

An aerial photograph of a river flowing through a city. The river is a light blue-green color, and the city is a mix of green trees and grey buildings. The sky is blue with some white clouds. In the top left corner, there is a circular button with a white 'X' on a dark background. In the top right corner, there are two circular buttons with white arrows pointing left and right on a dark background.

Yahara River Watershed

USGS Water-Quality Monitoring Update

Dec 16, 2025

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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.

Yahara River Watershed

Published by the Wisconsin Department of Natural Resources
 Version 1.0 (2010)
 Map created by the Wisconsin Department of Natural Resources
 Map created by the Wisconsin Department of Natural Resources

Scale: 0 1 2 Miles

- 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

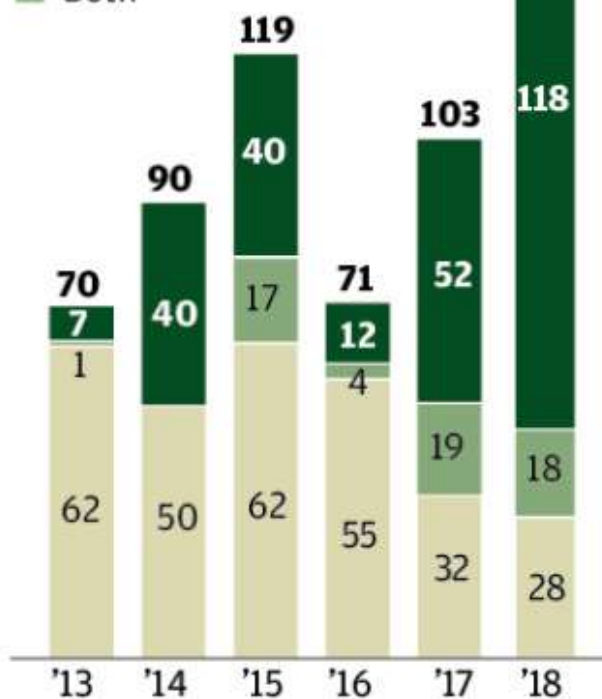
Most beach closings in years

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



SOURCE: Public Health
Madison & Dane County

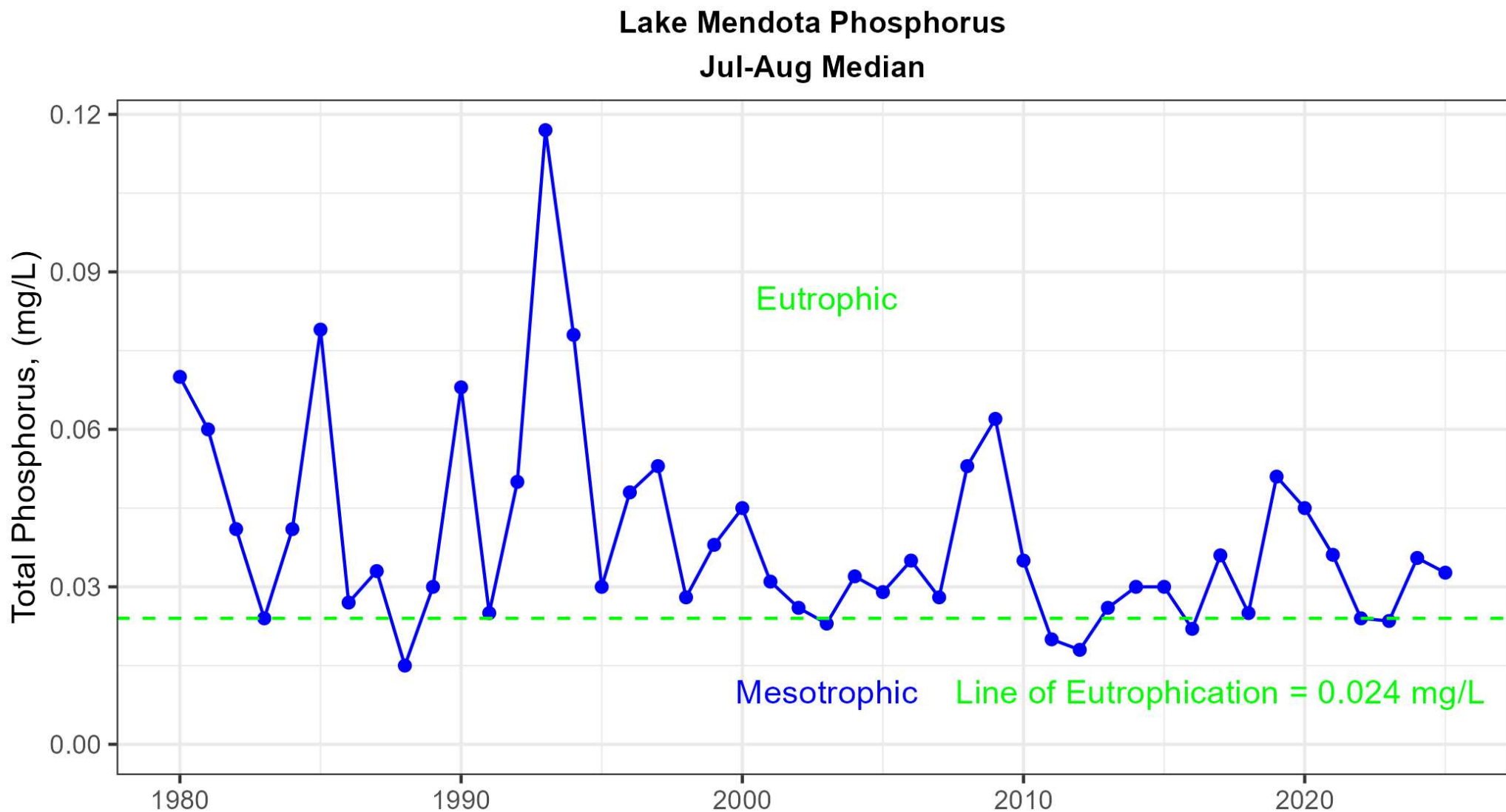
State Journal



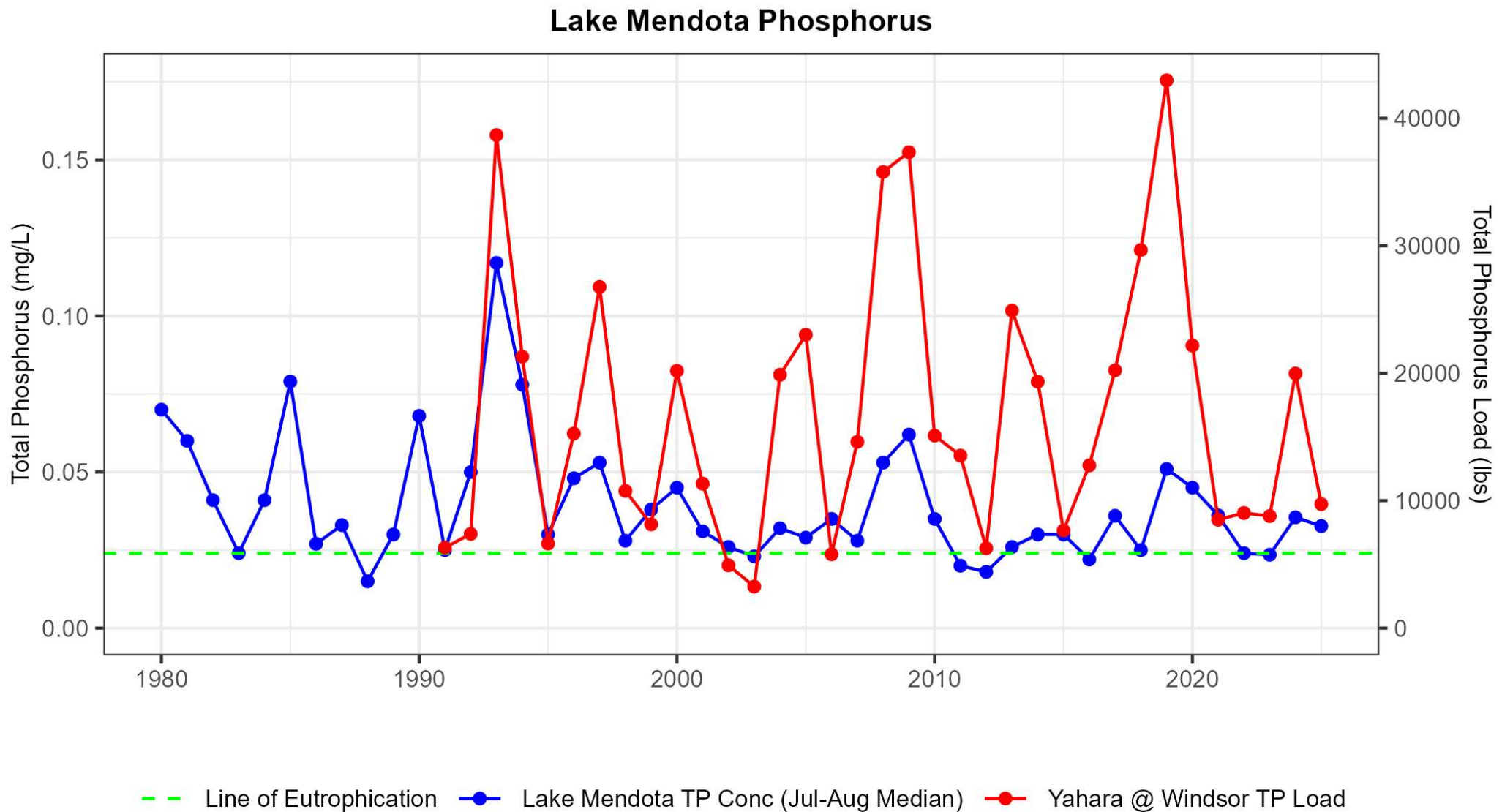
madison.com

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

Phosphorus and lake effects

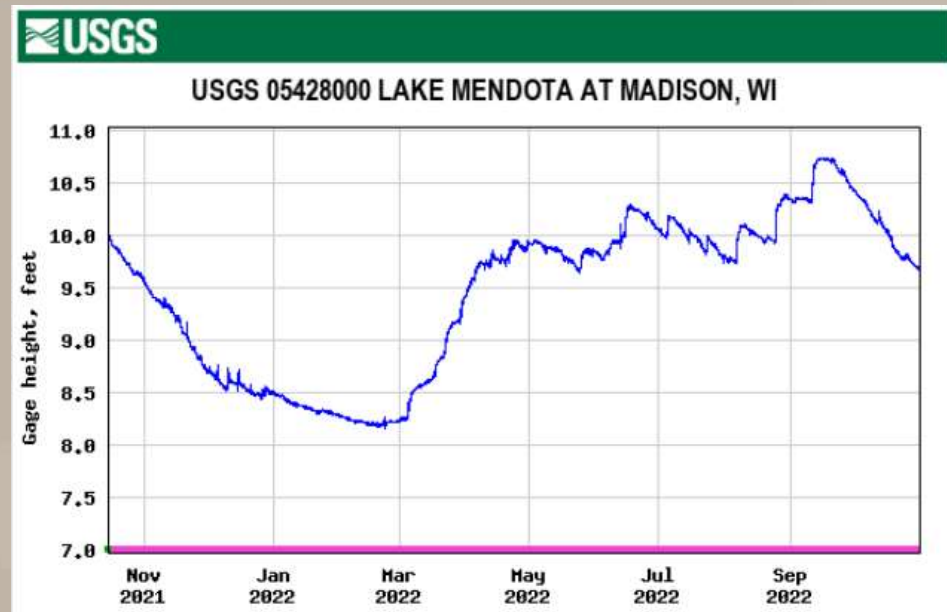


Linkage between P inputs and lake water quality

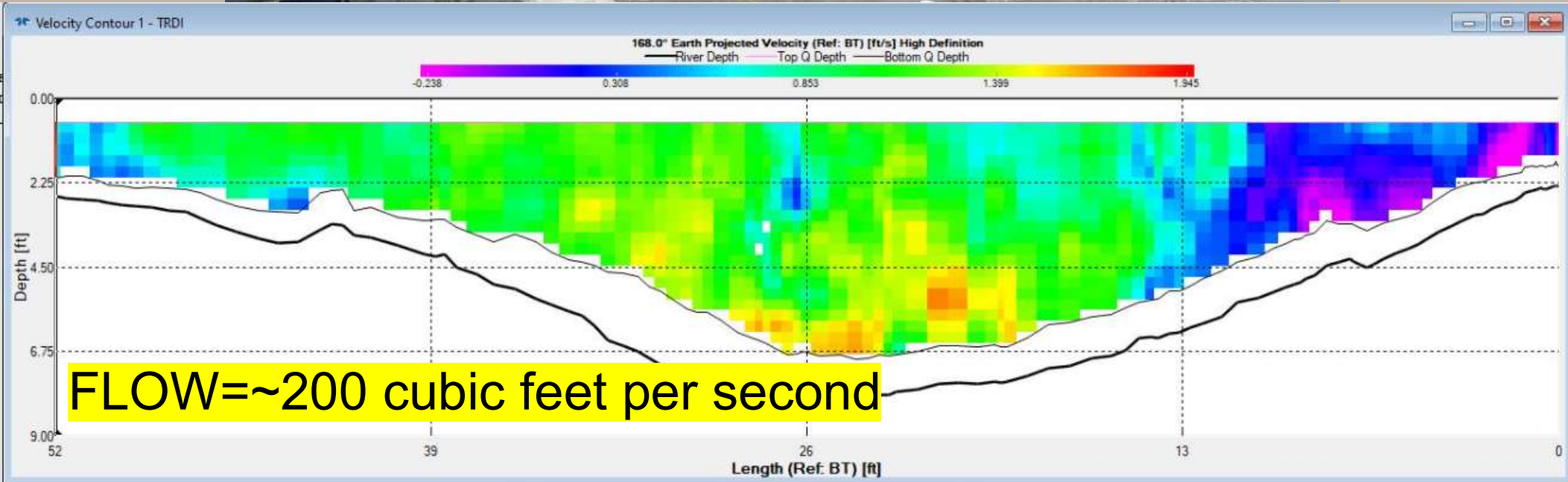


What is being measured?

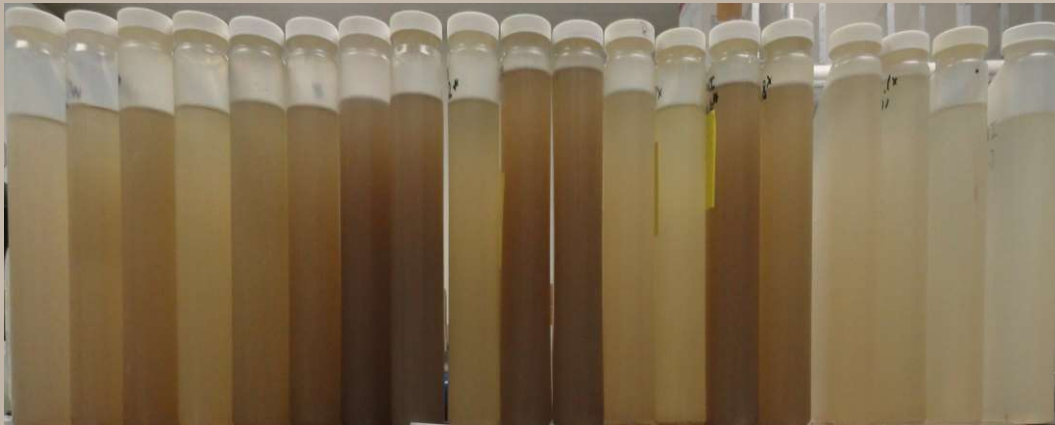
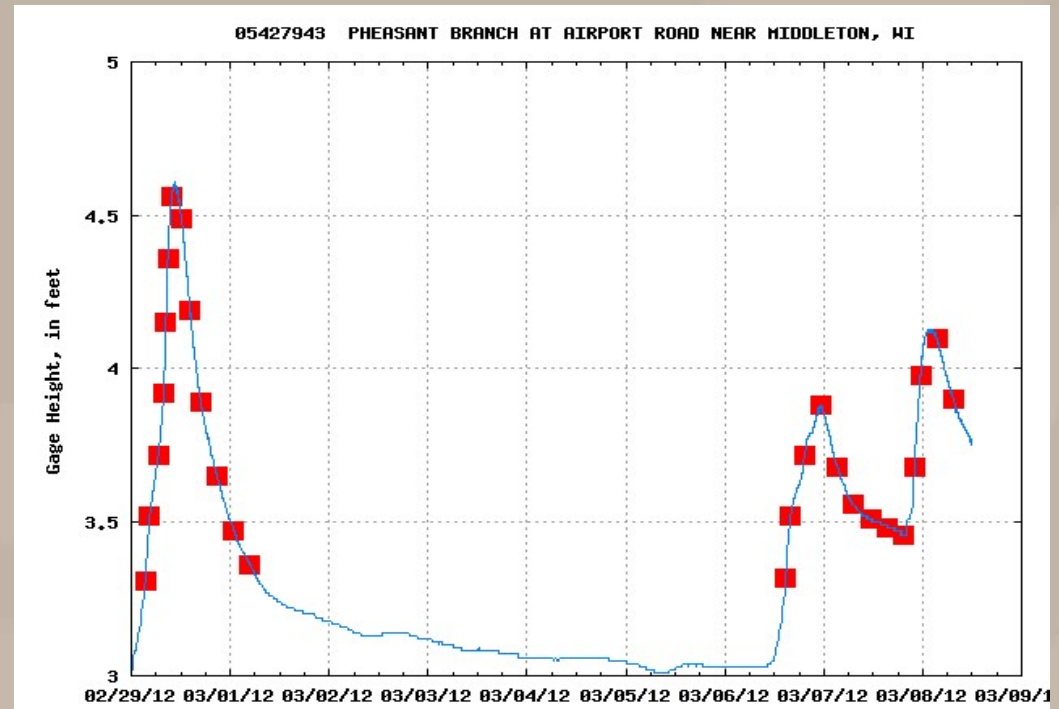
- Water level and/or streamflow
- Periodic water sample concentrations
 - Total Phosphorus (TP)
 - Dissolved Phosphorus
 - Suspended Sediment or Suspended Solids
 - Nitrogen (Ammonia, Nitrate, TKN)
 - Chloride



Streamflow



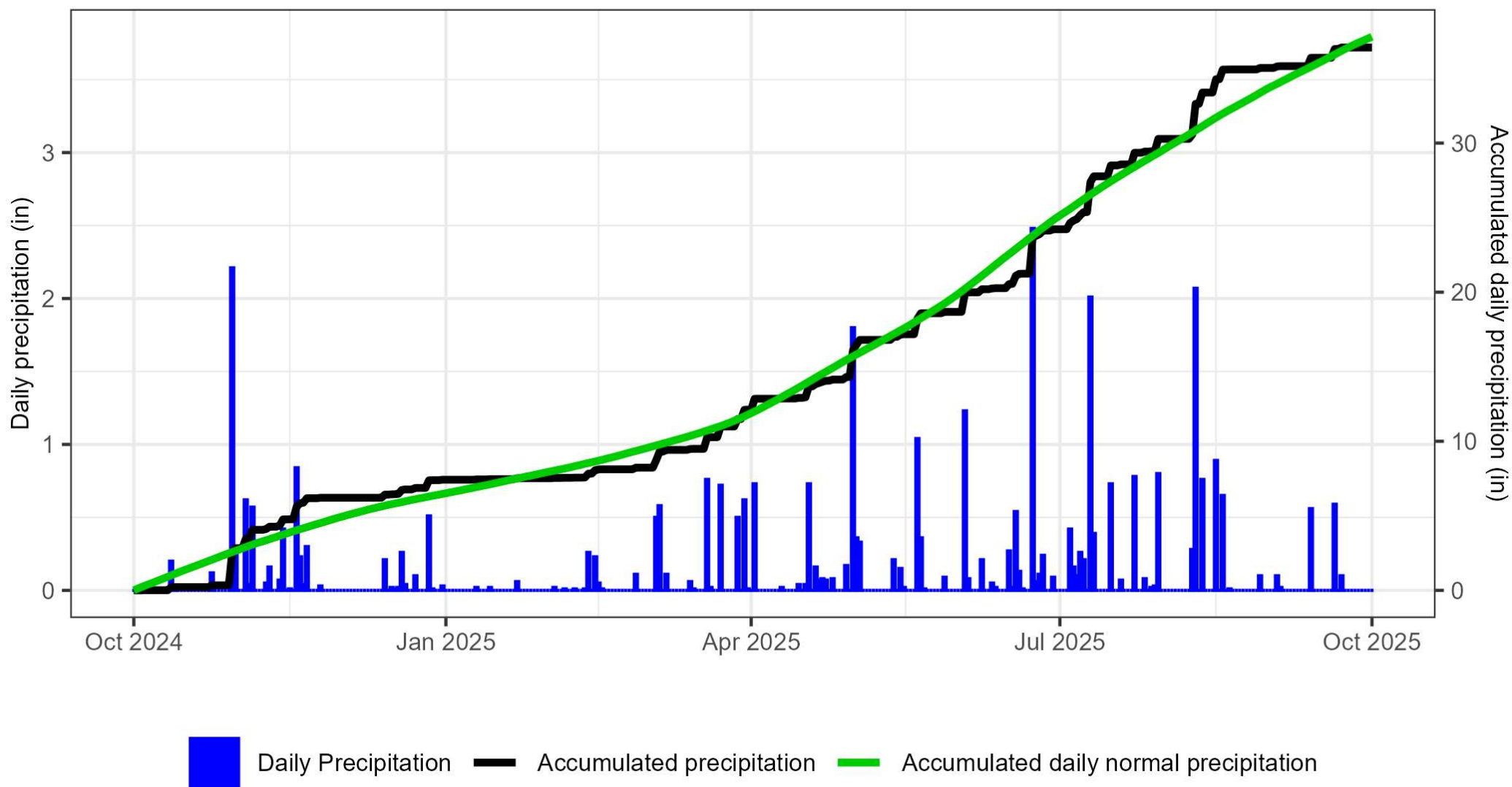
Water-quality sampling



Selected samples
sent to lab(s) for
analysis

WY2025 Precipitation

Madison, Wisconsin, Precipitation (WY 2025)

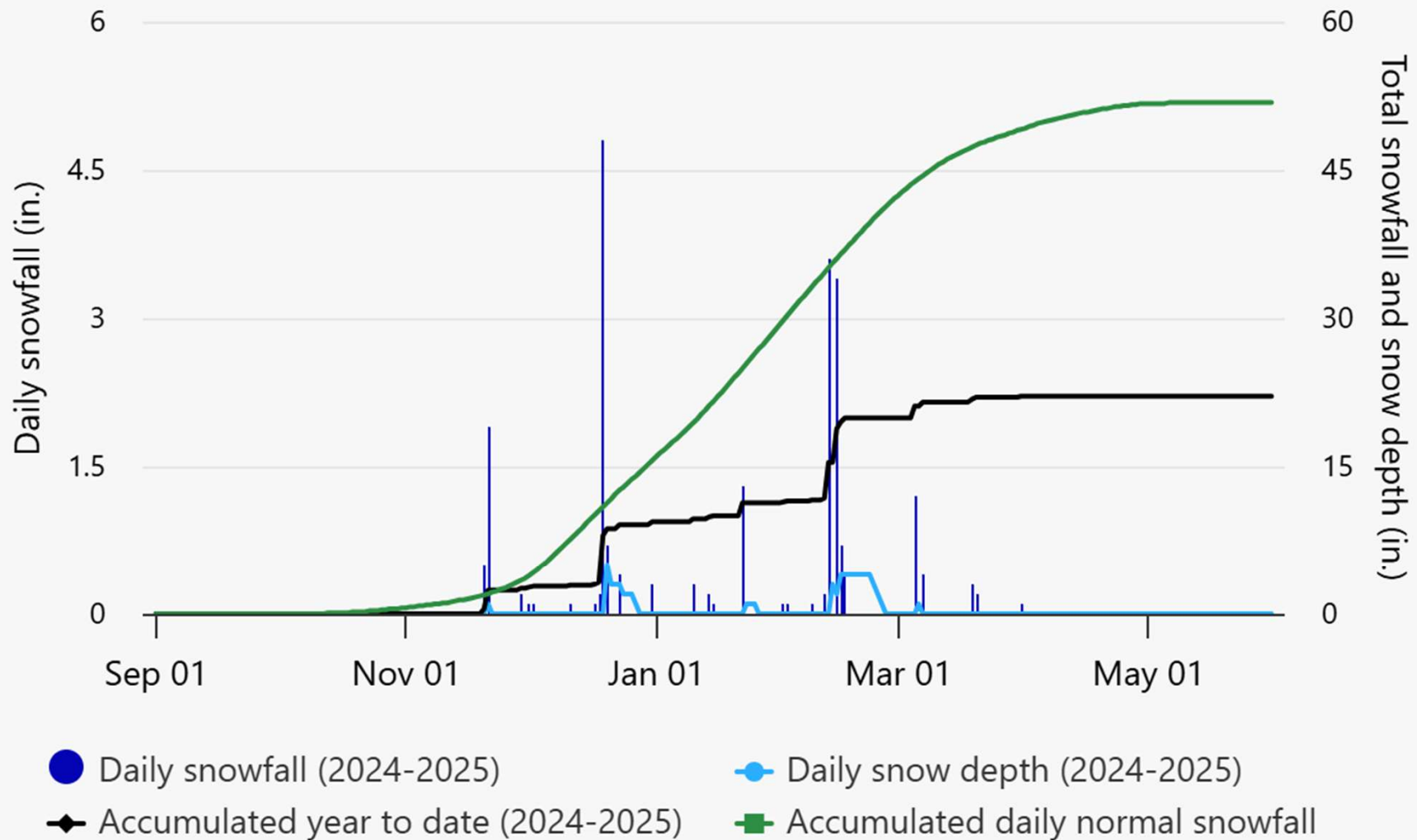


Data from Dane County Regional Airport

- 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)

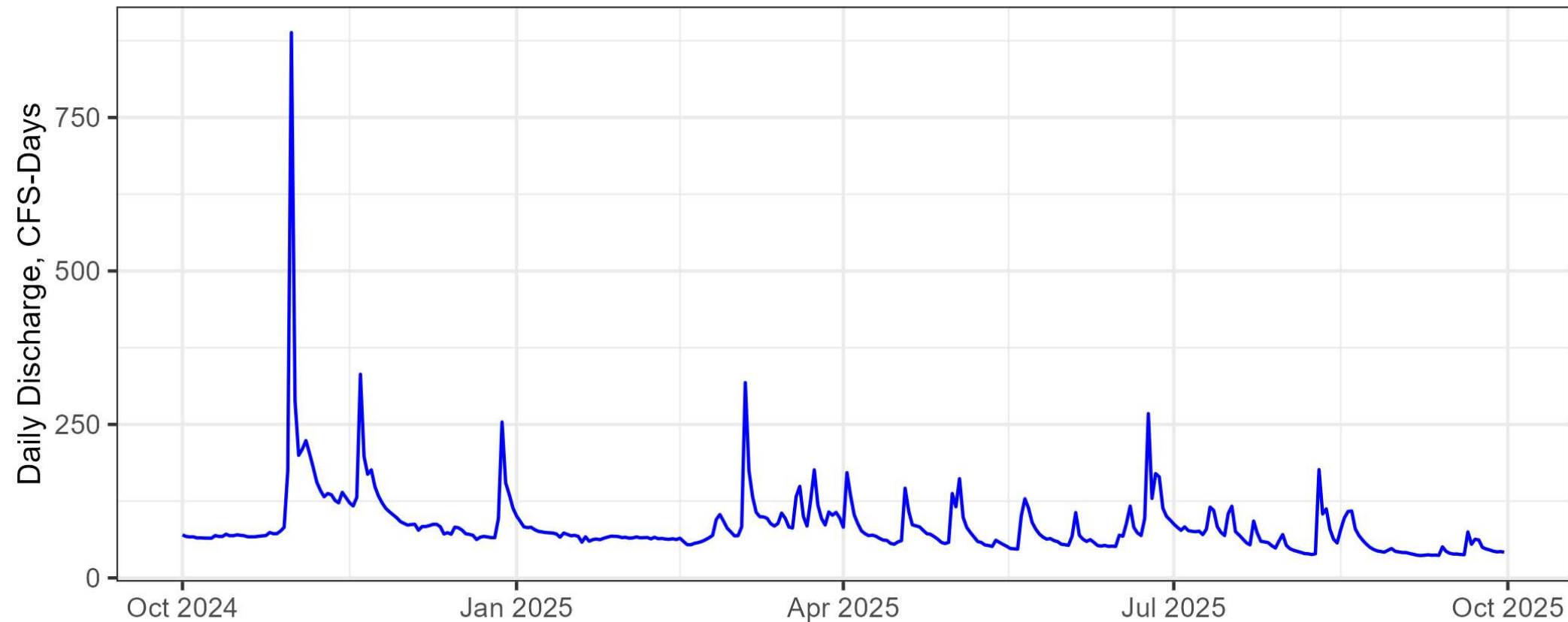


Data from Dane County Regional Airport

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

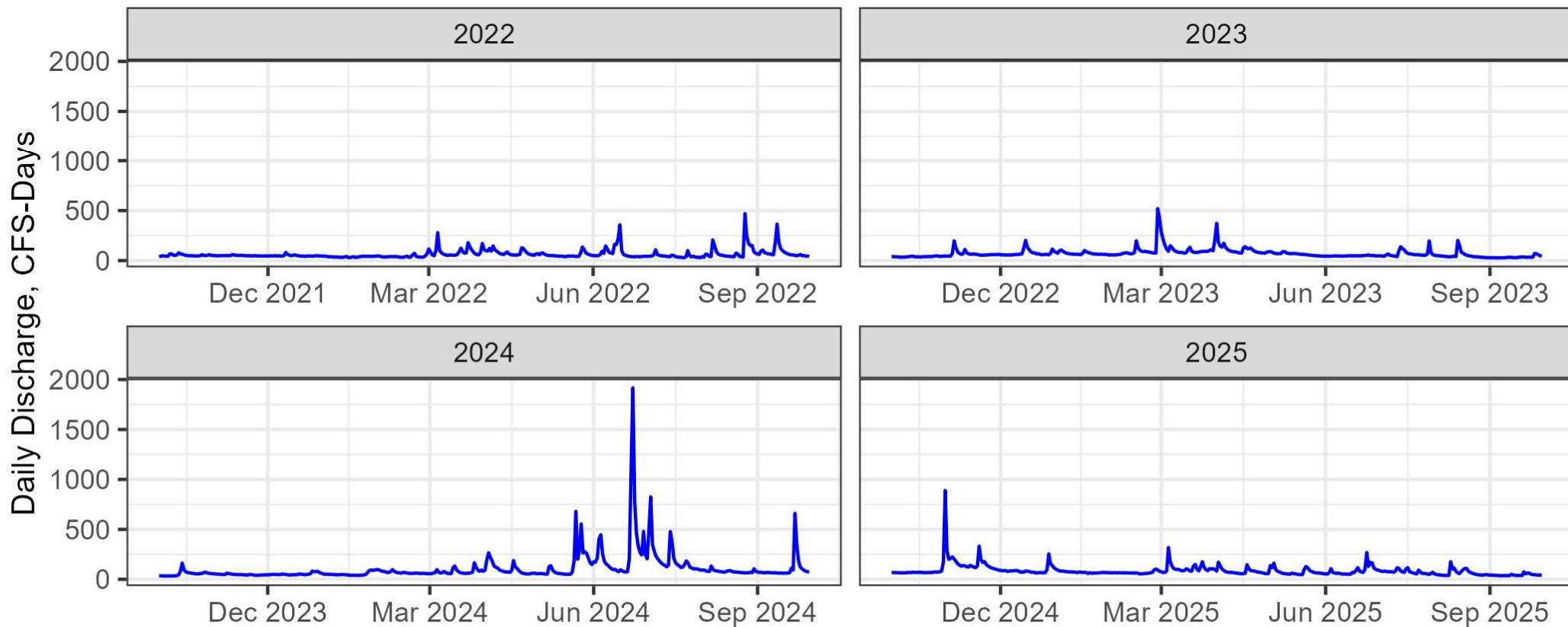
Streamflow Water Year 2025

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



Last 4 Years

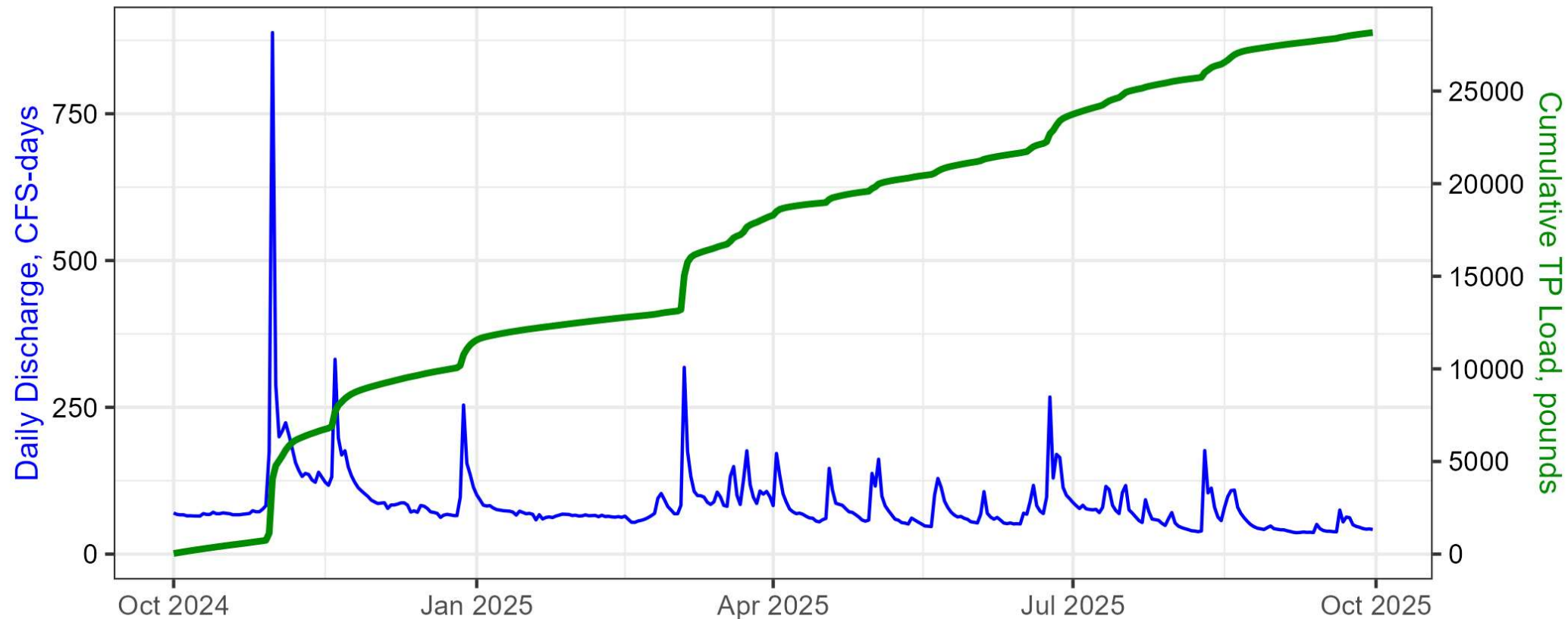
Lake Mendota Tributary Discharge Dorn, Sixmile*, P.Branch, Yahara @ Windsor



2025 P loads to Lake Mendota

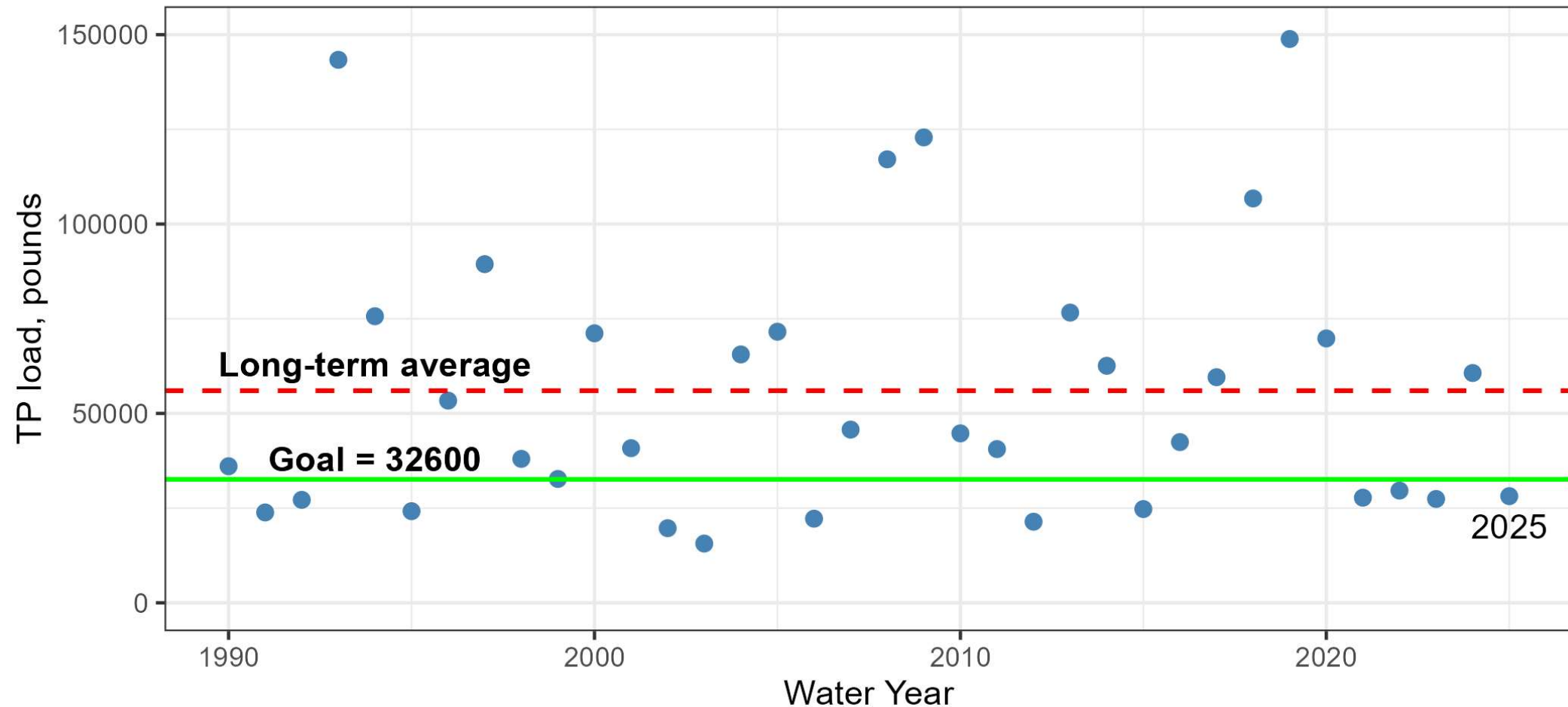
Lake Mendota Tributary Discharge and TP Load

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



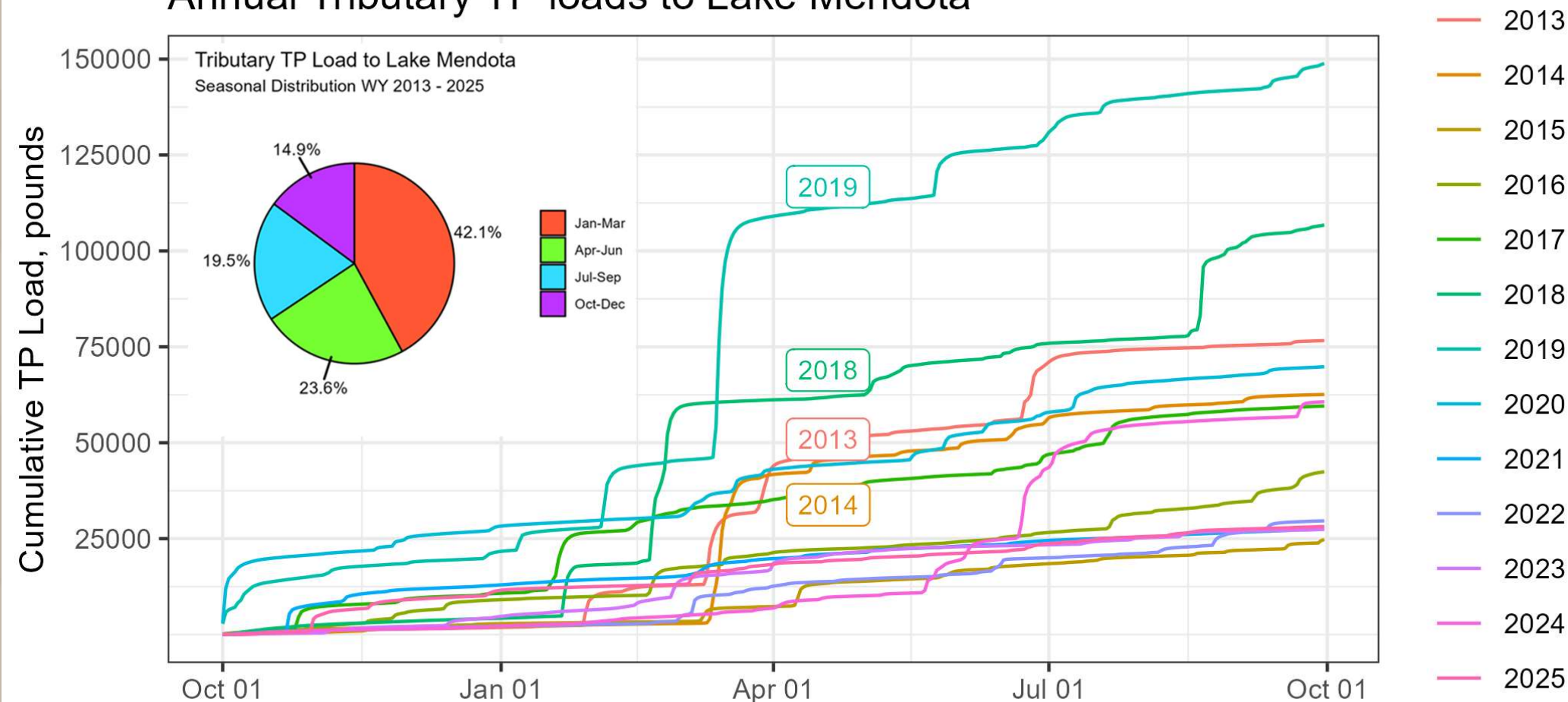
What amount of TP loading is desirable?

Estimated Tributary TP Loading to Lake Mendota



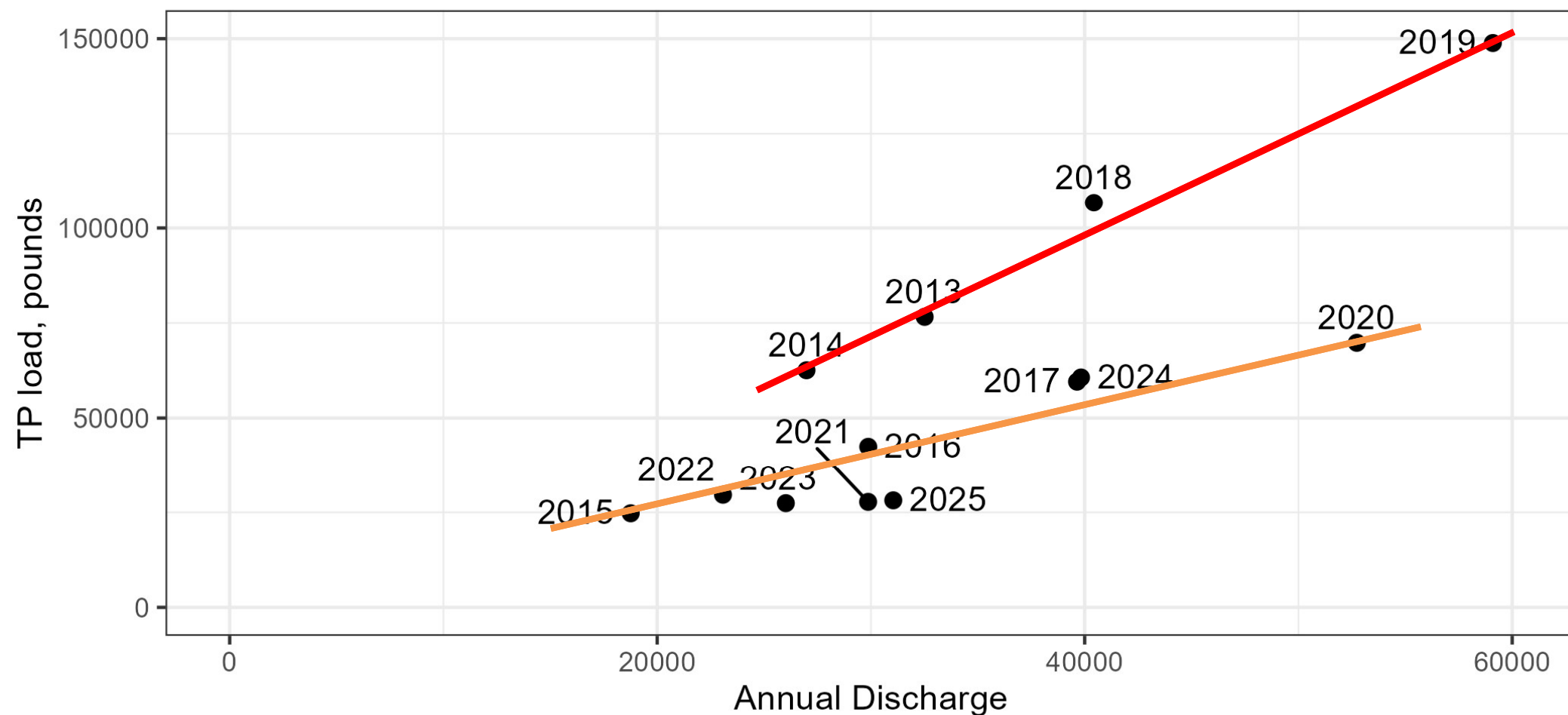
Historical P Loading (2013-present)

Annual Tributary TP loads to Lake Mendota



Observations of TP in Winter Runoff (Snowmelt)

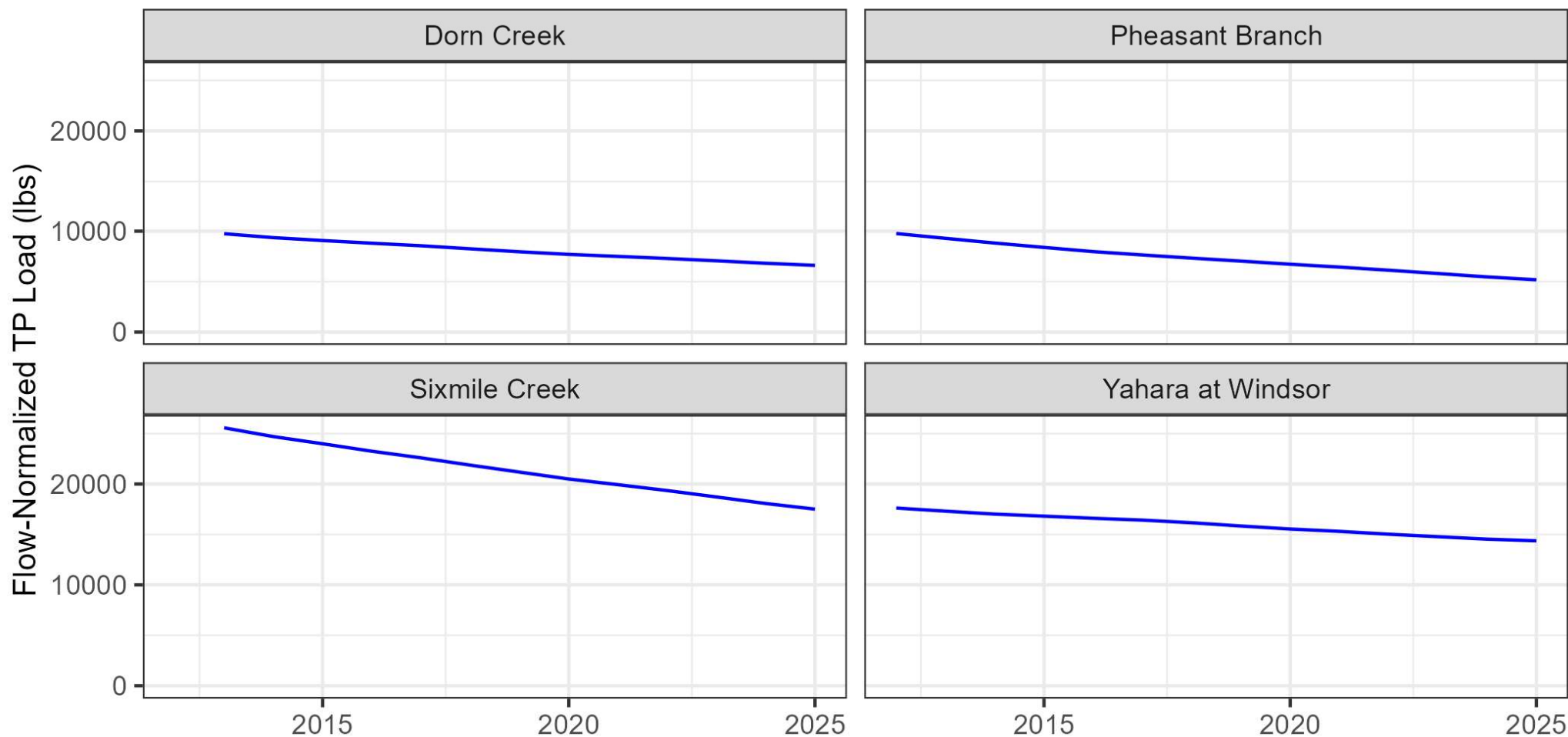
Relation between Discharge and TP load



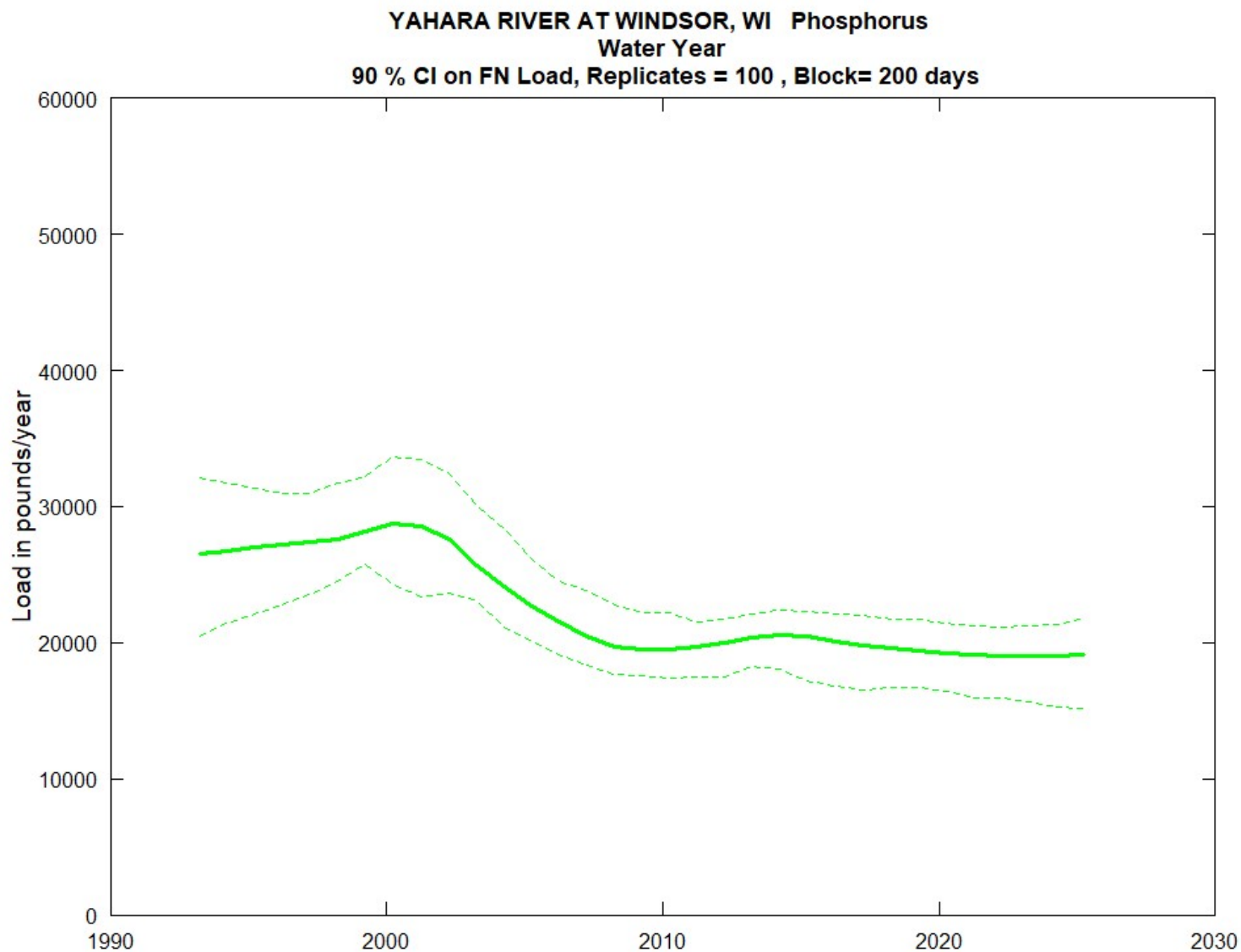
- This demonstrates that there is a higher TP concentration per unit runoff during snowmelt
- Potential to significantly lower annual P loading if snowmelt P concentrations are reduced

Flow-Normalized P loads

Flow-Normalized Tributary Phosphorus Load
WY 2012-2025

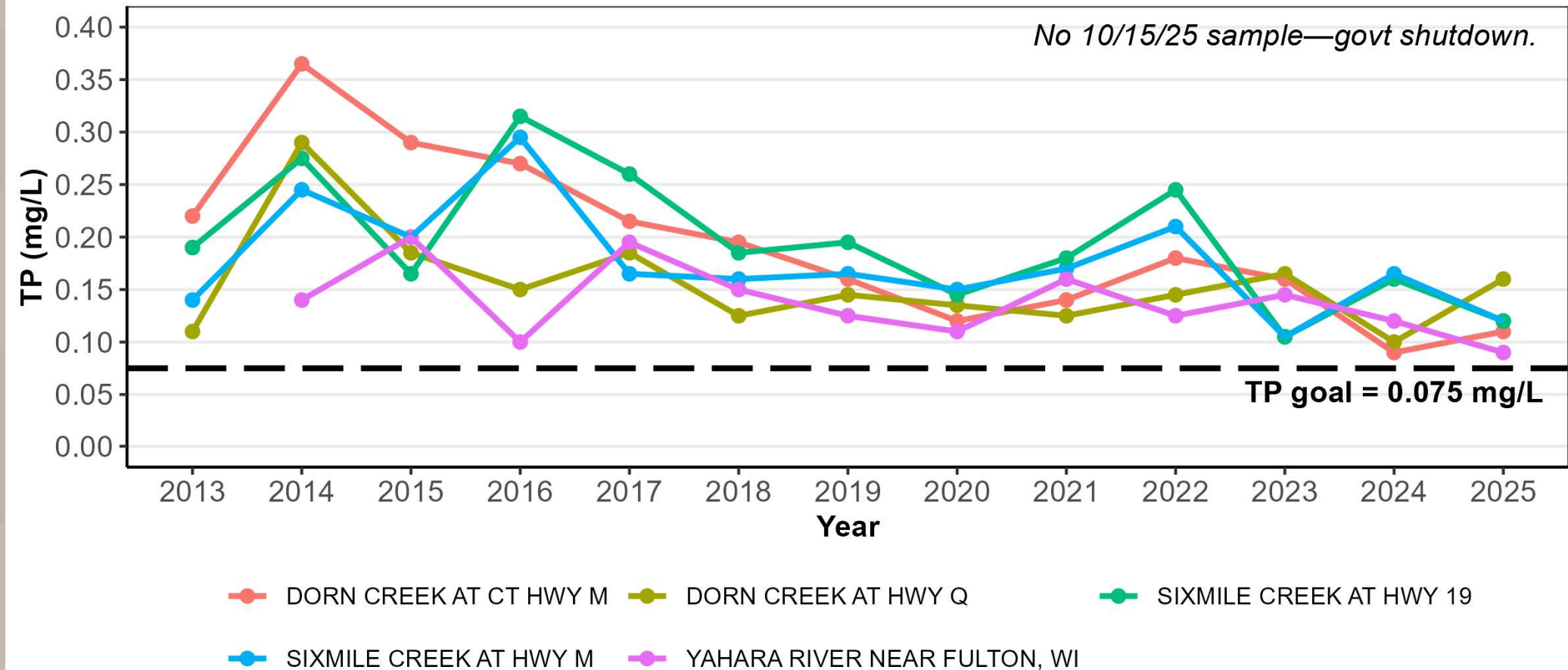


Flow-Normalized P loads: long-term

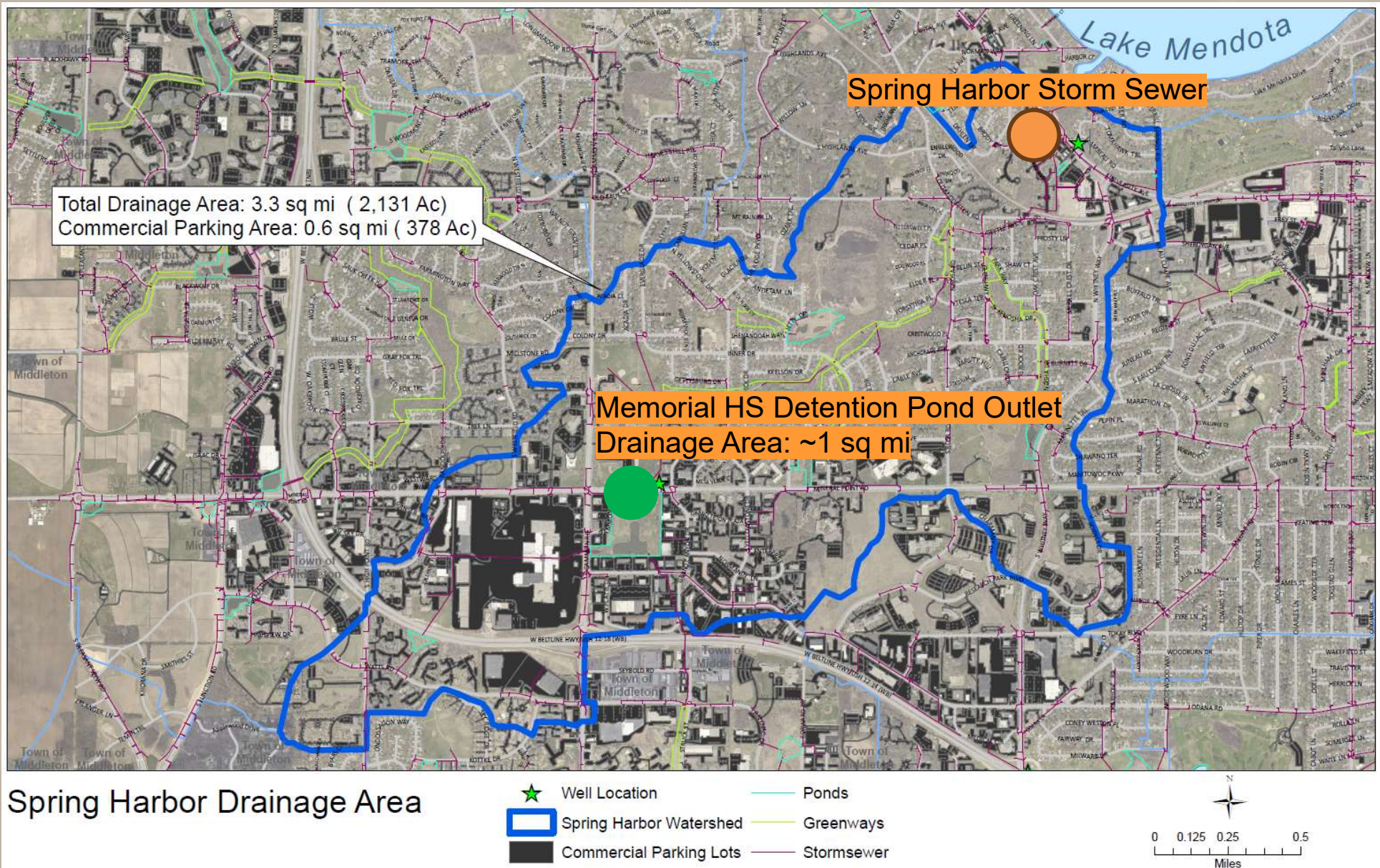


15th of the Month Growing Season TP Concentrations

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



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

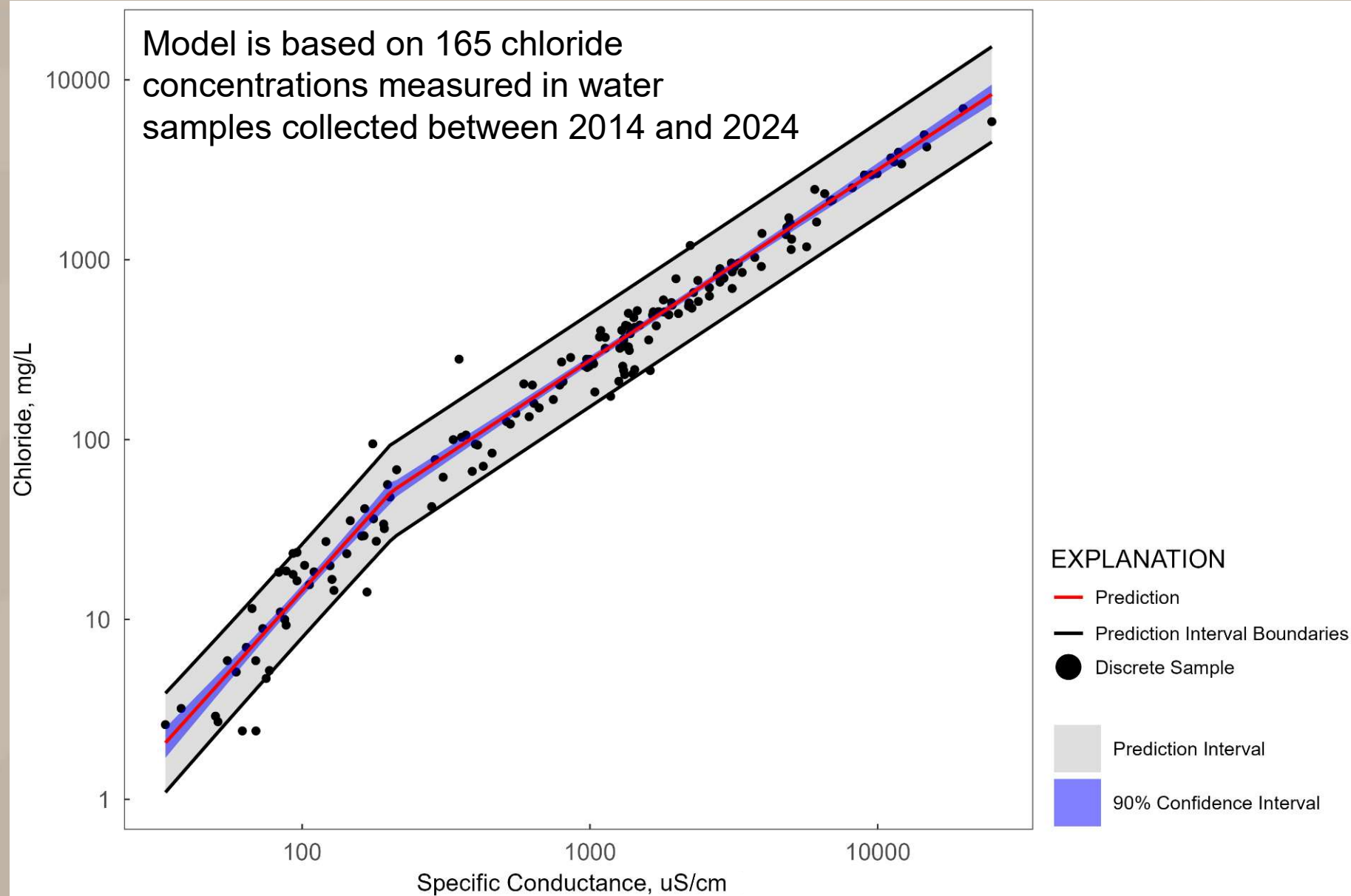
06-24-2020 Wed 18:09:58
USGS 05427965 SPRING HARBOR
DOWNSTREAM

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.

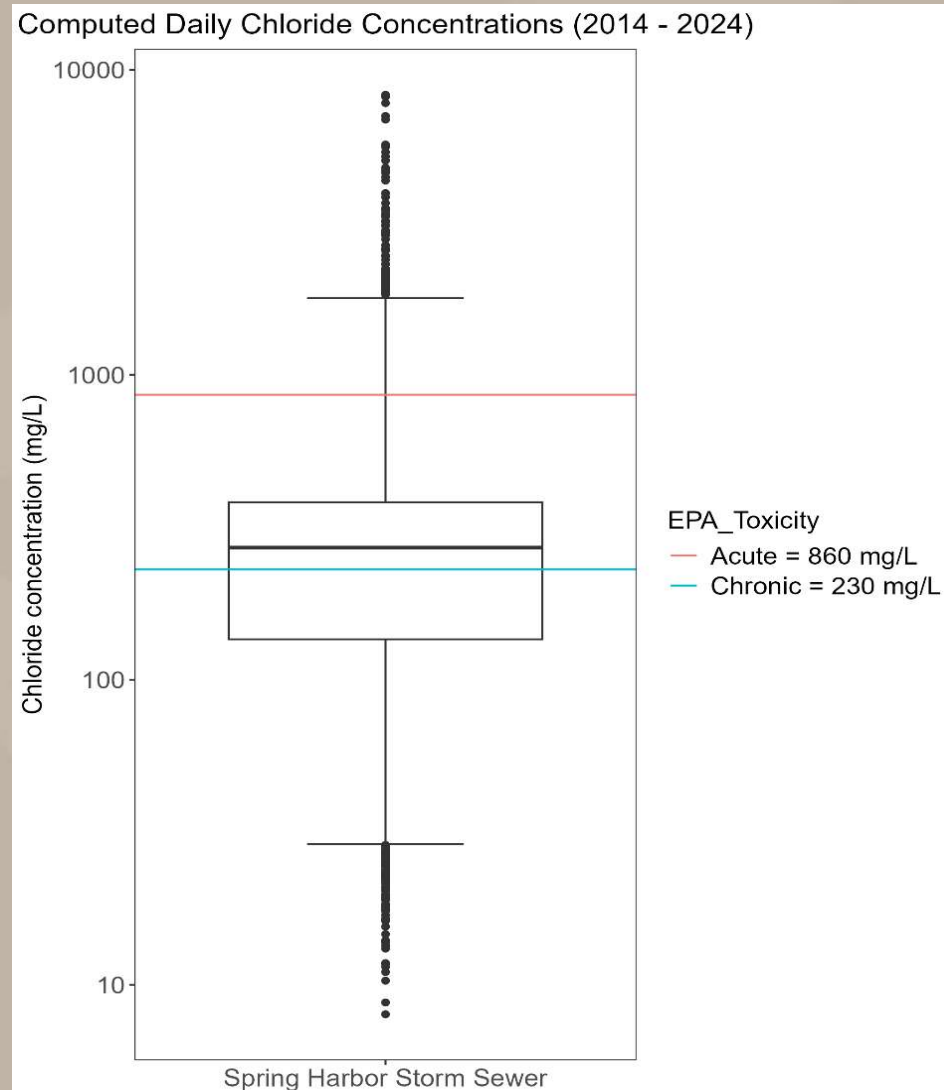
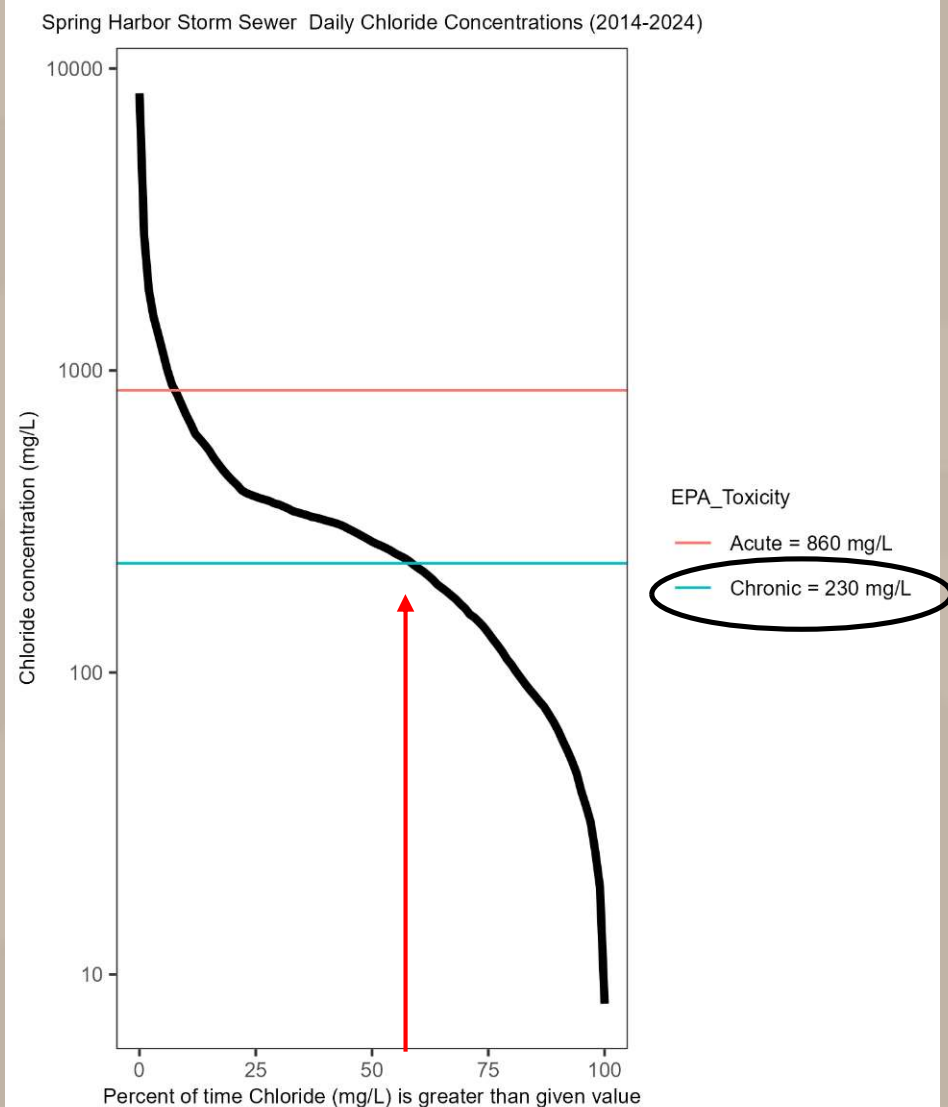
Spring Harbor Storm Sewer: Relationship between conductivity and chloride



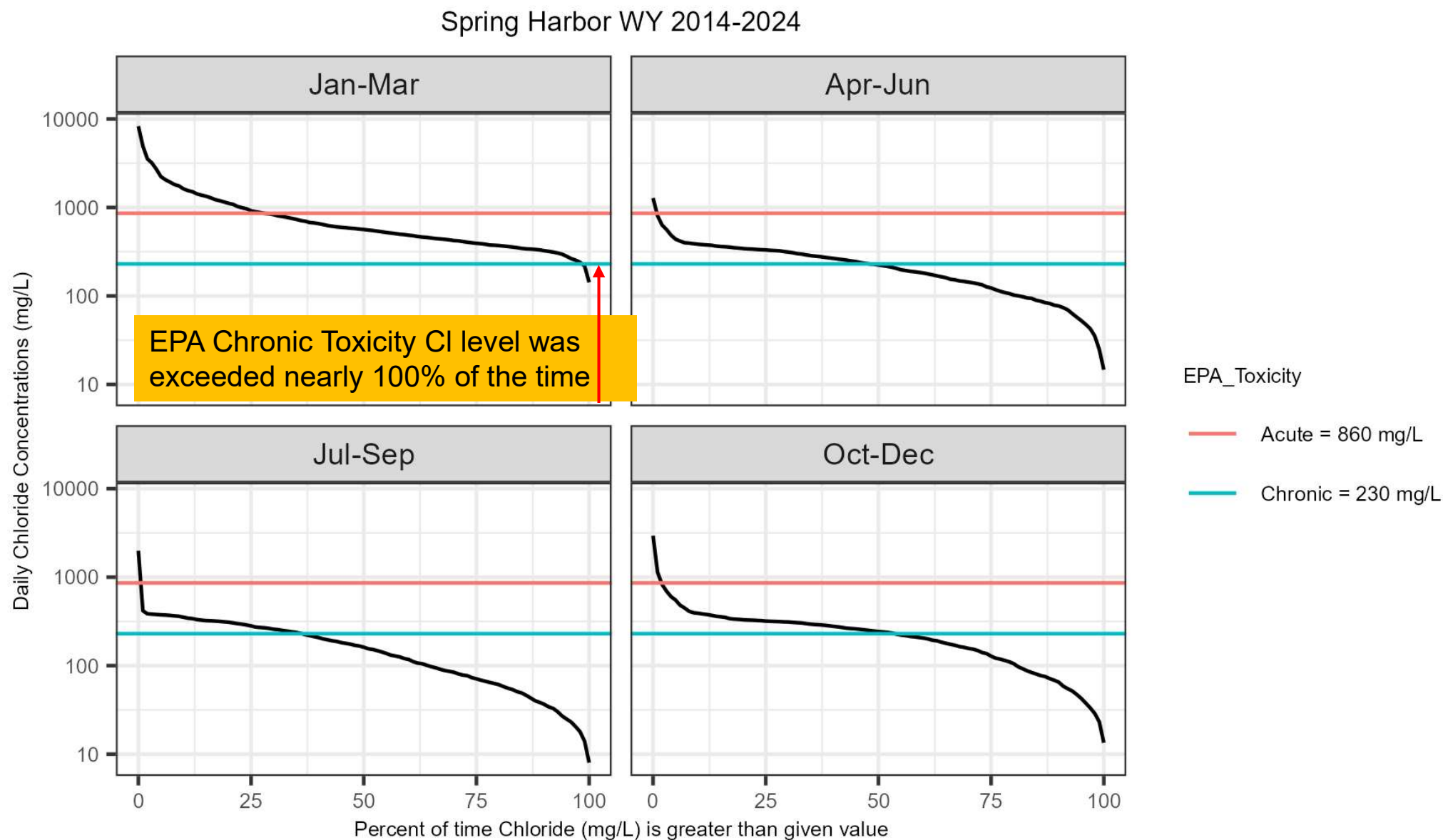
Exceedance probabilities (2014-2024)

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

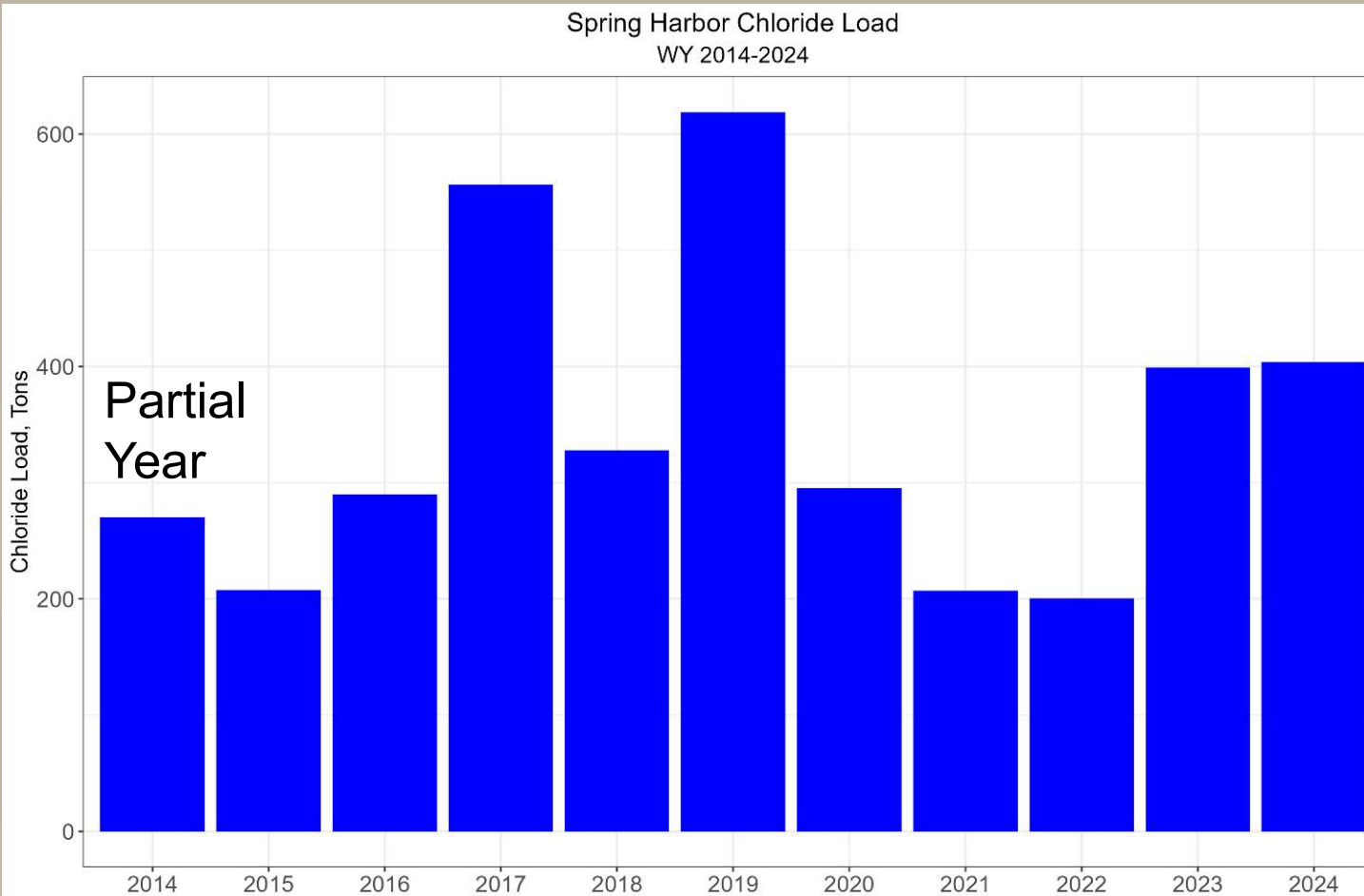
Median Cl concentration of 271 mg/L exceeds the EPA Chronic Toxicity level



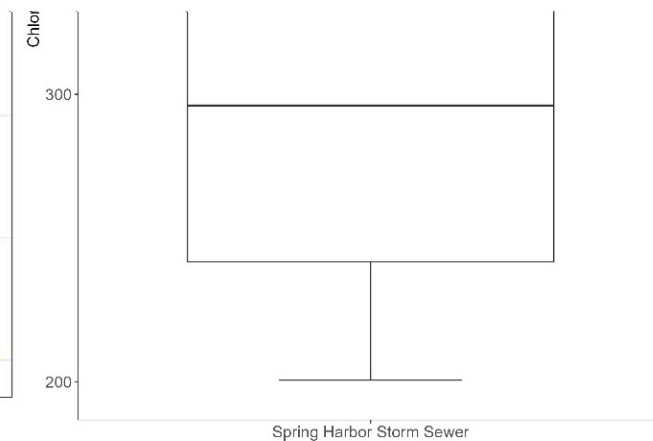
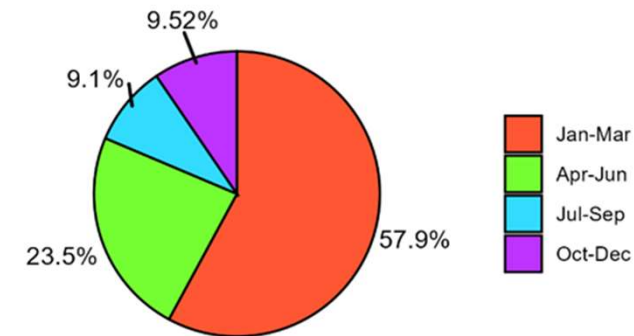
Exceedance probabilities – seasonal (2014-2024)



Spring Harbor chloride loads



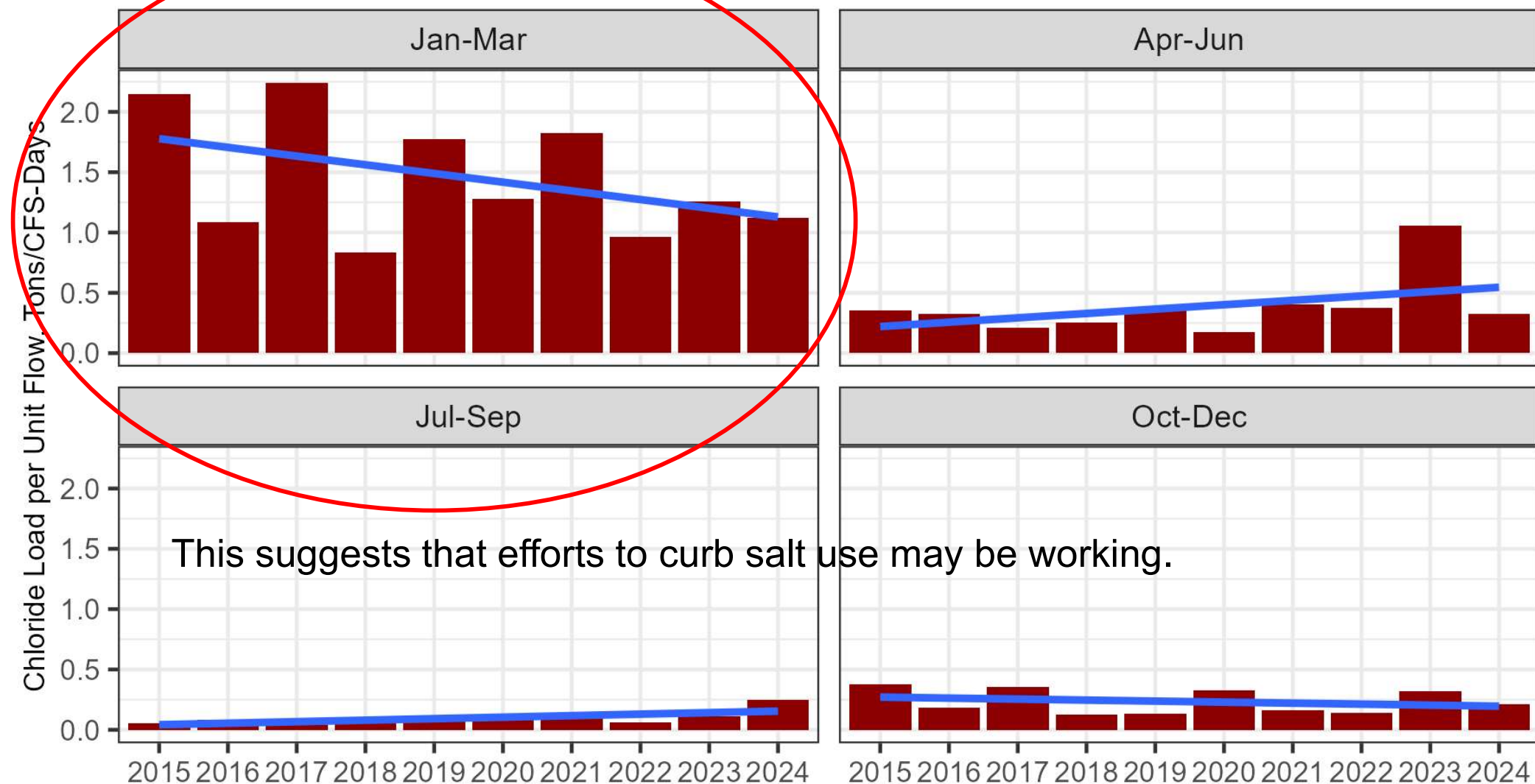
Percent of Annual Chloride Load
WY 2015-2024



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)

Flow-normalized chloride loads

Chloride Load per Unit Flow WY 2015-2024





Questions?