



## Storm event sampling: monitoring strategies, challenges and assessment protocols.

# What is considered wet data?



- No official designation at MPCA
- Some considerations:
  - > 0.5" rain within last 24 hours
    - Dependent on antecedent conditions
  - Flow rises above a certain threshold (site dependent)
  - Flow increases by a certain rate
  - An event that causes the river to rise and water quality to change
  - Samples collected at or above a certain flow percentile
  - Above bankfull flows



# Challenges of event-based sampling

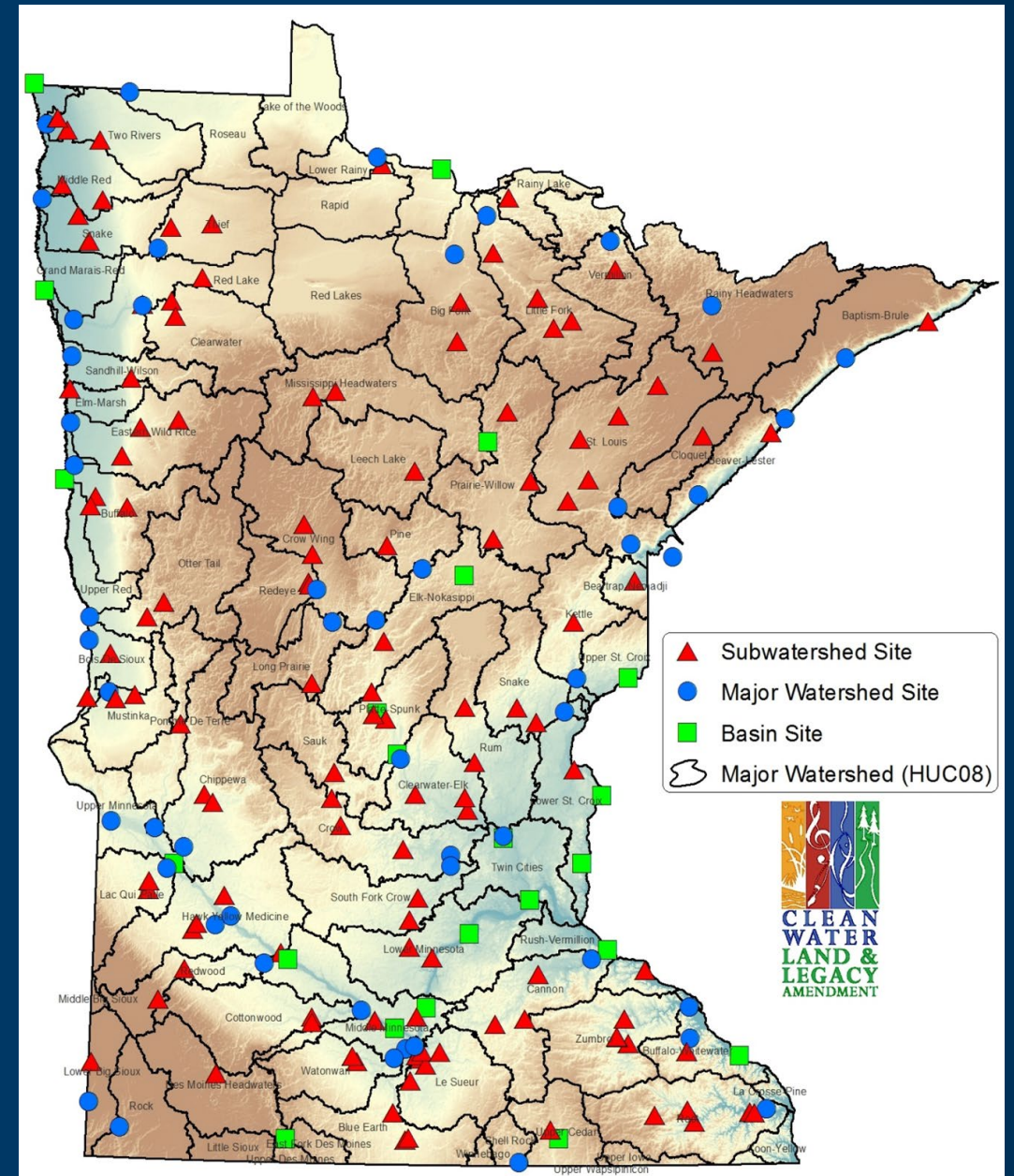


- Prioritizing sampling
- Weather
- Flooding
- Funding
- Changing climate



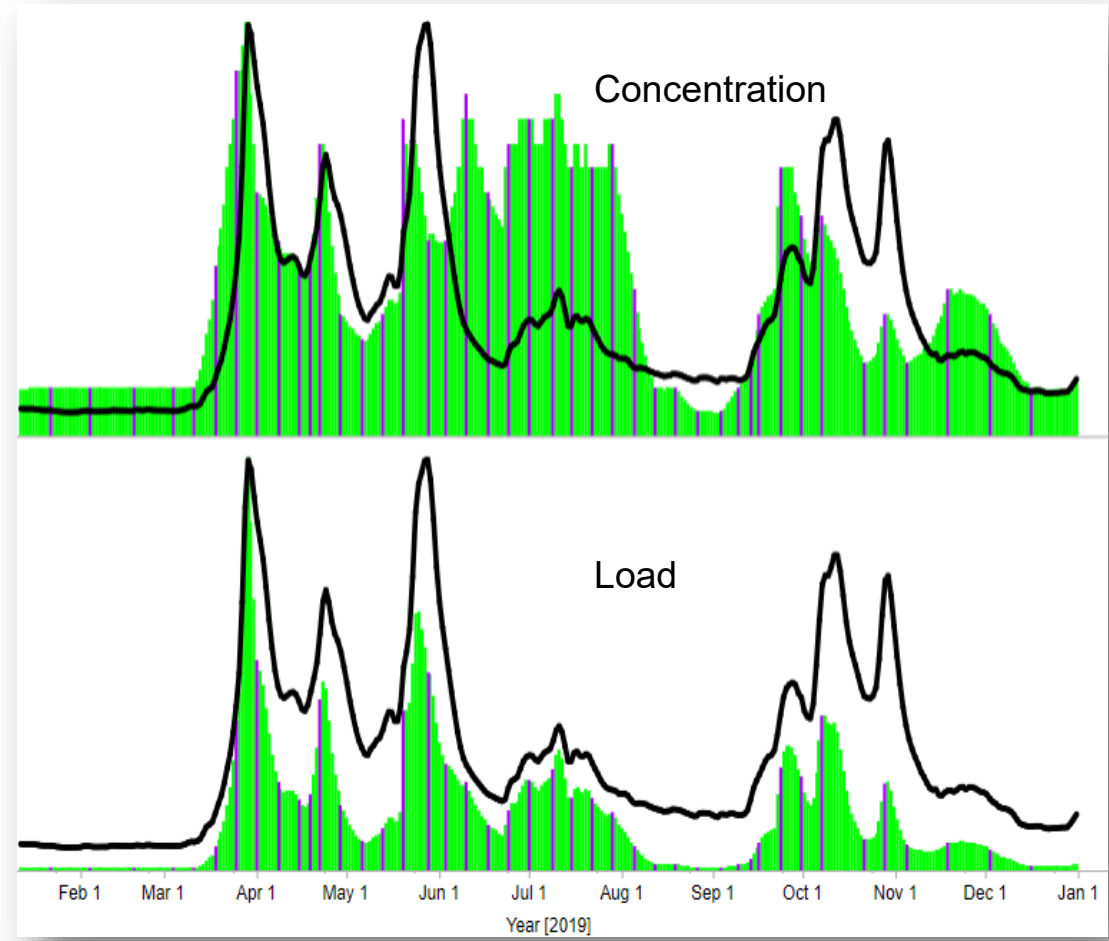
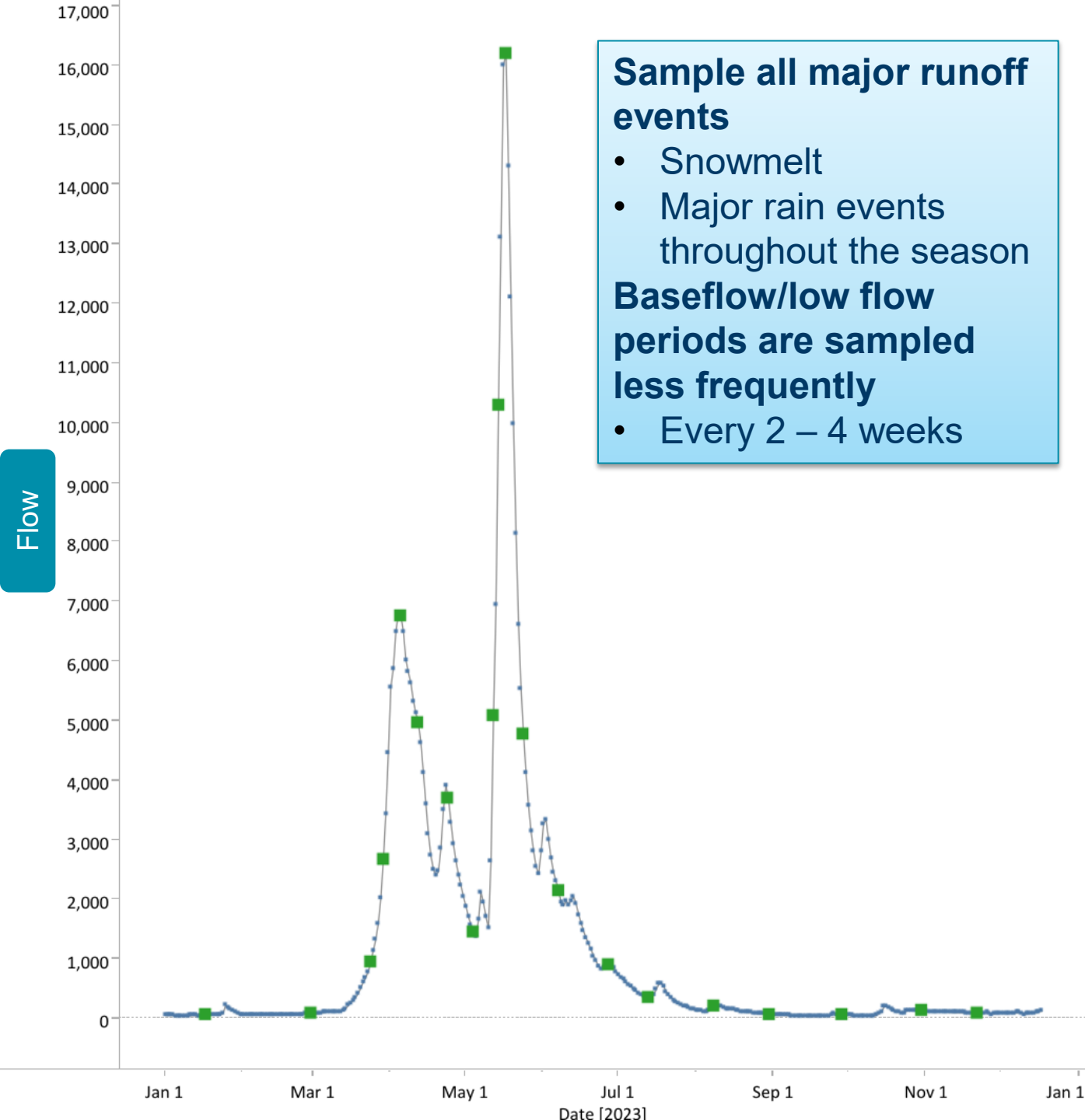
# Watershed Pollutant Load Monitoring Network (WPLMN) Overview

- Fixed network of 197 sites
  - Basin and Major Watershed; Year-round
  - Subwatershed; Seasonal
- Event based load sampling
  - Sampling by MPCA and partners
  - MNDNR, USGS and Water Survey Canada (WSC) discharge stations
- Program purpose
  - Statewide comparison of water quality
  - Track trends
  - Chemistry and pollutant load data for assessments, analysis and reports



<https://www.pca.state.mn.us/wplmn>

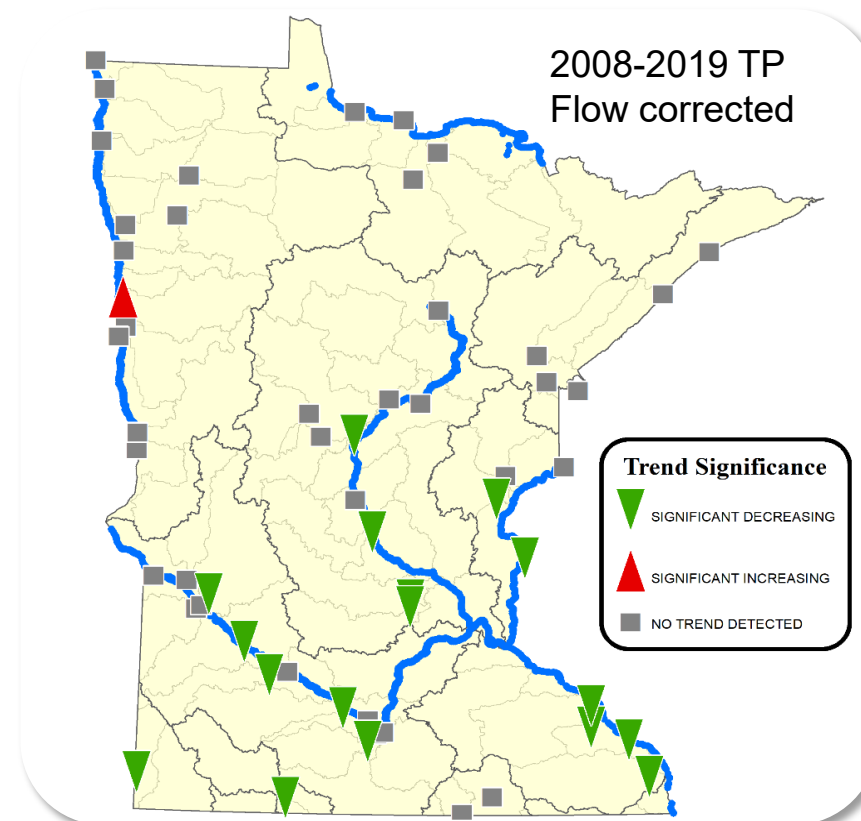
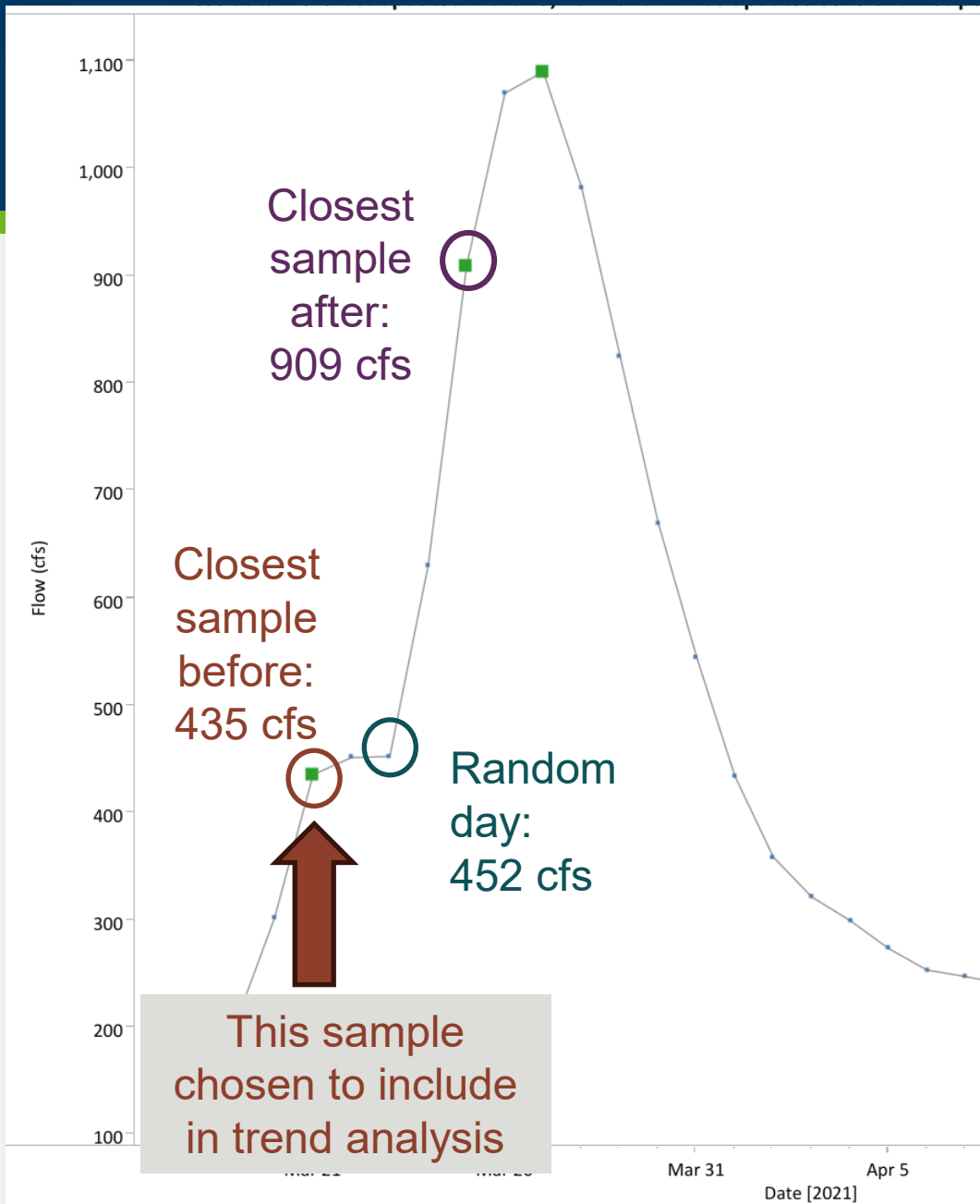
# WPLMN Sampling and Loads



■ discrete sample point ■ modeled point ■ Flow (cfs)

## Bootstrapped Seasonal Kendall

- Challenge: Emulate a random sampling regime
- Weighted sub-sample method



- Monitoring data is stored in MPCA's internal databases: WISKI and EQulS.
- Finalized assessment data includes data from storm runoff events.
- Assessment of pollutants follows our [2024 Guidance Manual](#).
- Case Study: Total Suspended Solids Assessment –
  - Data requirements: 20 minimum samples from the most recent ten years of data
  - TSS Assessment Specification: valid data runs from Apr-Sept
  - MN's TSS standards are based on nutrient region and river reaches
  - An assessment database (CARL) generates the rate of exceedance of the applicable standard.
  - Impairment Determinations: Not support if at least 3 measurements exceed the standard, and the exceedance rate is more than 10%.

# Assessment Challenges

- **Late Monitoring Data:**
- While that has not been the case for WISKI database, we constantly guard against late data in general.
- Monitoring data need to be submitted into WISKI database by Jan 12 every year.
- Submittals after Jan 12 are considered late and will affect...
  - the official opening of the assessment database,
  - actual desktop assessment of waterbodies,
  - Watershed Assessment Team and Professional Judgment Group meetings,
  - Work schedules of assessors.



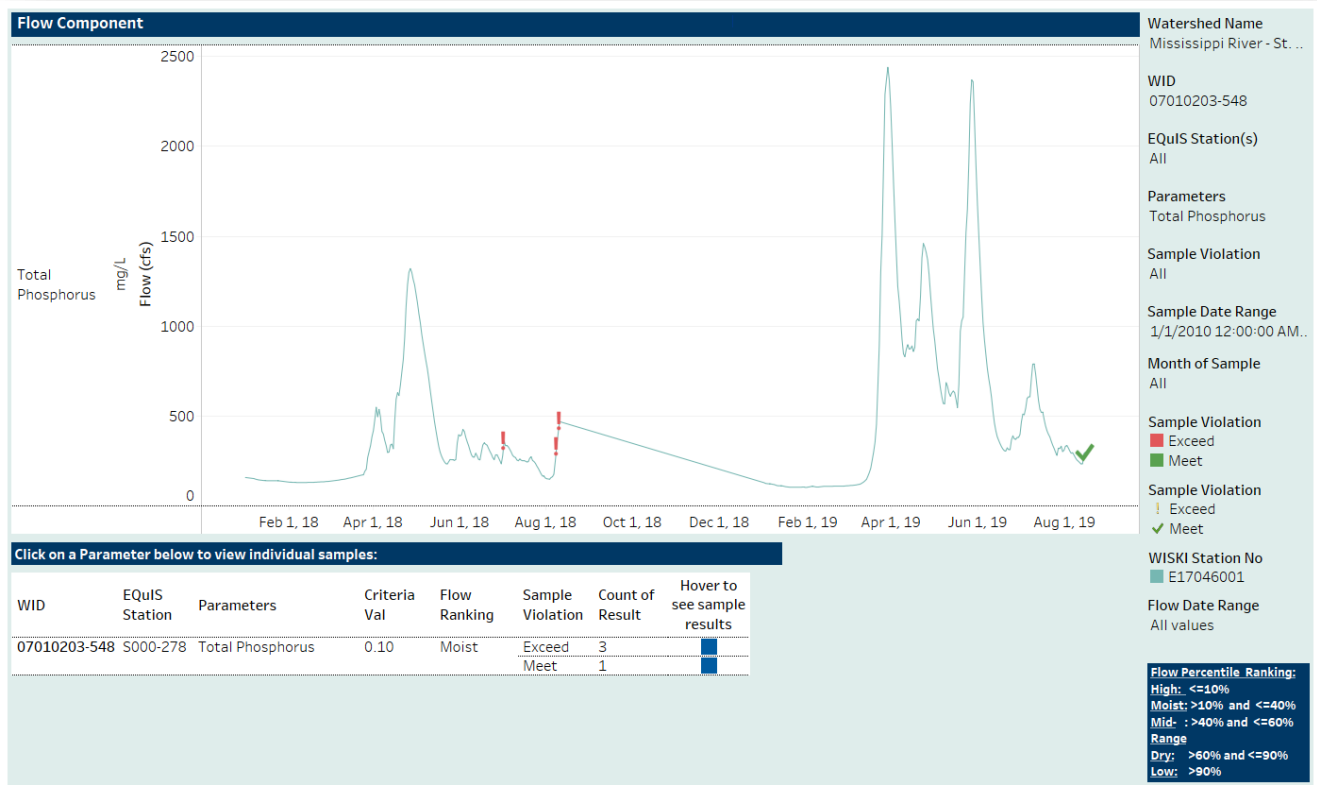
# Stressor ID Challenges



What are the sample results?

Was it a wet sample?

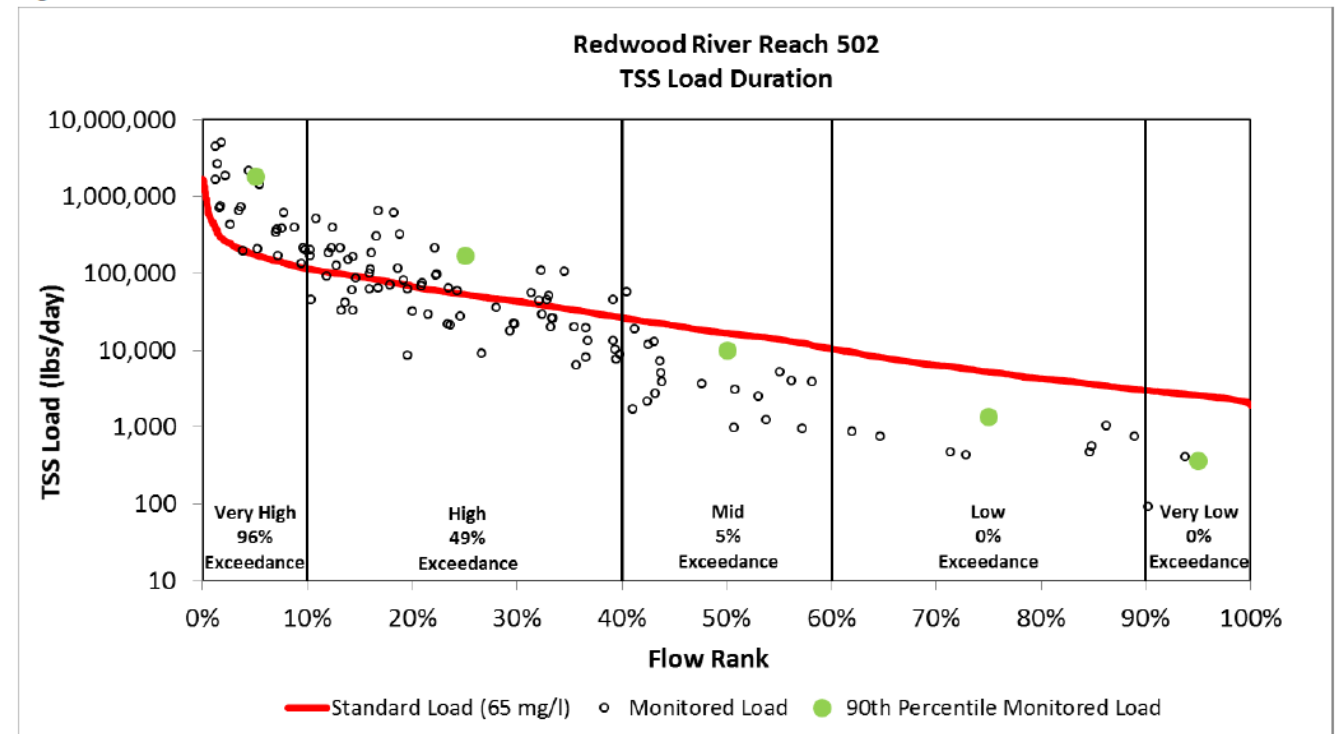
What does this sample tell us about the conditions causing the stressor?



# Implications for TMDLs

- Not a lot of specific examples
- Effect of event-based sampling regime varies by parameter and standard
  - Annual loads important; e.g., P loading to a lake, then high flow weight ok
  - Exceedance occurrence TMDL; e.g., TSS 90<sup>th</sup> percentile concentration

Figure 7. Redwood River Reach 502 TSS load duration curve and monitored loads and exceedances.



# Thank you!

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