Yahara River Watershed
USGS Water-Quality Monitoring Update
Dec 19, 2023

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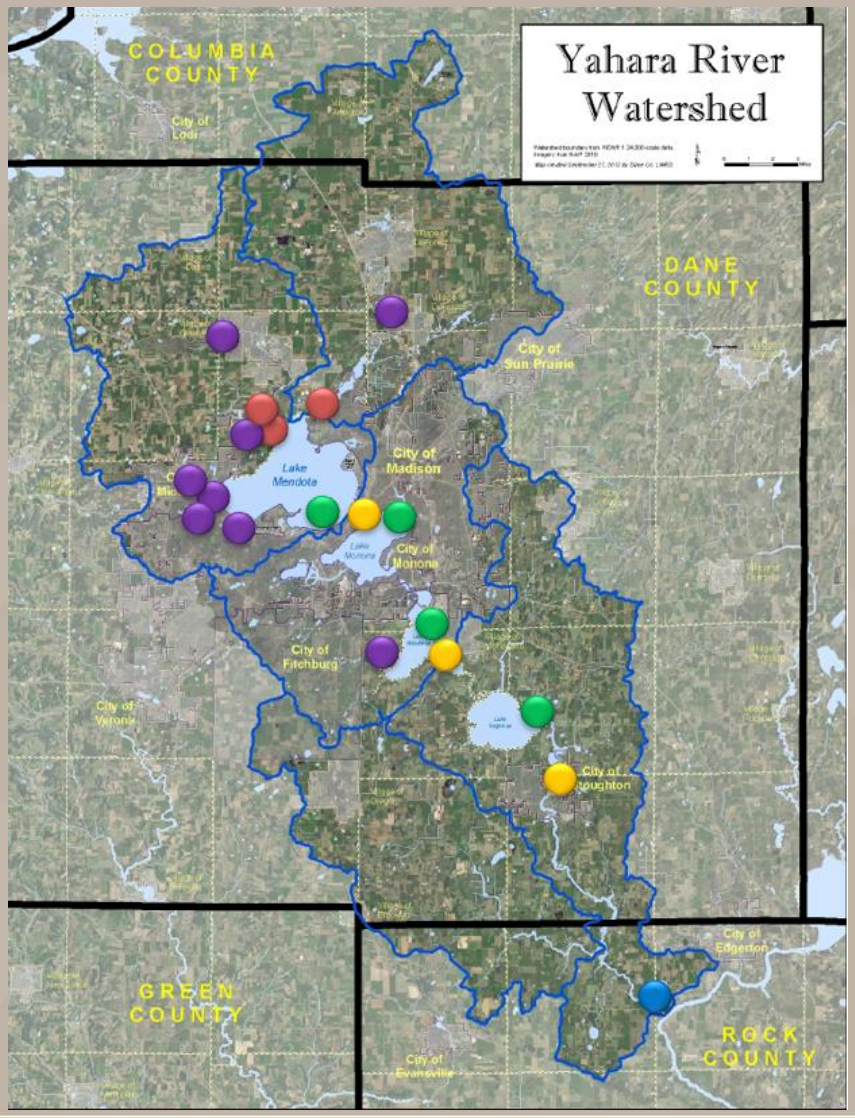
Robert Rosner

U.S. Geological Survey

USGS “Dane County Monitoring” Project



2023 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)

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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

madison.com

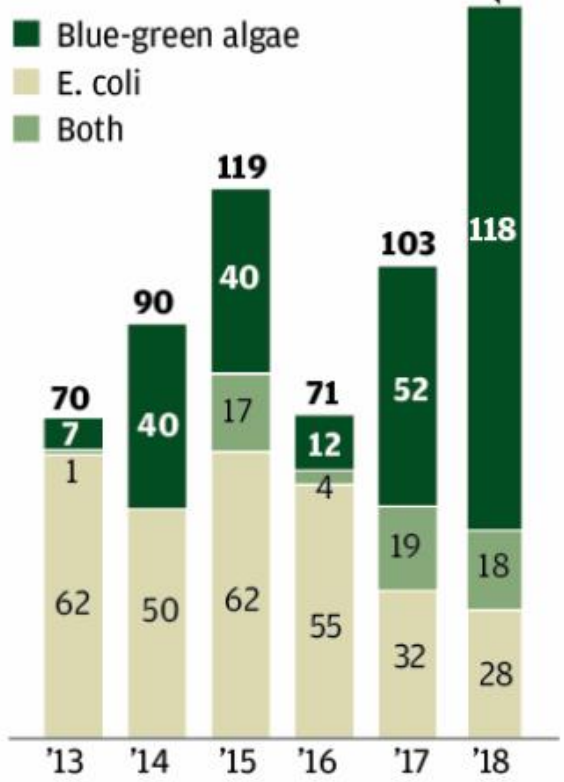
Update: At least 5 Madison-area beaches closed due to blue-green algae | Local News | madison.com

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



SOURCE: Public Health Madison & Dane County

State Journal

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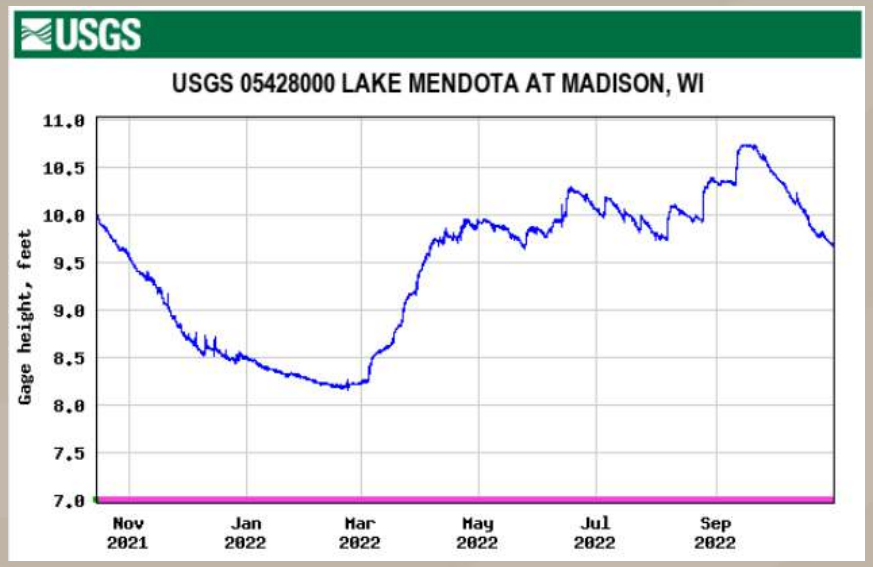
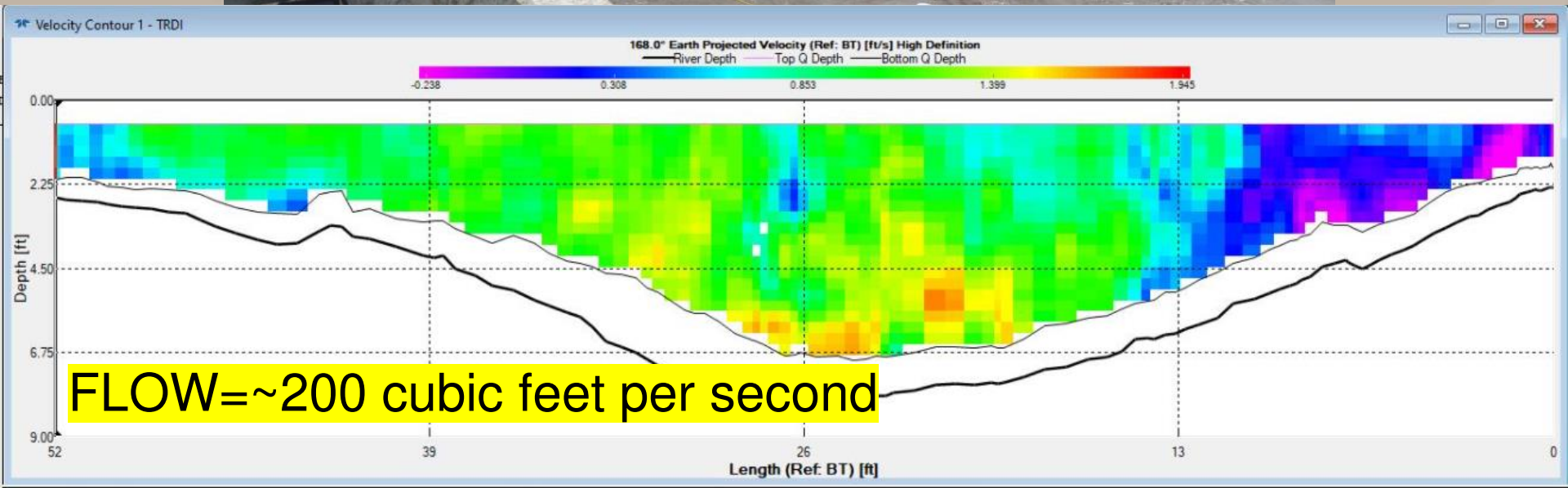
What is being measured?

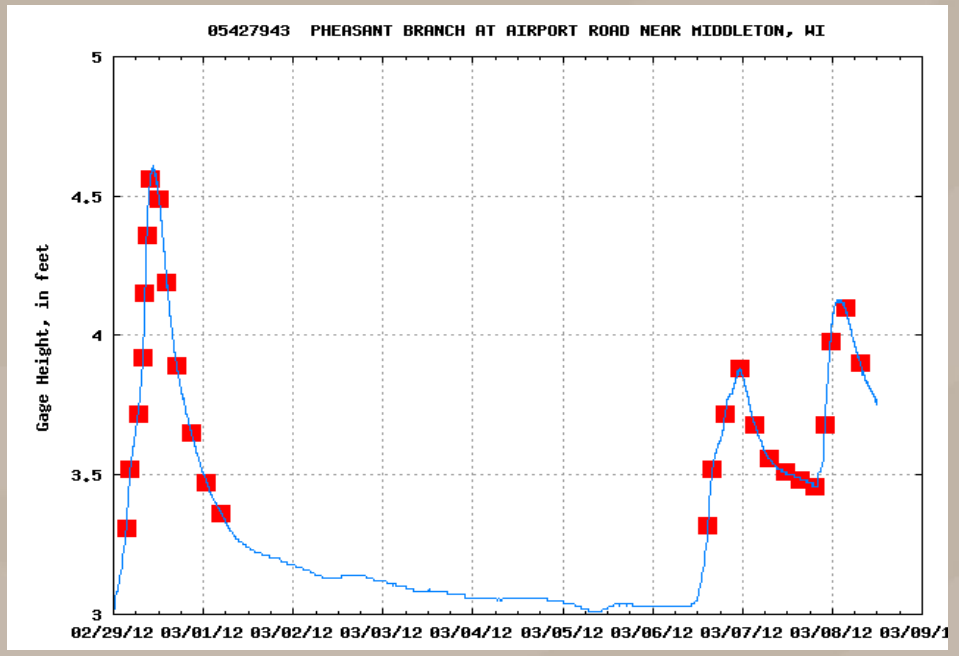
- Water level and/or streamflow
- Periodic water sample concentrations
  - Total Phosphorus
  - Dissolved Phosphorus
  - Suspended Sediment or Suspended Solids
  - Nitrogen (Ammonia, Nitrate, TKN)
  - Chloride

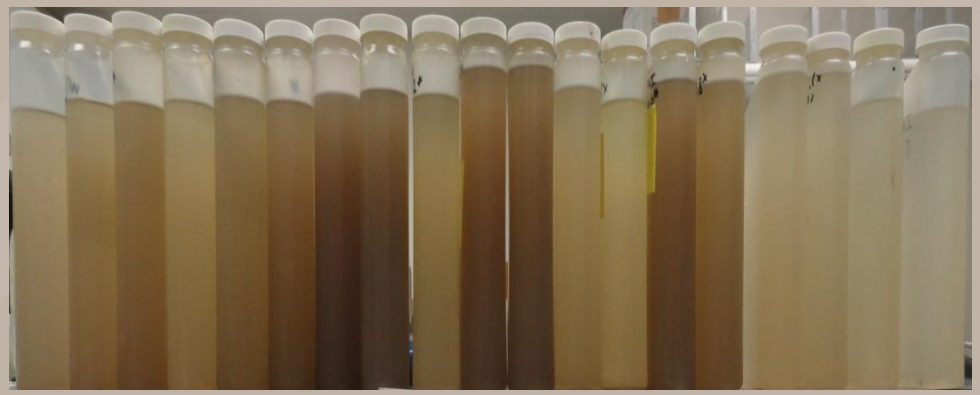


Streamflow


Velocity Contour 1 - TRDI
168.0° Earth Projected Velocity (Ref: BT) [ft/s] High Definition
River Depth
Top Q Depth
Bottom Q Depth
-0.238
0.308
0.853
1.399
1.945
0.00
2.25
4.50
6.75
9.00
Depth [ft]
52
39
26
13
0
Length (Ref: BT) [ft]
FLOW=~200 cubic feet per second

Water-quality sampling





Selected samples sent to lab(s) for analysis

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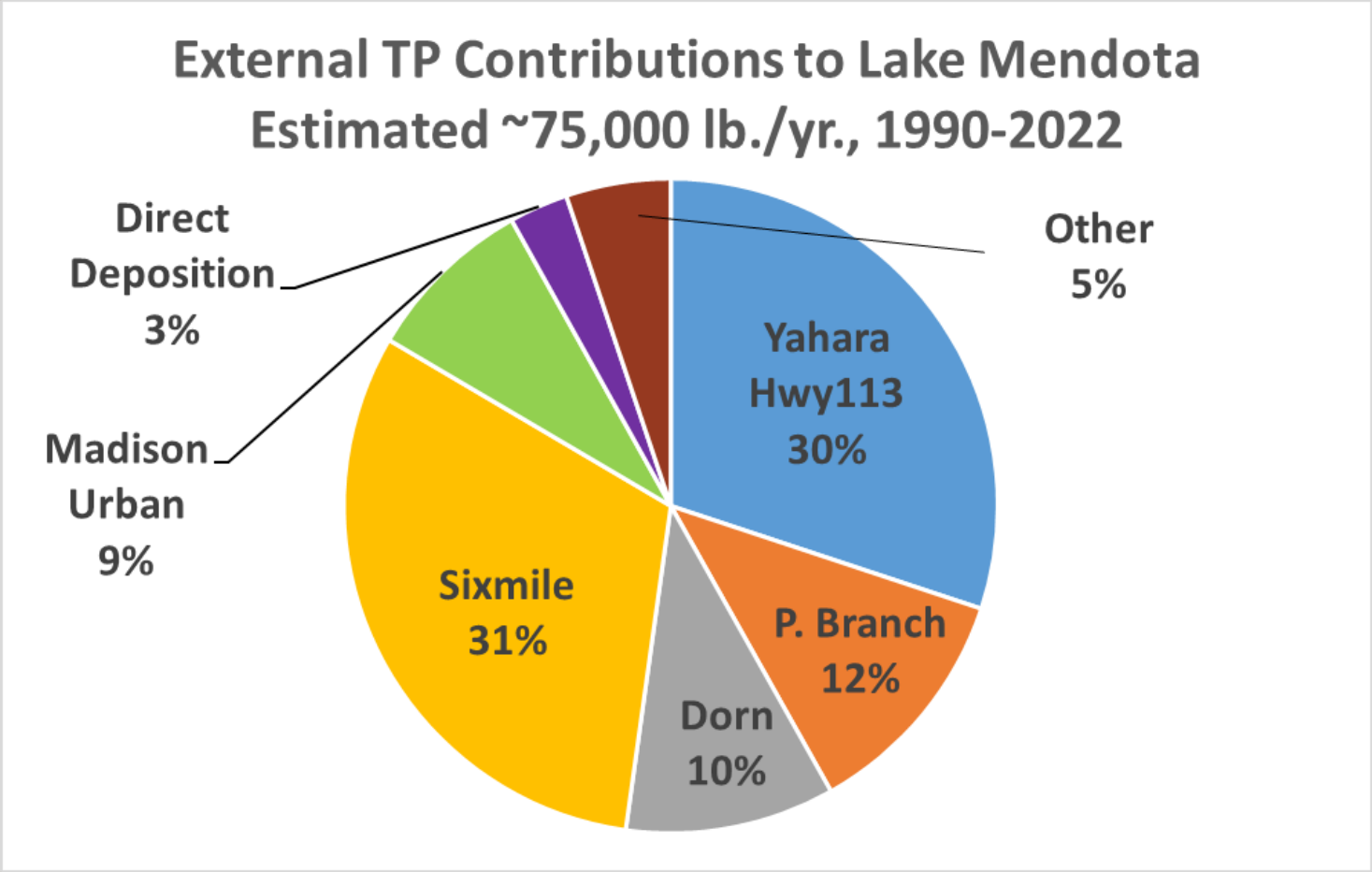
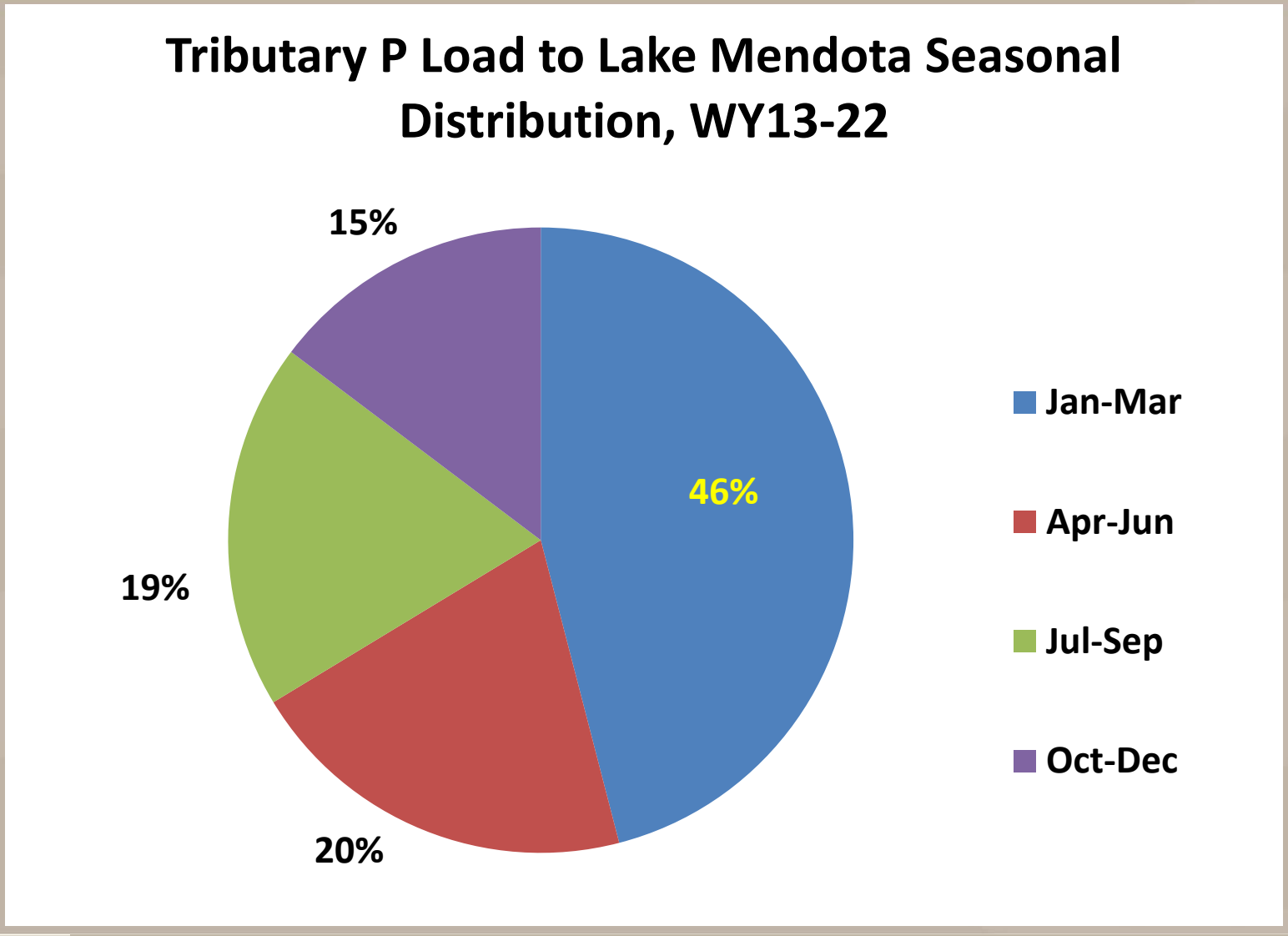
Phosphorus sources



Timing of phosphorus delivery

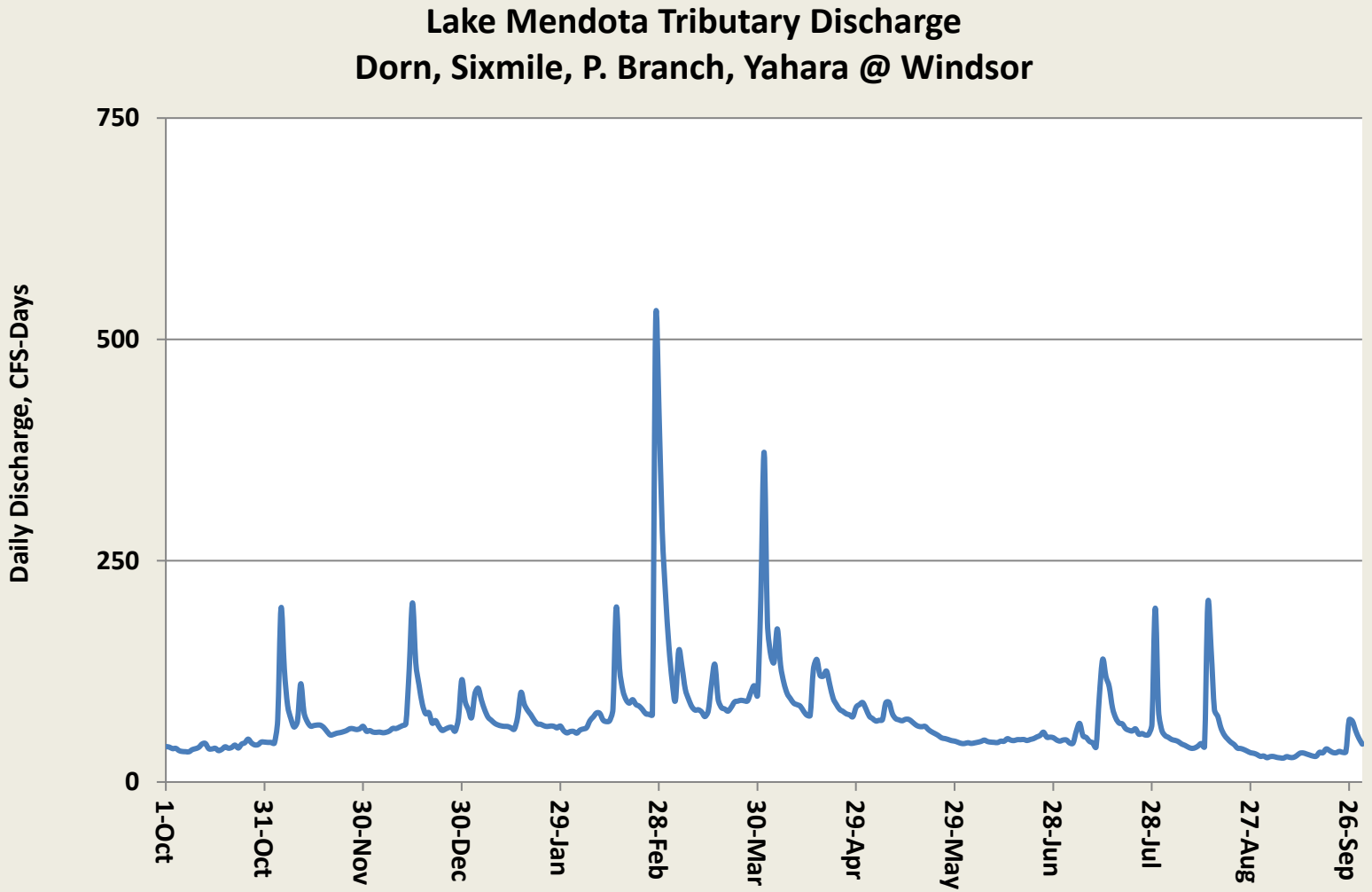


Precipitation characteristics – Water Year 2023

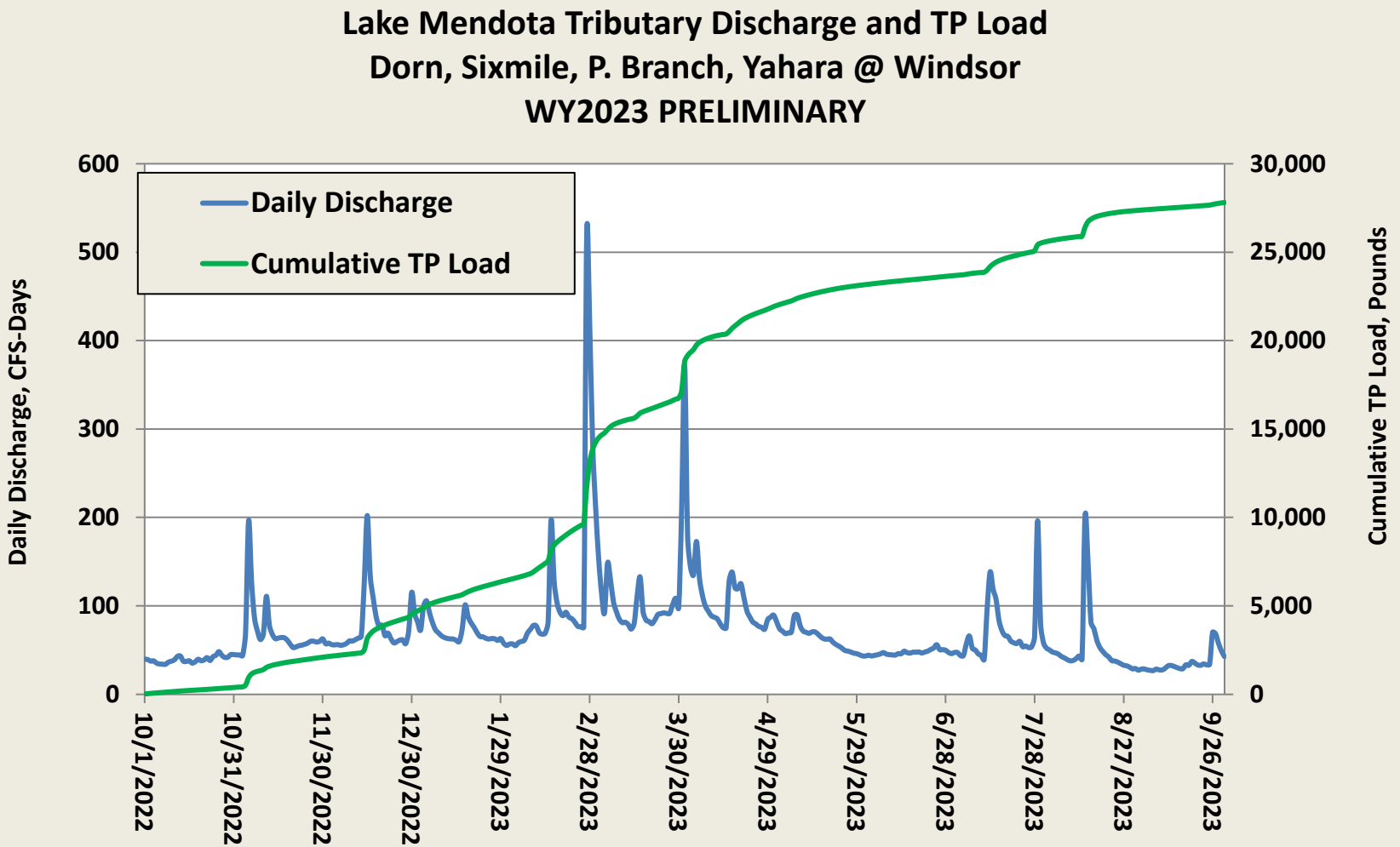
- Rainfall was about 31 in., average is 37 in.
- Drought conditions much of year, especially spring/summer

Snowfall was 72 in., average is 52 in.

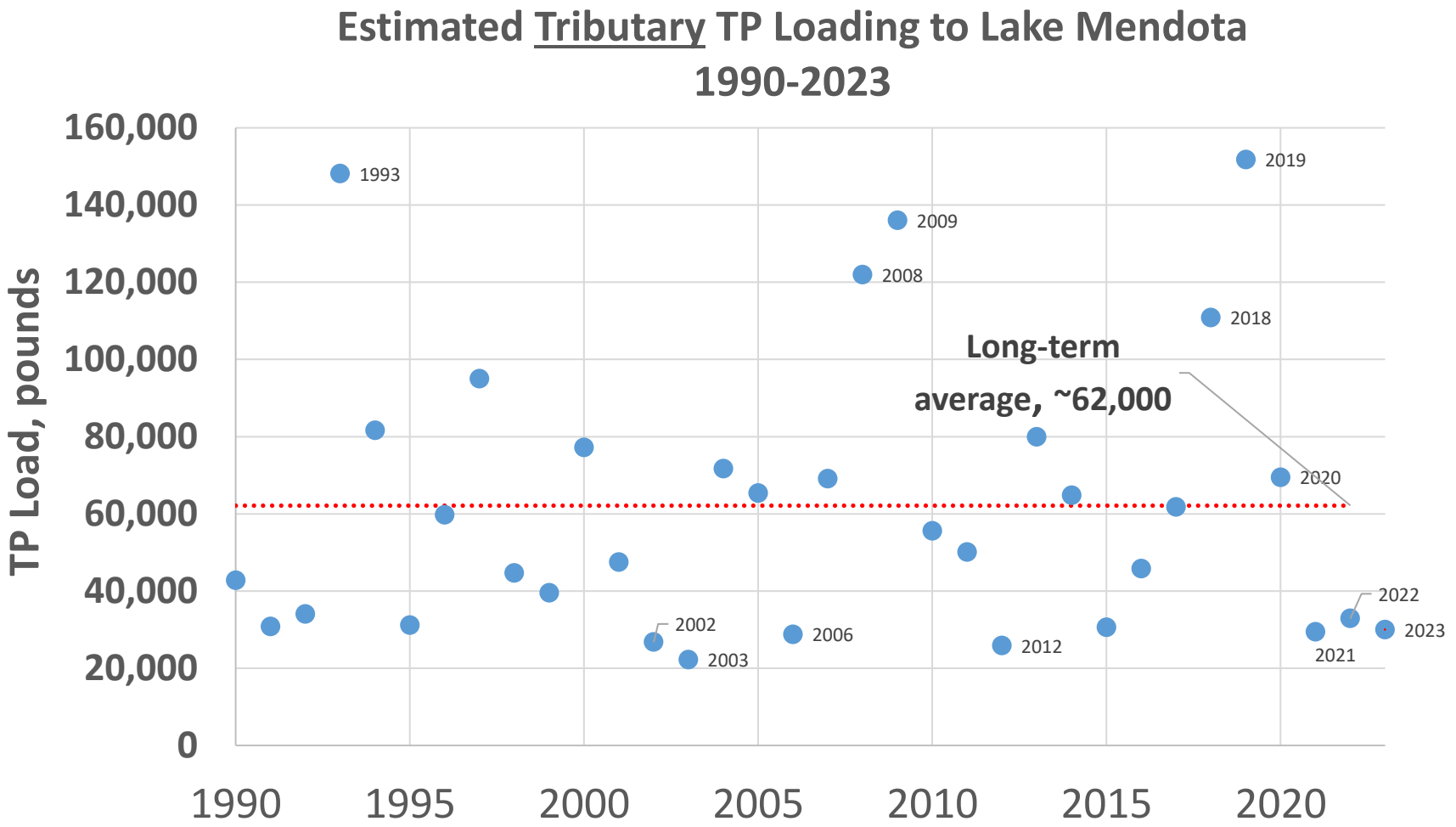
Streamflow Water Year 2023



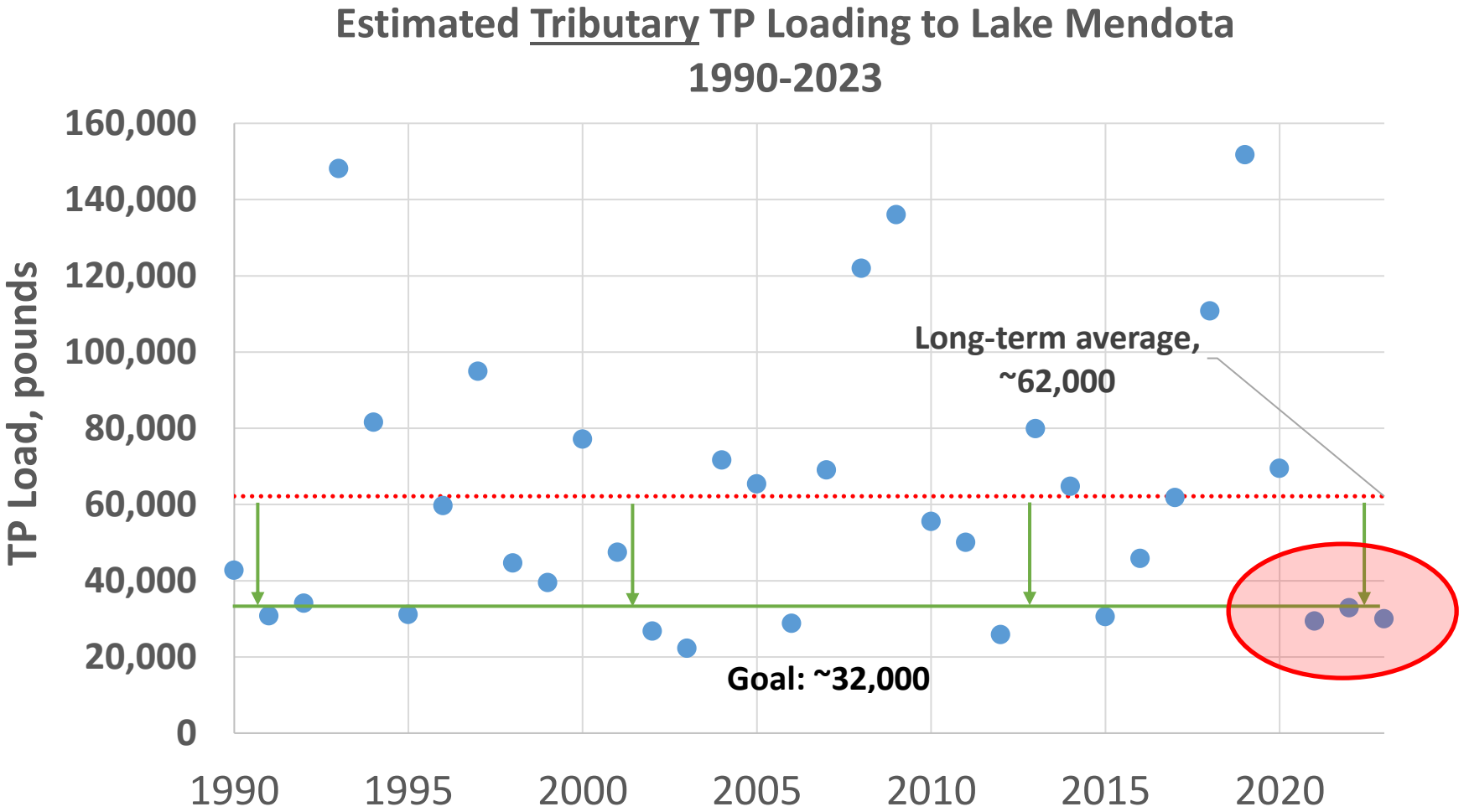
2023 P loads to Lake Mendota



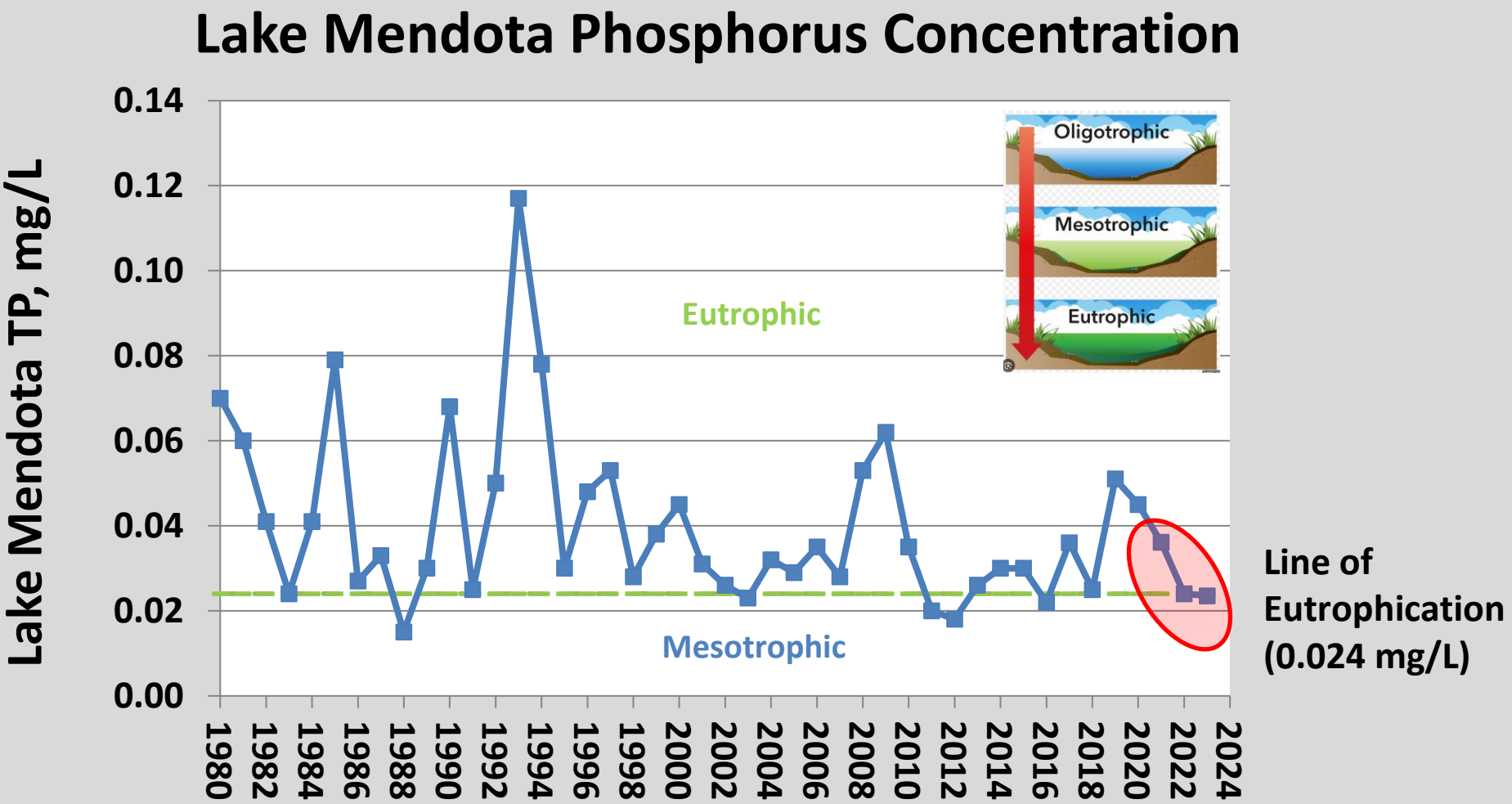
Historical perspective



What amount of TP loading is desirable?



Phosphorus and lake effects



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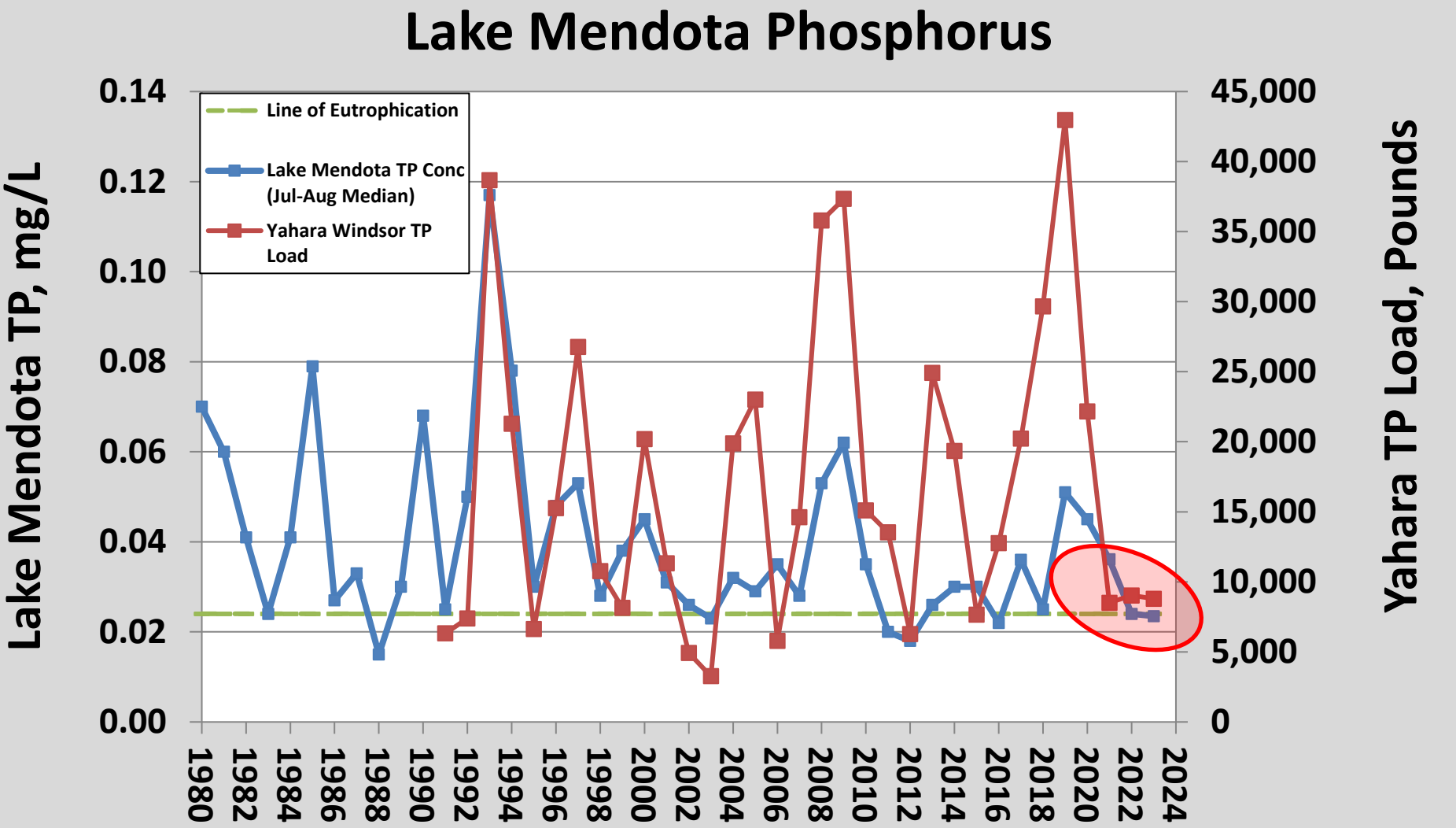
Lake Mendota phosphorus data was collected by UW-Madison Limnology Department and summarized for this graph by Dick Lathrop.

Linkage between P inputs and lake water quality



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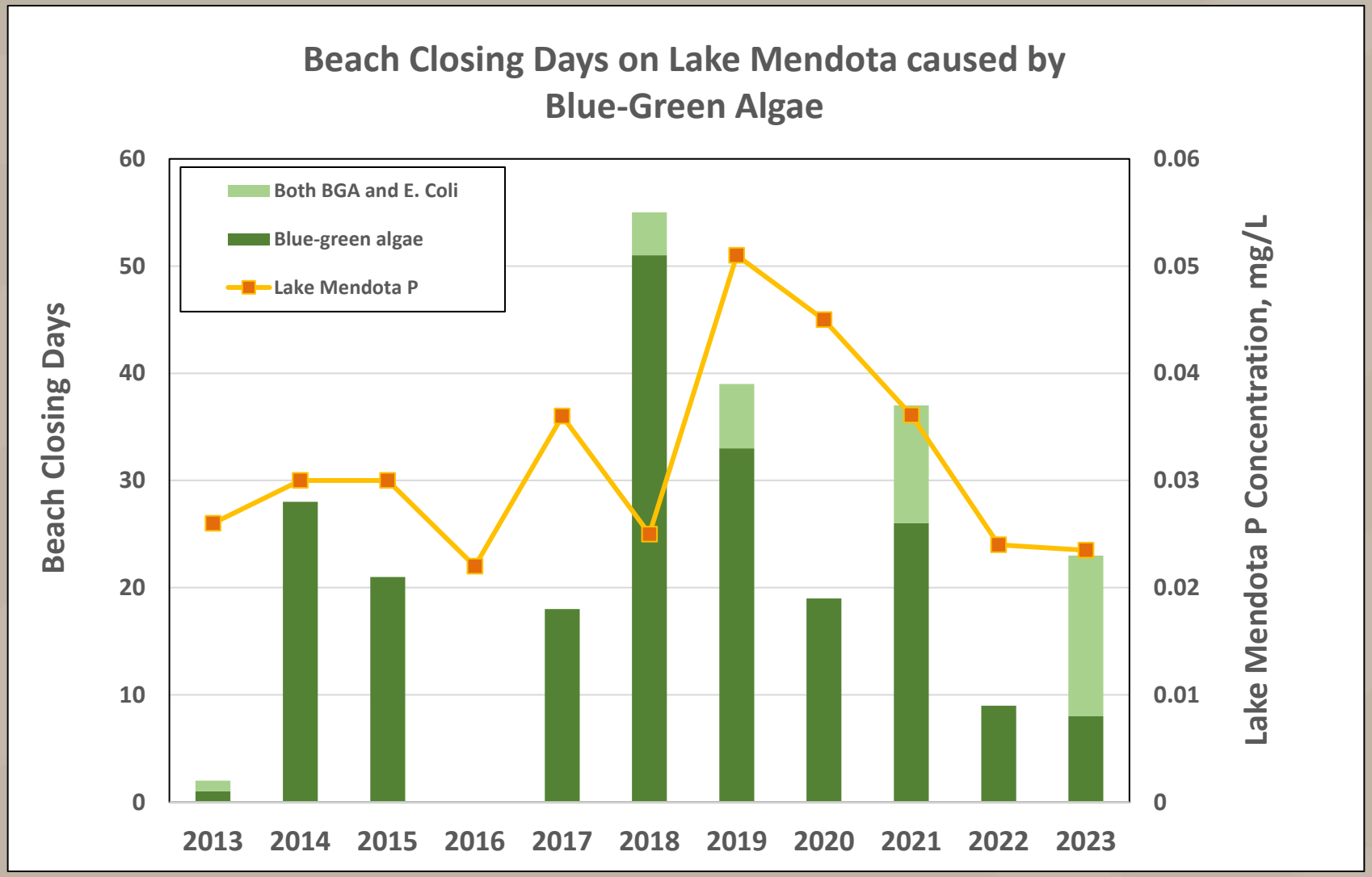
How have the lakes responded to a 3-year period of reduced P loading?



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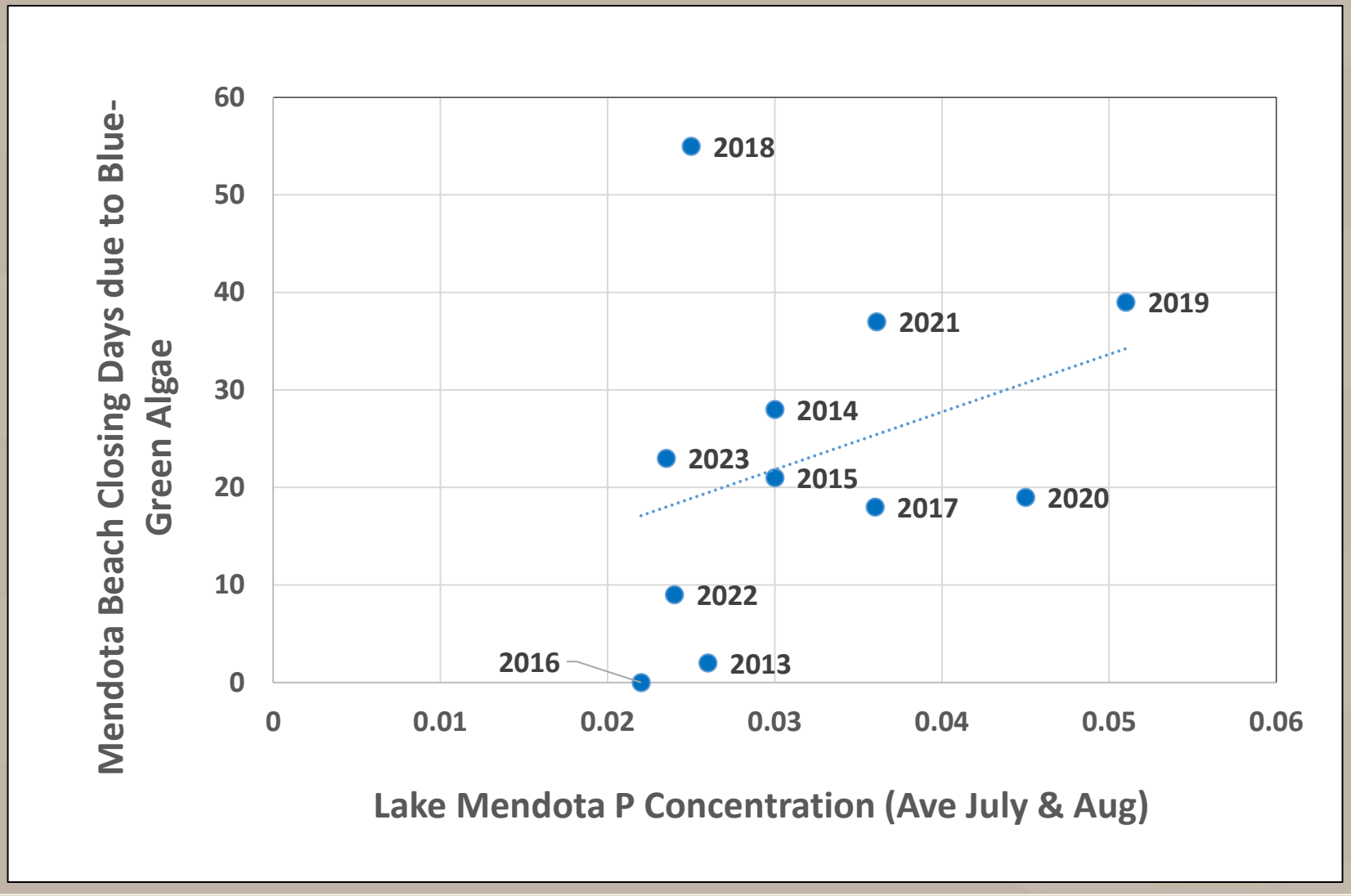
This graph was generated from data provided by Public Health Madison & Dane County and from data collected by UW-Madison Limnology Department, summarized by Dick Lathrop

Is there a relationship between in-lake P and beach closures due to blue-green algae?



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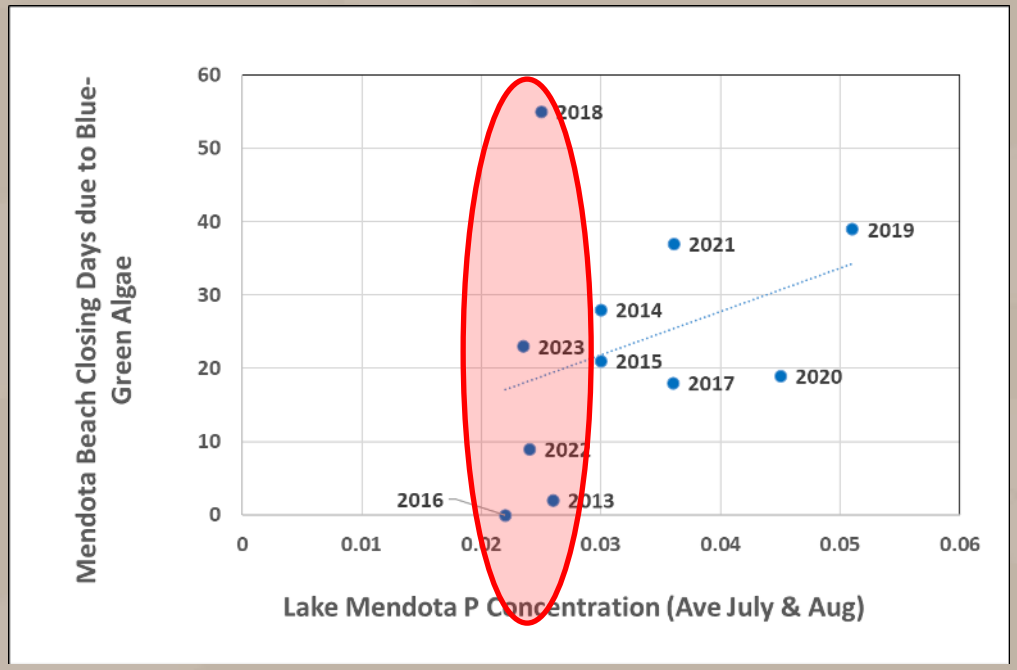
There is a relationship, however…



- Variability
  - Years with low lake P concentrations experienced both the lowest AND highest number of closure days
- In-lake P concentration "floor" just above 0.02 mg/L

- In-lake P concentrations are only one driver of BGA blooms
  - Water temp
  - Wind
  - Local runoff/P inputs

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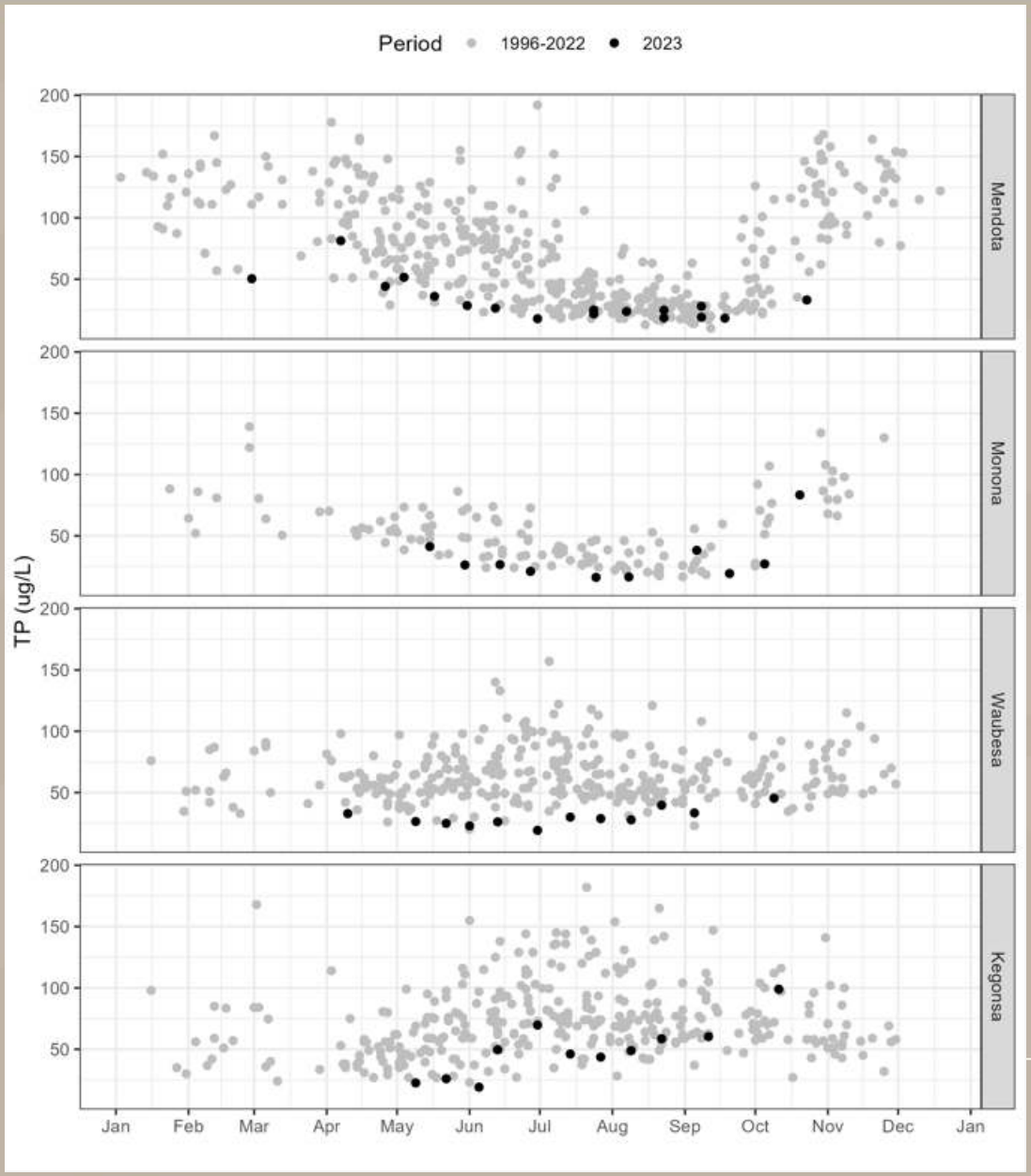
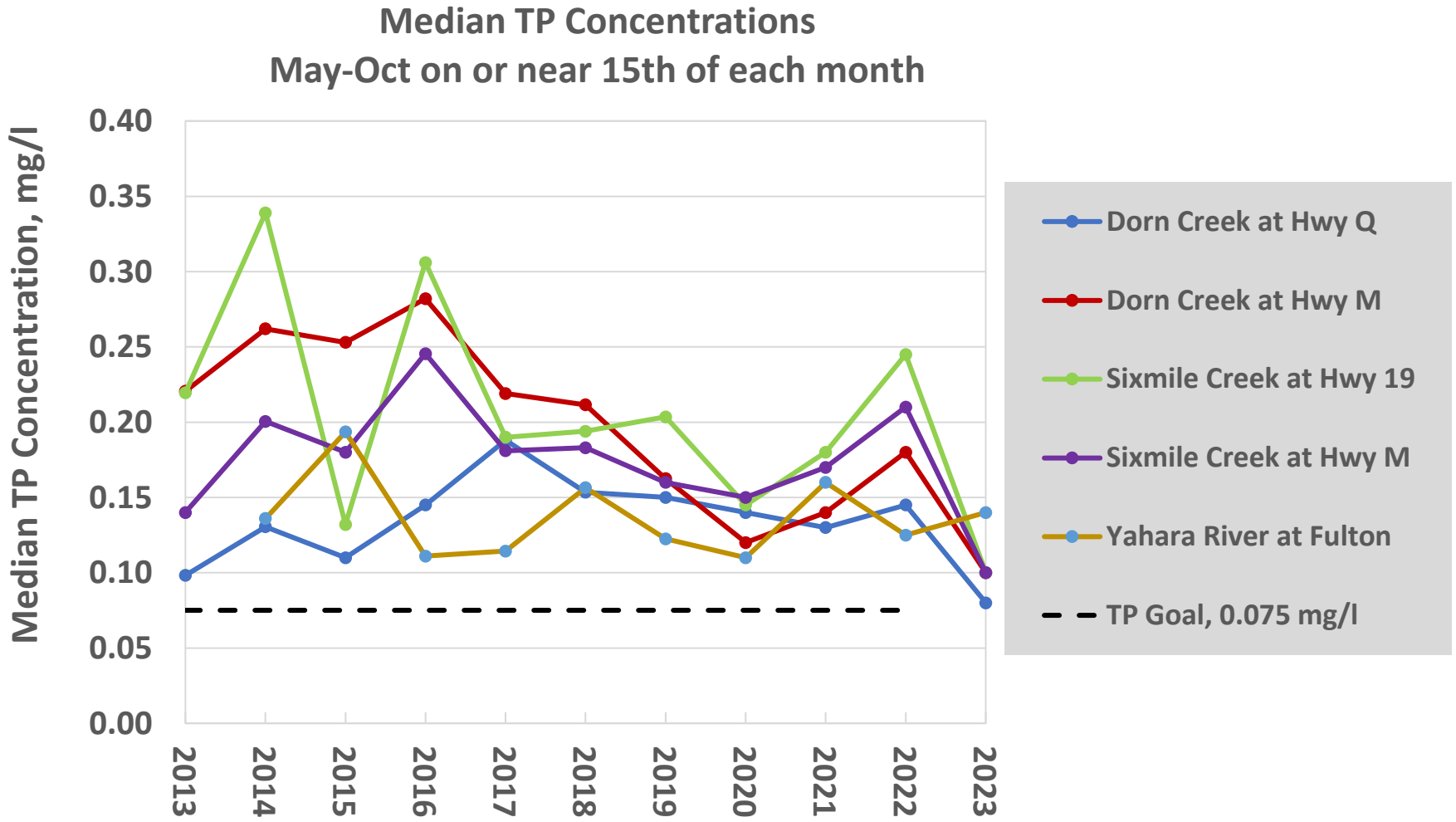
2024 Lake TP concentrations for Yahara lakes



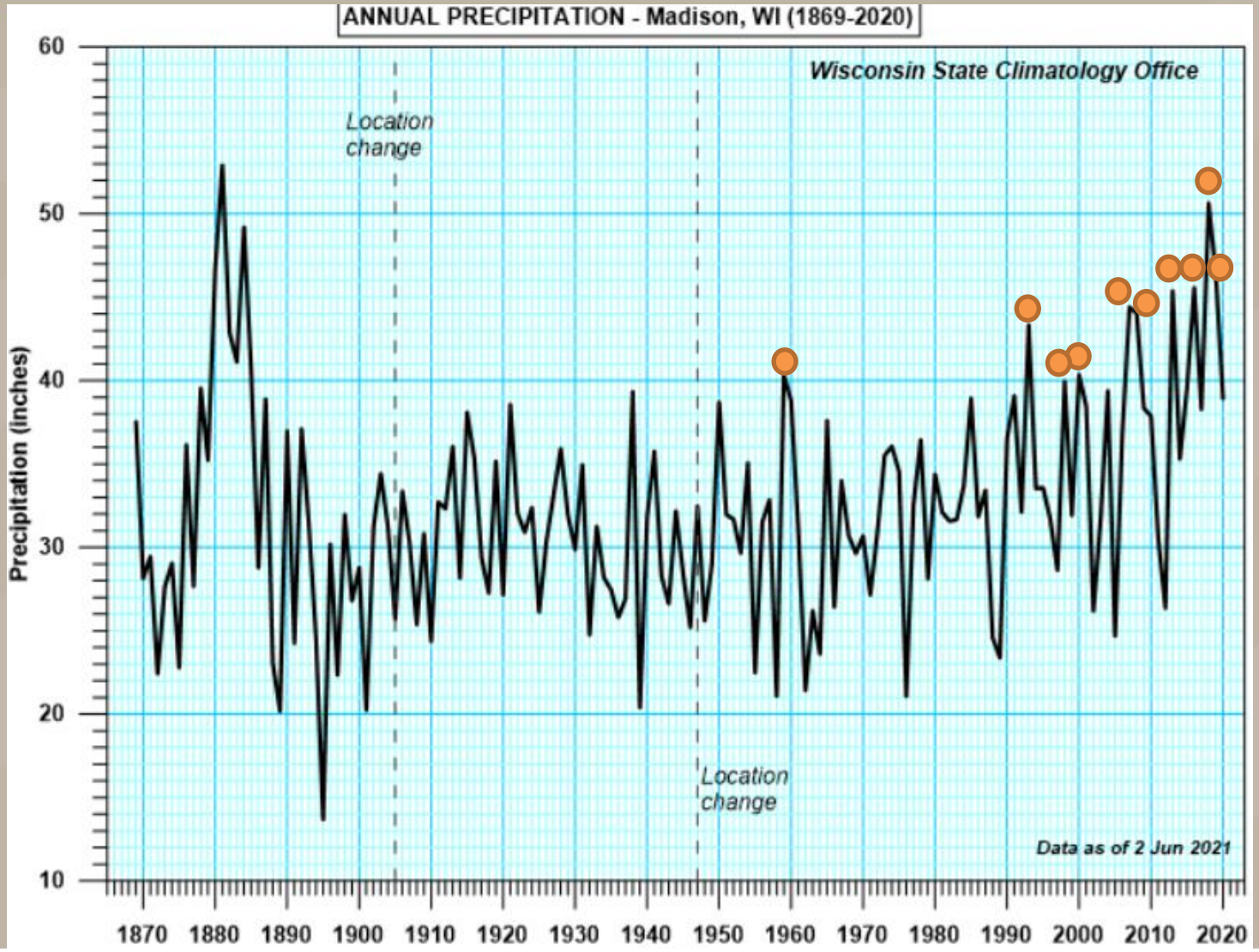
- 2024 monthly concentrations in all lakes among the lowest (dating to 1996)
- Note Y-axis scale is in µg/L, divide by 100 to get mg/L

Data source: WIDNR SWIMS database

15th of the Month Growing Season TP Concentrations - PRELIMINARY

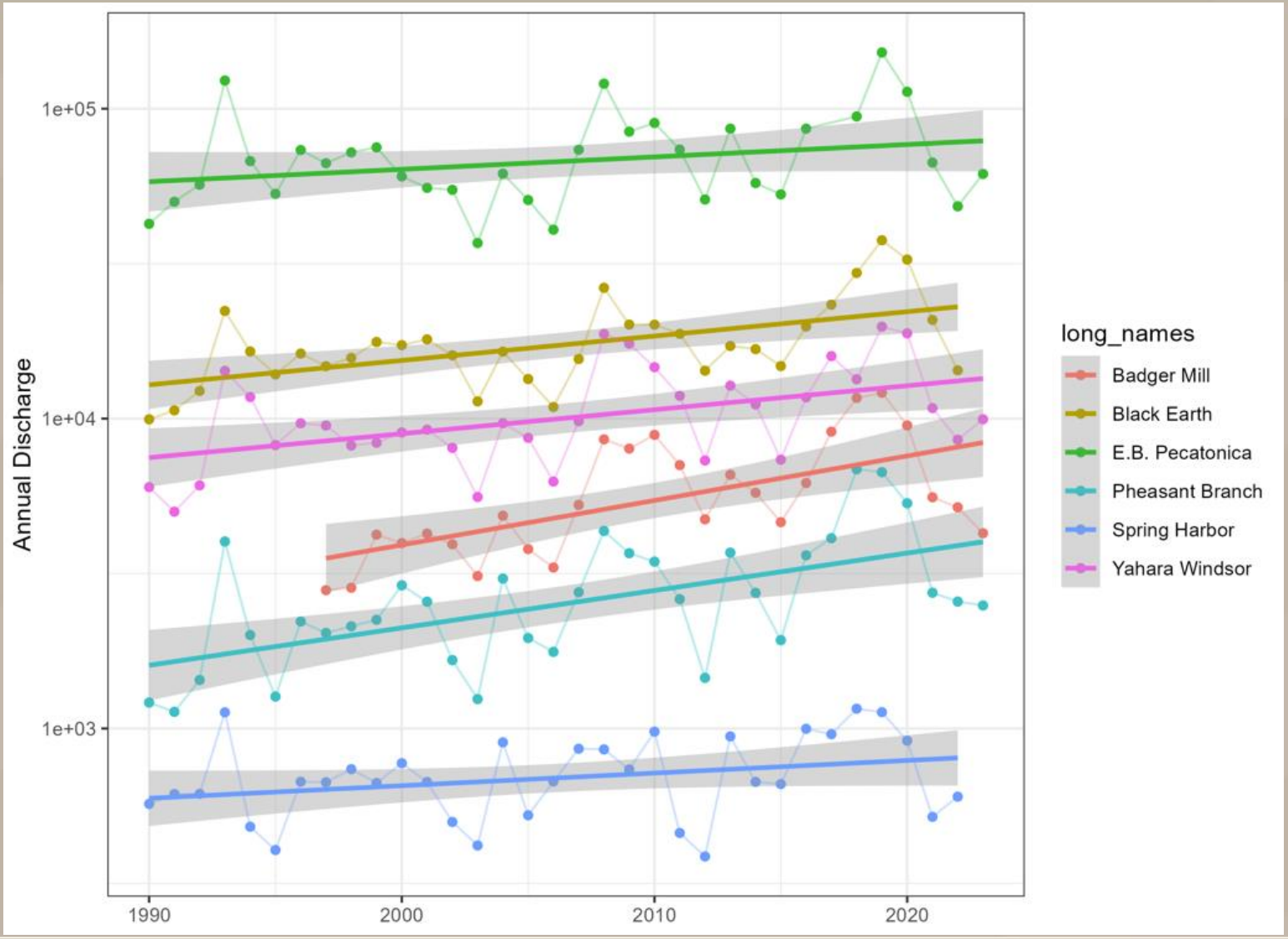


Local trend in rainfall



Over the past ~150 years (excluding the early-mid1880's) 9 out of the 10 highest annual precipitation totals have occurred in the last ~20 years

Trends in streamflow: 1990-2023



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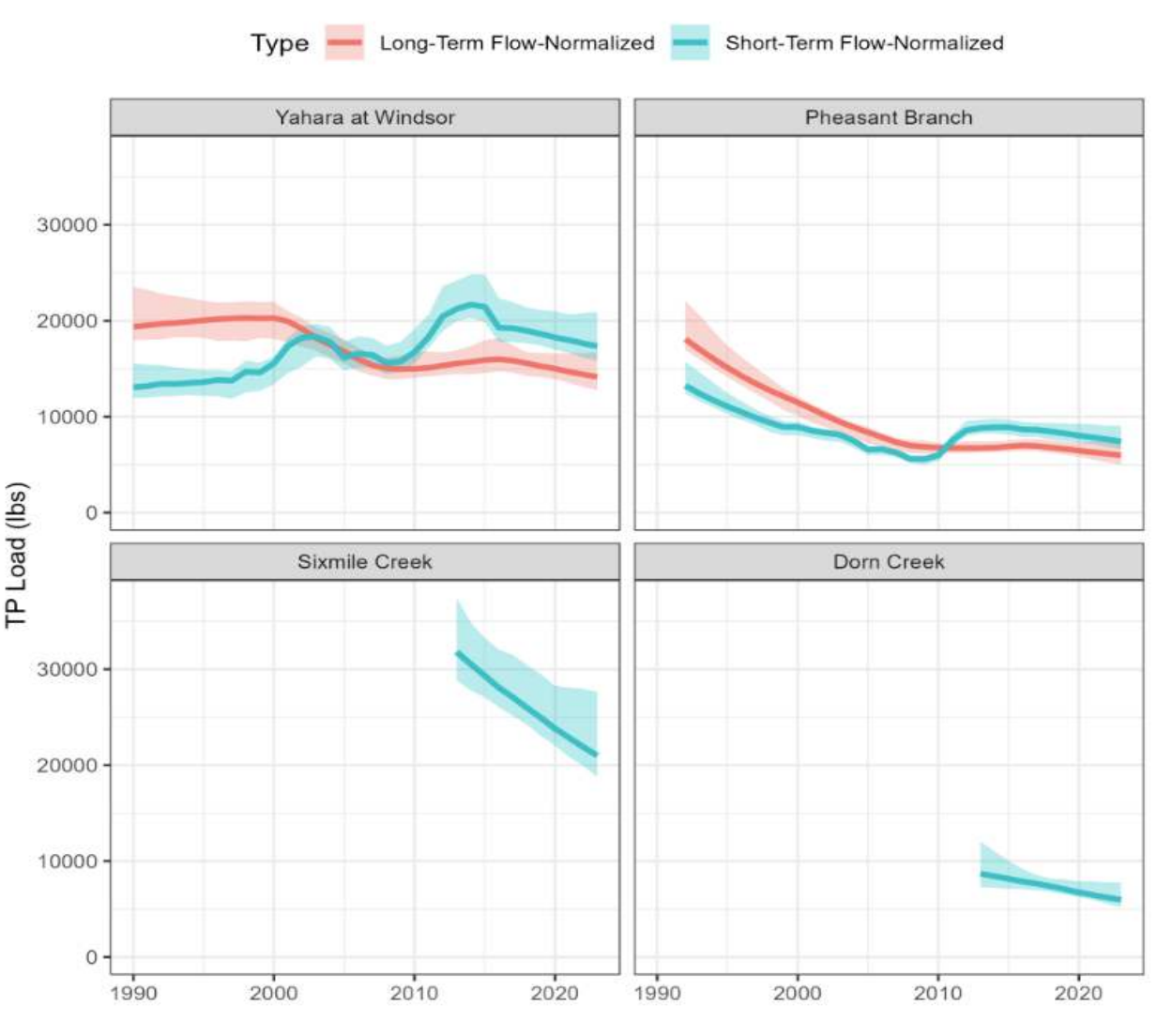
Questions?

Which way are P loads trending?



- Yahara at Windsor: increasing 1990 - present.
- Pheasant Branch: decreasing1992 - present
- Sixmile Creek: decreasing 2013-present?
- Dorn Creek: decreasing 2013-present?