

The background image is an aerial photograph of a river watershed. A large, winding river flows through the center of the image, with a city built along its banks. The surrounding land is a mix of green fields and darker, more developed areas. The sky is filled with scattered clouds.

# Yahara River Watershed

## USGS Water-Quality Monitoring Update

### Dec 16, 2025

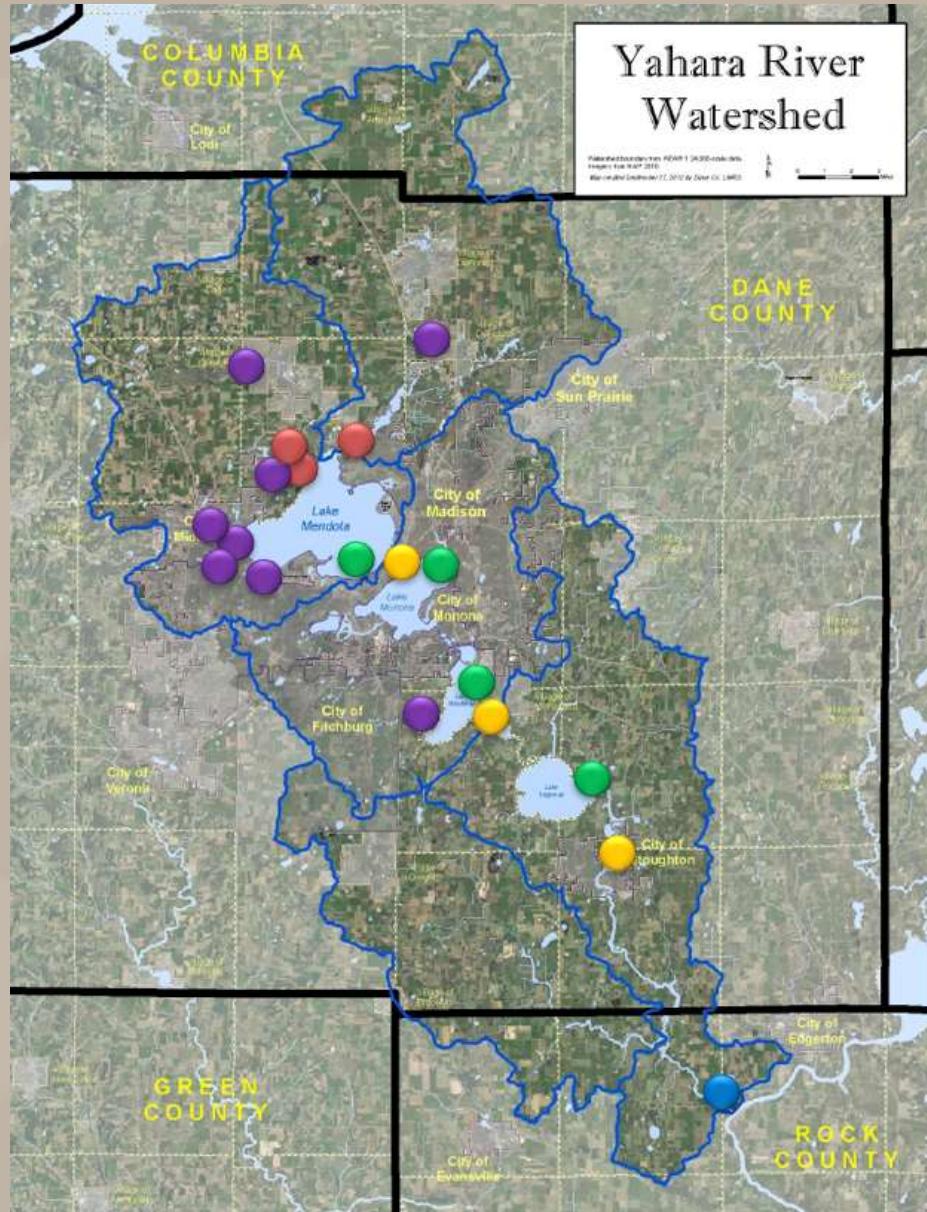
Todd Stuntebeck

Robert Rosner

U.S. Geological Survey

Some of the information is preliminary or provisional and is subject to revision. It is being provided to meet the need for timely best science. The information has not received final approval by the U.S. Geological Survey (USGS) and is provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the information.

# USGS “Dane County Monitoring” Project



## 2025 Status

- 8 streamflow (standard) and high-intensity water quality
- 3 streamflow (hydroacoustic) and high-intensity water quality
- 1 streamflow (standard) and fixed-interval water quality
- 4 lake-level
- 3 streamflow (hydroacoustic) only
- 19 long-term baseflow monitoring locations (on rotation)

# USGS collaborators over the 30+ years

- CARPC
- Dane County
- DNR
- Madison, Middleton, Westport, Fitchburg
- MMSD, Yahara WINS
- Nature Conservancy
- NRCS
- Sand County Foundation
- Yahara Pride Farms
- Friends of Waubesa Wetlands
- Lake Waubesa Conservation Association



# What is the driving force behind

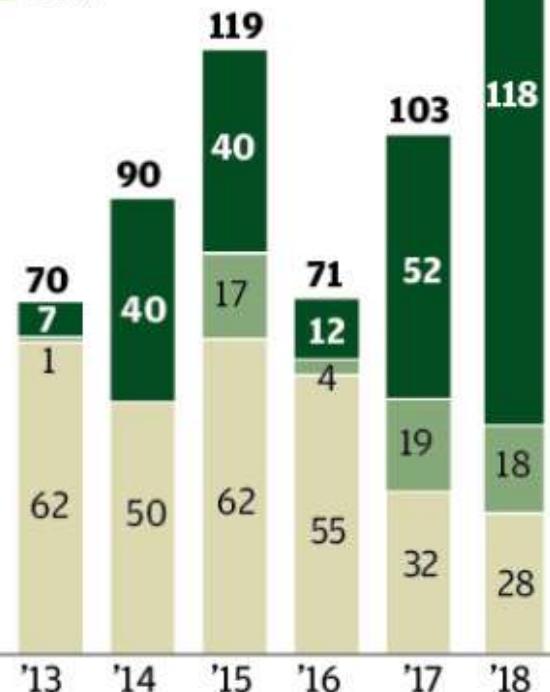
## Most beach closings in years

*Nutrient runoff helps fuel bacterial growths that forced a record number of Dane County beach closings this year.*

**Minimum number of beach days lost, by cause**

**164 days**  
So far in 2018

- Blue-green algae
- E. coli
- Both



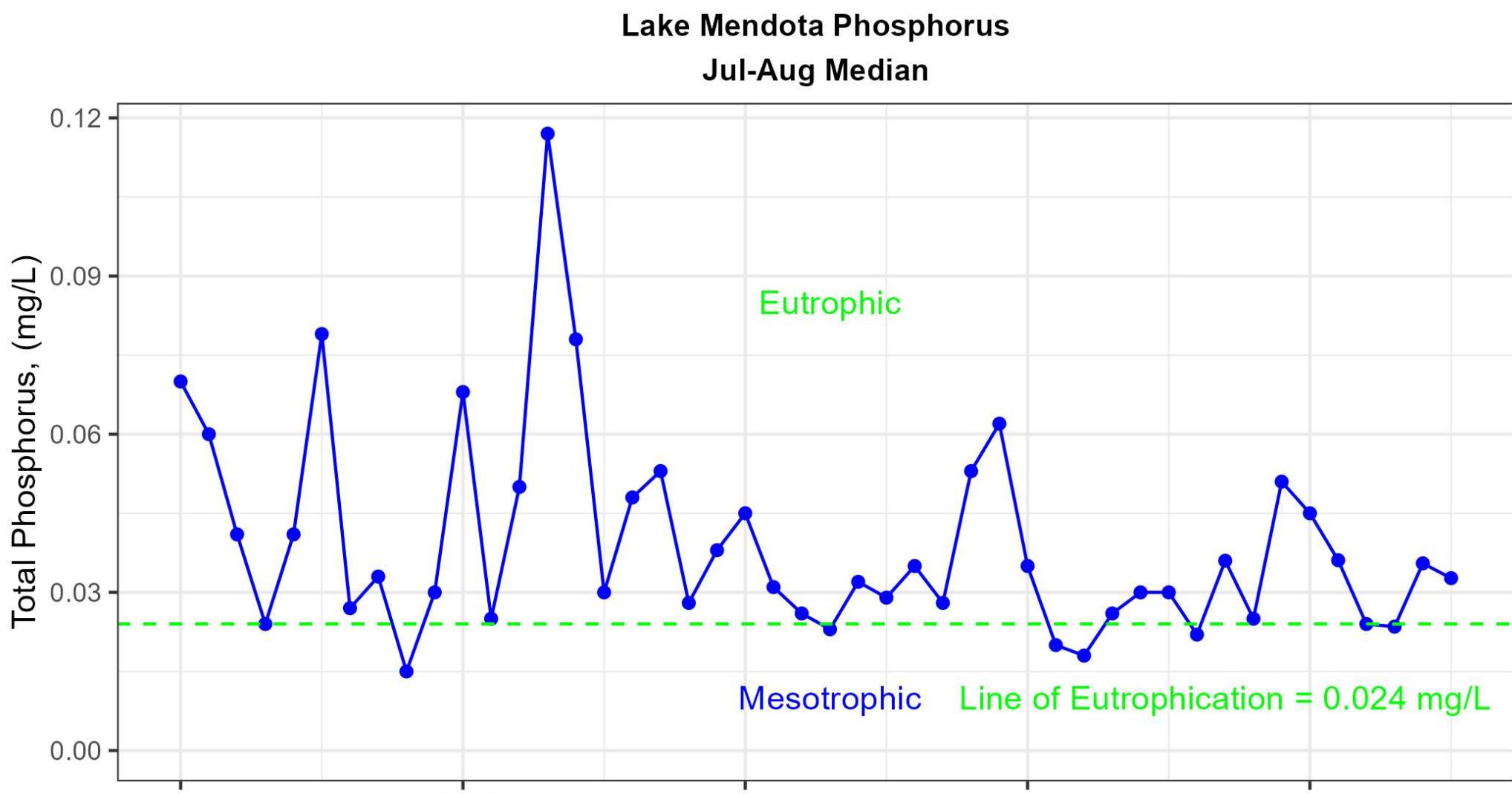
madison.com

[Update: At least 5 Madison-area beaches closed due to blue-green algae | Local News | madison.com](#)

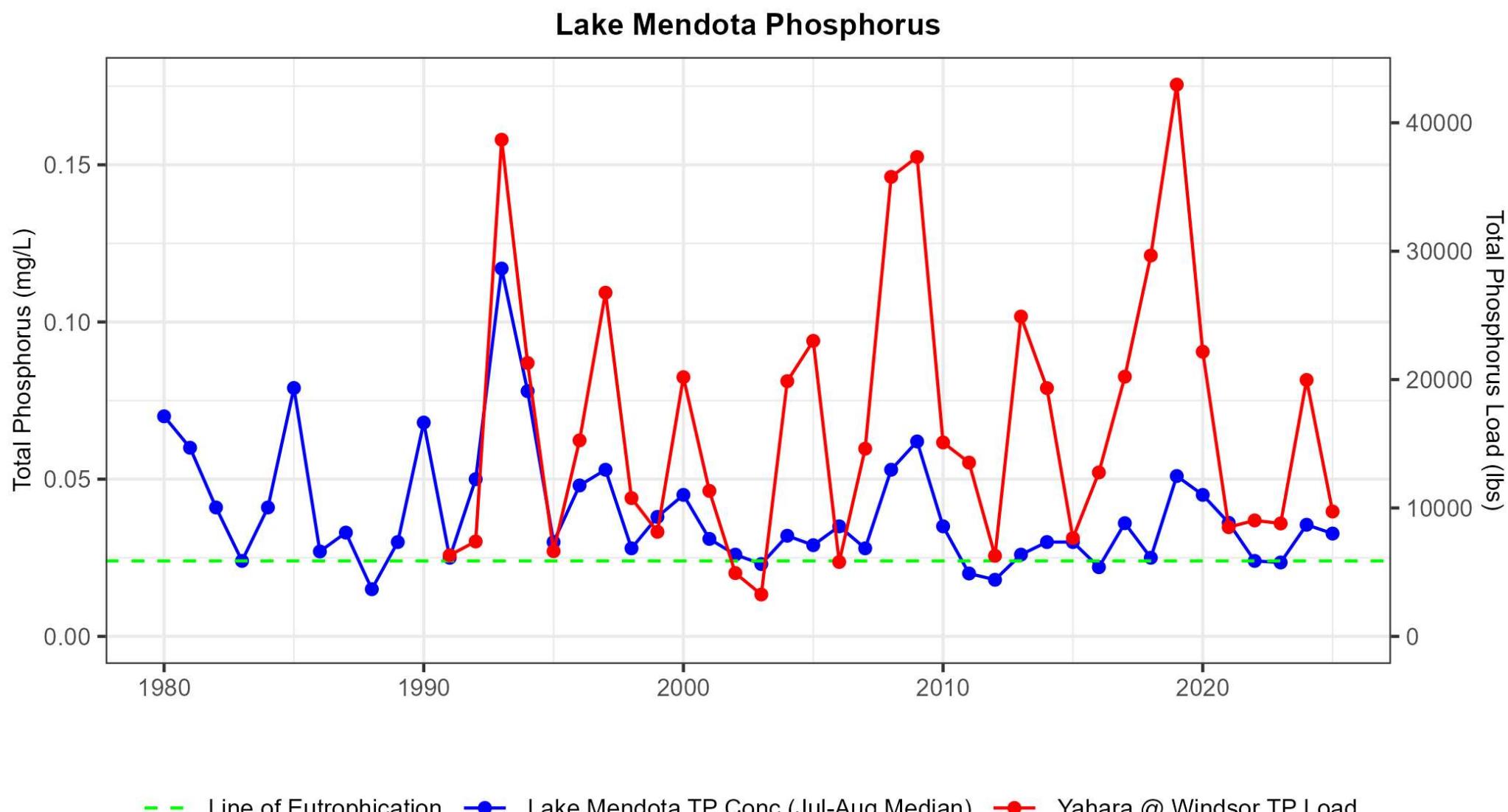
SOURCE: Public Health  
Madison & Dane County

State Journal

# Phosphorus and lake effects

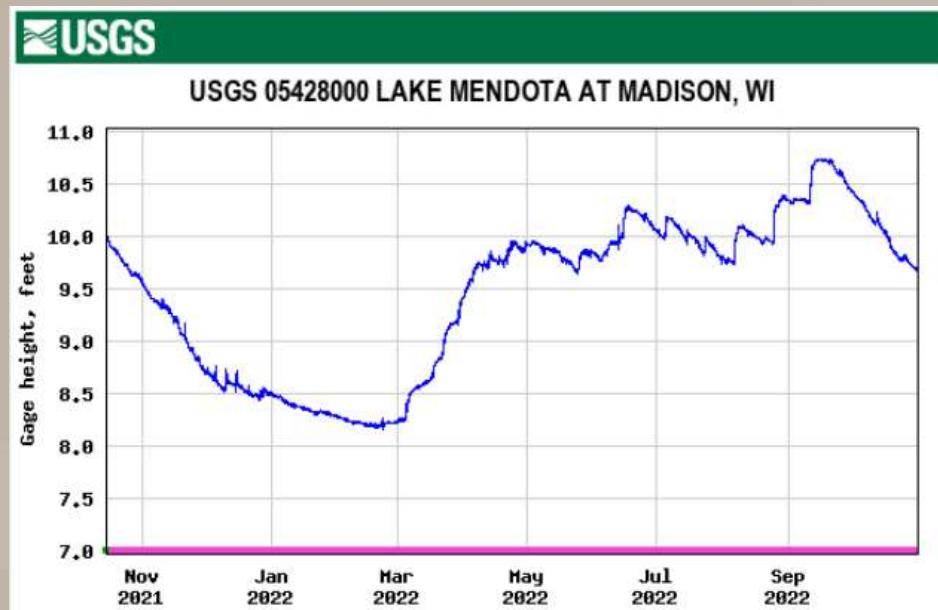


# Linkage between P inputs and lake water quality

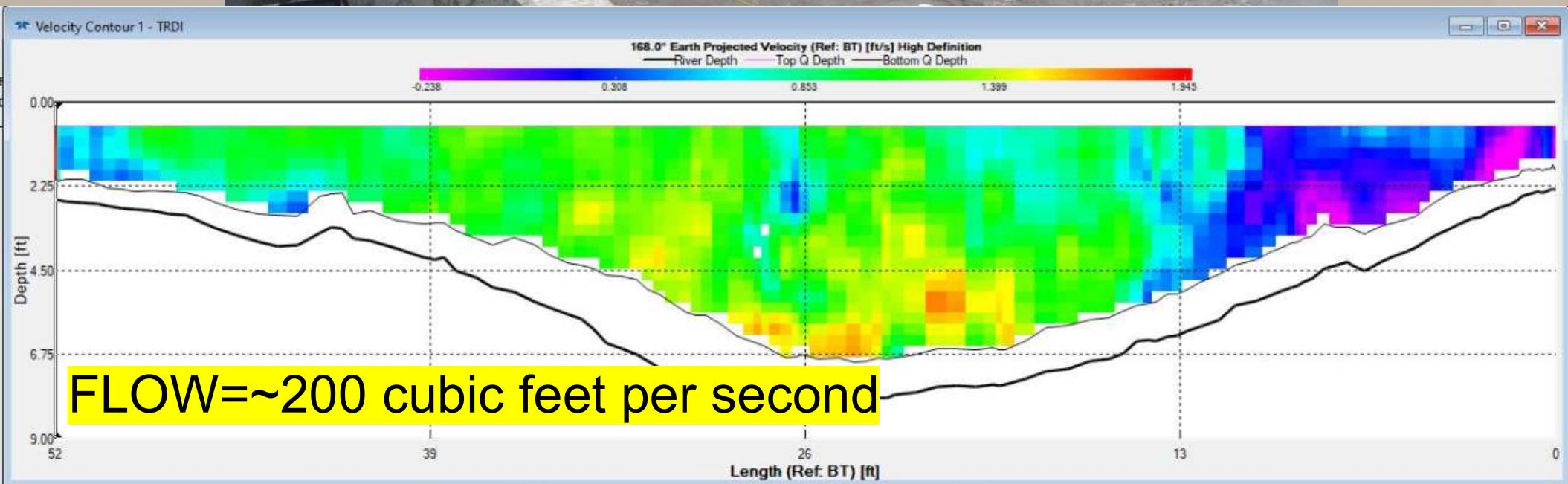


# What is being measured?

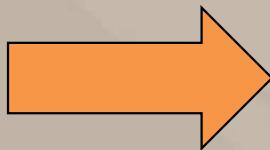
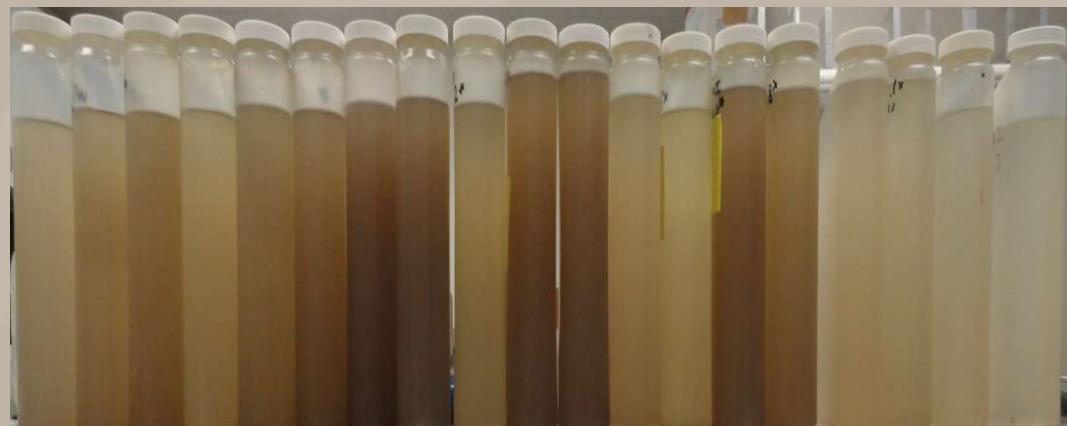
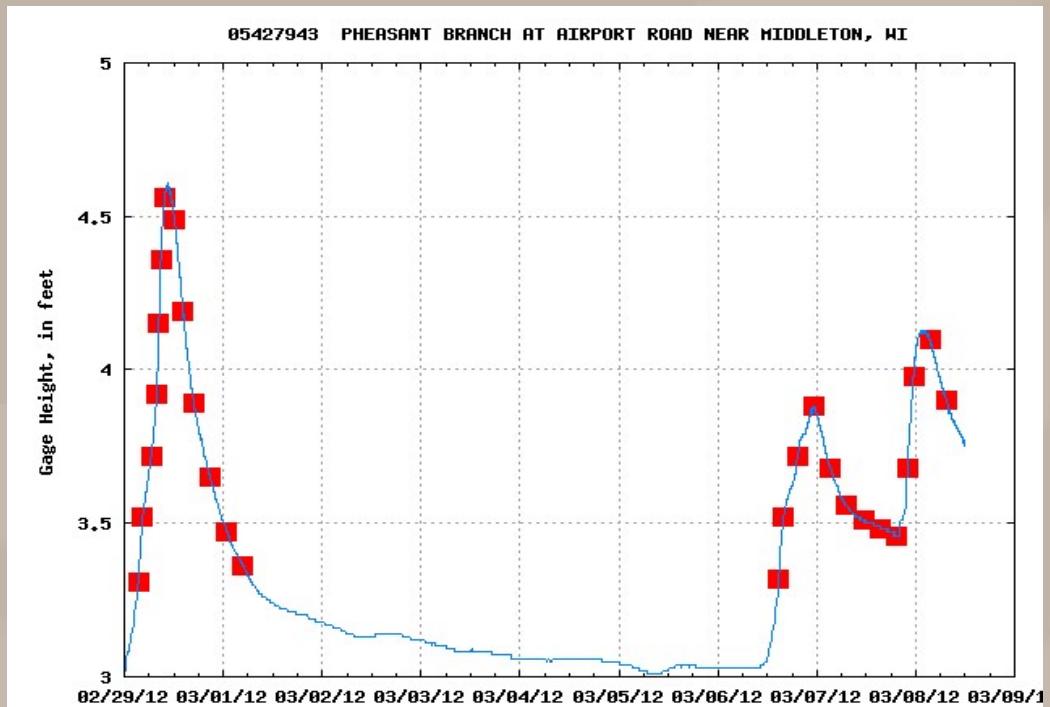
- Water level and/or streamflow
- Periodic water sample concentrations
  - Total Phosphorus (TP)
  - Dissolved Phosphorus
  - Suspended Sediment or Suspended Solids
  - Nitrogen (Ammonia, Nitrate, TKN)
  - Chloride



# Streamflow



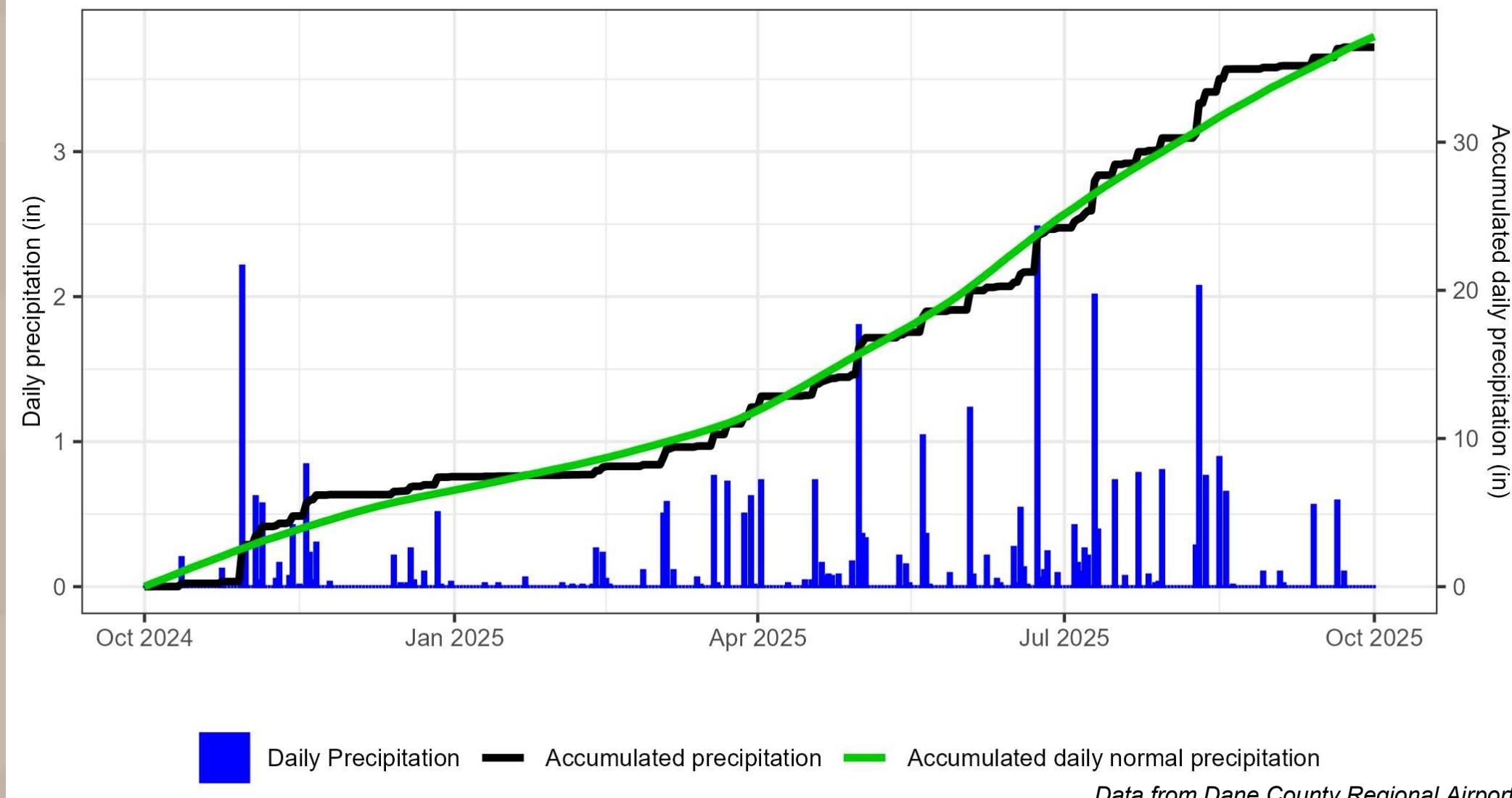
# Water-quality sampling



Selected samples  
sent to lab(s) for  
analysis

# WY2025 Precipitation

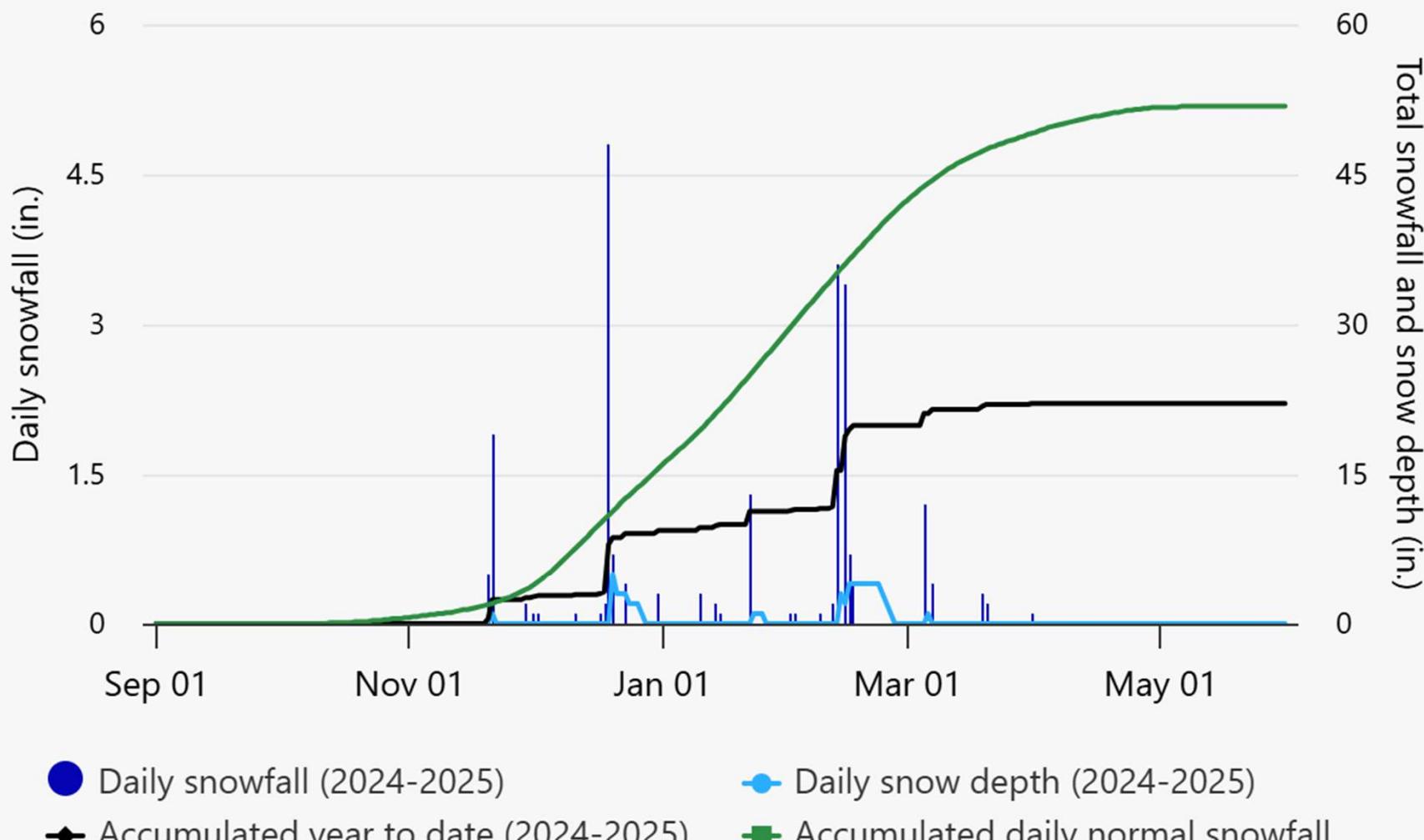
Madison, Wisconsin, Precipitation (WY 2025)



- WY25 Rainfall was about 36.4 in., average is 37.13
- Wet fall, dry winter, average spring/summer

# WY2025 Snowfall

## Madison, Wisconsin, Daily Snowfall (2024-2025)



● Daily snowfall (2024-2025)

◆ Accumulated year to date (2024-2025)

● Daily snow depth (2024-2025)

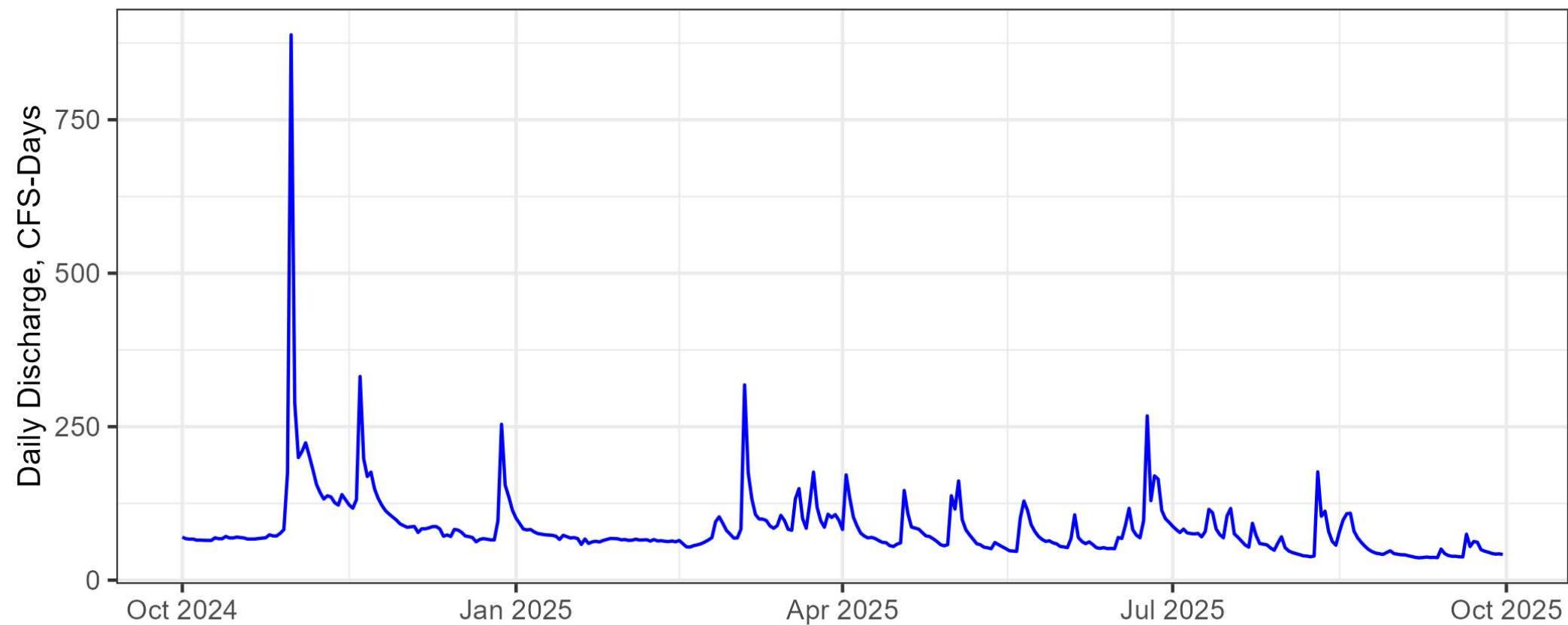
■ Accumulated daily normal snowfall

*Data from Dane County Regional Airport*

- Snowfall was ~22 in., average is 52 in.
- Least snowy season since 1967-1968

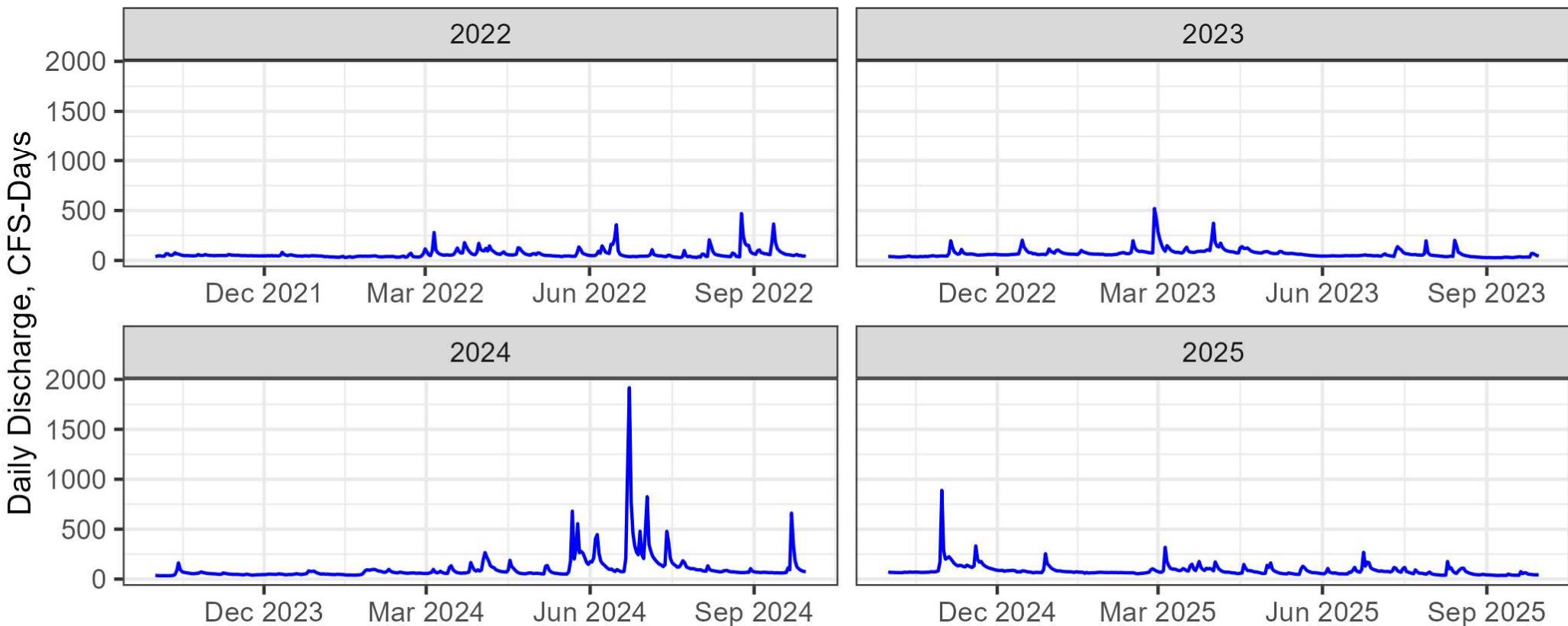
# Streamflow Water Year 2025

Lake Mendota Tributary Discharge  
Dorn, Sixmile\*, P.Branch, Yahara @ Windsor



# Last 4 Years

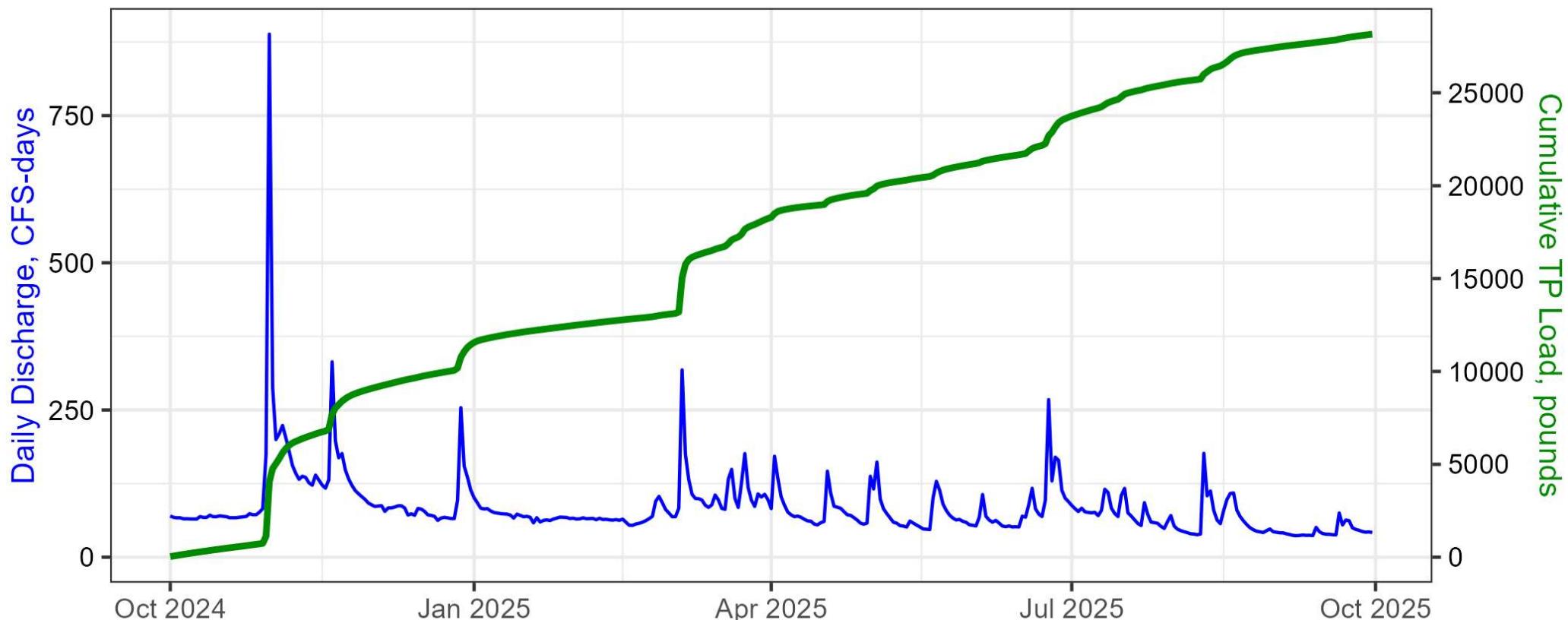
## Lake Mendota Tributary Discharge Dorn, Sixmile\*, P.Branch, Yahara @ Windsor



# 2025 P loads to Lake Mendota

## Lake Mendota Tributary Discharge and TP Load

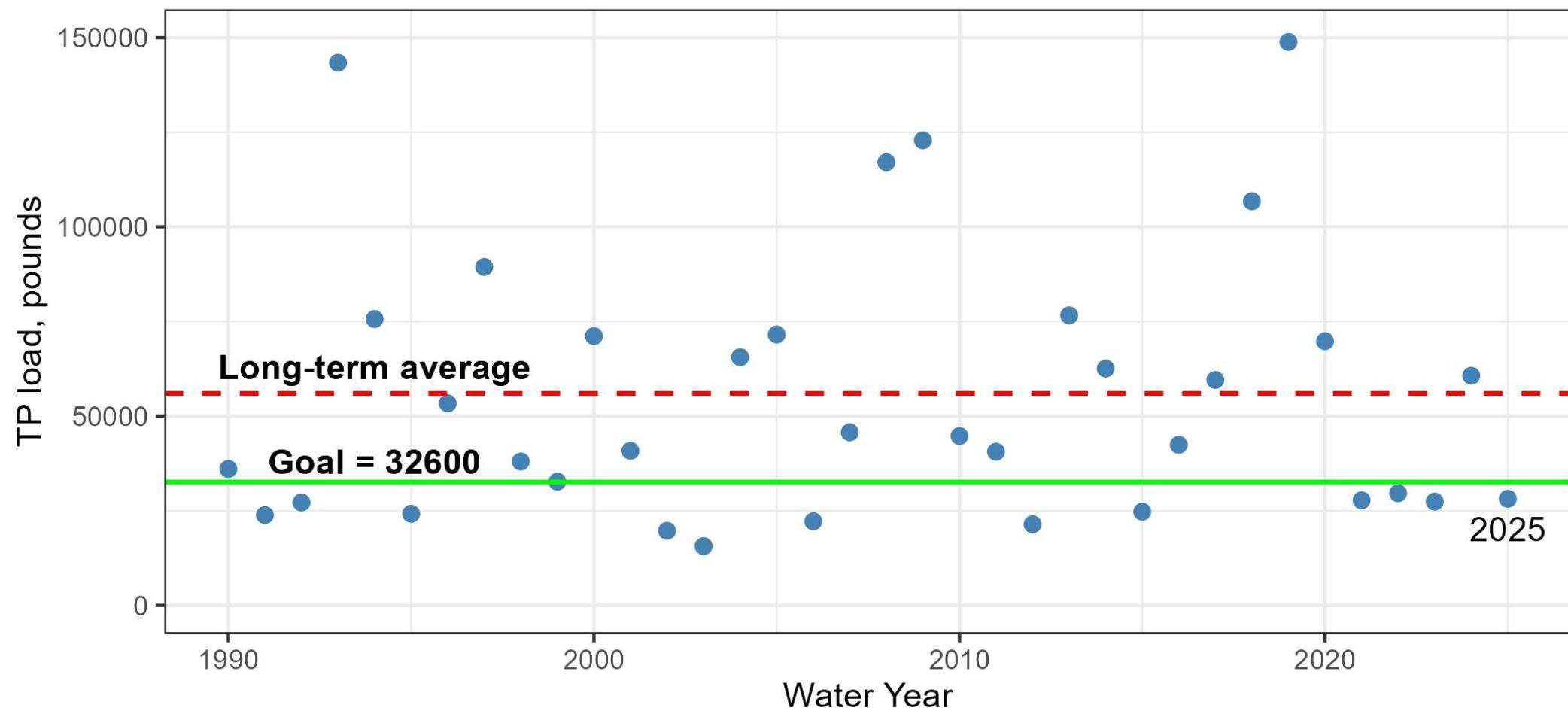
Dorn, Sixmile\*, P. Branch, Yahara @ Windsor



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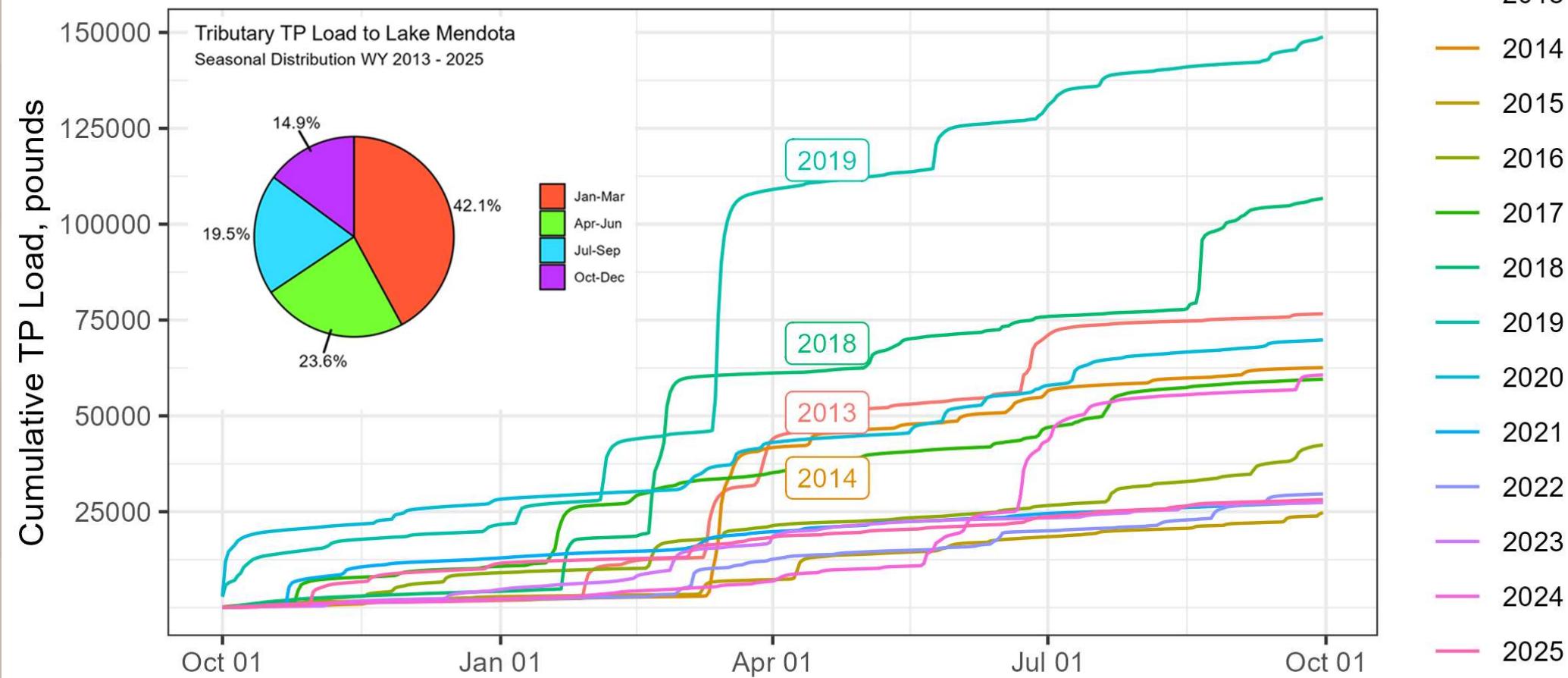
# What amount of TP loading is desirable?

Estimated Tributary TP Loading to Lake Mendota



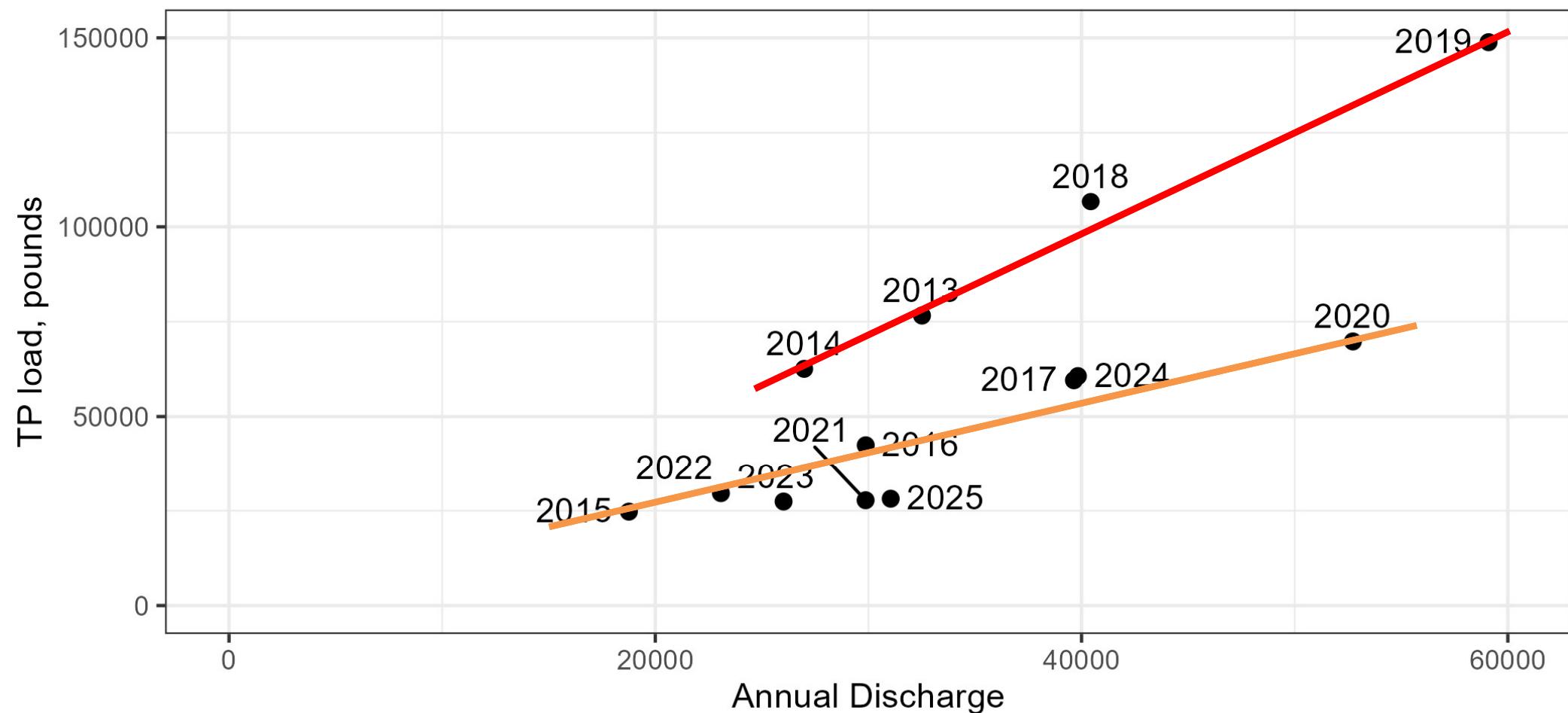
# Historical P Loading (2013-present)

## Annual Tributary TP loads to Lake Mendota



# Observations of TP in Winter Runoff (Snowmelt)

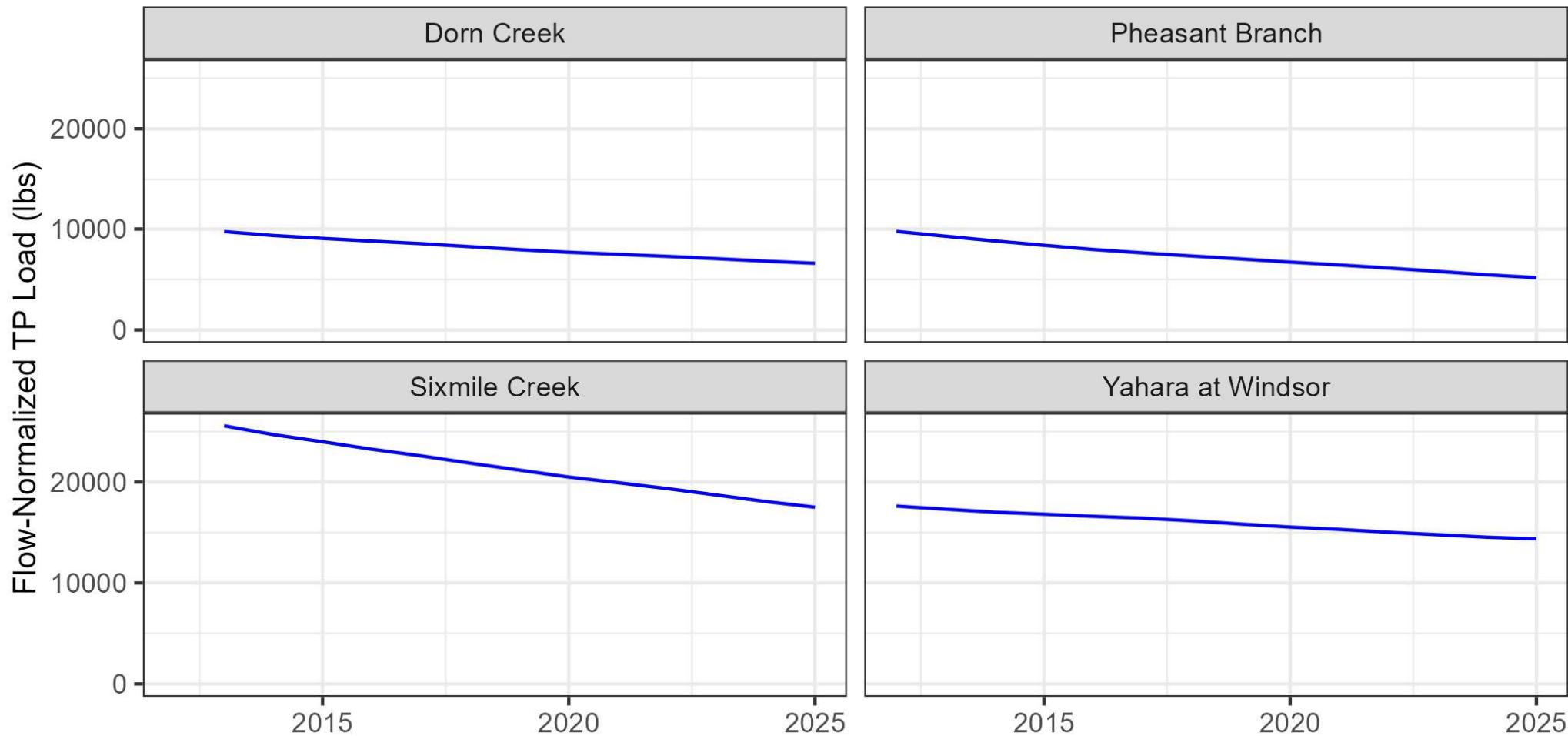
Relation between Discharge and TP load



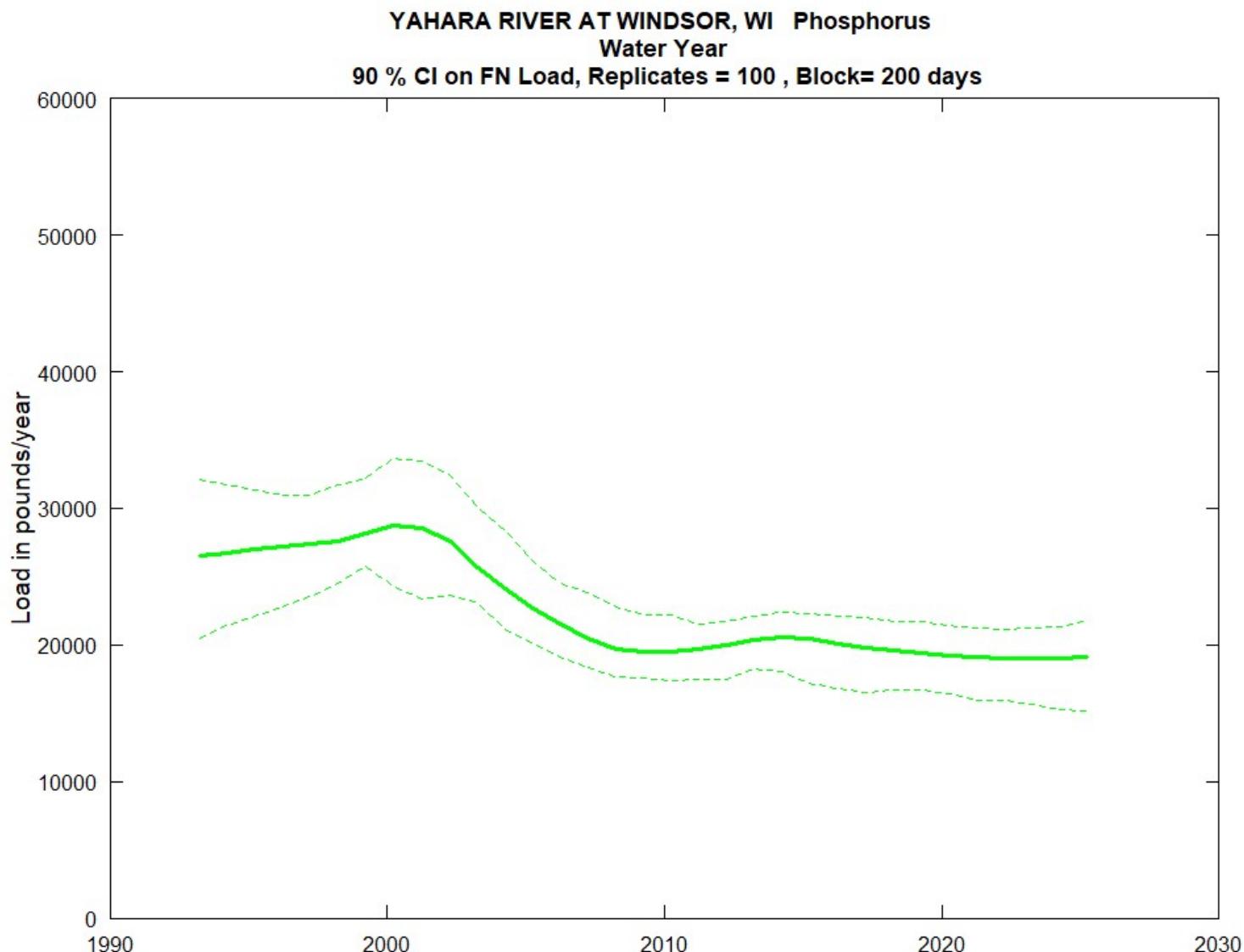
- This demonstrates that there is a higher TP concentration per unit runoff during snowmelt
- Potential to significantly lower annual P loading if snowmelt P concentrations are reduced

# Flow-Normalized P loads

## Flow-Normalized Tributary Phosphorus Load WY 2012-2025



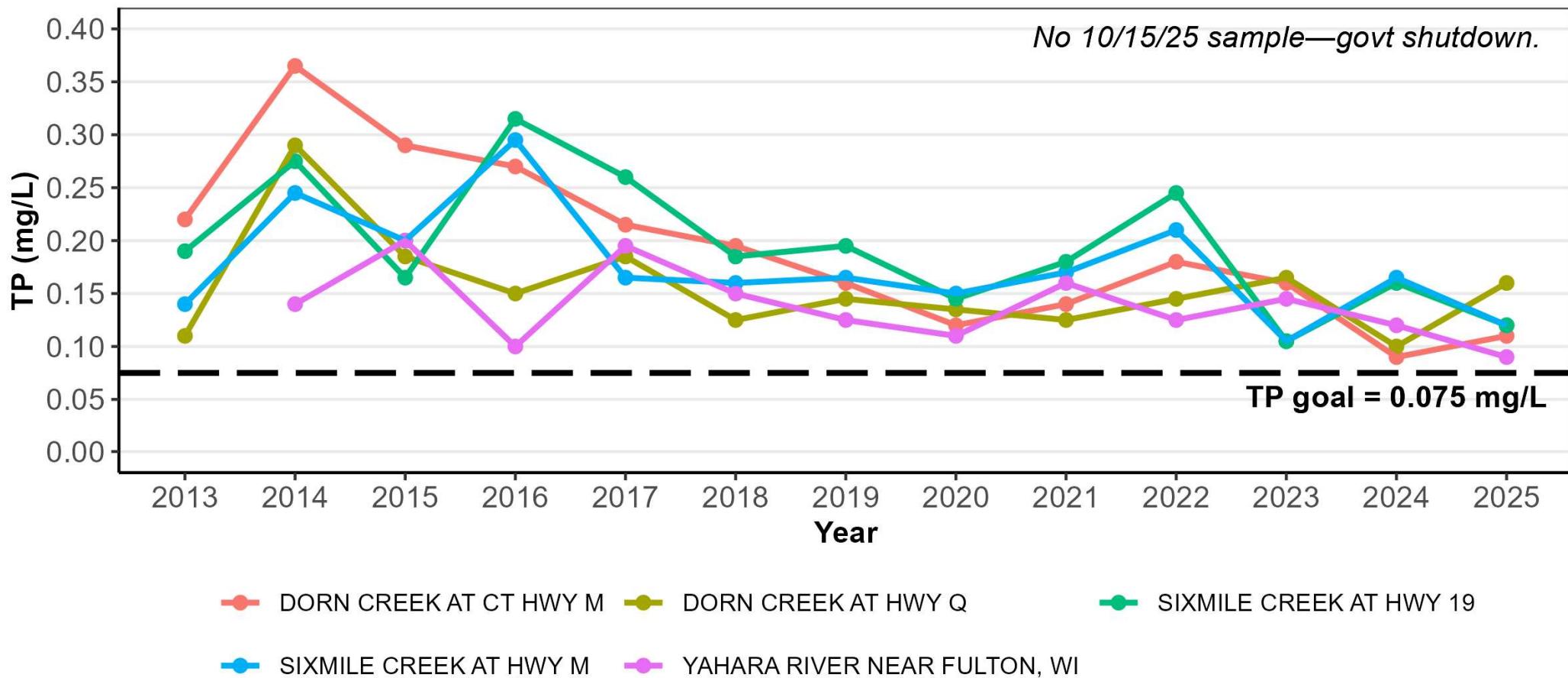
# Flow-Normalized P loads: long-term



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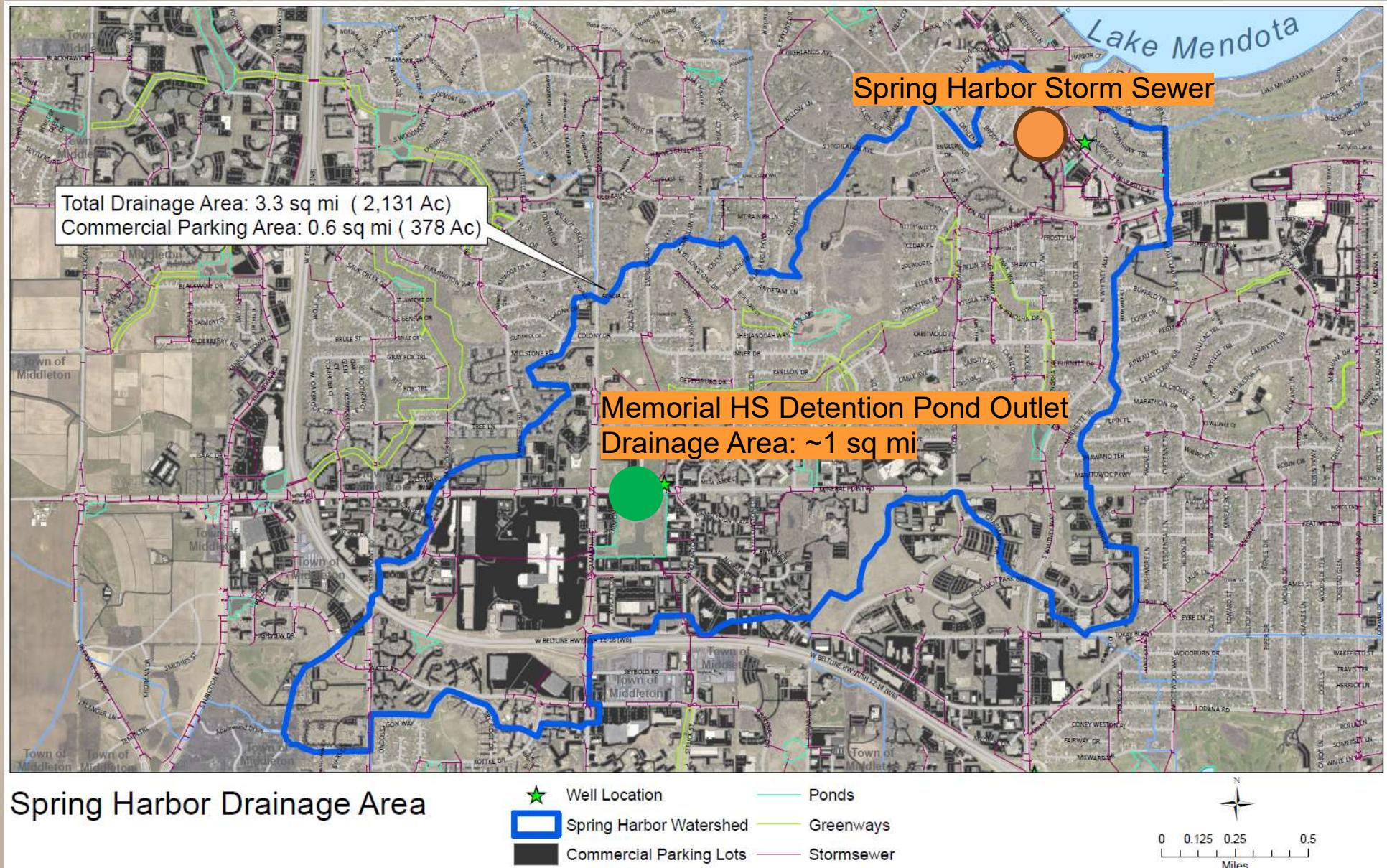
# 15<sup>th</sup> of the Month Growing Season TP Concentrations

Median TP Concentrations  
May - Oct on or near 15th of each month



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# Spring Harbor Chloride Monitoring Project



# Spring Harbor Chloride Monitoring

10-11-2019 Fri 14:00:58

USGS 05427965 SPRING HARBOR  
DOWNSTREAM



Downstream - USGS 05427965 SPRING HARBOR STORM SEWER AT MADISON, WI  
Friday, October 11, 2019 2:00:59 PM

06-24-2020 Wed 18:09:58

USGS 05427965 SPRING HARBOR  
DOWNSTREAM

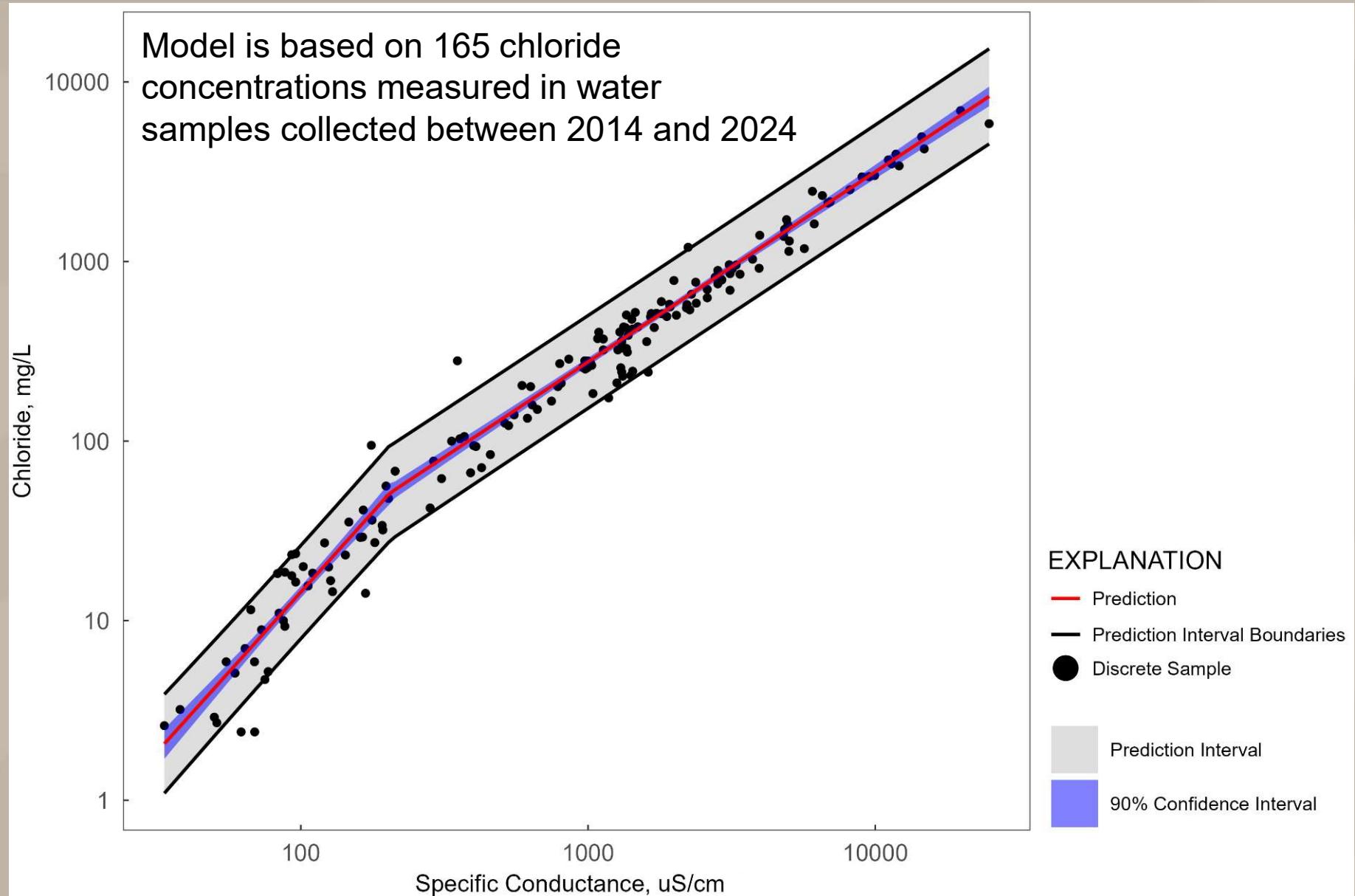


Downstream - USGS 05427965 SPRING HARBOR STORM SEWER AT MADISON, WI  
Wednesday, June 24, 2020 6:09:59 PM

## Workflow

- Measure continuous discharge (flow) at 1-minute or 15-minute intervals depending on conditions.
- Measure continuous conductance with a real-time probe (every 15 minutes).
- Autosampler collects water samples periodically during runoff events. Selected samples are sent to MMSD for chloride analysis.
- Determine relationship between conductance and chloride.
- Compute a continuous record of chloride concentration and load using the flow data and the conductance/chloride relationship.

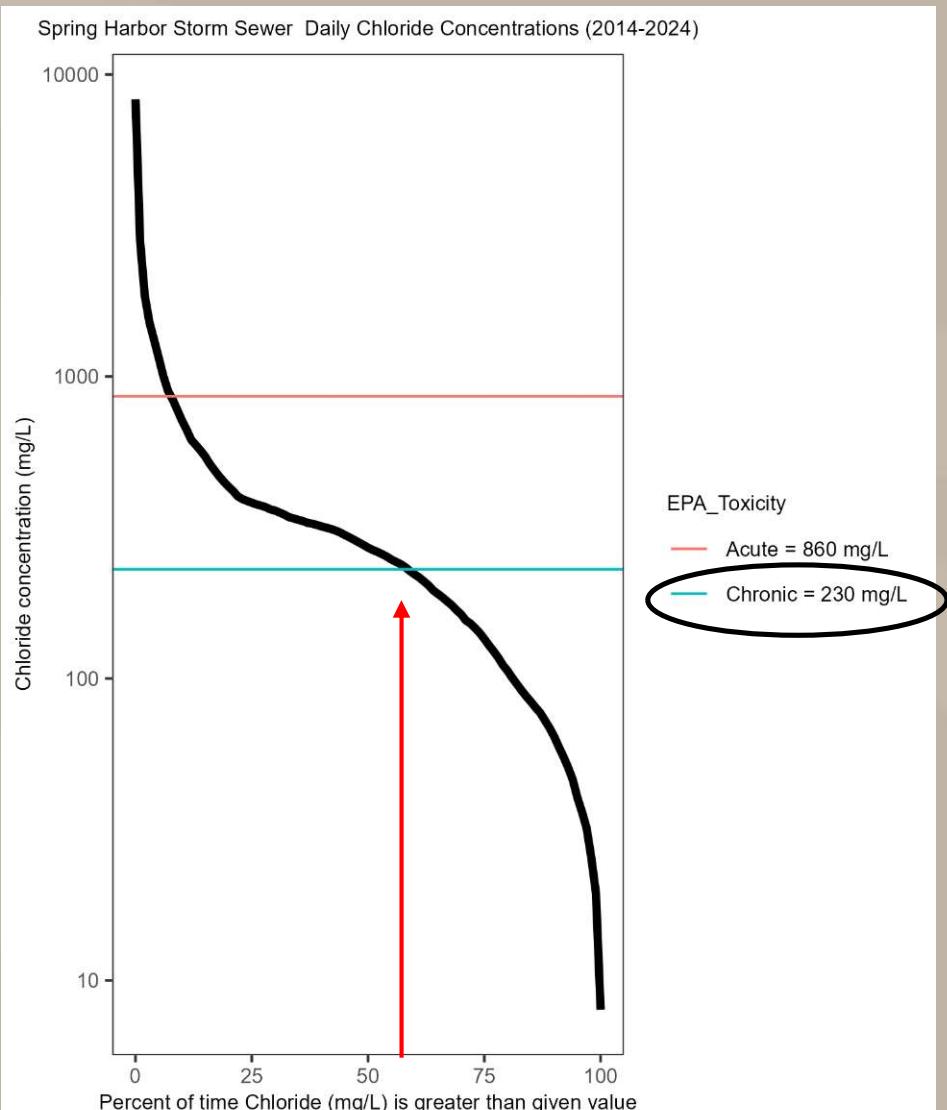
# Spring Harbor Storm Sewer: Relationship between conductivity and chloride



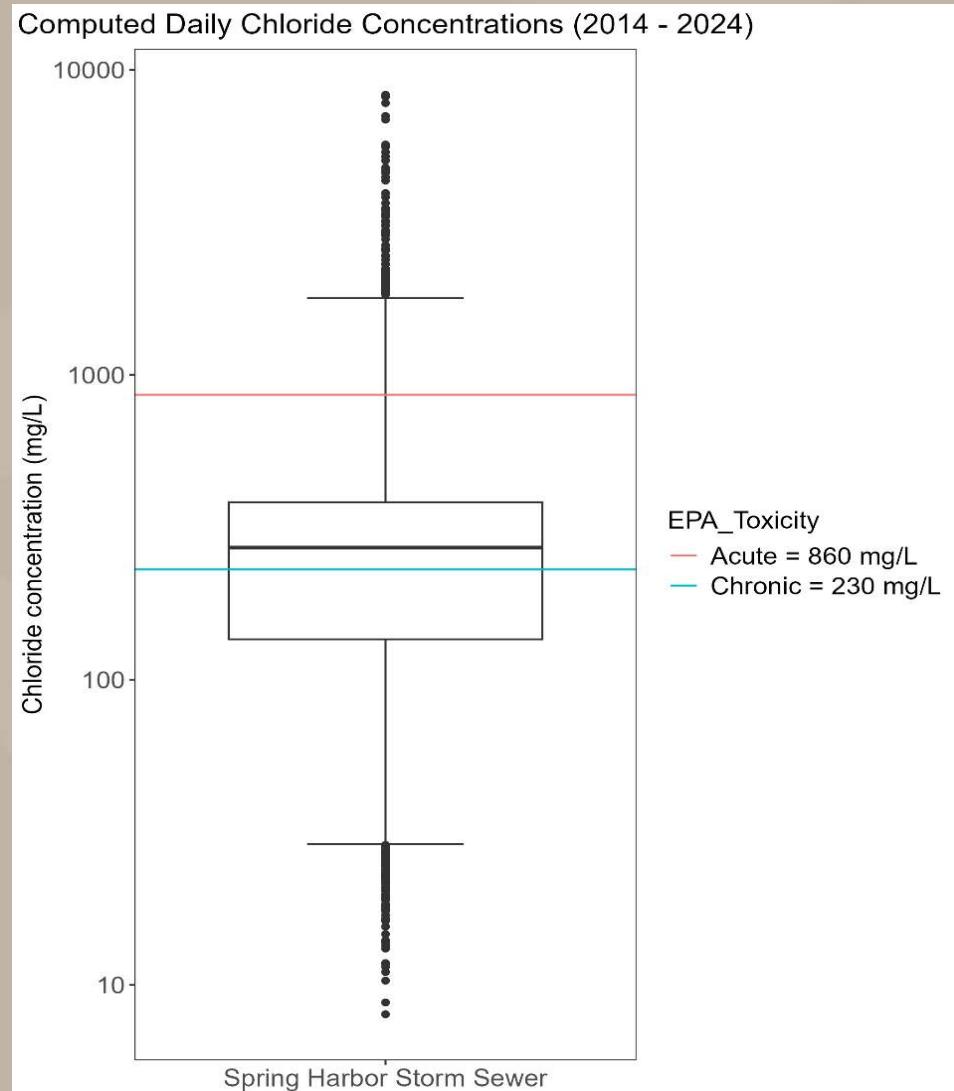
The information has not received final approval by the U.S. Geological Survey (USGS) and is provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the information.

# Exceedance probabilities (2014-2024)

EPA Chronic Toxicity CI level was exceeded about 60% of the time

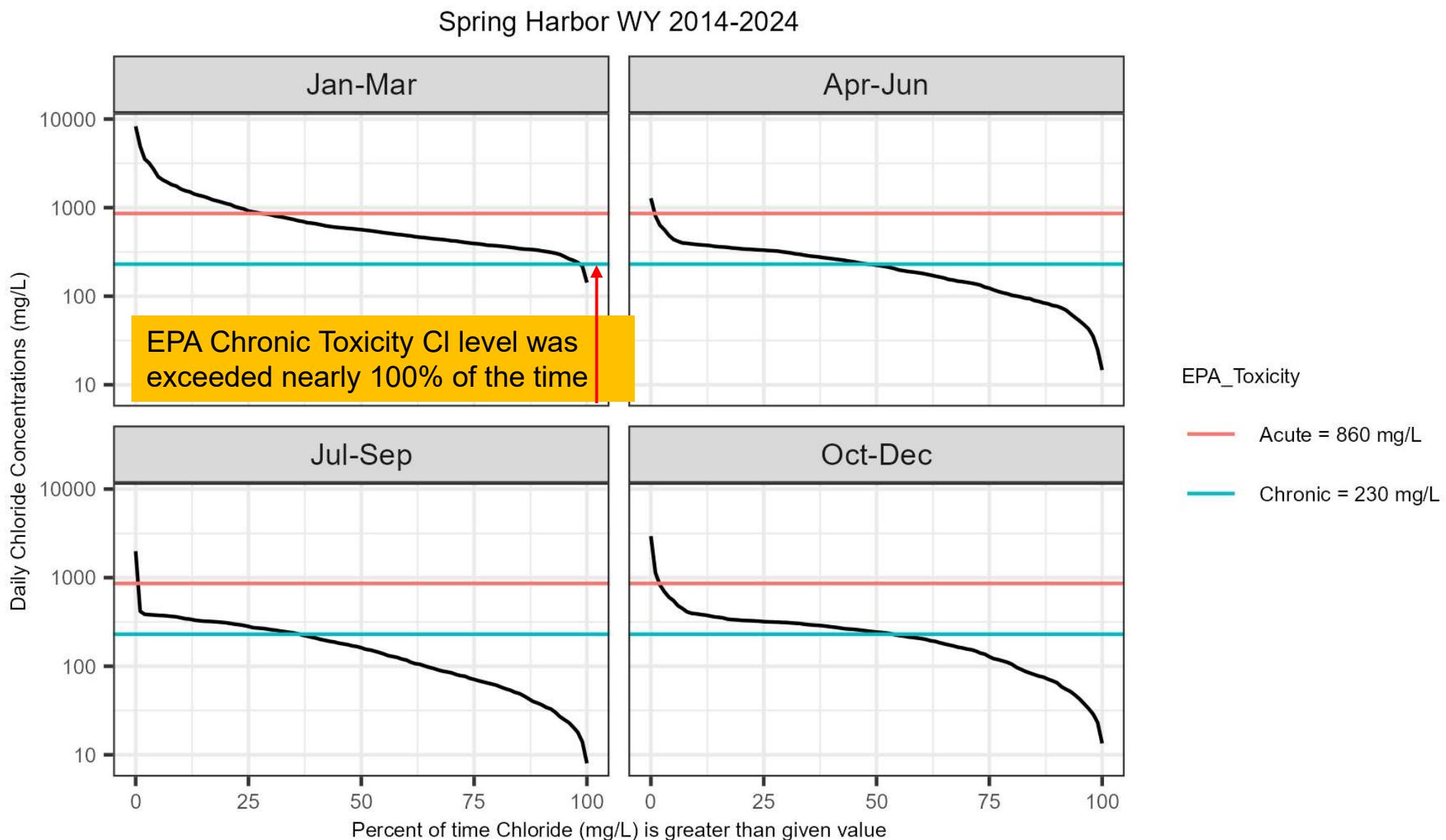


Median CI concentration of 271 mg/L exceeds the EPA Chronic Toxicity level

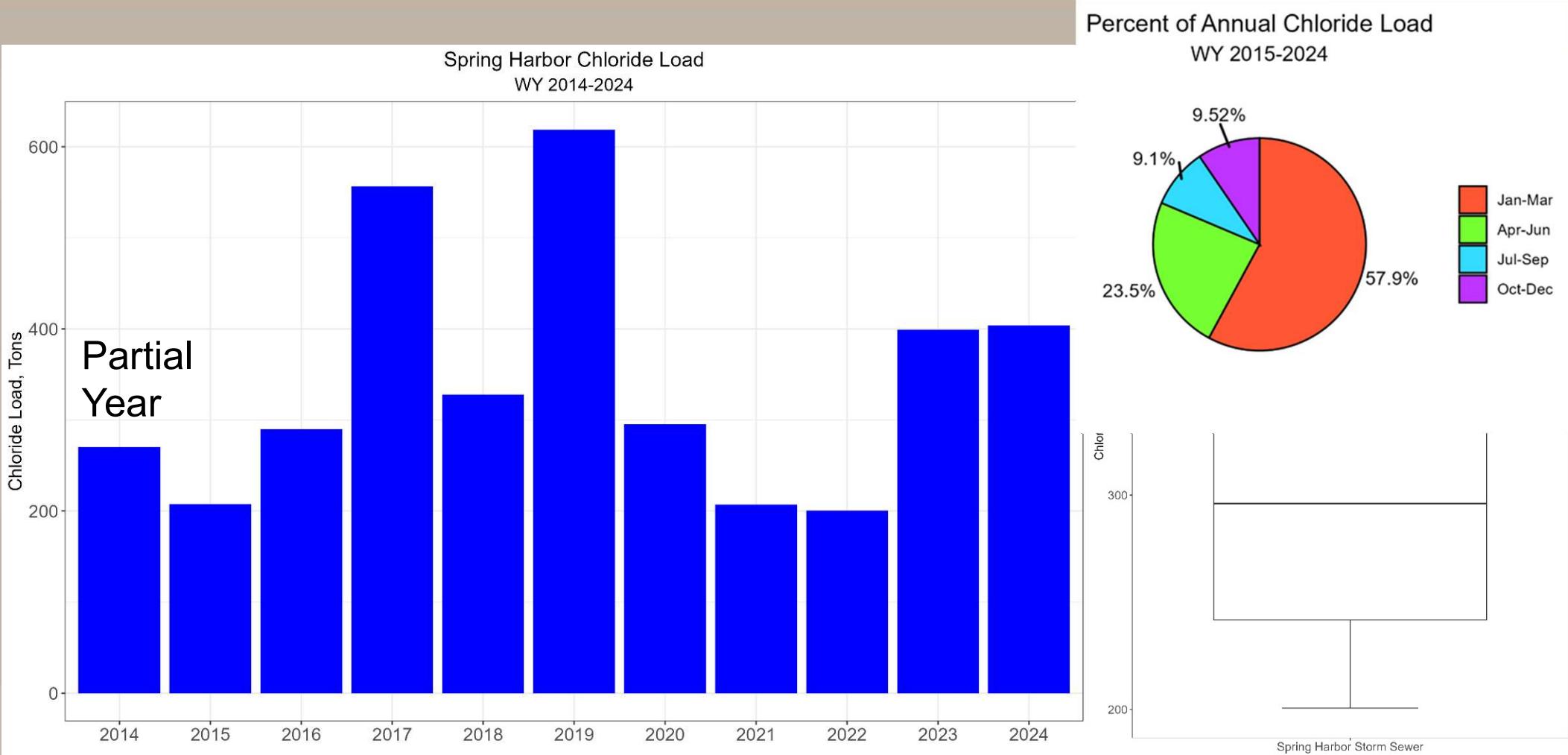


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# Exceedance probabilities – seasonal (2014-2024)



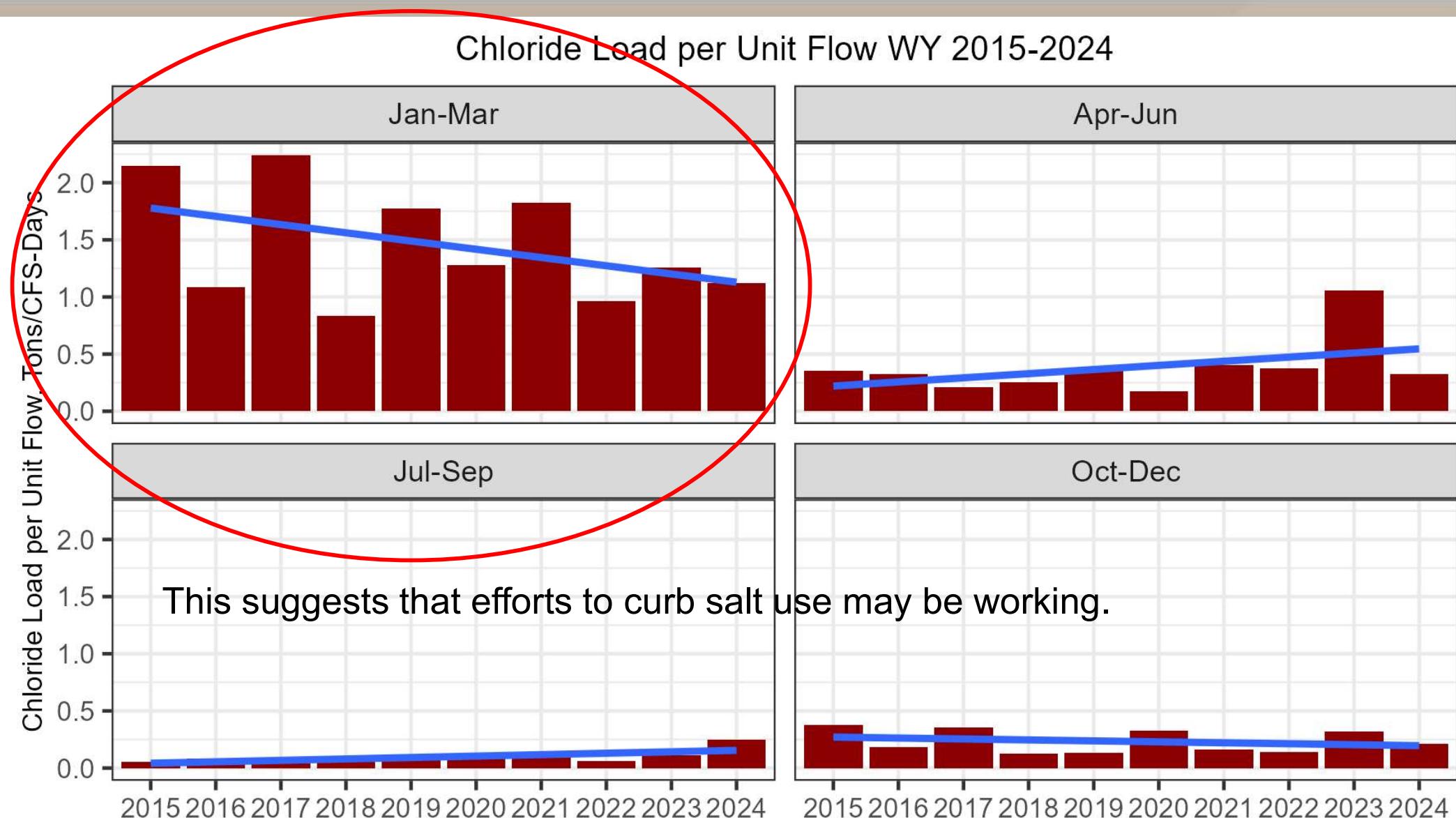
# Spring Harbor chloride loads



Annual Median = ~300 tons of Cl or 490 tons of salt (NaCl)  
- About 58 dump truck loads of salt annually (assuming 8.5 tons/truck)

  
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# Flow-normalized chloride loads



X

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An aerial photograph of a coastal city, likely Anchorage, Alaska. The city is built along a long, narrow peninsula that extends into a large, turquoise-colored body of water. The land is densely packed with buildings, roads, and green spaces. In the background, a range of mountains is visible under a sky filled with white, wispy clouds.

Questions?