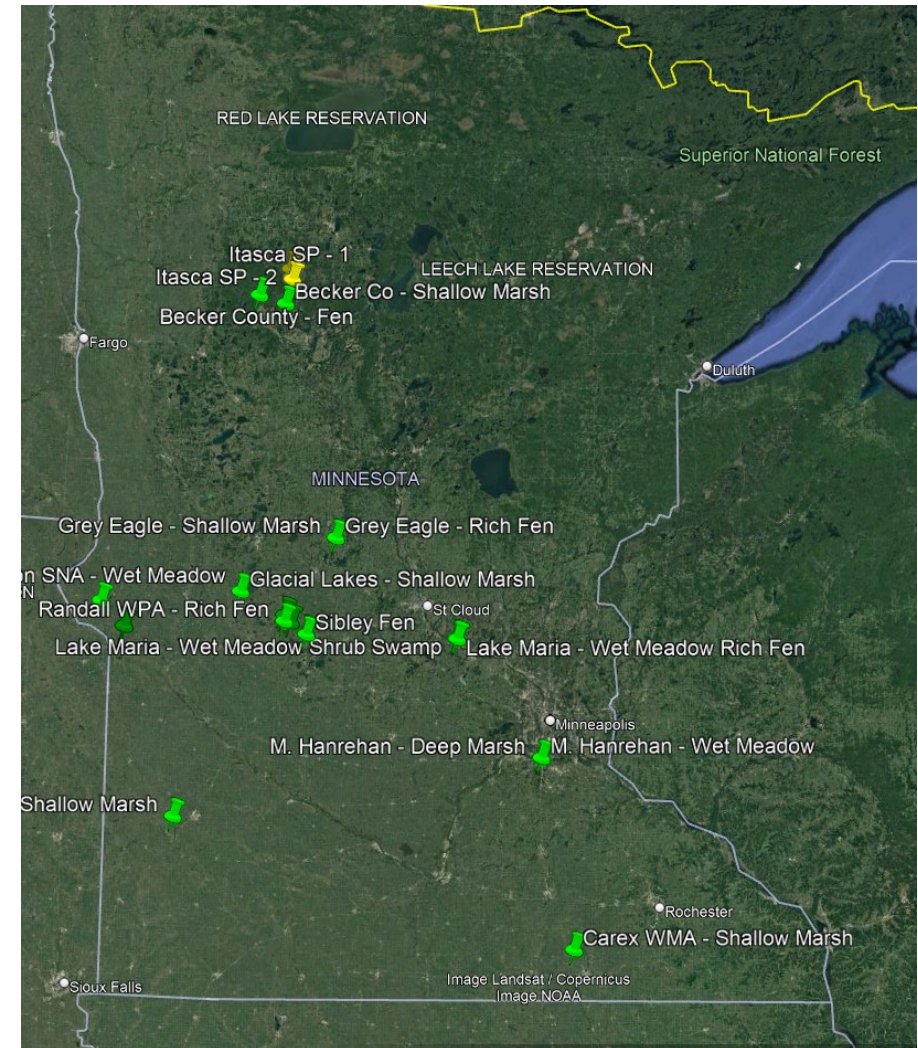
Survey Crew

- Conducts survey requests from regional EWR staff for permitting decisions (60-100 per year)
- Ties in all of our hydrology monitoring sites to NAVD88 datum
- Conducts Lake Gage run each spring
- Ordinary High Water Level Determination



Wetland Monitoring

- 20 stations have been installed in reference wetlands with 40 to go
- WMS covers the installation/maintenance of the sites and processes the data in reference to ground level
- Wetland staff will create reference hydrographs for each wetland type to be compared to impacted wetlands
- <https://www.dnr.state.mn.us/wetlands/index.html>



Stream Gage

- Equipment that records stage (gage height, elevation, water level) of a stream or river
- Supplementary sensors: precipitation, water temperature, turbidity, DO
- Stage is converted to discharge (streamflow) using discharge measurements & rating curve



Stream Gaging Equipment

Datalogger

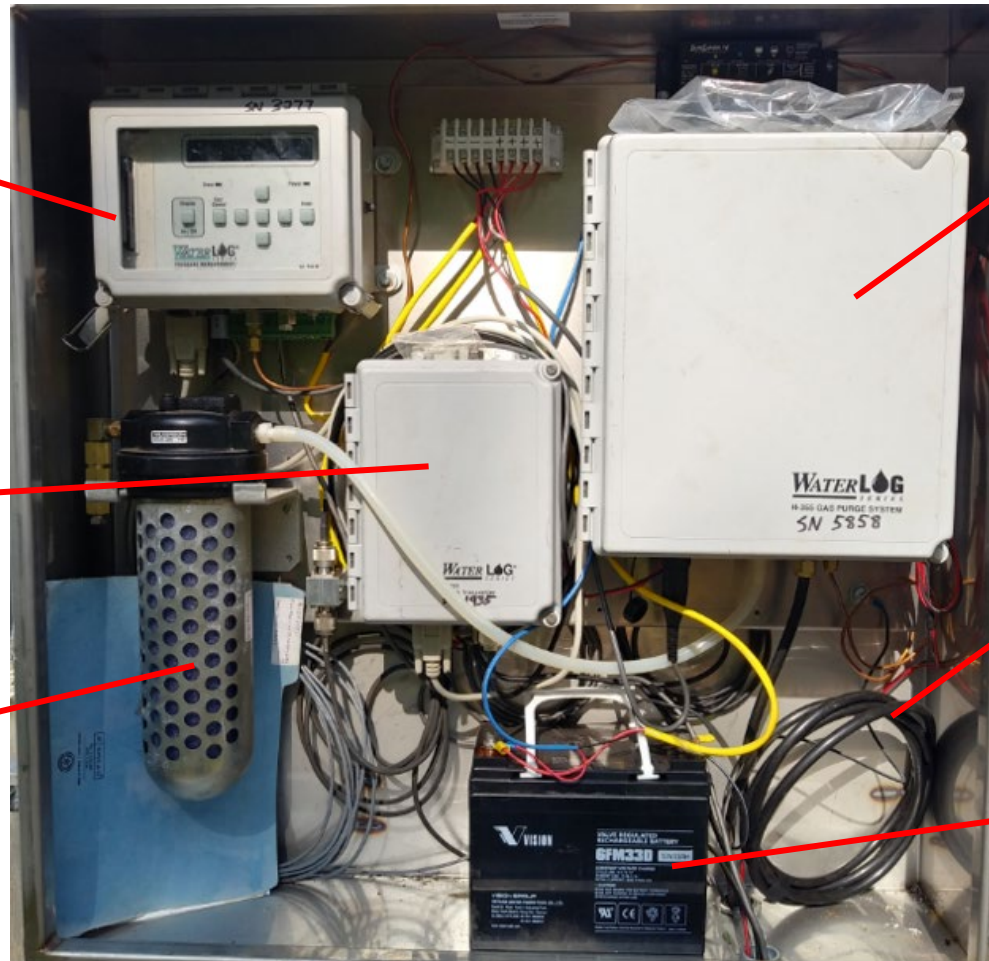
Bubbler

GOES Transmitter

Orifice Line

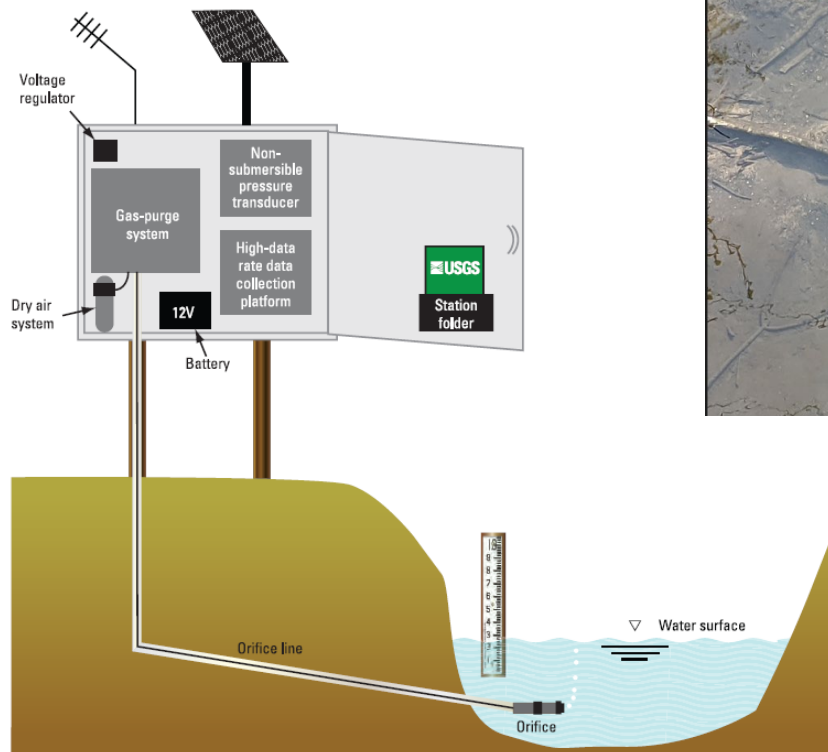
Desiccant

12V Battery



Stage Sensors

- Bubbler System



<https://pubs.usgs.gov/tm/tm3-a7/tm3a7.pdf>



- Radar



Gage Datum/Reference Marks

NGVD29

NAVD88

Assumed (local) Datum

REFERENCE MARKS:

B.M. 1: Brass disk in bridge number 86508 in southeast (downstream right bank) bridge abutment.

Elevation: 47.64 ft assumed datum (972.46 ft NAVD88). Surveyed on 8/4/2021 by MNDNR.

R.M. 1: Chiseled square located on the upstream (west) side of bridge rail, approximately 100 ft from the upstream left bank (north) end of the bridge.

Elevation: 50.00 ft assumed datum (974.82 ft NAVD88). Surveyed on 8/4/2021 by MNDNR.

R.M. 2: Wire weight checkbar on upstream (west) side of bridge.

Elevation: 48.94 ft assumed datum (973.76 ft NAVD88). Surveyed on 8/4/2021 by MNDNR.

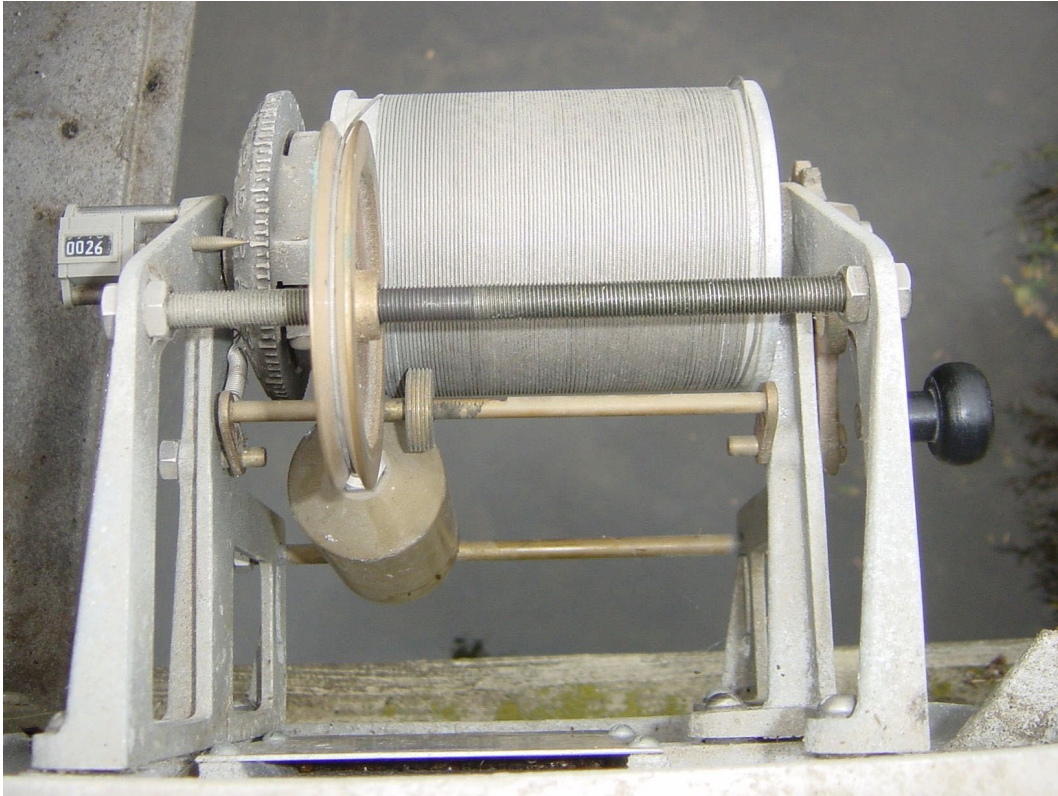
R.M. 3: Spike in east side of 1 foot diameter ash tree, 1.5 feet above ground. Tree is located on upstream right bank, approx. 40 feet east of bridge, northern-most tree in a cluster of 3 trees.

Elevation: 41.21 ft assumed datum (966.03 ft NAVD88). Surveyed on 8/4/2021 by MNDNR.

Primary Reference: R.M. 2 (48.94 ft assumed datum)

Gage zero: 924.82 ft NAVD88

Stage Measurements



Discharge Measurements

Wading Measurements



Discharge Measurements

ADCP Measurements

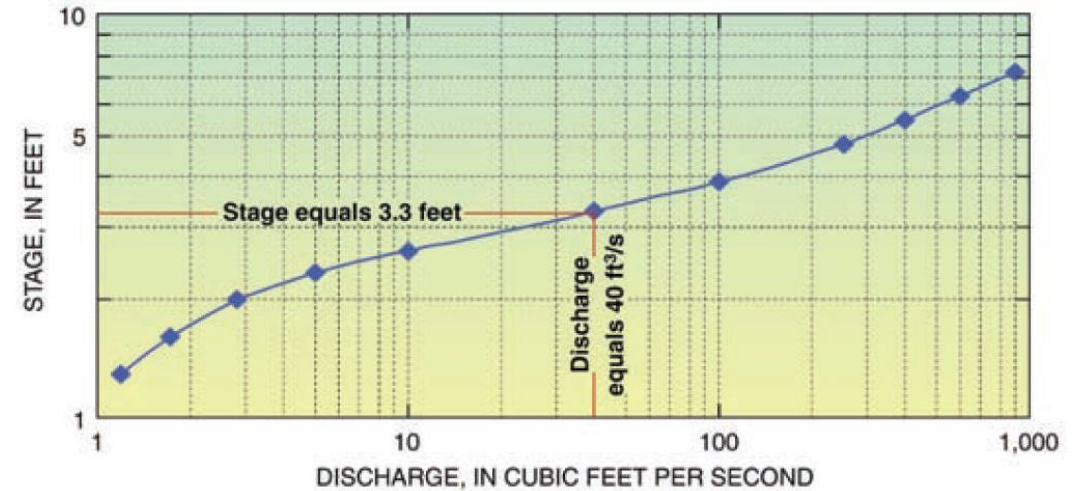
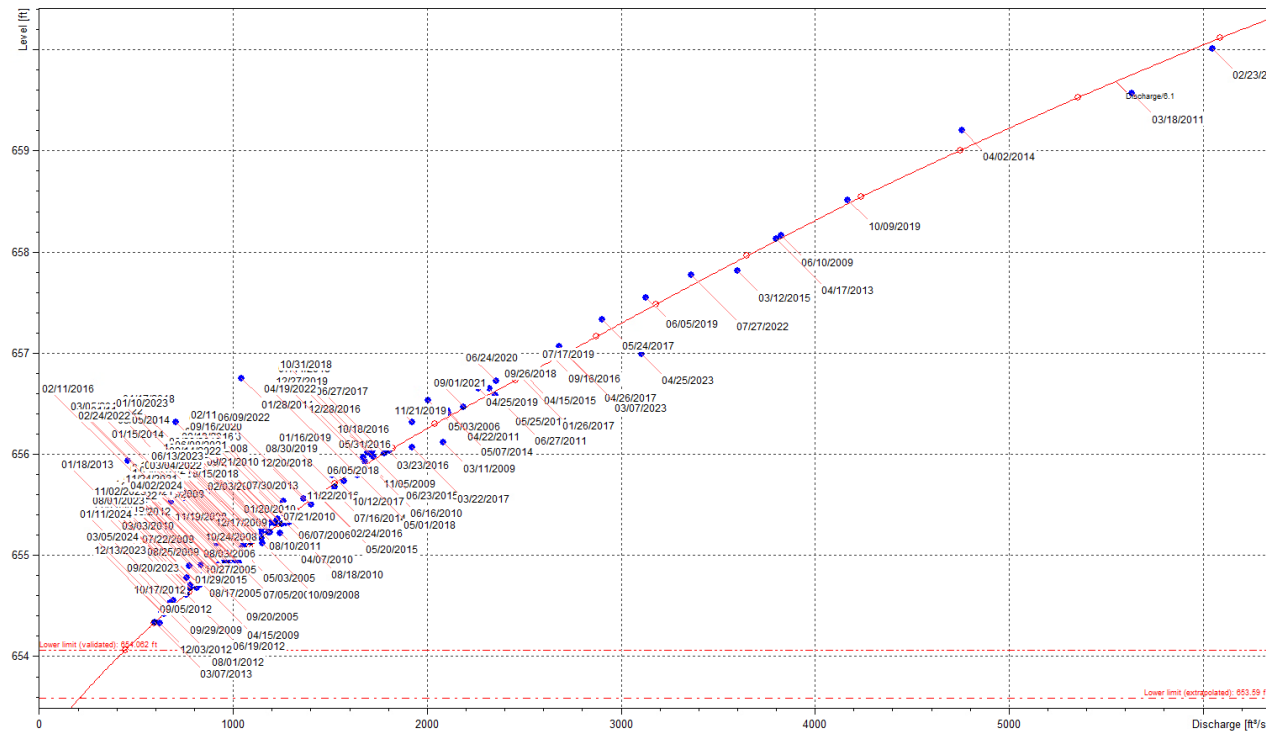


Discharge Measurements

Ice Measurements

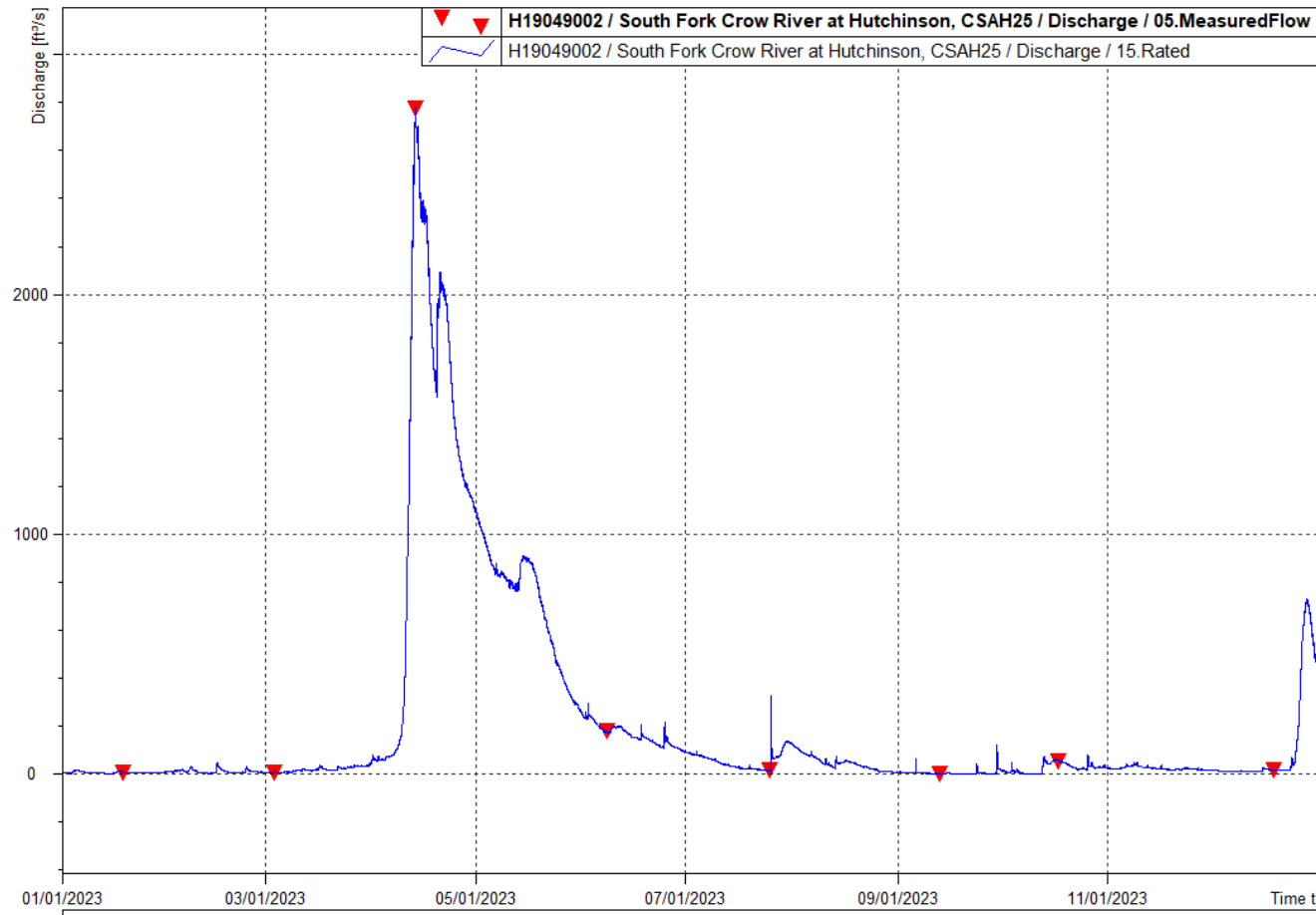


Stage-Discharge Relationship



<https://pubs.usgs.gov/fs/2011/3001/pdf/fs2011-3001.pdf>

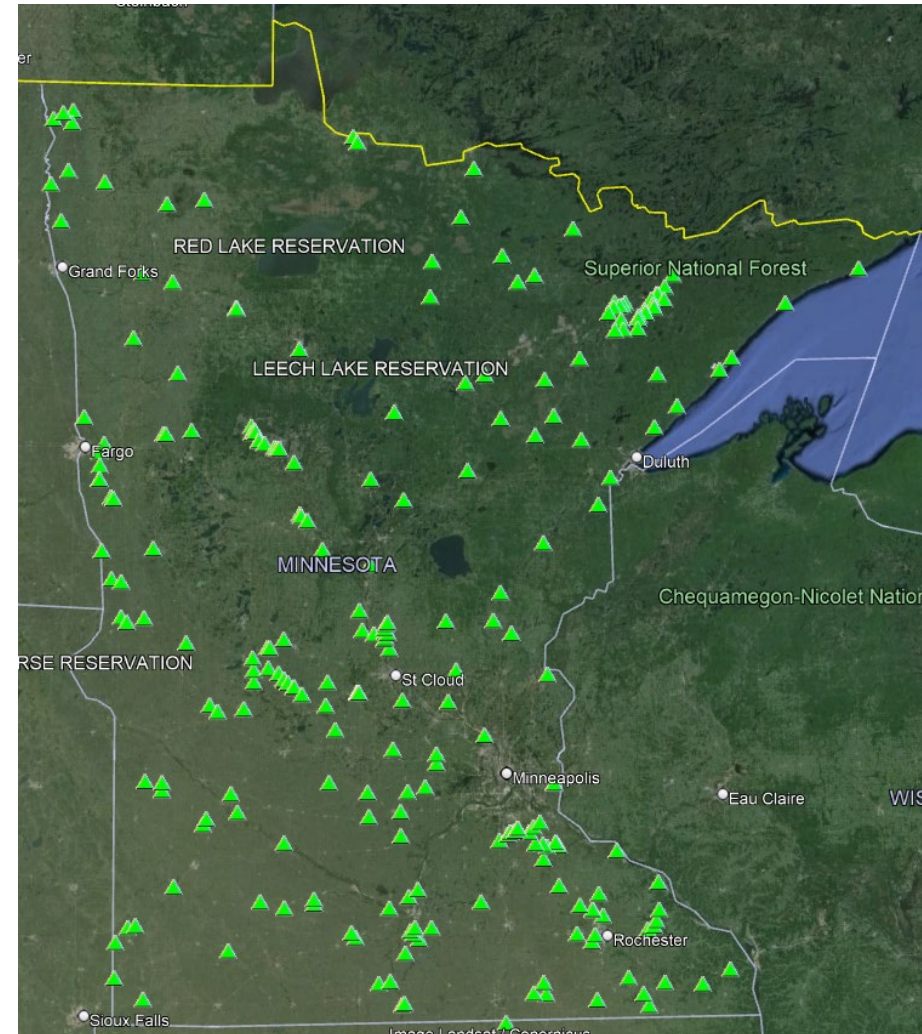
Discharge Record



DNR Stream Gaging Network

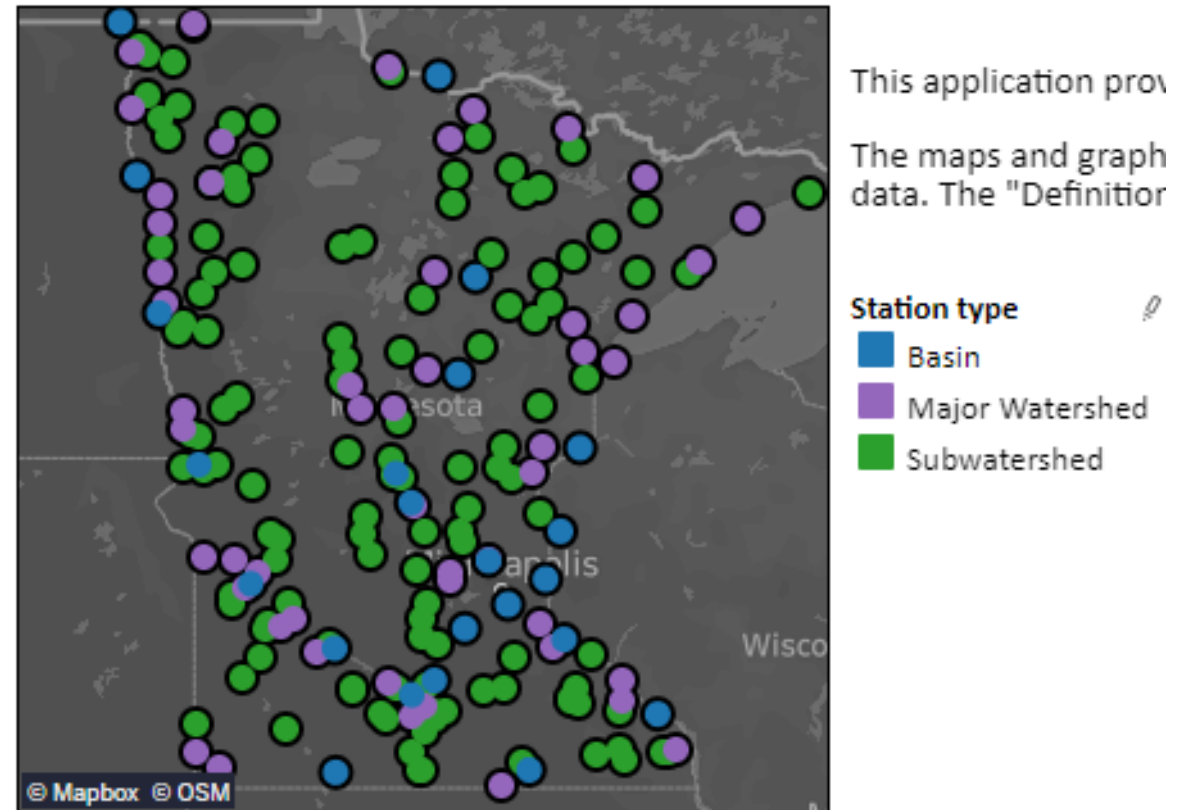
- ~265 gages that measure and record water level
- ~220 transmit the data hourly to estimate streamflow using the stage-discharge relation (rating curve), in near real-time.
- To find DNR gages, search “DNR CSG” or go here:

<https://www.dnr.state.mn.us/waters/csg/index.html>



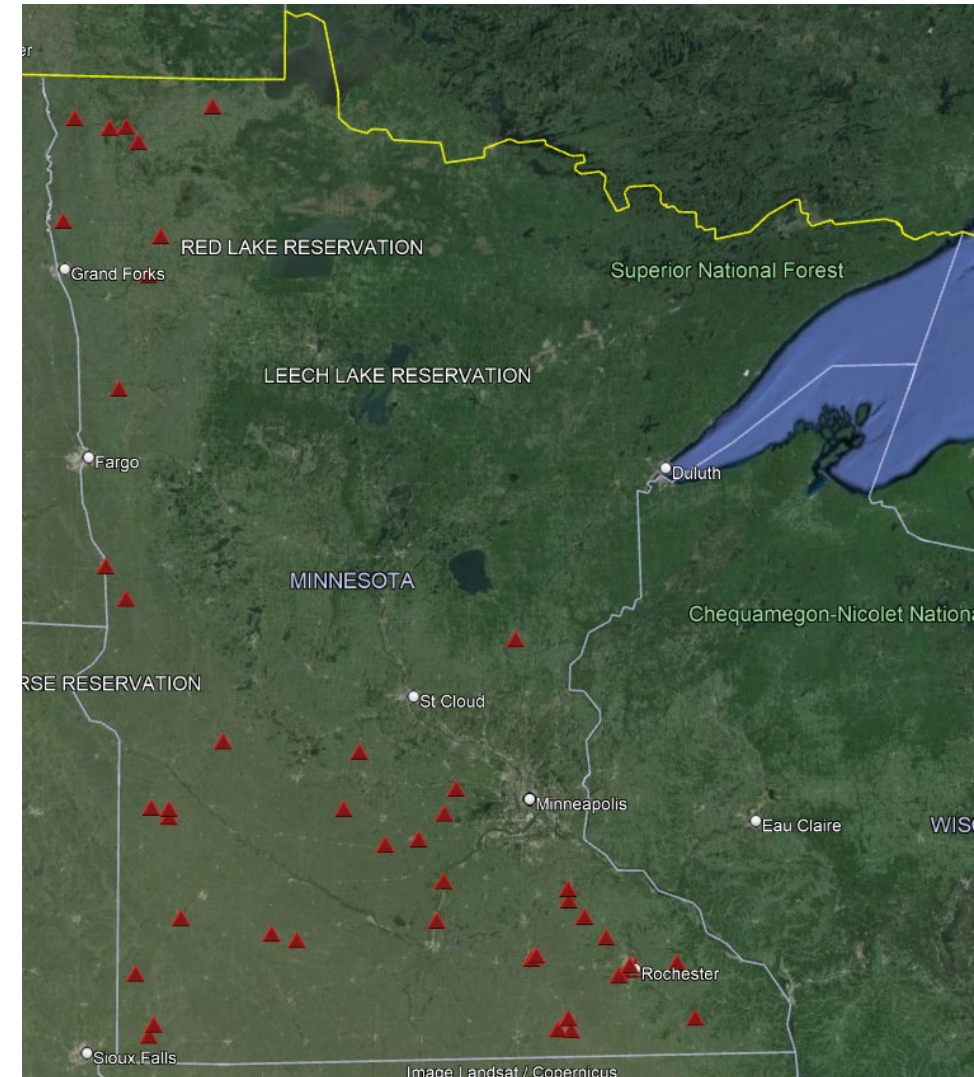
DNR Stream Gaging Network

- Watershed Pollutant Load Monitoring
 - ~200 stations – DNR, USGS, ACOE
 - Long-term trends, changes over time



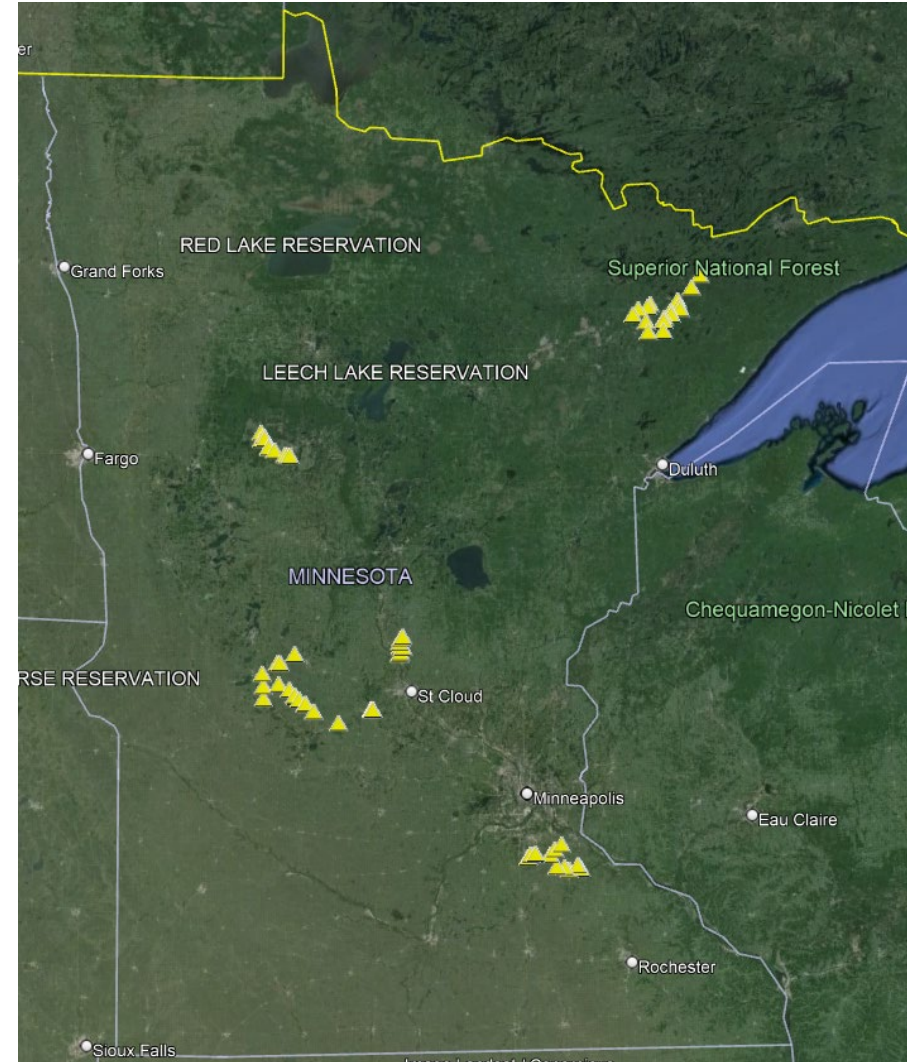
DNR Stream Gaging Network

- Flood Warning Gages
 - Flood Forecasting
 - Community Emergency Managers

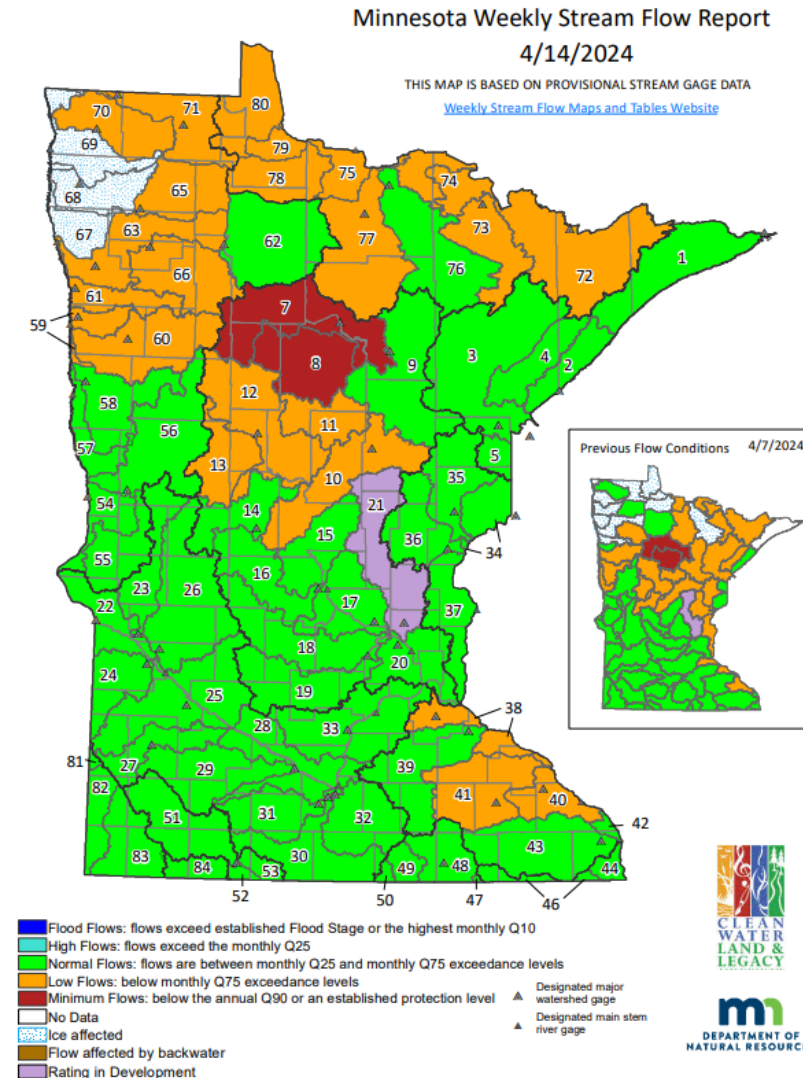


DNR Stream Gaging Network

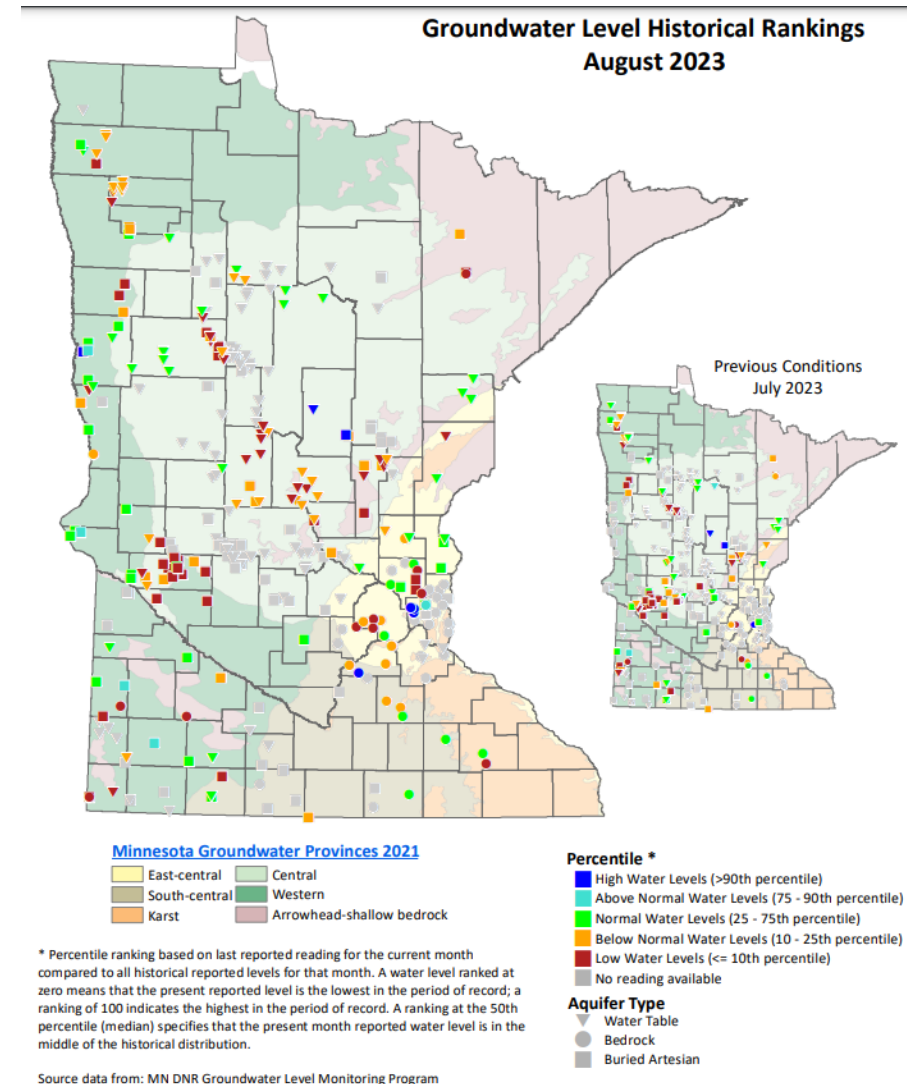
- Mine Permit Monitoring
- GWMA's
- Little Rock Creek
- Cold Spring Creek
- Surface Water-Groundwater Interactions



- Weekly Streamflow Report
- Current streamflow compared to historical flow data
- https://www.dnr.state.mn.us/waters/surfacewater/section/stream_hydro/streamflow_weekly.html



- Monthly Hydrologic Conditions Report
- Summary of current precipitation, drought, streamflow, lake levels, groundwater levels
- https://www.dnr.state.mn.us/current_conditions/hydro_conditions.html



Thank You!

Ryan Whittaker

ryan.whittaker@state.mn.us

651-539-2106

DNR/PCA Cooperative Stream Gage Site

Home > Nature > Climate > Flood preparation, response, and recovery

Flood preparation, response, and recovery

Disaster roles of local officials videos

Learn about local official responsibilities for preparation, response and recovery. Useful resources are also discussed and examples are shown.

[Disaster Roles of Local Officials: Preparation](#)

[Disaster Roles of Local Officials: Flood Response and Recovery](#)

[Expand all sections](#)

Summary of resources and links noted in the disaster roles of local officials videos

Before the flood

There are a number of things you can do to prepare your community or property for floods. Below are some very useful resources. Additionally, there are a number of guidance materials for floodproofing and retrofitting on our [Technical Resources](#) page.

- [DNR Flood Hazard Mitigation Program](#)
- [Minnesota Homeland Security and Emergency Management](#) administers a number of grants to mitigate flood losses.
- [Minnesota Department of Labor Disaster Preparedness Manual for Building Officials \(PDF\)](#)
- [Flood Resilience Checklist](#) - The US Environmental Protection Agency (EPA) created a tool to help communities prepare for, deal with, and recover from floods. This checklist offers strategies communities can consider to manage stormwater.
- [Understanding and Managing Flood Risk: A Guide for Elected Officials](#) - Association of State Floodplain Managers
- [What can \(and should\) I do about fluctuating water levels on my property? \(PDF\)](#)

During the flood

Current flood forecasts and stream flow conditions from the National Weather Service:

- [Northwest Minnesota](#)
- [Northeast Minnesota](#)
- [Central and South Central Minnesota](#)
- [Southwest Minnesota](#)
- [Southeast Minnesota](#)

Current Minnesota stream flow conditions:

- [Cooperative Stream Gaging Program \(DNR/MPCA\)](#)
- [USGS WaterWatch](#)

[Temporary Closures](#)

- [Closure Information for State Parks, State Trails, State Forest Roads, and State Water Accesses](#)
- [U.S. Army Corps of Engineers Emergency Response and Recovery](#)

Post-flood information

- On main DNR Floodplain page, select [Flood Preparation, response and recovery page](#)
- Under During the flood section, select Cooperative Stream Gaging Program (DNR/PCA)

During the flood

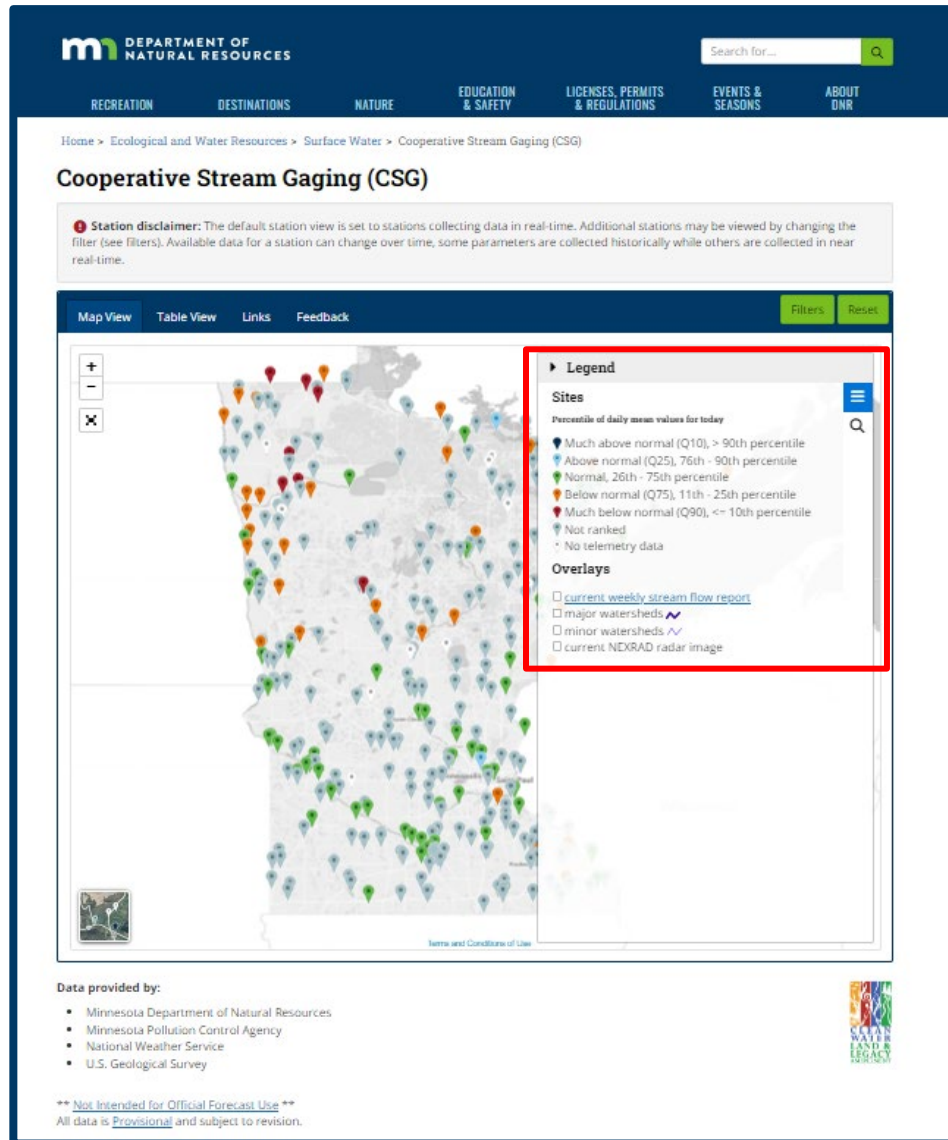
Current flood forecasts and stream flow conditions from the National Weather Service:

- [Northwest Minnesota](#)
- [Northeast Minnesota](#)
- [Central and South Central Minnesota](#)
- [Southwest Minnesota](#)
- [Southeast Minnesota](#)

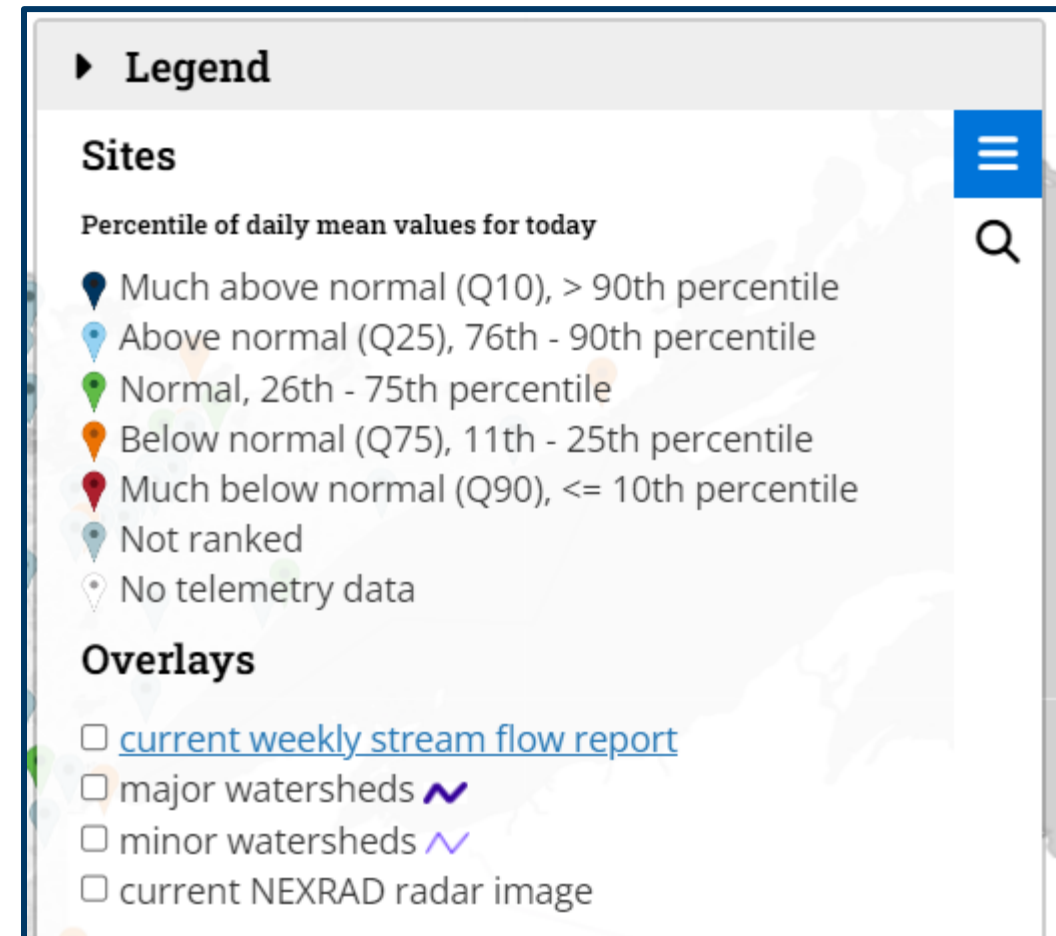
Current Minnesota stream flow conditions:

- [Cooperative Stream Gaging Program \(DNR/MPCA\)](#)
- [USGS WaterWatch](#)

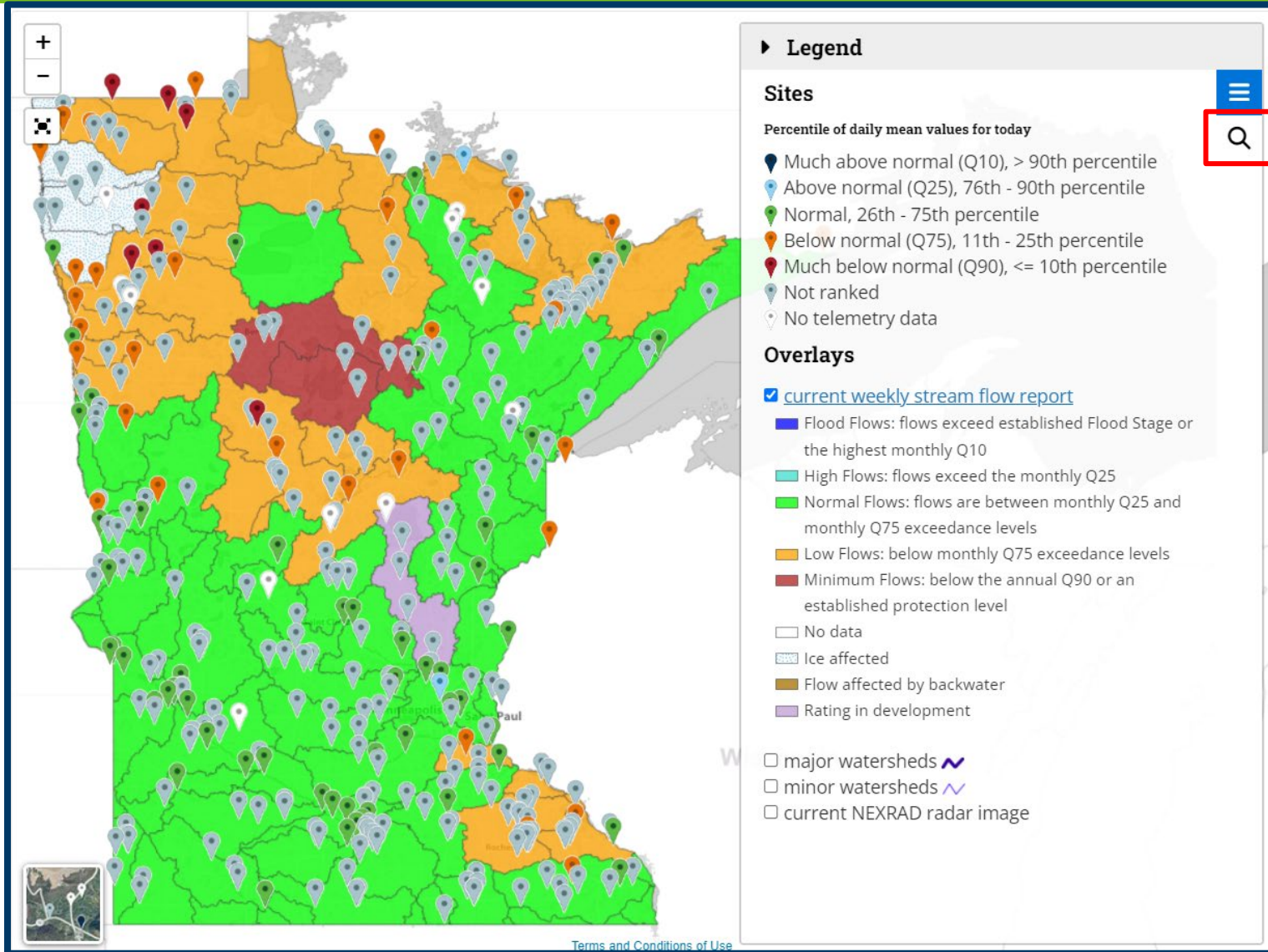
DNR/PCA Cooperative Stream Gaging (CSG) Site



DNR/PCA Cooperative Stream Gaging (CSG) Site



DNR/PCA Cooperative Stream Gaging (CSG) Site

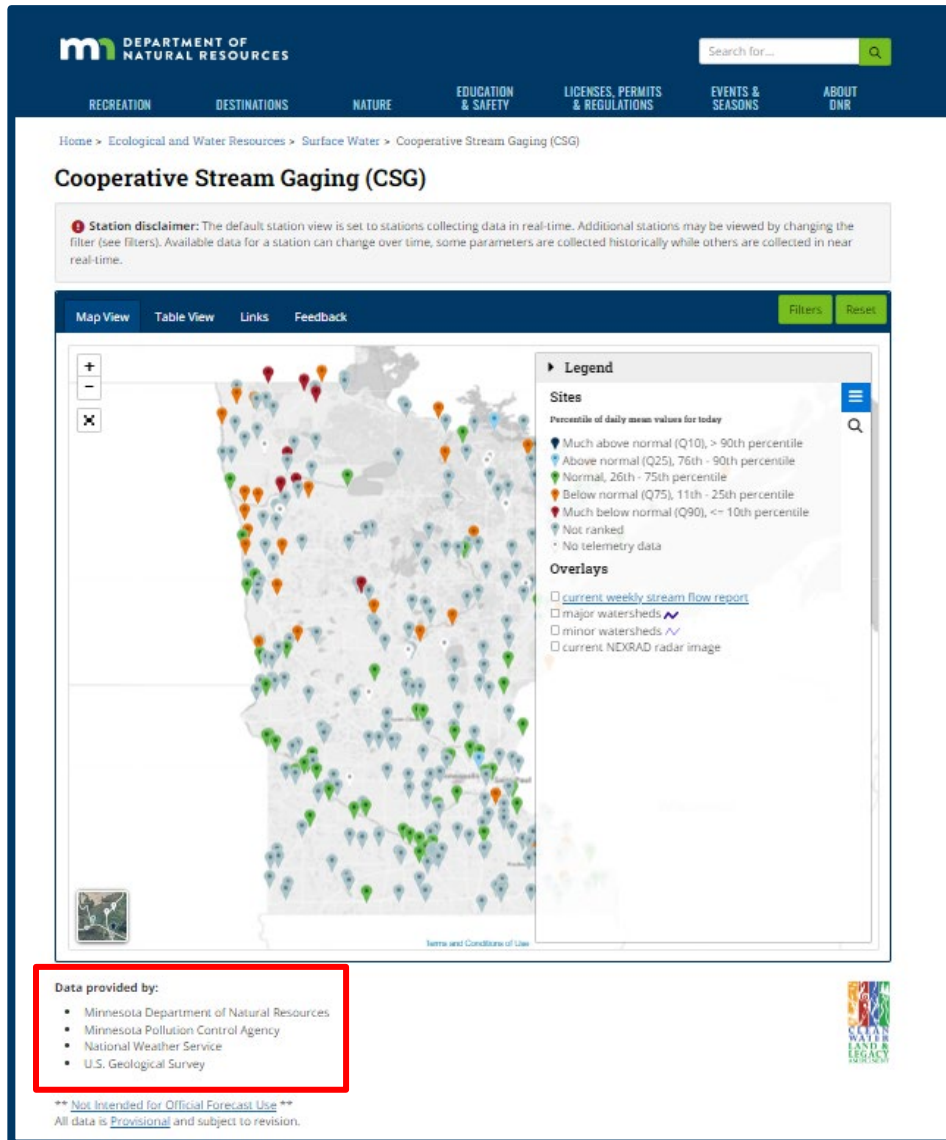


Place Search

place name

go

DNR/PCA Cooperative Stream Gaging (CSG) Site



Data provided by:

- Minnesota Department of Natural Resources
- Minnesota Pollution Control Agency
- National Weather Service
- U.S. Geological Survey

DNR/PCA Cooperative Stream Gaging (CSG) Site

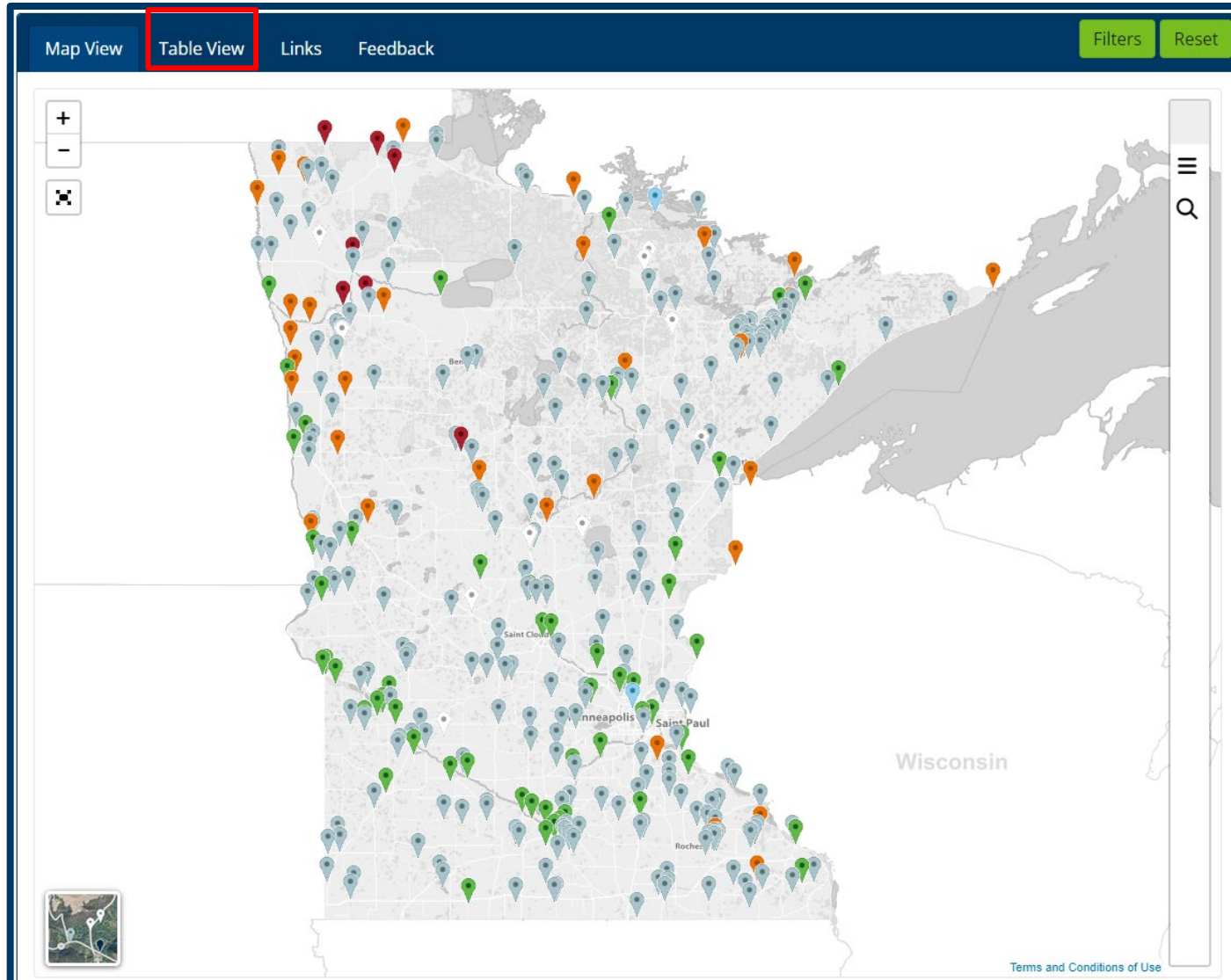
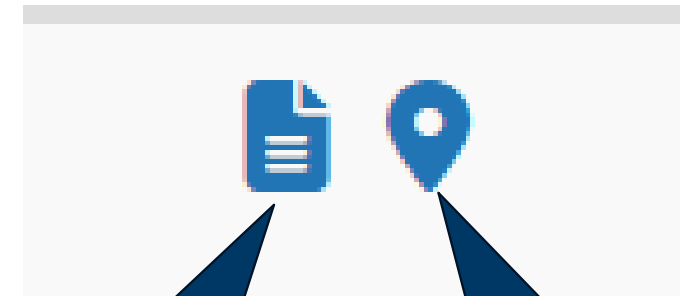


Table View

DNR/PCA Cooperative Stream Gaging (CSG) Site

Map View Table View Links Feedback Filters Reset						
Show 10 entries		Site Search:				
Rank	ID	Name	Stage (ft)	Flow (cfs)	Timestamp	Action
	20110001	Shingle Creek at Queen Ave in Minneapolis, MN	10.05	36.60	2024-4-16 13:00 CST	
	74004001	Gold Portage Outlet from Kabetogama Lake nr Ray, M	14.56	89.70	2024-4-16 12:30 CST	
	01092001	Baptism River nr Beaver Bay, MN61	12.38	417.00	2024-4-16 13:45 CST	
	03174001	St. Louis River at Scanlon, MN	4.65	2,950.00	2024-4-16 12:30 CST	
	09064001	Mississippi River at Grand Rapids, MN		389.00	2024-4-16 12:45 CST	
	14051001	Long Prairie River at Long Prairie, MN	3.03	238.00	2024-4-16 13:15 CST	
	15001002	Mississippi River nr Royalton, MN	9.92	5,120.00	2024-4-16 13:15 CST	
	16058004	Sauk River nr St. Cloud, MN	1.79	490.00	2024-4-16 13:15 CST	
	17022001	Mississippi River at St. Cloud, MN	5.40	6,380.00	2024-4-16 12:45 CST	
	17046001	Elk River nr Big Lake, MN	2.08	466.00	2024-4-16 13:15 CST	
Showing 1 to 10 of 359 entries (filtered from 1,157 total entries)						
Previous 1 2 3 4 5 ... 36 Next						

↑↓ Action



Site details

Site map

Site Location and Data Summary

Shingle Creek at Queen Ave in Minneapolis, MN

ID: 20110001

USGS ID: [05288705](#) 

Provider(s): USGS

County: Hennepin

Lat/Long: 45.049886/-93.310283

Reports and Data

- [year end summaries](#)

 Download data ▾

Provisional Data[?]

Period of Record:

2018-4-12 to 2024-4-16

Most Recent Data:

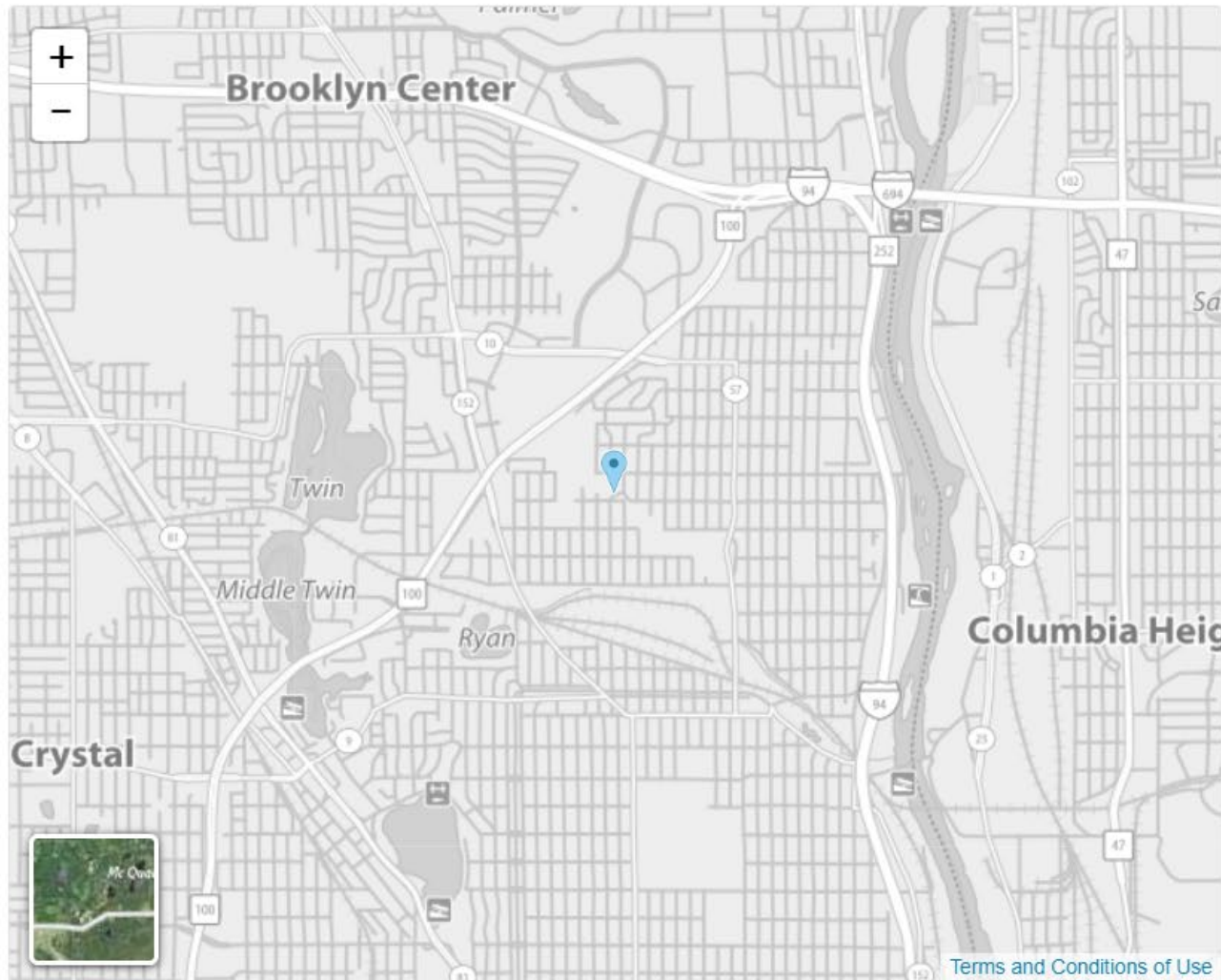
raw levels: 10.05 ft (2024-4-16 13:00 CST)

discharge: 36.60 cfs (2024-4-16 13:00 CST)

Approved Data[?]

Period of Record:

1996-5-8 to 2019-6-5



Default Graph

Shingle Creek at Queen Ave in Minneapolis, MN

ID: 20110001
USGS ID: [05288705](#)
Provider(s): USGS
County: Hennepin
Lat/Long: 45.049886/-93.310283

Reports and Data

- [year end summaries](#)

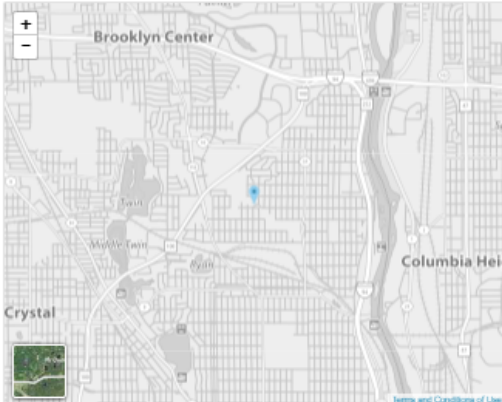
[Download data](#)

Provisional Data

Period of Record:
2018-4-12 to 2024-4-16
Most Recent Data:
raw levels: 10.05 ft (2024-4-16 13:00 CST)
discharge: 36.60 cfs (2024-4-16 13:00 CST)

Approved Data

Period of Record:
1996-5-8 to 2019-6-5

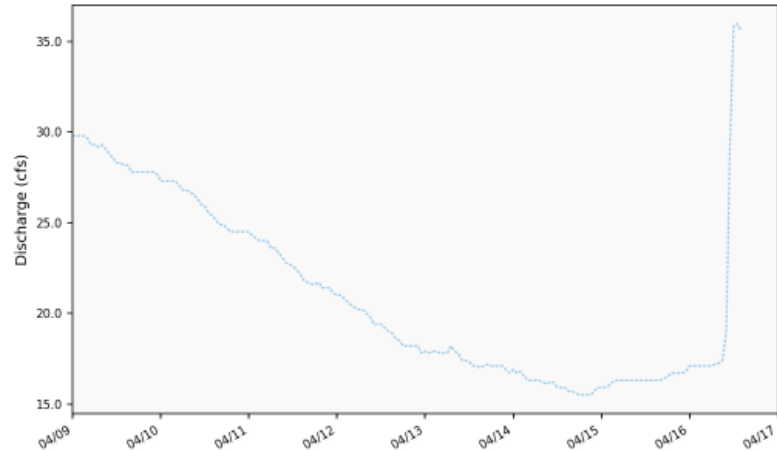


Time Series Graph

Help

Feedback

2024-4-9 to 2024-4-16 discharge (cfs) Other Data Display Options Update



Please note that provisional data are represented by a dashed [----] line.

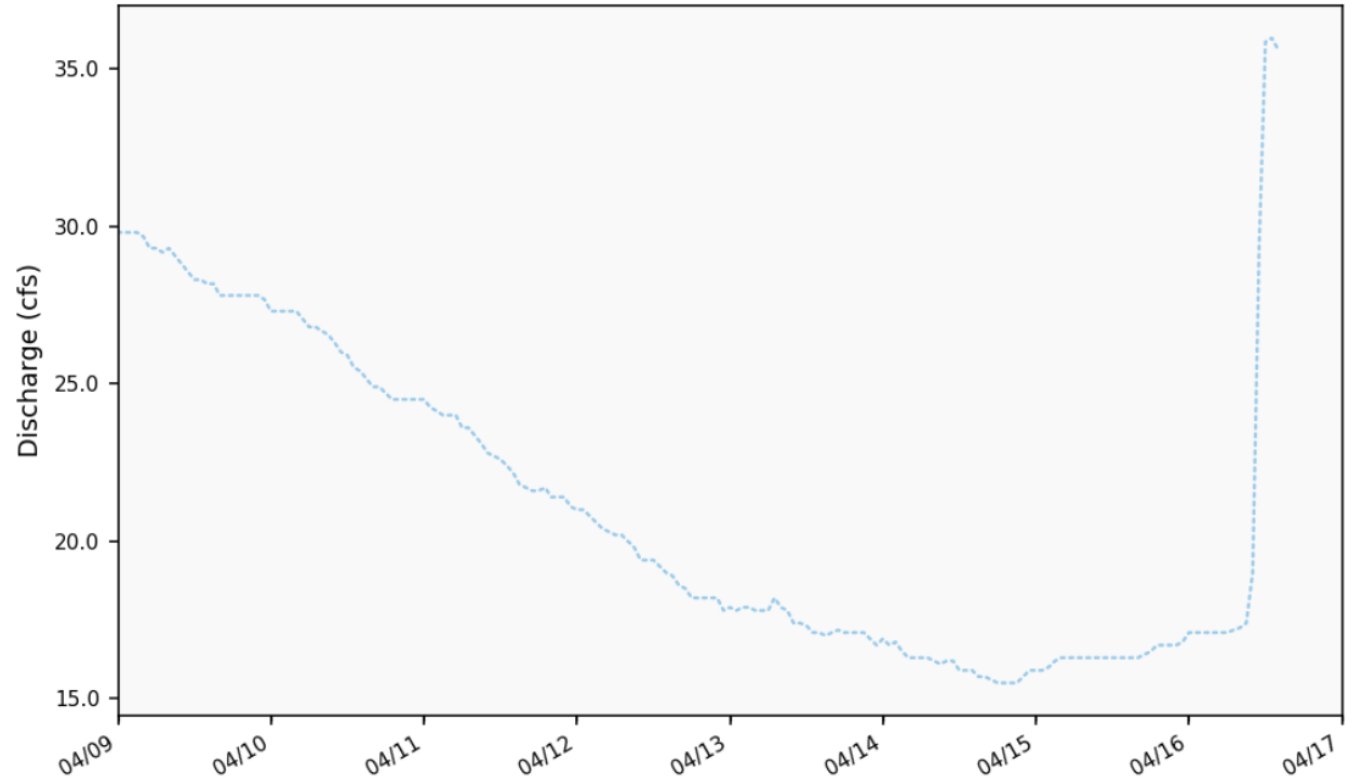
**** Not Intended for Official Forecast Use ****
All data is [Provisional](#) and subject to revision.

Time Series Graph

Help

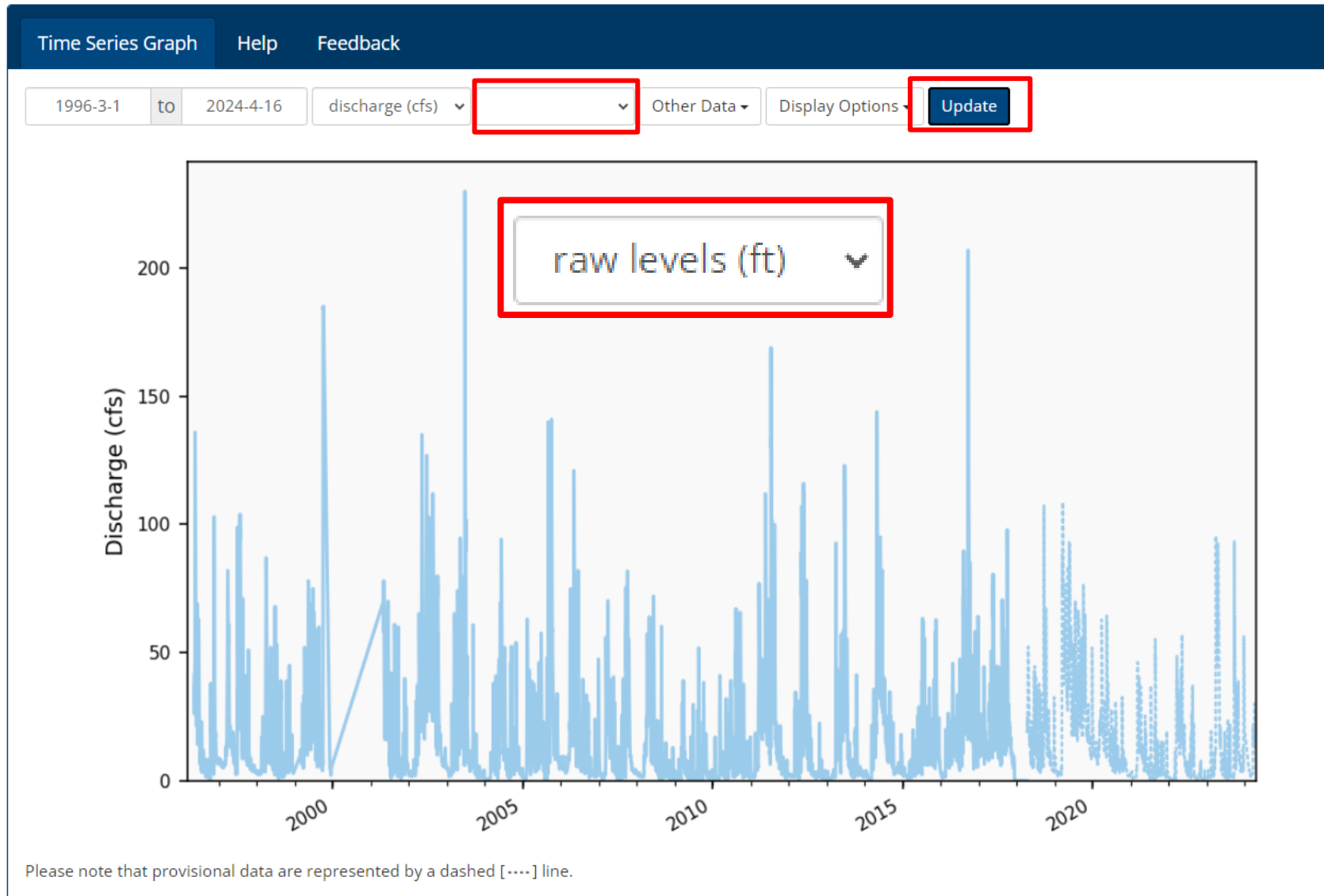
Feedback

2024-4-9 to 2024-4-16 discharge (cfs) Other Data Display Options Update

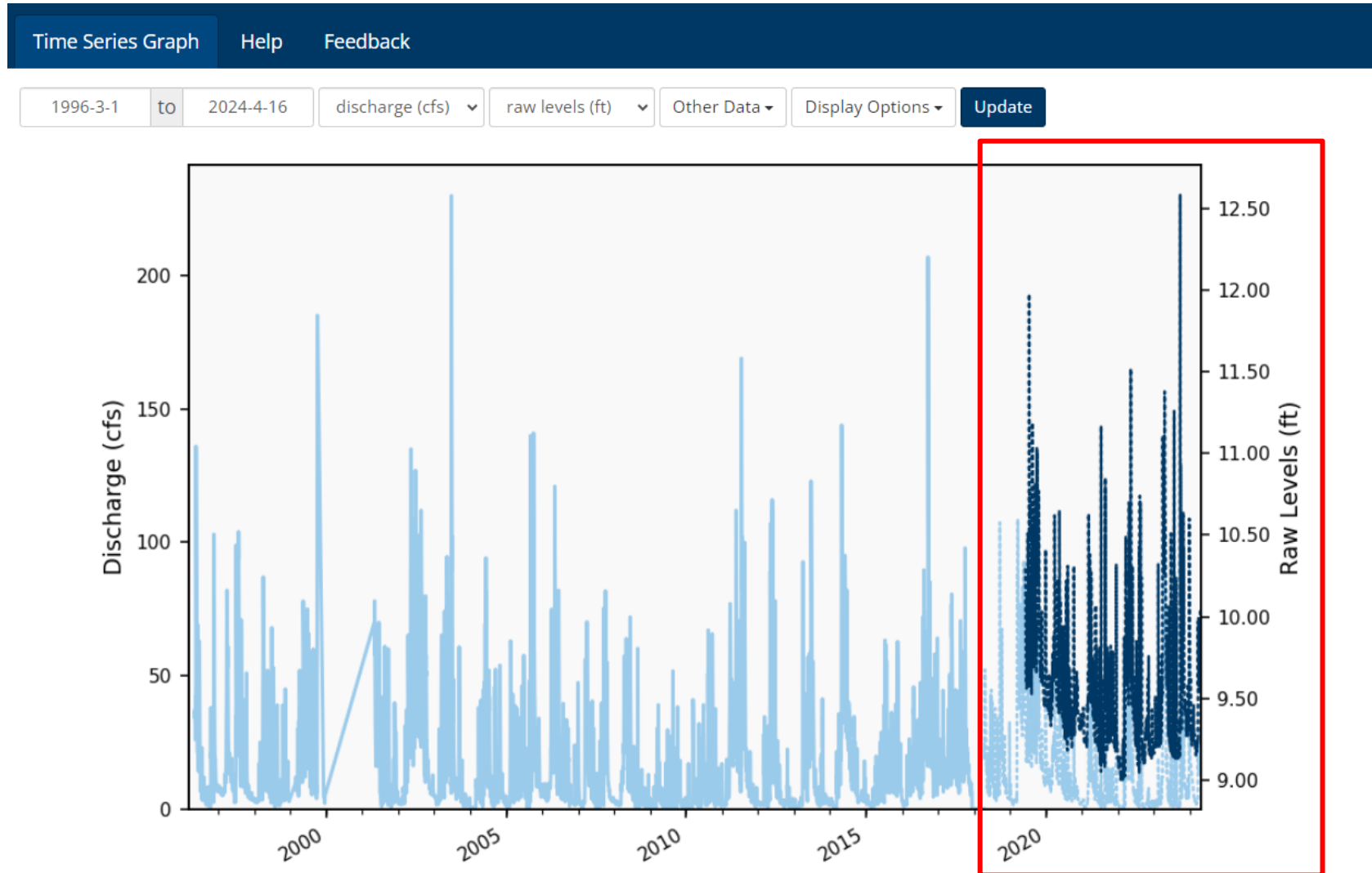


Please note that provisional data are represented by a dashed [----] line.

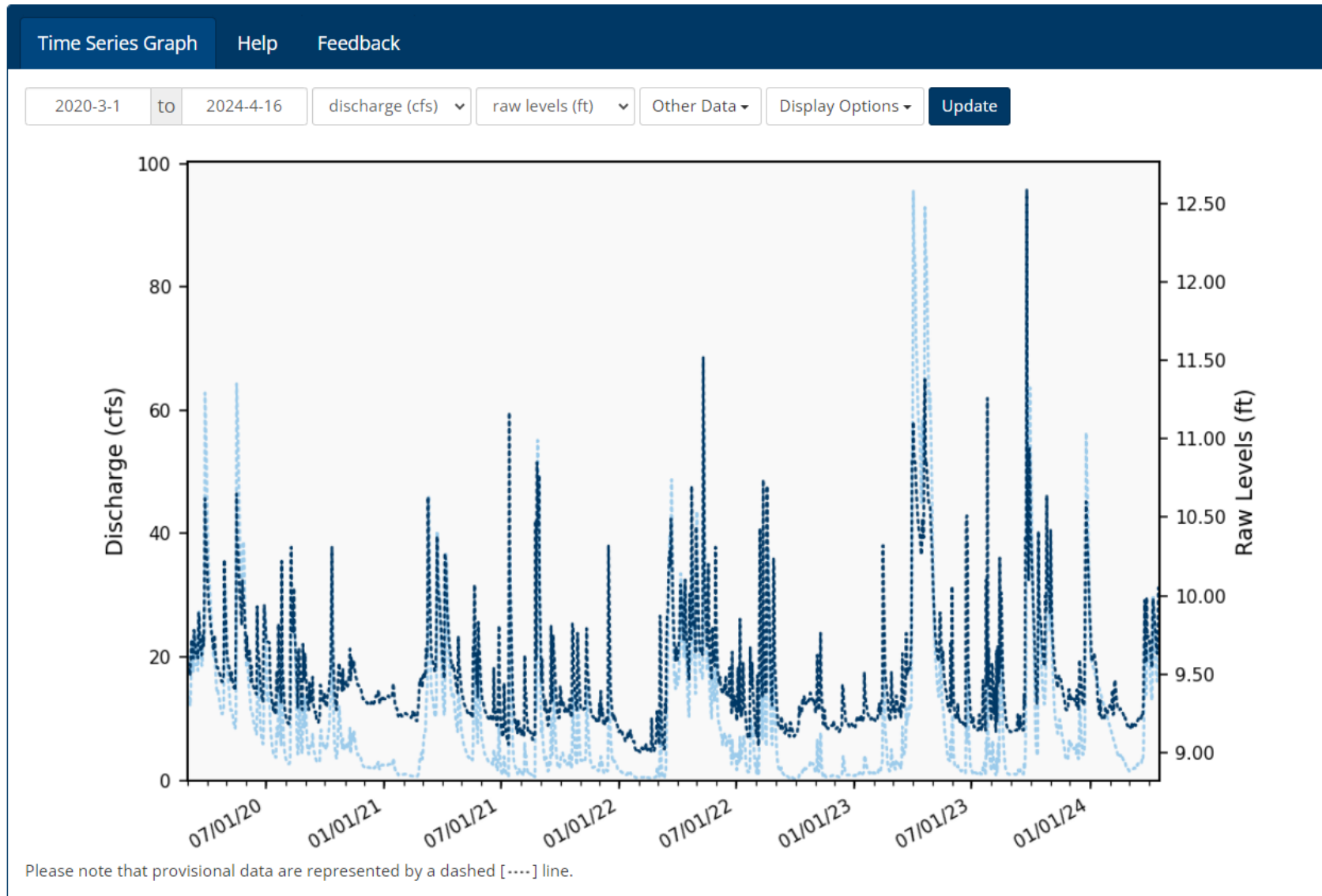
Graph with Longer Period of Record



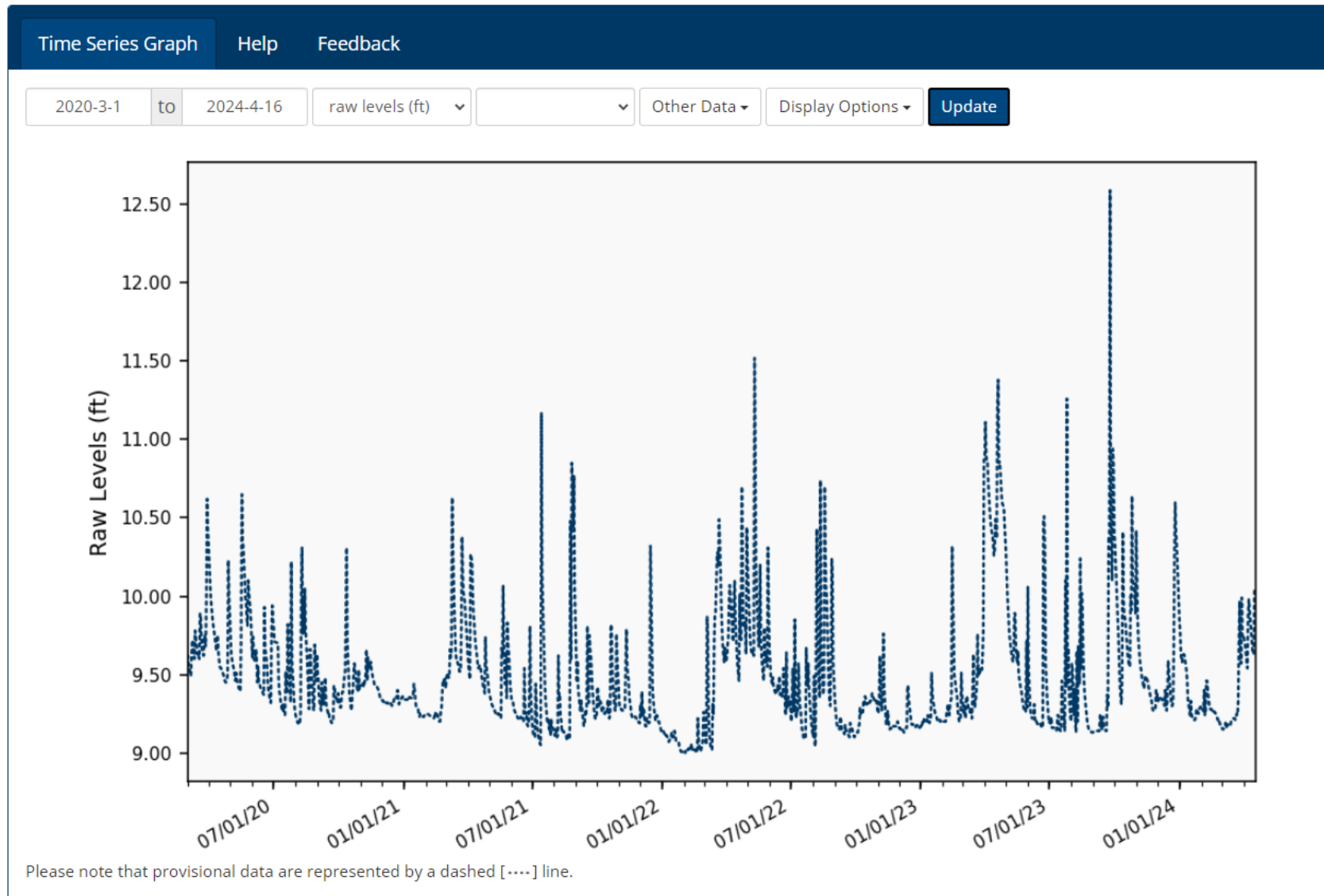
Graph with Longer Period of Record



Graph with Discharge and Raw Levels



Graph Raw Levels



Check Past Records

Minnesota River nr Jordan, MN

Time Series Graph Help Feedback

1934-6-1 to 2024-4-16 discharge (cfs) Other Data Display Options Update

ID: 33145001
USGS ID: [05330000](#)
NWS AHPS: [IDNM5](#)
PCA EQuls: [5000-039](#)
Provider(s): LGU, USGS, PCA
County: Carver
Lat/Long: 44.692745/-93.641866

Reports and Data

- [year end summaries](#)

Download data

Provisional Data

Period of Record:

2018-12-17 to 2024-4-16

Most Recent Data:

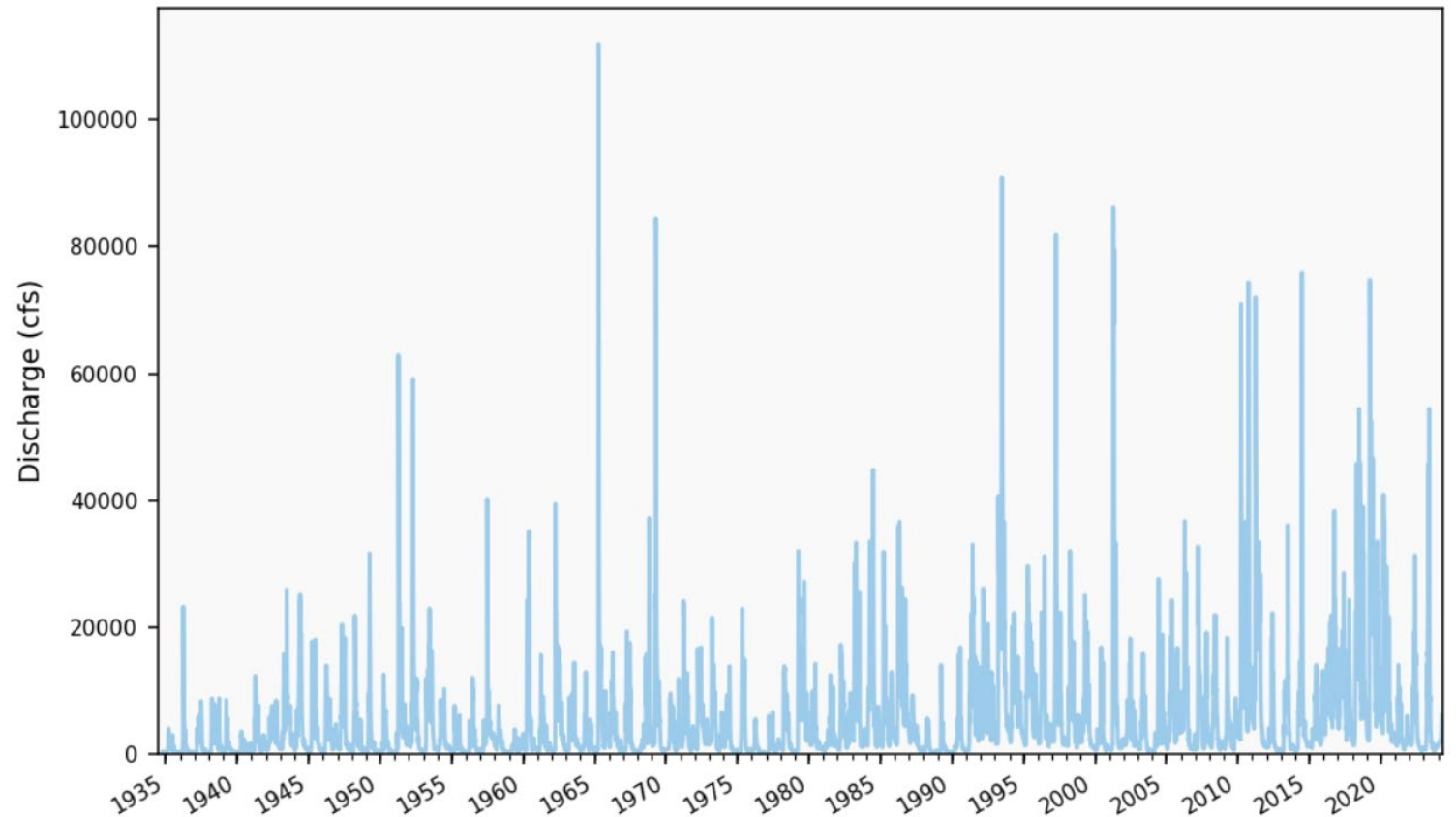
raw levels: 10.01 ft (2024-4-16 14:45 CST)

discharge: 5,850.00 cfs (2024-4-16 14:45 CST)

Approved Data

Period of Record:

1934-10-1 to 2024-4-15



Sometime Have Precipitation, But May Be Small Portion of Record

Minnehaha Creek at Hiaw

ID: 20114001

USGS ID: [05289800](#) 

Provider(s): USGS

County: Hennepin

Lat/Long: 44.915434/-93.212640

Reports and Data

- [year end summaries](#)

 Download data 

Provisional Data[?]

Period of Record:

2018-4-12 to 2024-4-16

Most Recent Data:

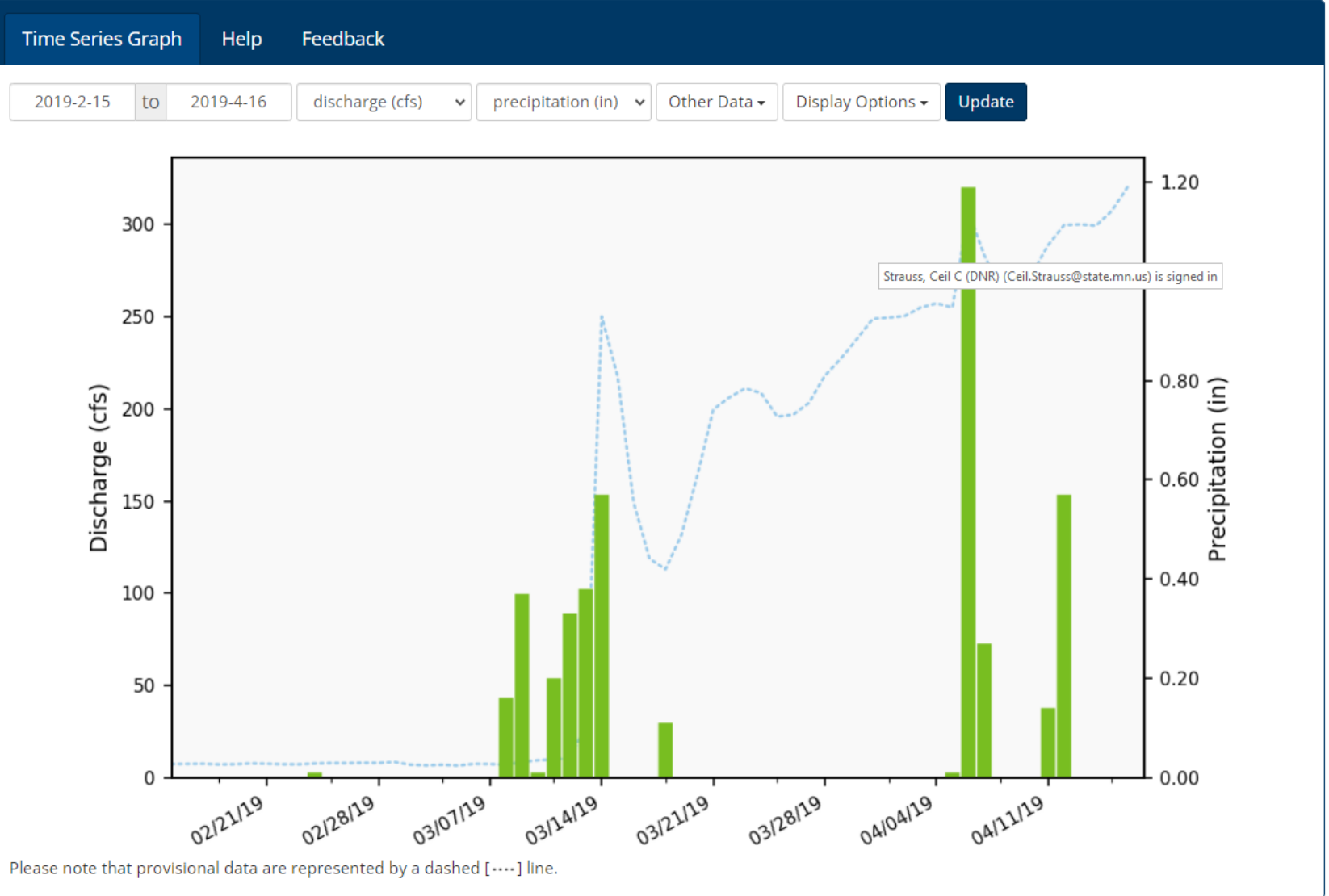
raw levels: 12.42 ft (2024-4-16 13:00 CST)

discharge: 23.90 cfs (2024-4-16 13:00 CST)

Approved Data[?]

Period of Record:

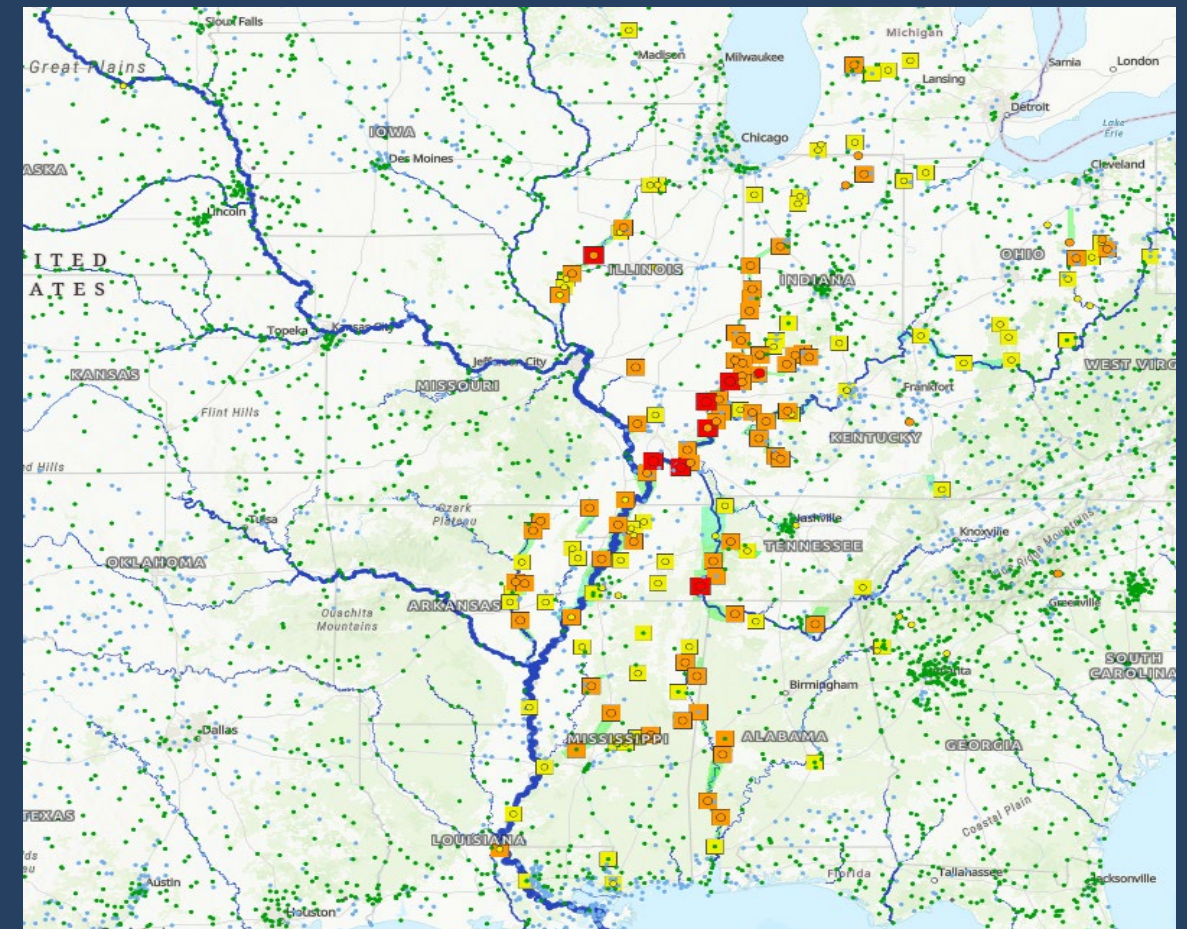
2005-11-5 to 2019-6-5



National Water Prediction Service (NWPS)

The Replacement for AHPS
(NWS River Gage Observations/
Forecast web page) –

Craig Schmidt
Senior Service Hydrologist
National Weather Service – Twin Cities



April 17, 2024



National Water Prediction Service (NWPS)

Biggest Changes You'll Notice

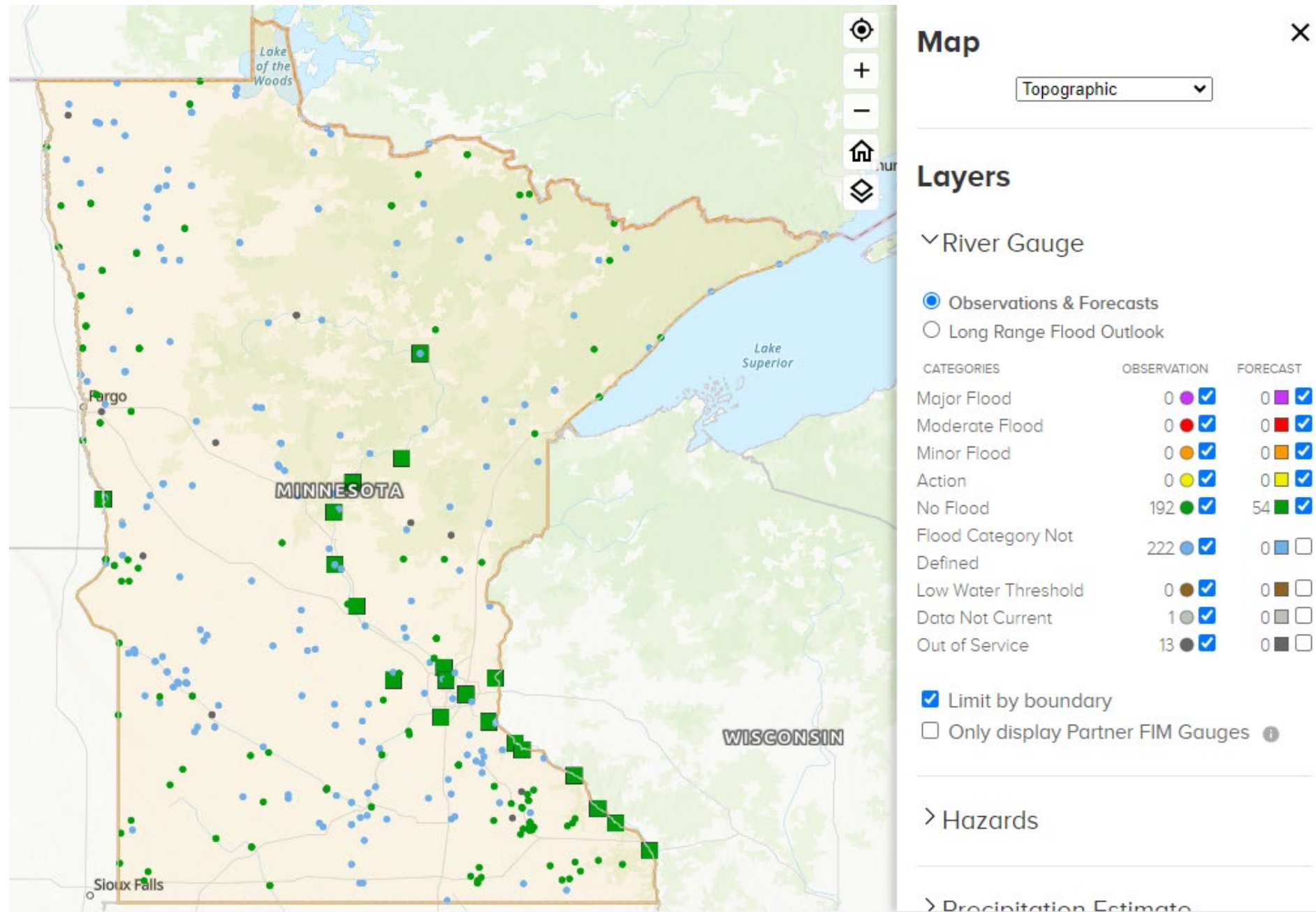
- **Maps**
 - Observation/Forecast flood status in same icon (circle/square)
 - Robust search and filter capabilities
 - Functional Legend to create specific displays for your situational awareness
 - New Hazard map – get all details for any watch/warning in effect, anywhere
 - Improved precipitation maps
 - Daily snow information maps
 - Long Range Outlook map – see quick view on mouse over



National Water Prediction Service (NWPS)

Changes to Map Interface – More Flexible Options

First, the old
AHPS map...



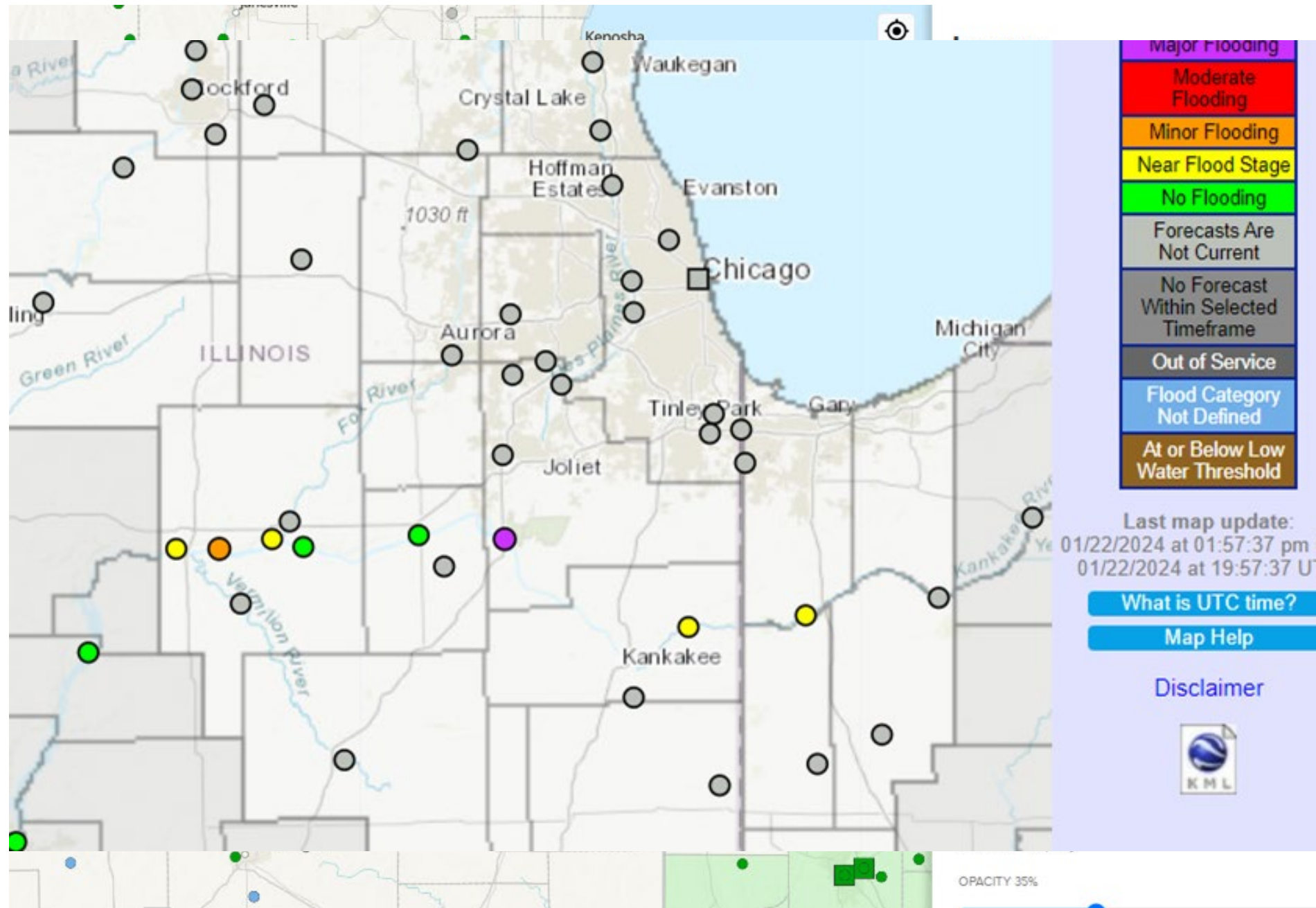
Once fully implemented, can easily see statewide counts of gages at and/or forecasted to be at minor/moderate/major flood stage

State of Minnesota example



National Water Prediction Service (NWPS)

Changes to Map Interface – More Detailed Information at a Glance



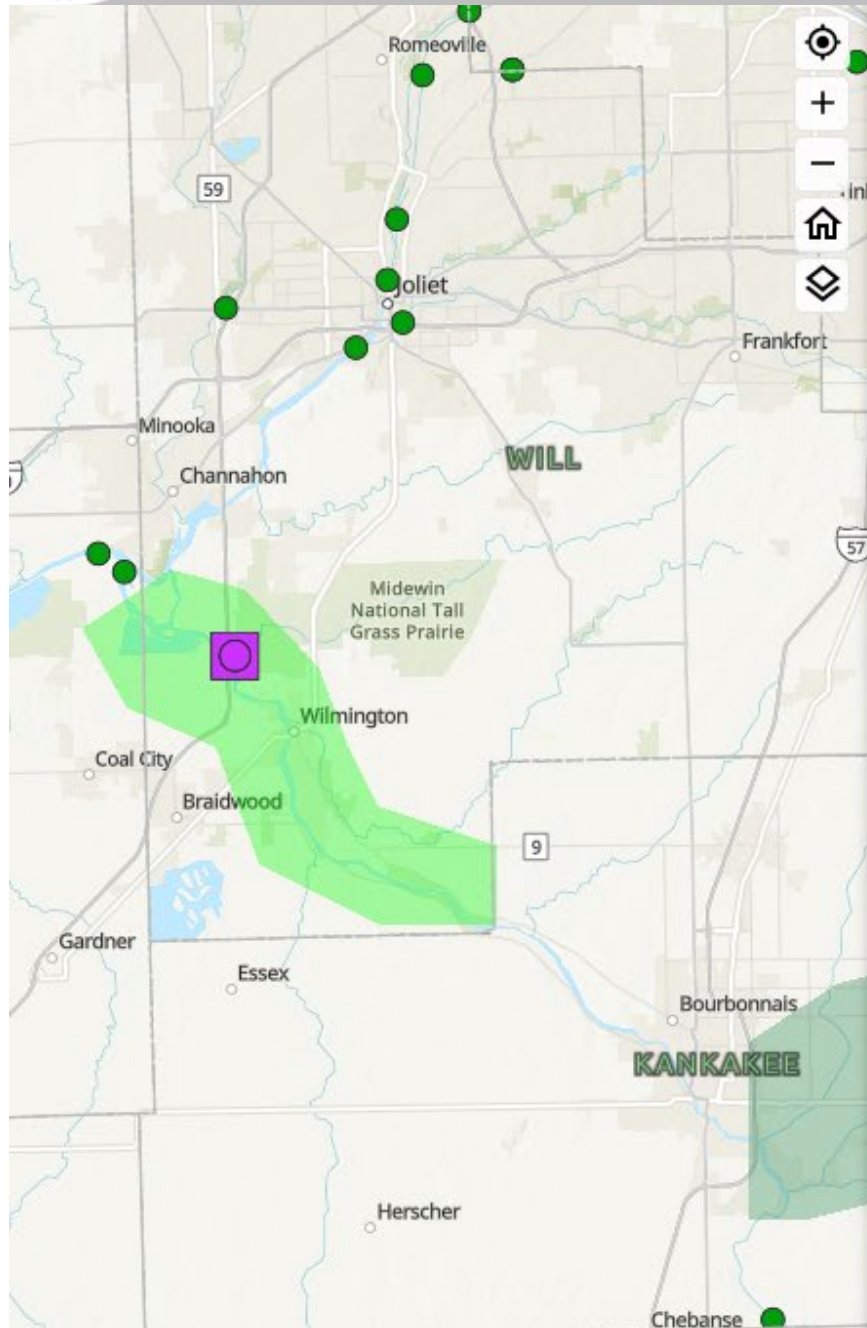
Much more information seen in the map icons (observations are circles, forecasts are squares surrounding the circle).

Can bookmark your own particular set of features/maps for easy return



National Water Prediction Service (NWPS)

Flood Warning example



Flood Warning

Flood Warning issued January 22 at 1:05PM CST until January 29 at 12:00PM CST by NWS Chicago IL

Effective ⁱ Jan 22, 2024, 1:05 PM CST Onset ⁱ Jan 22, 2024, 1:05 PM CST
Expires ⁱ Jan 29, 2024, 12:00 PM CST Ends ⁱ Jan 29, 2024, 12:00 PM CST

- WHAT...Flooding caused by an ice jam is expected.
- WHERE...The Kankakee River from near the Grundy Will county line upstream to near Kankakee River State Park, including portions of Grundy and Will counties.
- WHEN...Until further notice.
- IMPACTS...Flooding of roads and streets will continue. Yards and other low-lying areas along the river will remain inundated by water and ice. Shifting ice may damage structures along the shore.
- ADDITIONAL DETAILS...
 - At 1257 PM CST, river gauge data and emergency management indicated an ongoing ice jam extending from near the Grundy Will county line upstream to near Custer Park. Flooding will continue near and upstream of the ice jam while it remains in place.
 - Some locations that will experience flooding include... Wilmington, Lakewood Shores, and Custer Park.
 - <http://www.weather.gov/safety/flood>

Precautionary/preparedness actions

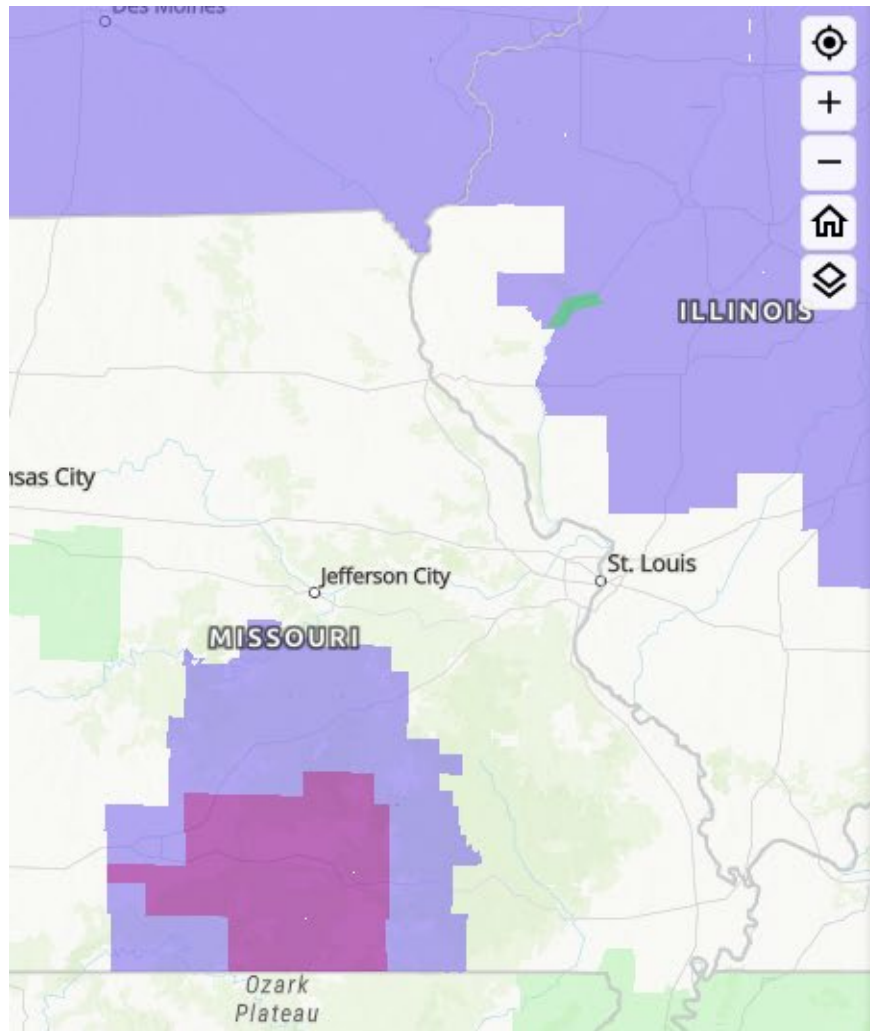
A Flood Warning means flooding is imminent or may already be occurring. Persons along rivers, creeks, and other waterways should take immediate precautions to protect life and property.

Flood hazard
display
example



National Water Prediction Service (NWPS)

All Hazards example



Ice Storm Warning

Ice Storm Warning issued January 22 at 11:58AM CST until January 22 at 3:00PM CST by NWS Springfield MO

Effective ⁱ Jan 22, 2024, 11:58 AM CST Onset ⁱ Jan 22, 2024, 11:58 AM CST
Expires ⁱ Jan 22, 2024, 3:00 PM CST Ends ⁱ Jan 22, 2024, 3:00 PM CST

- WHAT...Freezing rain with total ice accumulation between two tenths and one quarter of an inch.
- WHERE...Howell, Texas, Christian, Douglas, Ozark, Webster, and Wright Counties.
- WHEN...Until 3 PM CST this afternoon.
- IMPACTS...Roads, bridges, overpasses and sidewalks will remain slick and hazardous.

Precautionary/preparedness actions

Travel is strongly discouraged. If you must travel, keep an extra flashlight, food and water in your vehicle in case of an emergency. Prepare for possible power outages. Call 1-888-275-6636 for road conditions.

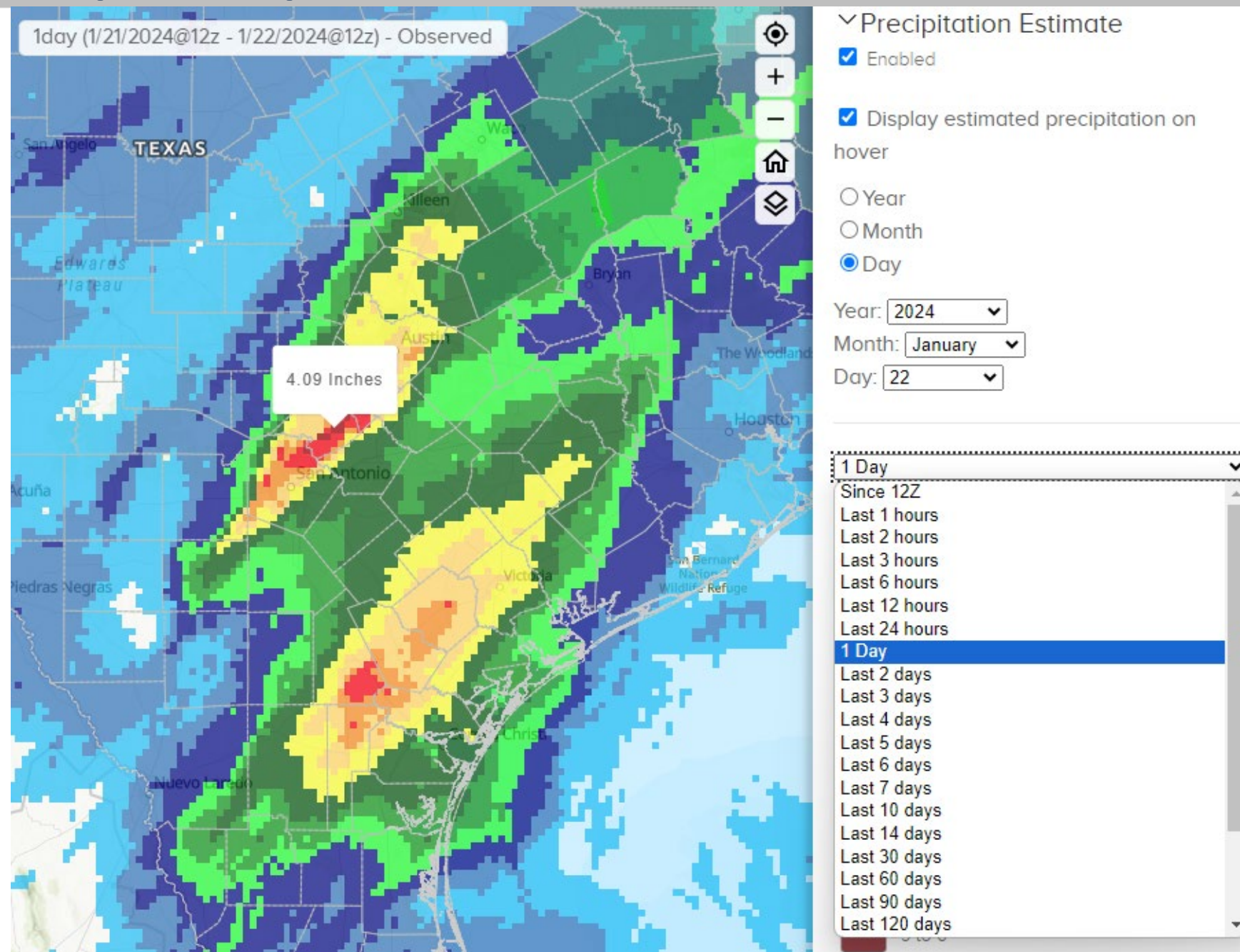
NWPS also makes a good All Hazards map.



National Water Prediction Service (NWPS)

One Seamless Map – Precipitation

- Defaults 12Z
- Observed
- Normal
- Departure from normal
- Percent of normal
- Hover feature precip estimate





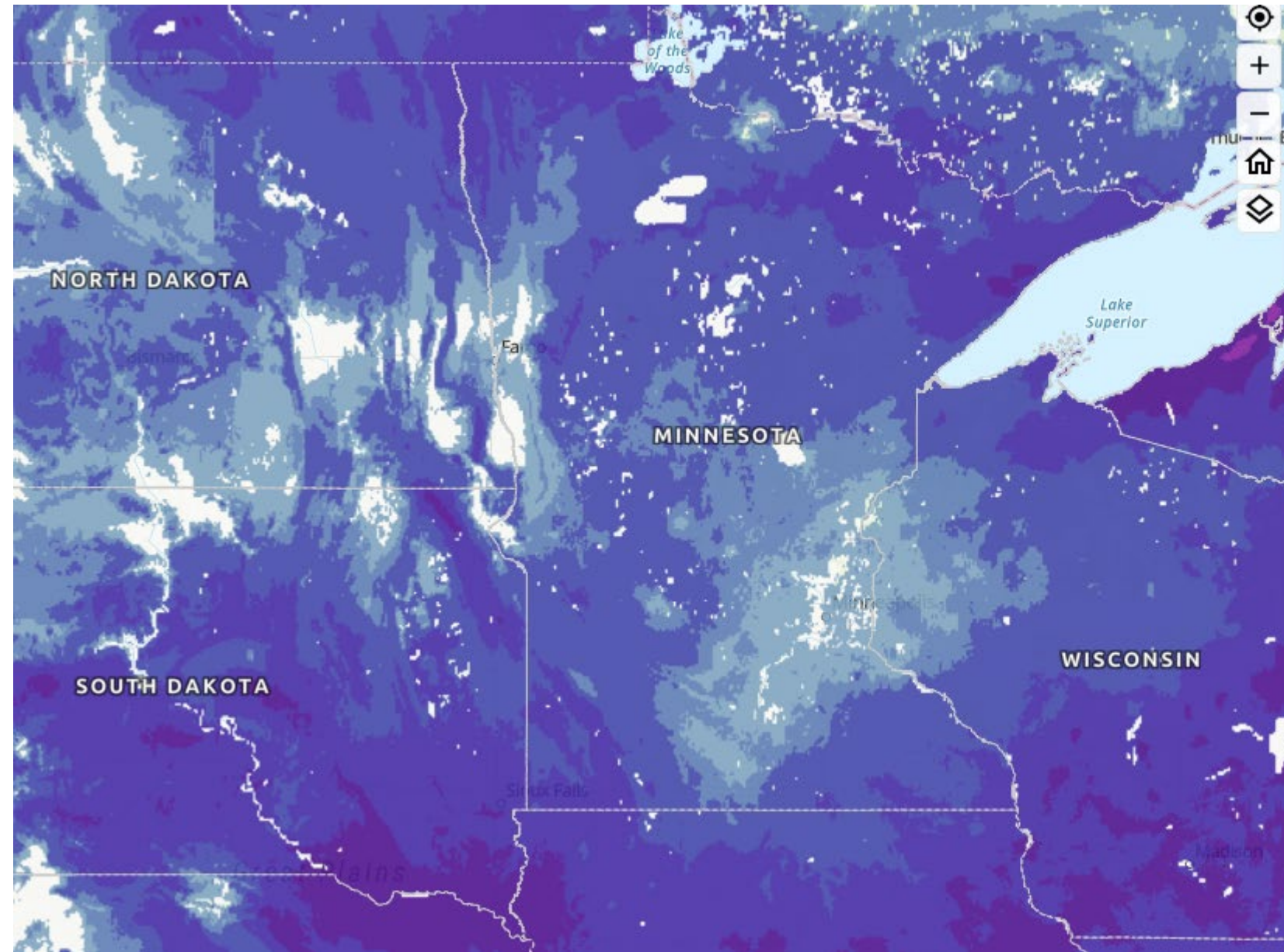
National Water Prediction Service (NWPS)

One Seamless Map – Snow Information

Once daily (12Z)

Snow Depth

Snow Water
Equivalent (SWE)



> Hazards

▼ Precipitation Estimate

☐ Enabled

> National Water Model

> Flood Inundation

☐ Enabled

▼ National Snow Analysis

Snow Depth ⓘ

☐

Snow Water Equivalent ⓘ

☒

Inches of Water Equivalent



OPACITY 90%





National Water Prediction Service (NWPS)

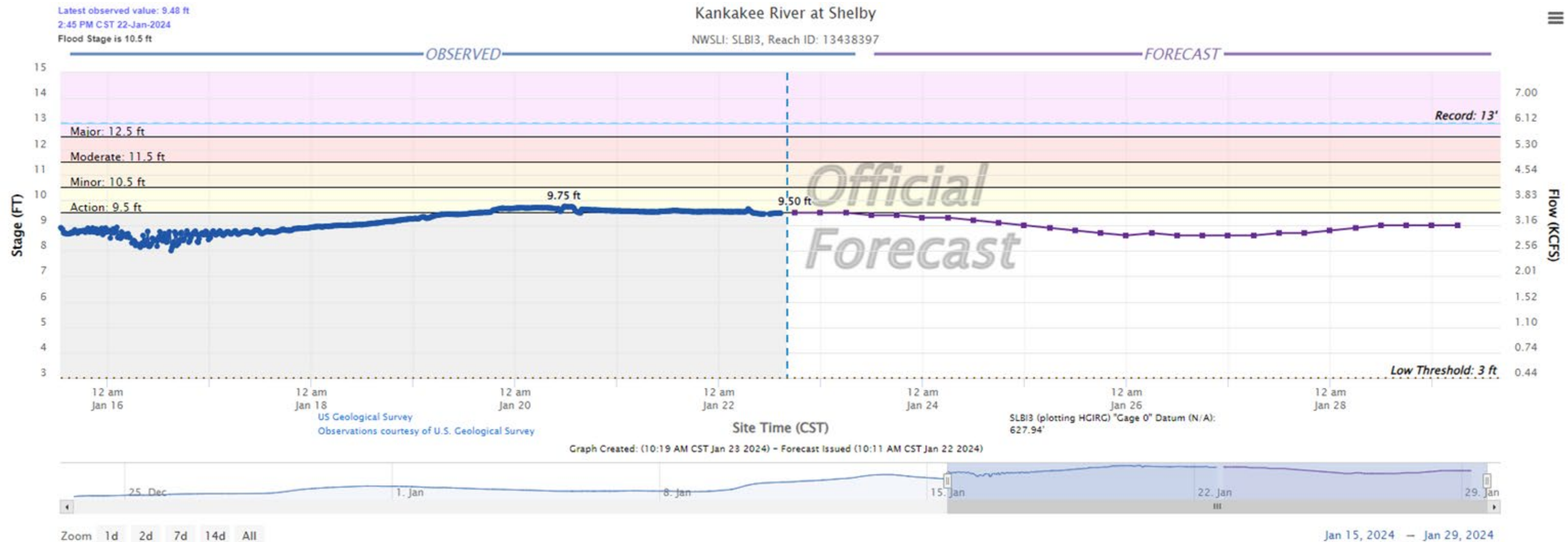
Biggest Changes You'll Notice

- **Hydrographs**
 - Much Faster Updates (hydrographs produced with up to the minute data every time you click)
 - One click for quick view; second click for full details (no mouseover)
 - Can look back at 30 days of observations (vs. 7 in AHPS)
 - Probabilistic graphics now on main hydrograph page (instead of separate tabs)
 - New EXPERIMENTAL National Water Model guidance
 - Has a long way to go to be useful to operations, but available for evaluation/testing



National Water Prediction Service (NWPS)

Hydrograph Features



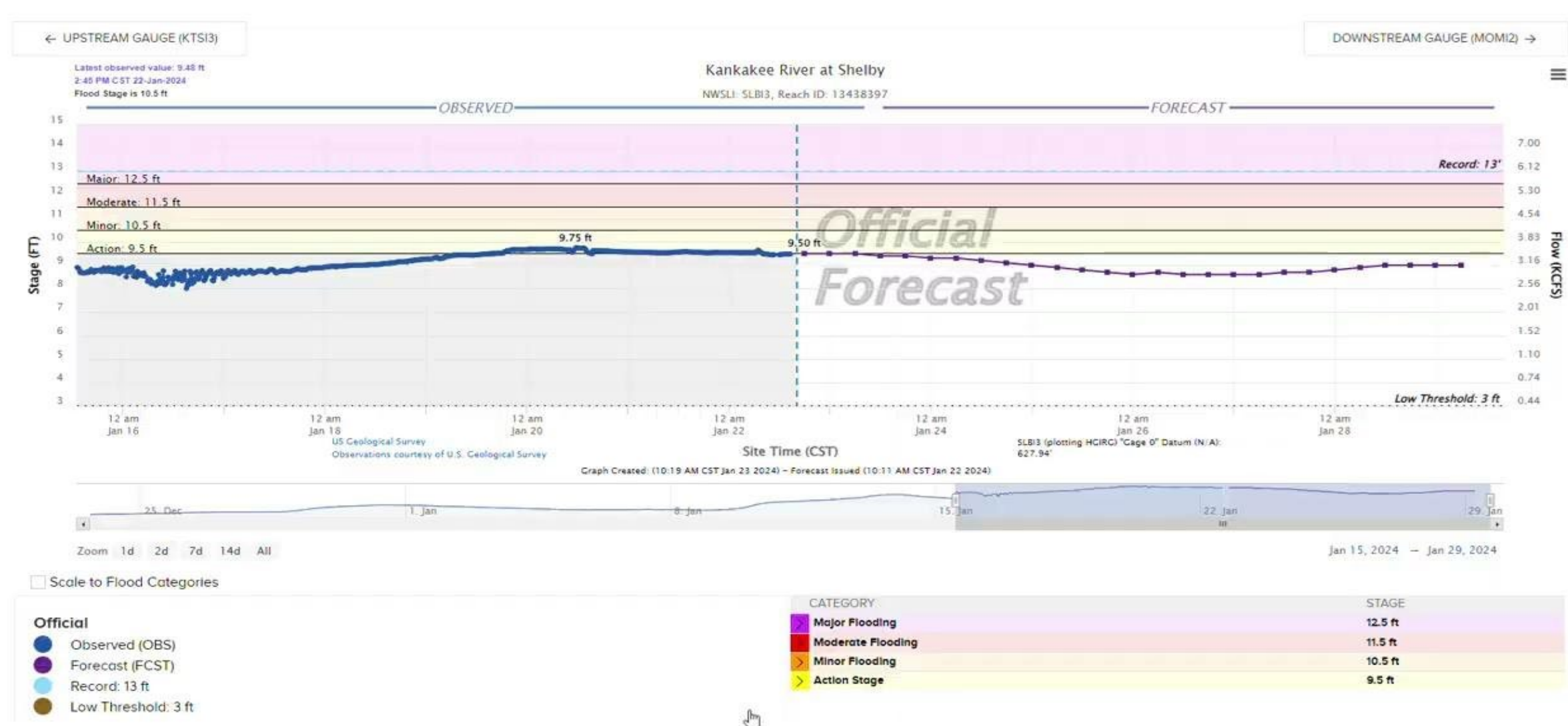
Comparison of old/new hydrographs

Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon
Jan 15	Jan 16	Jan 17	Jan 18	Jan 19	Jan 20	Jan 21	Jan 22	Jan 23	Jan 24	Jan 25	Jan 26	Jan 27	Jan 28	Jan 29



National Water Prediction Service (NWPS)

Hydrograph Features

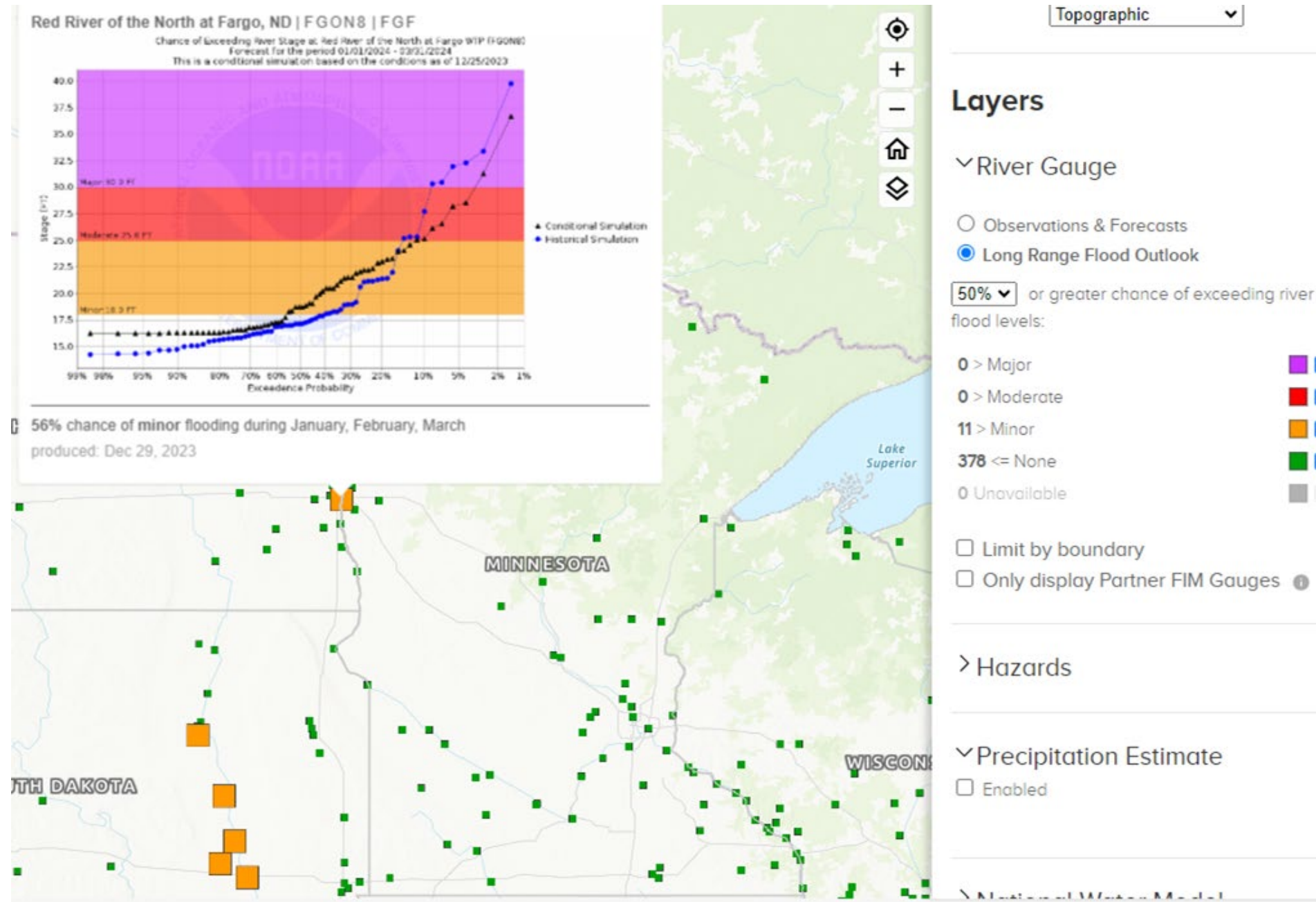


Data readout and Slider Bar demo – can scroll back 30 days



National Water Prediction Service (NWPS)

Long Range Outlook

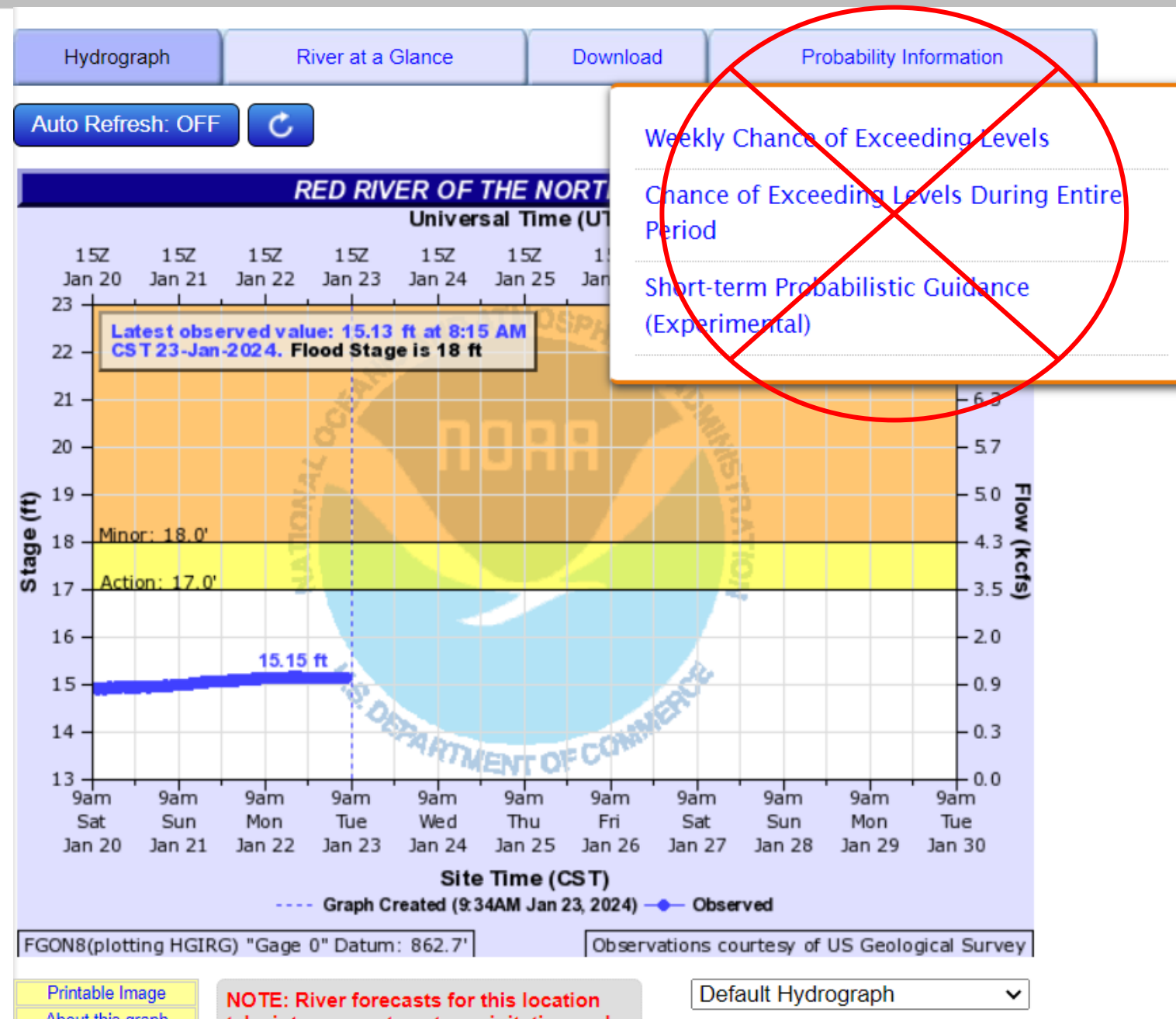


Quick look at long range probabilistic outlooks via popup on mouseover



National Water Prediction Service (NWPS)

Probabilistic Info

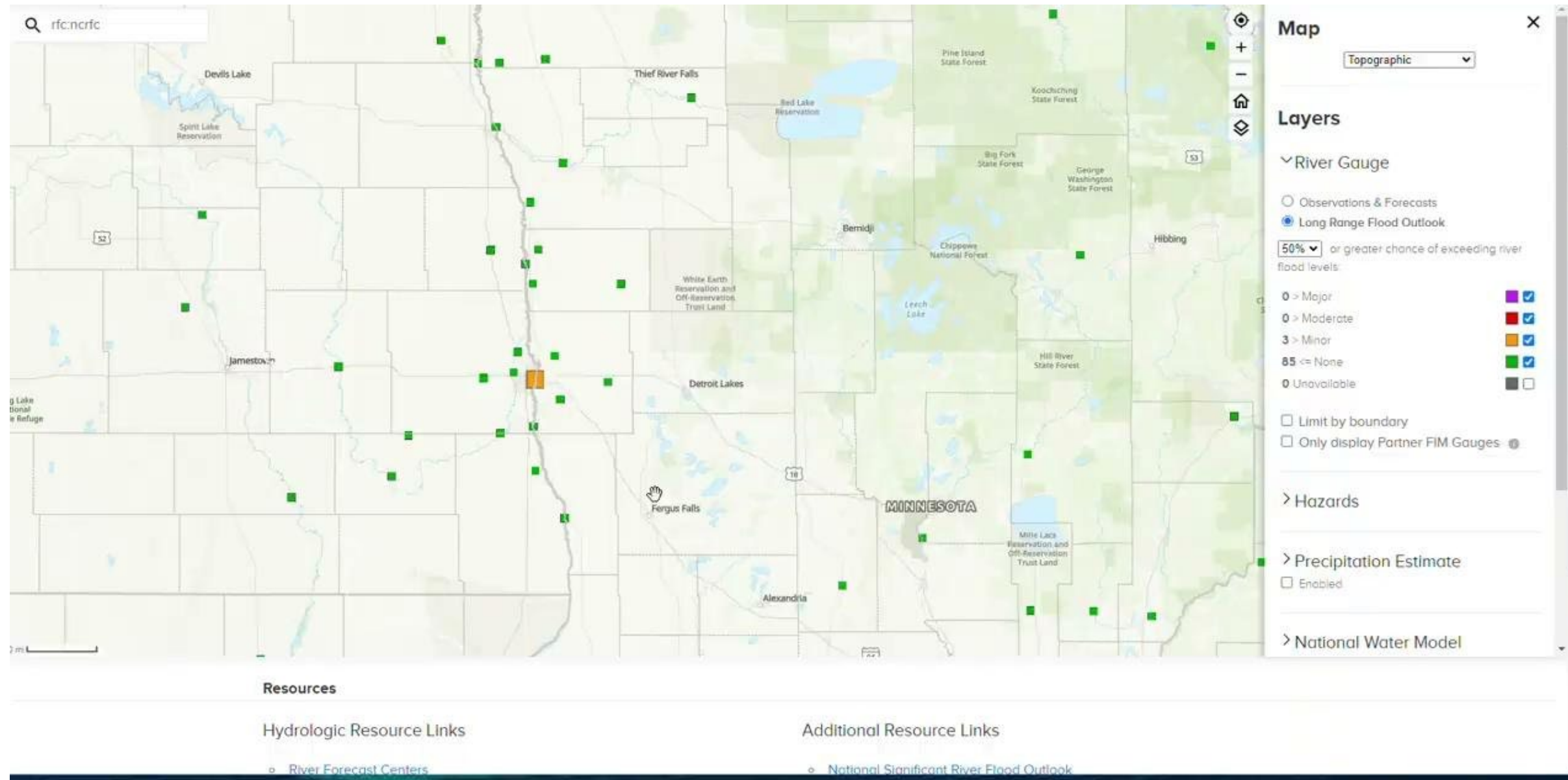


To Find **all** of the probabilistic graphics, including HEFS, scroll down on main hydrograph page



National Water Prediction Service (NWPS)

Hydrograph Features



To Find all of the probabilistic graphics, scroll down on main hydrograph page (video)

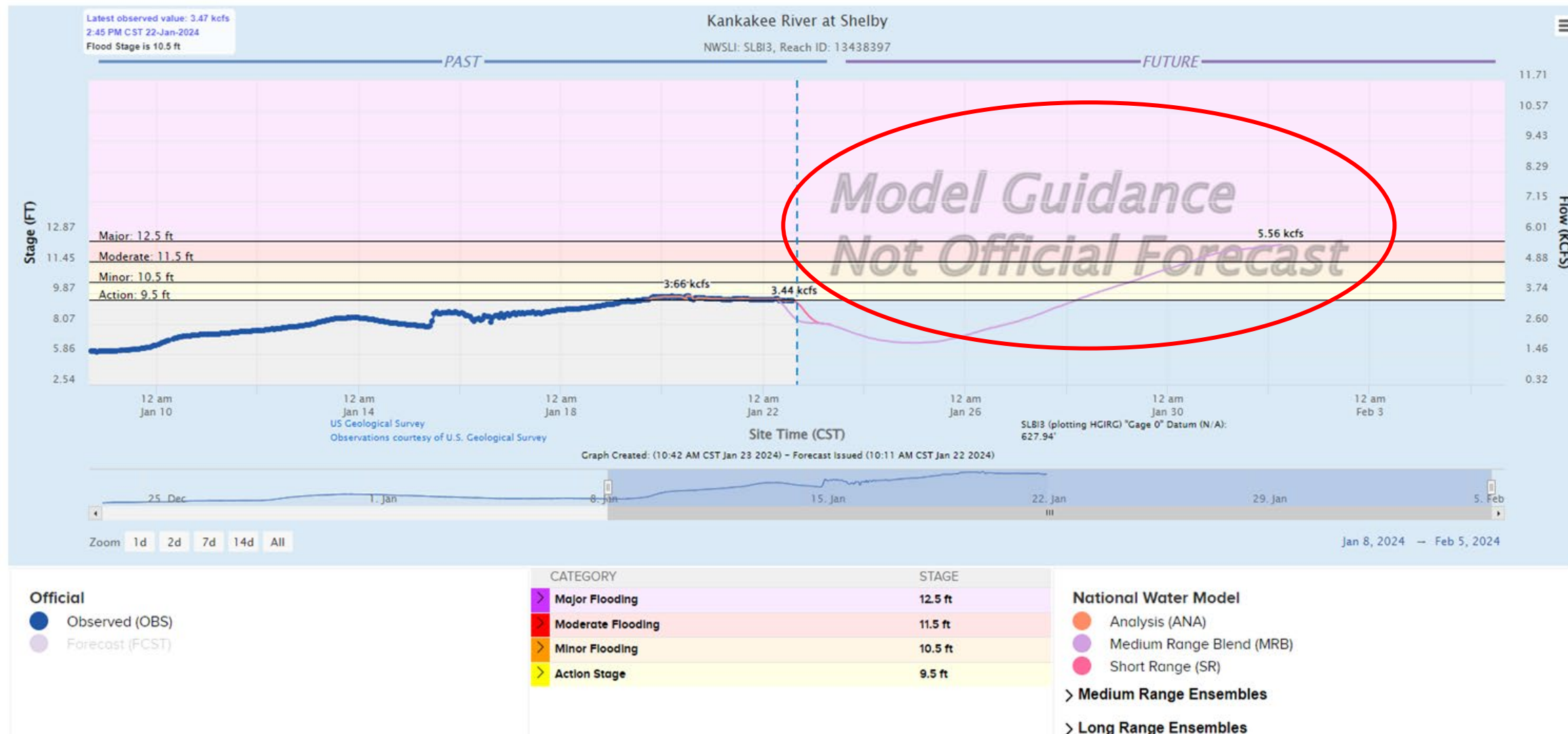


National Water Prediction Service (NWPS)

National Water Model display

Official

National Water Model Guidance



National Water Model (NWM) available on all hydrographs:

- GUIDANCE only
- Not calibrated
- Not QC'd

NWM also available from main map, for all streams/ivers (not shown)

About the National Water Model: <https://preview.water.noaa.gov/about/nwm>



National Water Prediction Service (NWPS)

NWPS resources

Website Address: water.noaa.gov

- AHPS decommissions on May 28, 2024
- Questions or Comments to craig.schmidt@noaa.gov

Resources:

[Users Guide to NWPS \(storymap\)](#) – good overview and demonstration of NWPS

[NWPS Products and Services Guide](#) – full reference document of all things NWPS

[NWPS Fact Sheet](#) – from the Office of Water Prediction

[Service Change Notice](#) – official document of change

[Resource list](#) available from the QR code to the right...[scroll to bottom of page](#)

