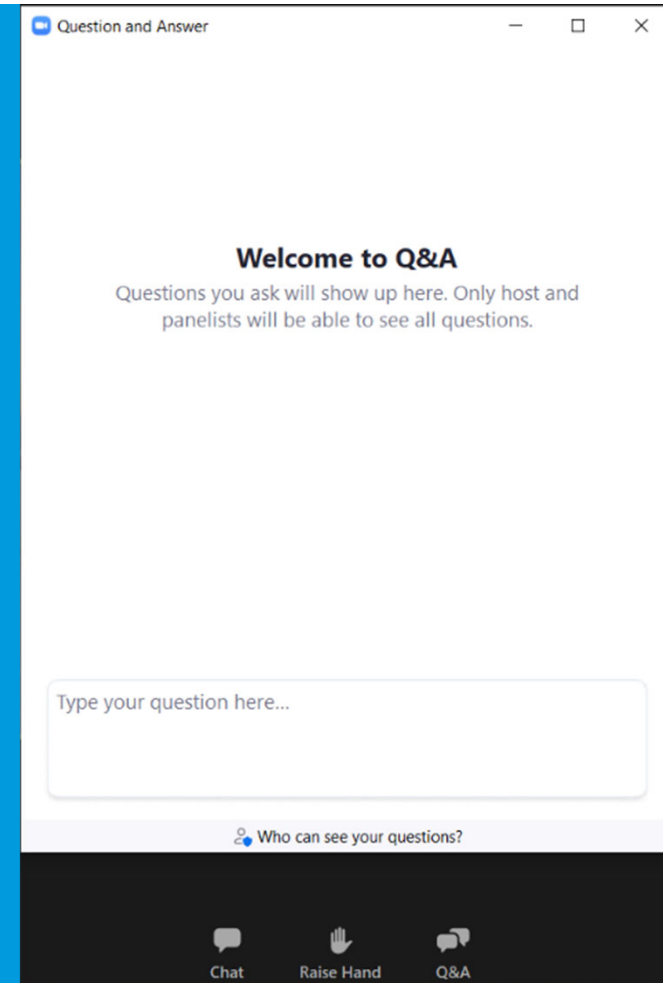


Clarks Fork Yellowstone Watershed Water Quality Monitoring Project

Abbie Ebert
February 16th, 2023

Questions or Comments

- Raise hand (*9 if on the phone) or type questions into the Q&A
- DEQ will unmute you if you wish to provide your comment orally
- If calling by phone, press*6 to unmute
- State your name and affiliation before providing your comment




Question and Answer

Welcome to Q&A
Questions you ask will show up here. Only host and panelists will be able to see all questions.

Type your question here...

Who can see your questions?

Chat Raise Hand Q&A

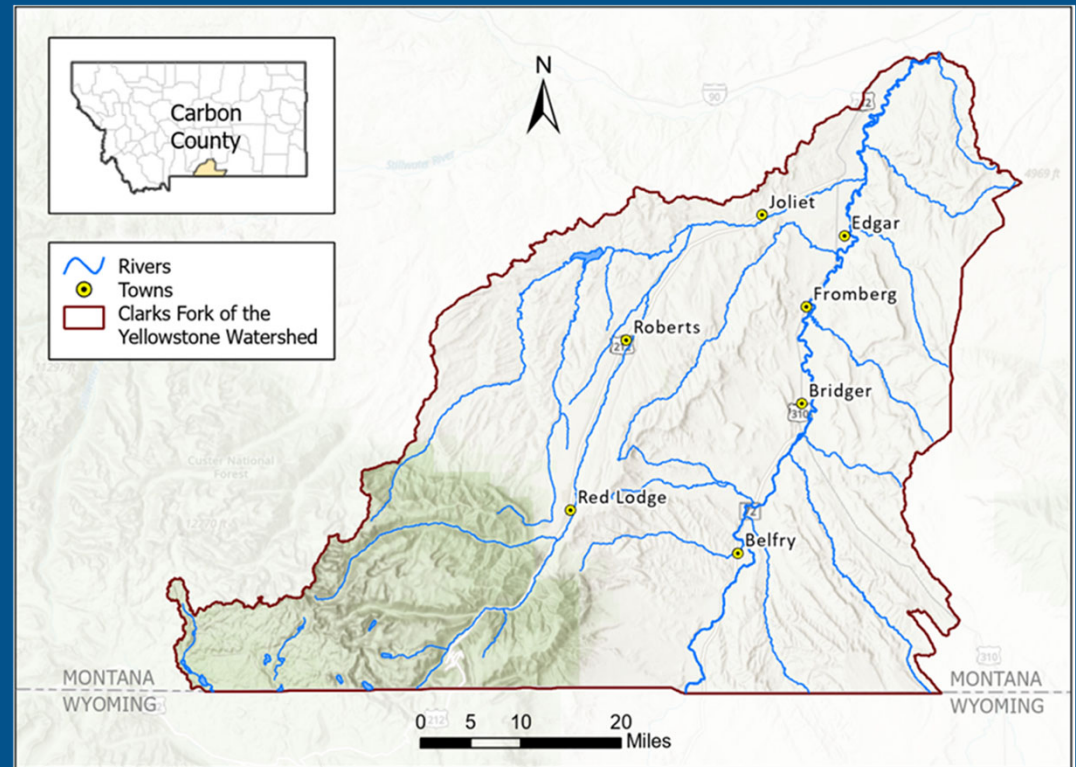


DEQ's Mission: To champion a healthy environment for a thriving Montana.

Water Quality Division Vision: Clean water from peaks to prairies for all Montanans.

Why are we monitoring here and now?

- Watershed value and vulnerability
- Local interest
- Time lapse in data



Purpose of Monitoring and Assessing Water Quality

- Update the status of previous water quality issues.
- Determine the overall health of the Clarks Fork Yellowstone watershed.
- Total Maximum Daily Loads (TMDLs)



Beneficial Uses

Are goals and expectations specified in water quality standards for state surface waters uses.



Clarks Fork Yellowstone Watershed Beneficial Uses

- Drinking, culinary, and food processing purposes, after conventional treatment;
- Bathing, swimming, and recreation;
- Growth and propagation or marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers;
- Agricultural water supply; and
- Industrial water supply (ARM 17.30.623).

Water Quality Planning Process

3 - 4
Years

- **Monitor Water Quality**
 - Collect data about water quality.

1 - 2
Years

- **Assess Water Quality**
 - Describe water quality and determine whether waters are “impaired” (do not meet water quality standards and do not fully support beneficial uses).

1 - 3
Years

- **Identify Sources of Pollution and Develop TMDLs**
 - Estimate amount of pollution from identified sources.
 - Determine reductions needed for impaired waters to meet water quality standards and recommend pollution reduction strategies.

Multiple
Years

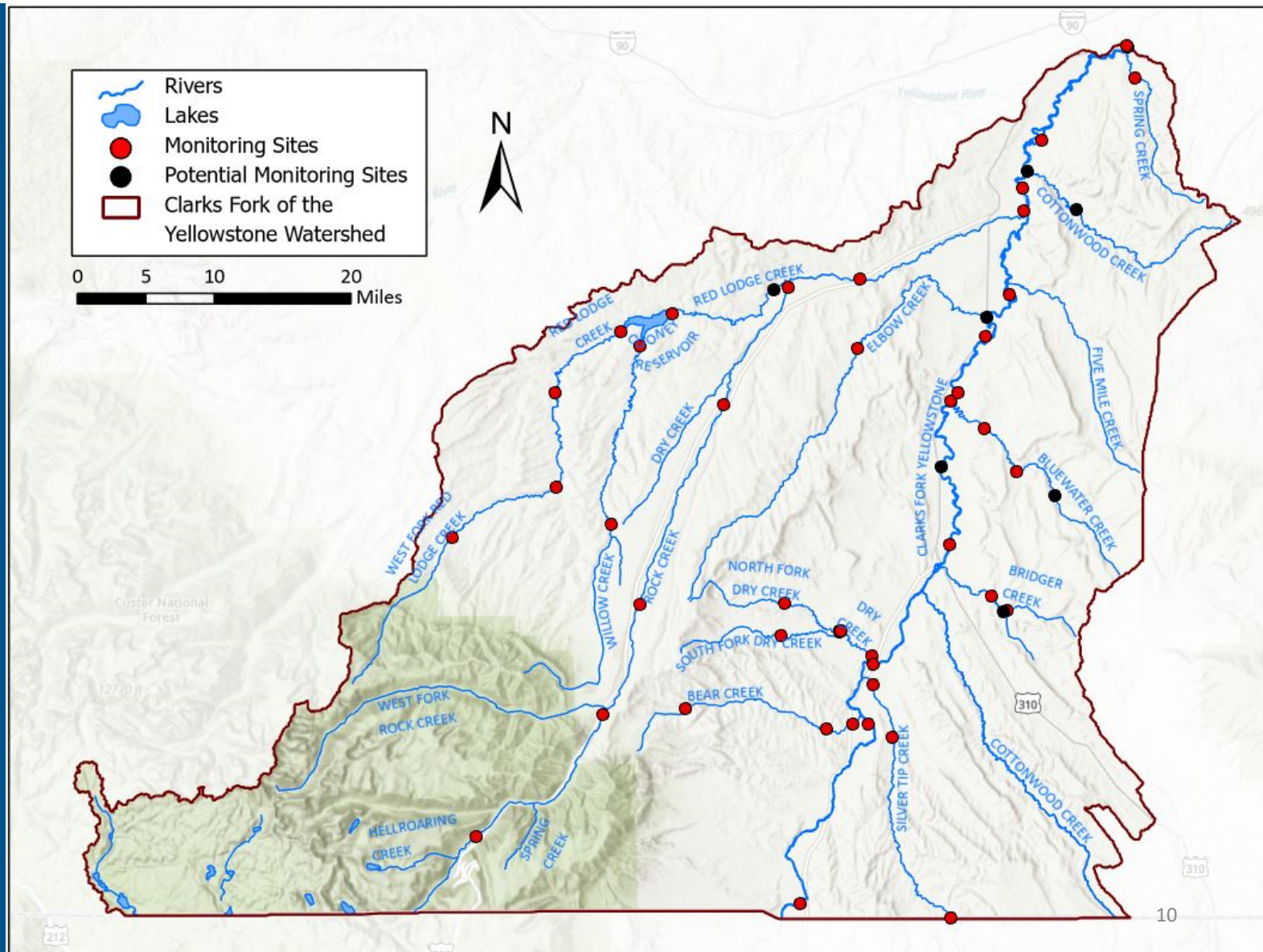
- **Support Water Quality Protection Practices**
 - Support efforts to reduce point and nonpoint source pollution and protect and restore water quality.

2022 Monitoring

- 5 Monitoring Events
- 15 Waterbodies
- 46 Monitoring Sites
- Water Quality Parameters
 - Nutrients
 - Metals



2022 Monitoring Sites



Slide 10

EA0

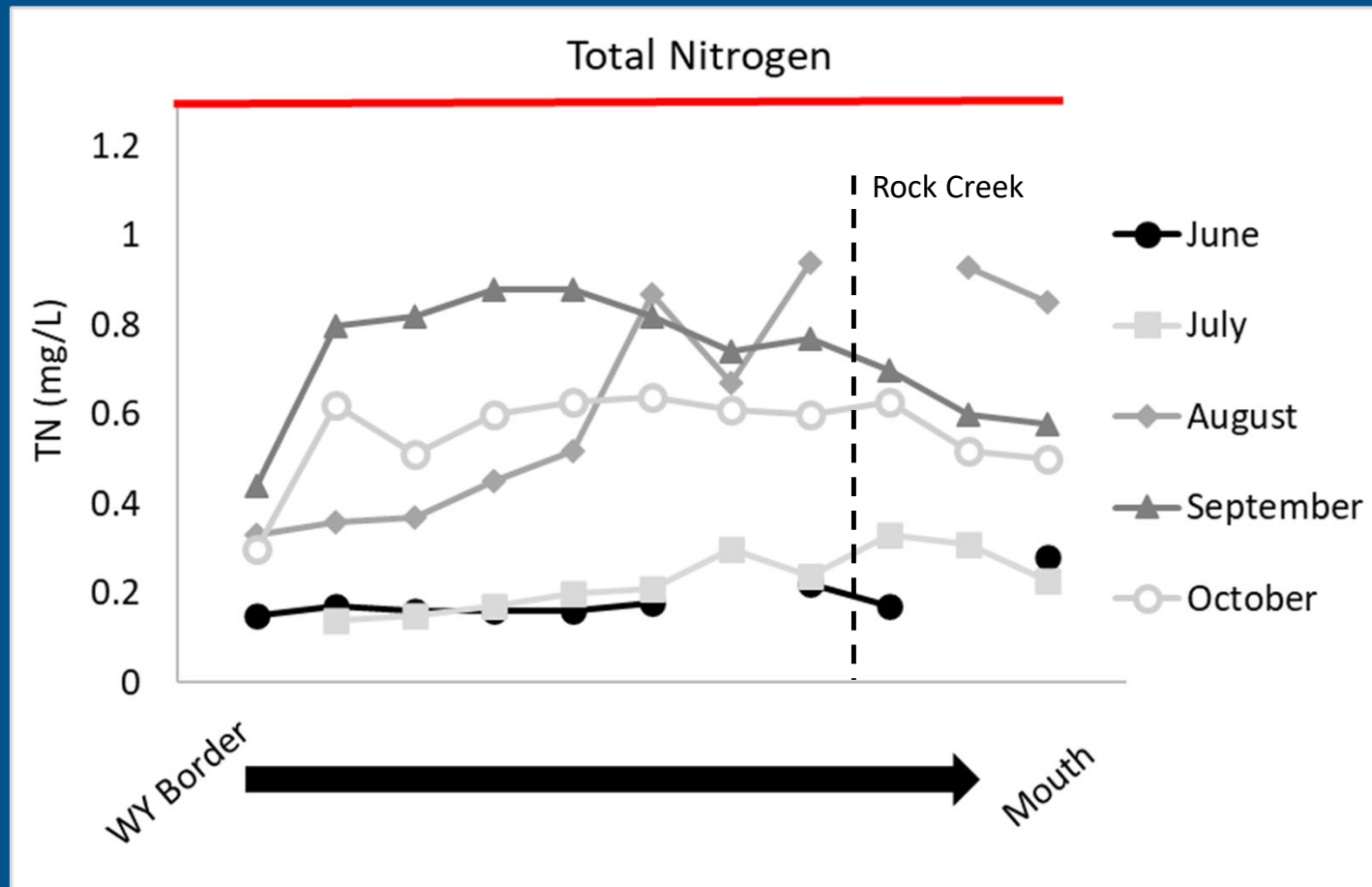
Need new maps

Ebert, Abbie, 2023-02-12T19:50:37.971

Clarks Fork Yellowstone River Nutrient Results



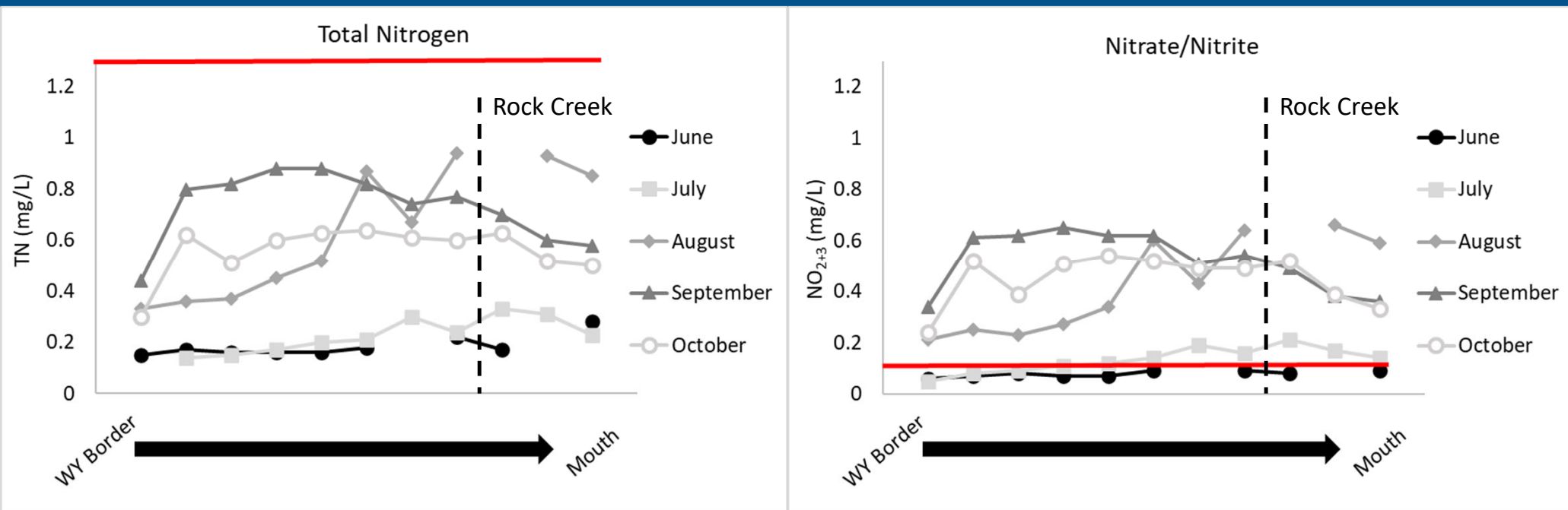
Clarks Fork Yellowstone River: Nitrogen Results



Total Nitrogen
Threshold = 1.3
mg/L

Only applied
July - September

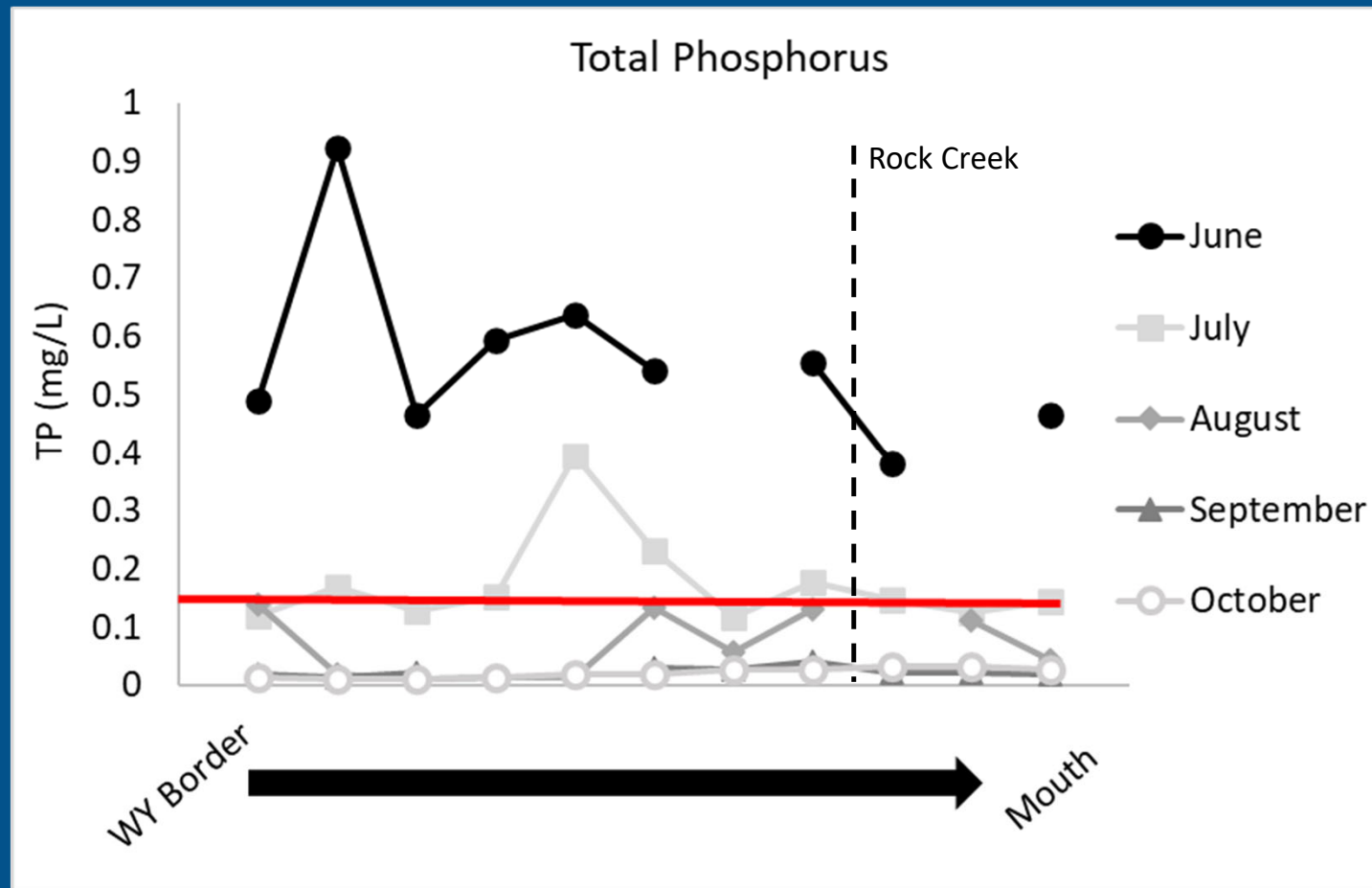
Clarks Fork Yellowstone River: Nitrogen Results



Total Nitrogen Threshold = 1.3 mg/L
Only applied July - September

Nitrate/Nitrite Threshold = 0.1 mg/L
Only applied July - September

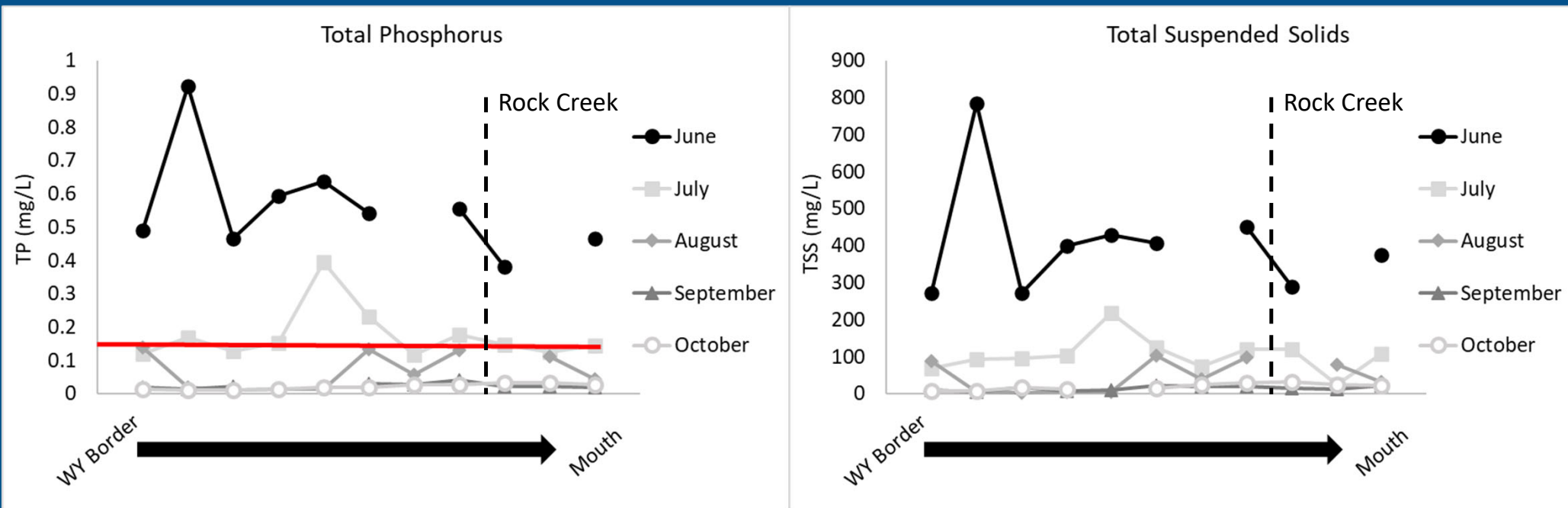
Clarks Fork Yellowstone River: Phosphorus Results



Total
Phosphorus
Threshold = 0.15
mg/L

Only applied July
- September

Clarks Fork Yellowstone River: Phosphorus Results



Total Phosphorus Threshold = 1.3 mg/L

Only applied July - September

Bear Creek: Nutrient Results

- TP increase from upstream to downstream.
- TN does not follow a seasonal or upstream to downstream pattern.



Silvertip Creek: Nutrient Results

- Elevated concentrations of ammonia, TN, TP, and SRP at the WY border.



Dry Creek: Nutrient Results

- TN and TP increase in concentrations from upstream to downstream.
- North Fork Dry Creek was dry from August – October.



Bluewater Creek: Nutrient Results

- TSS, TP, TN, and NO₂+3 increase from upstream to downstream.



Spring Creek: Nutrient Results

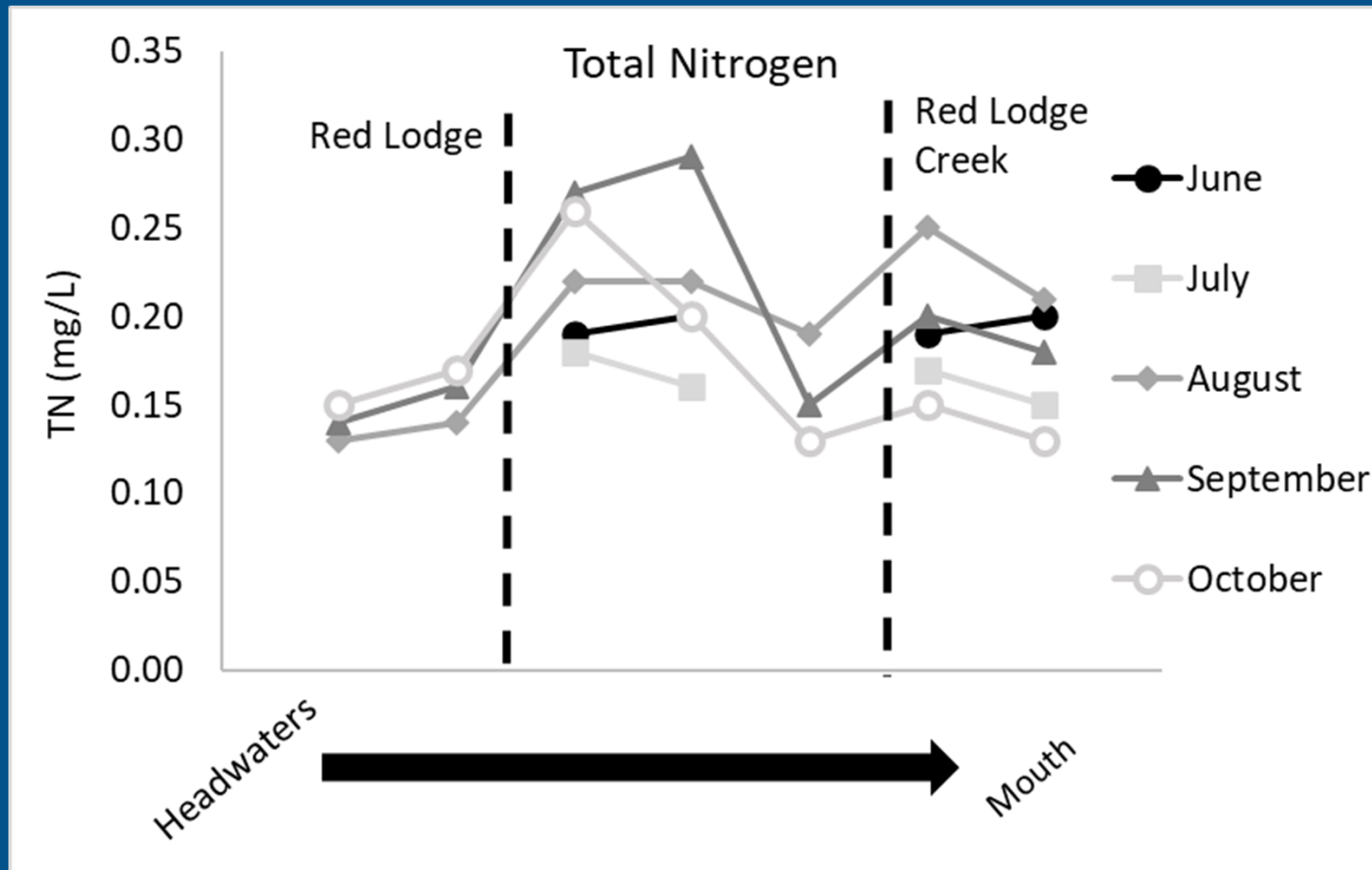
- TN and NO₂+3 are the highest tributary concentrations in the watershed.
- One sampling site was dry during all 5 monitoring events.



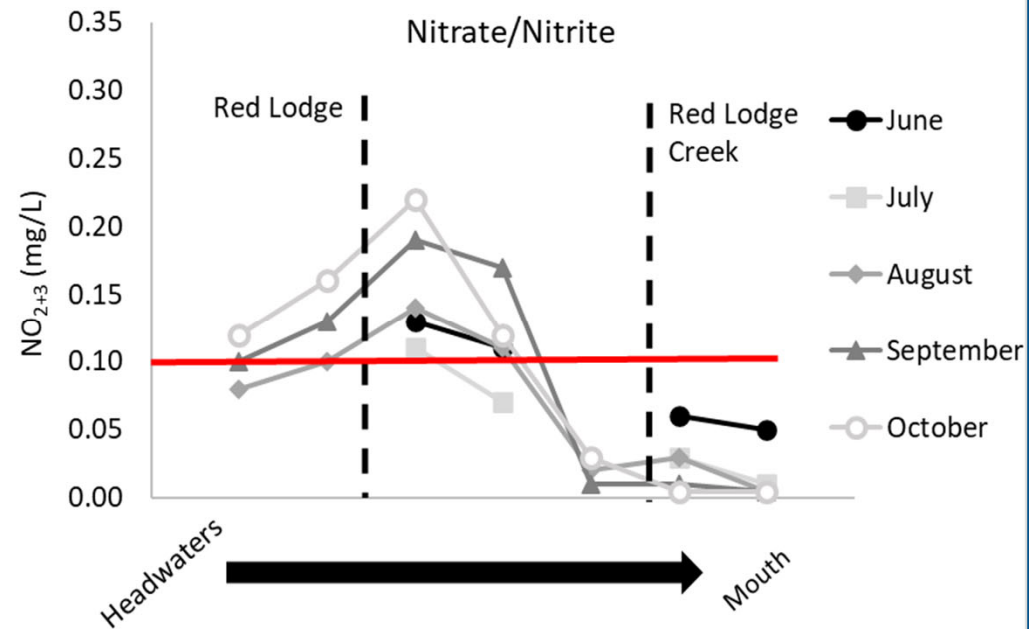
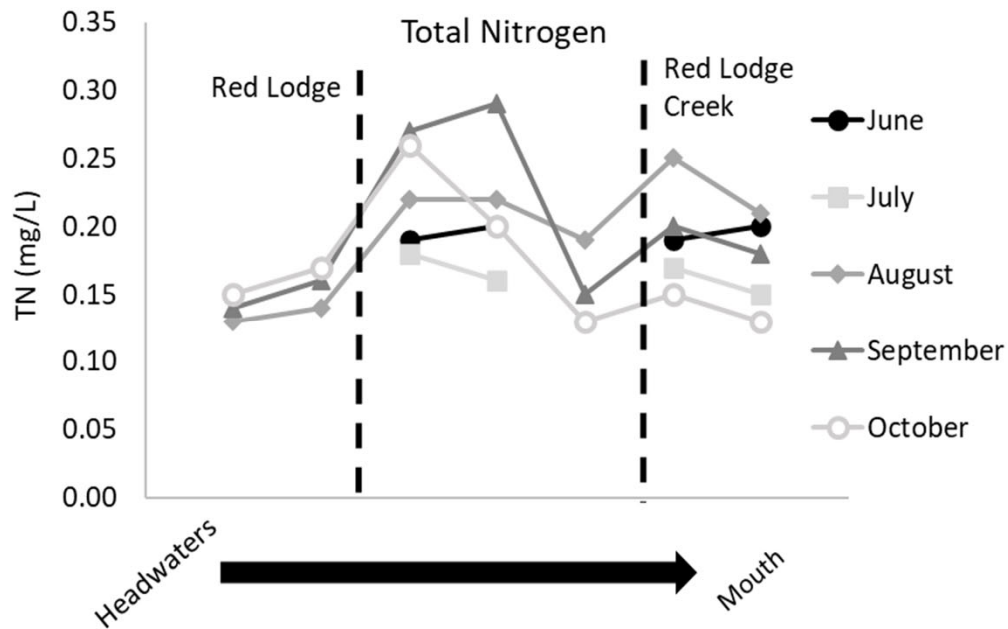
Rock Creek Nutrient Results



Rock Creek: Nitrogen Results

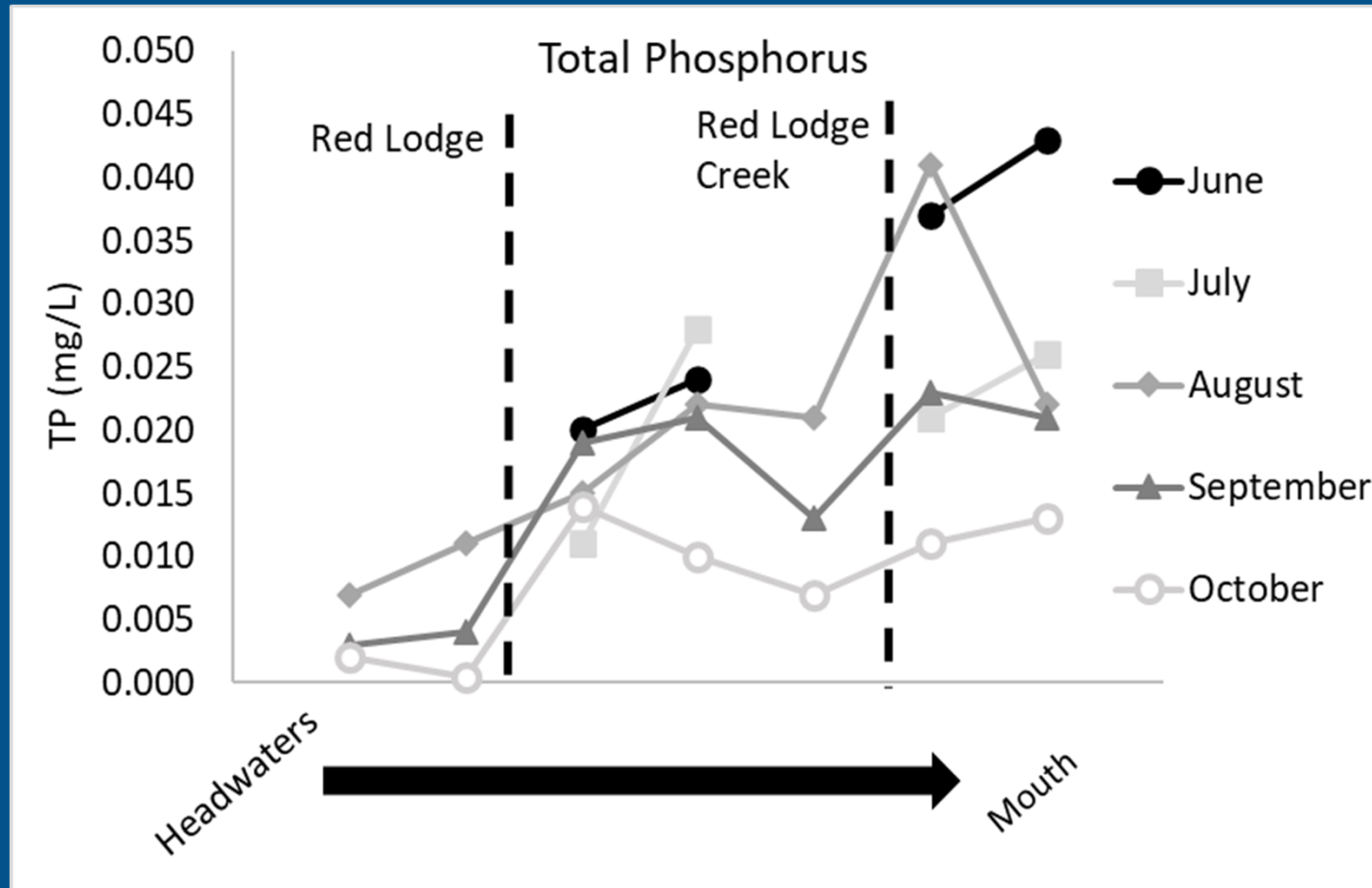


Rock Creek: Nitrogen Results

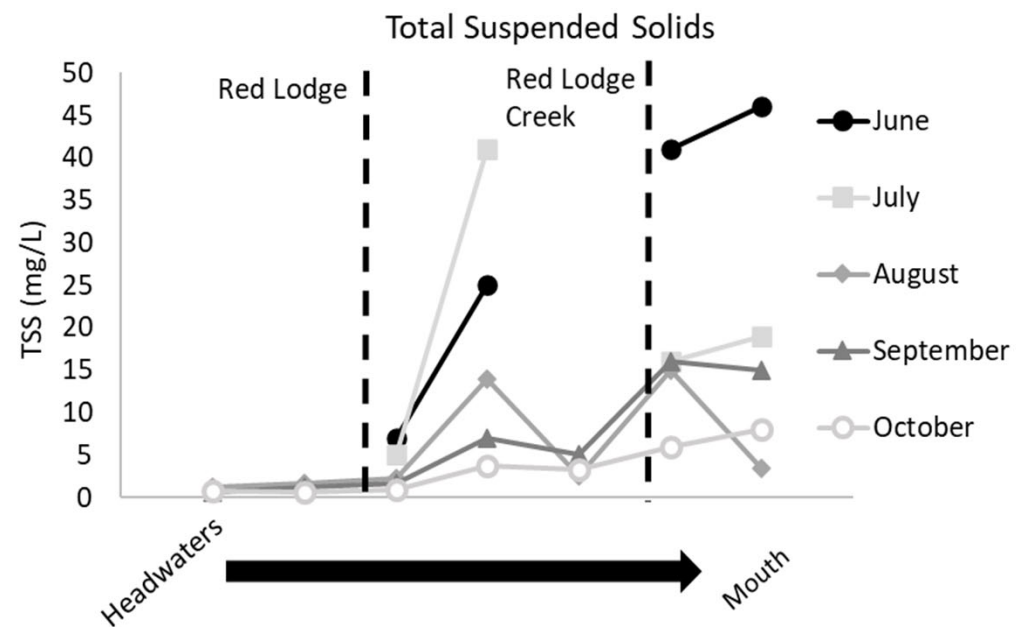
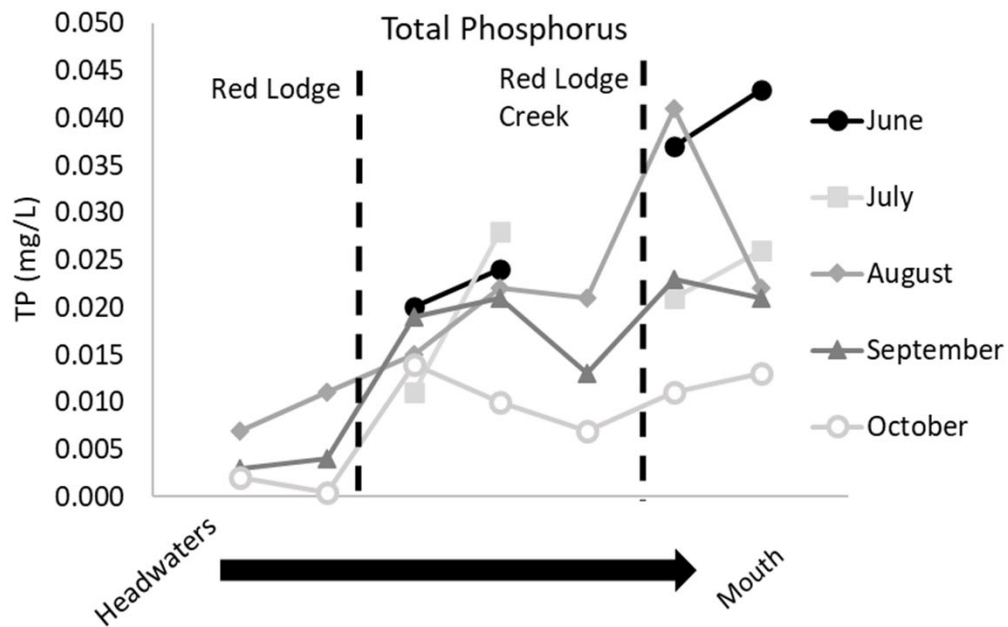


Nitrate/Nitrite Threshold = 0.1 mg/L
Only applied July - September

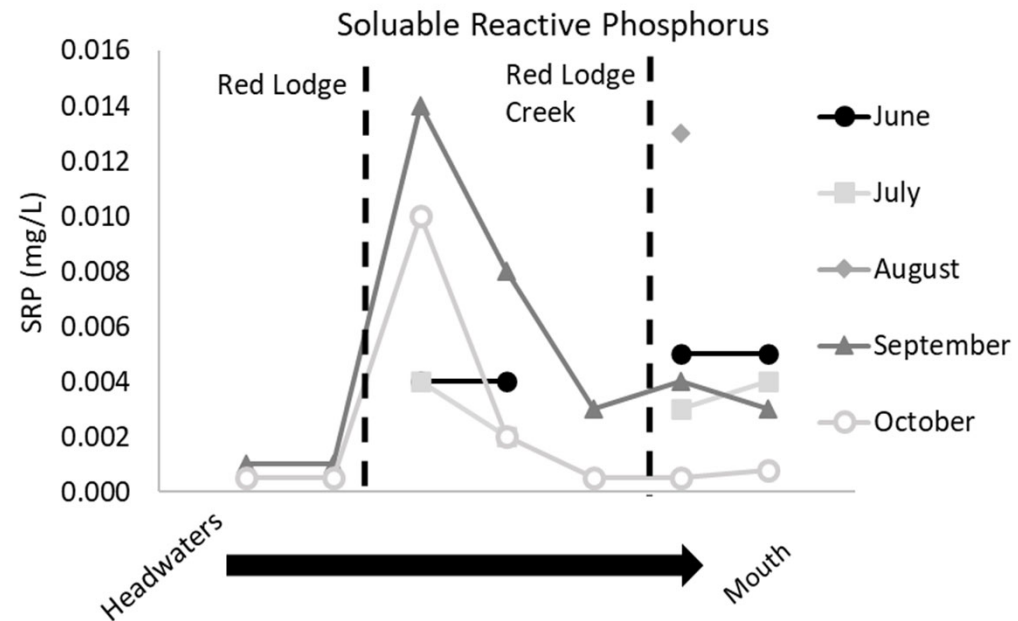
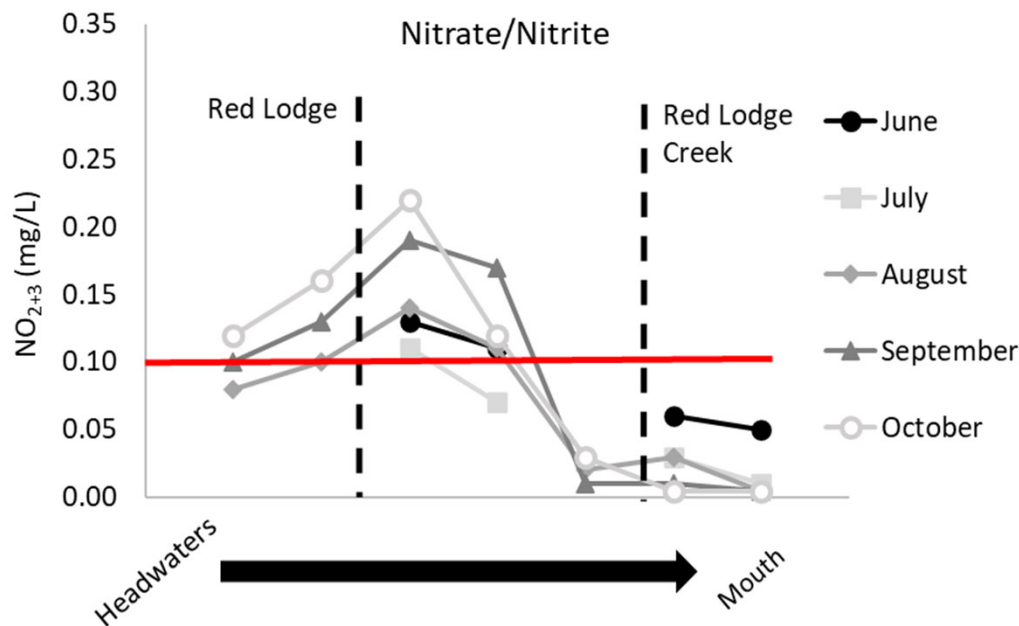
Rock Creek: Phosphorus Results



Rock Creek: Phosphorus Results



Rock Creek: Bioavailable Nutrient Results



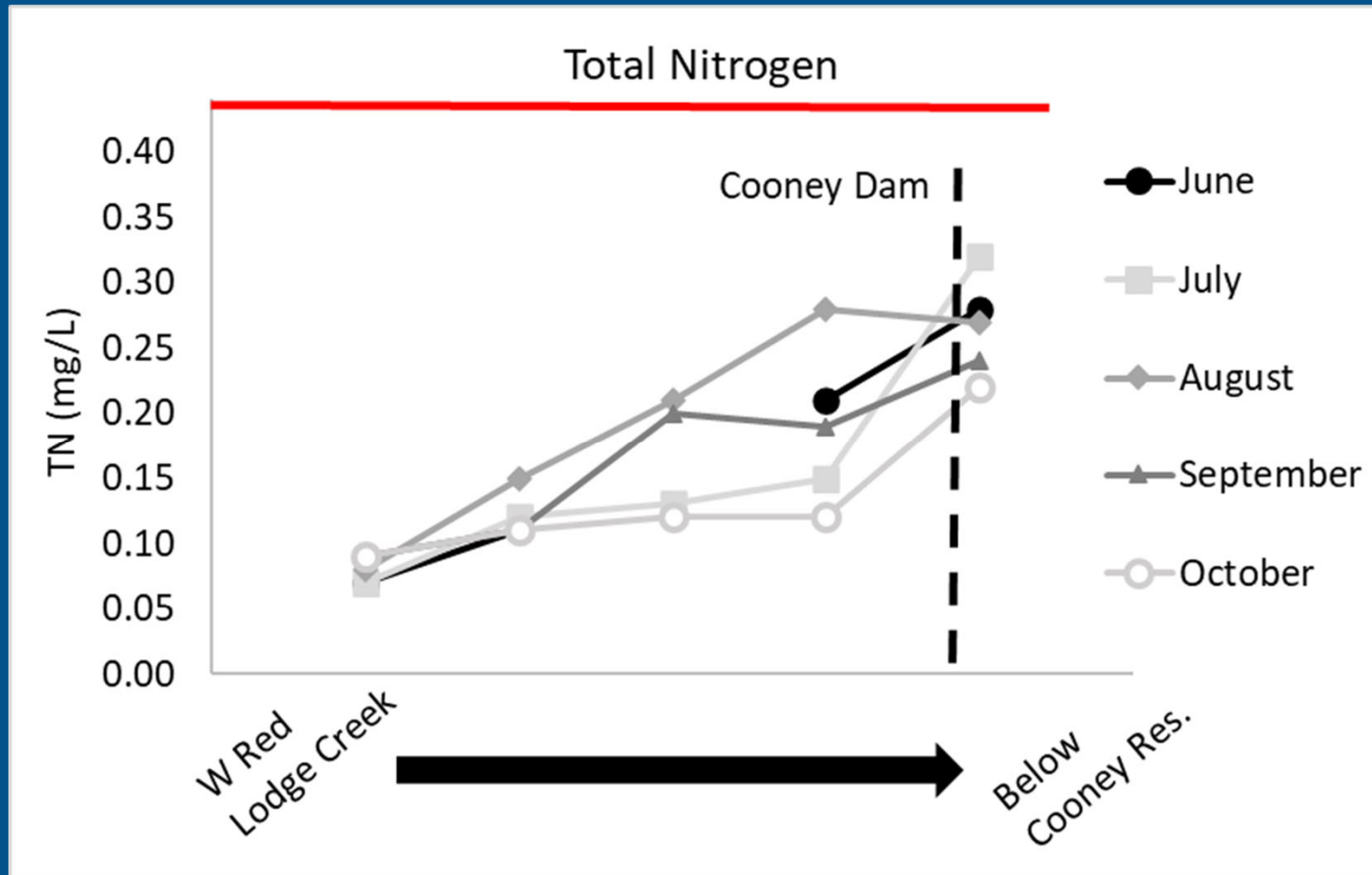
Nitrate/Nitrite Threshold = 0.1 mg/L

Only applied July - September

Red Lodge Creek Nutrient Results



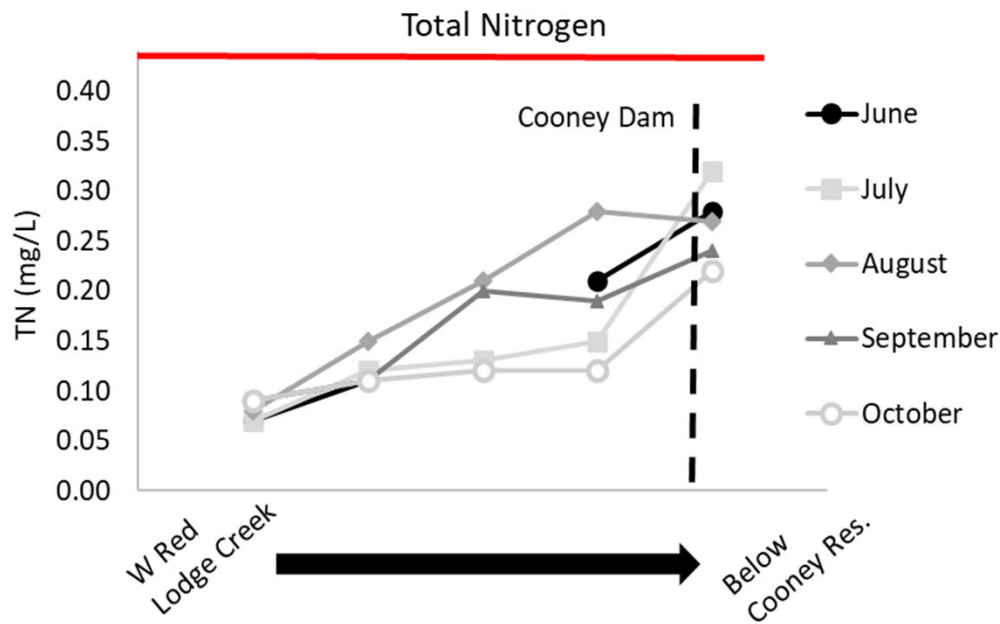
Red Lodge Creek: Nitrogen Results



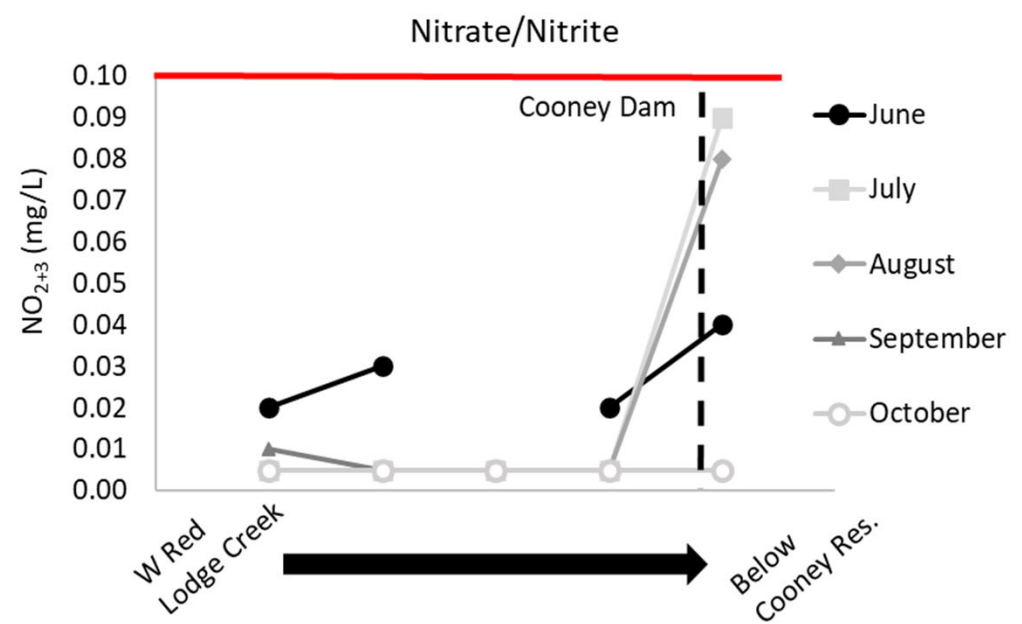
Total Nitrogen
Threshold = 0.44
mg/L

Only applied
July - September

Red Lodge Creek: Nitrogen Results

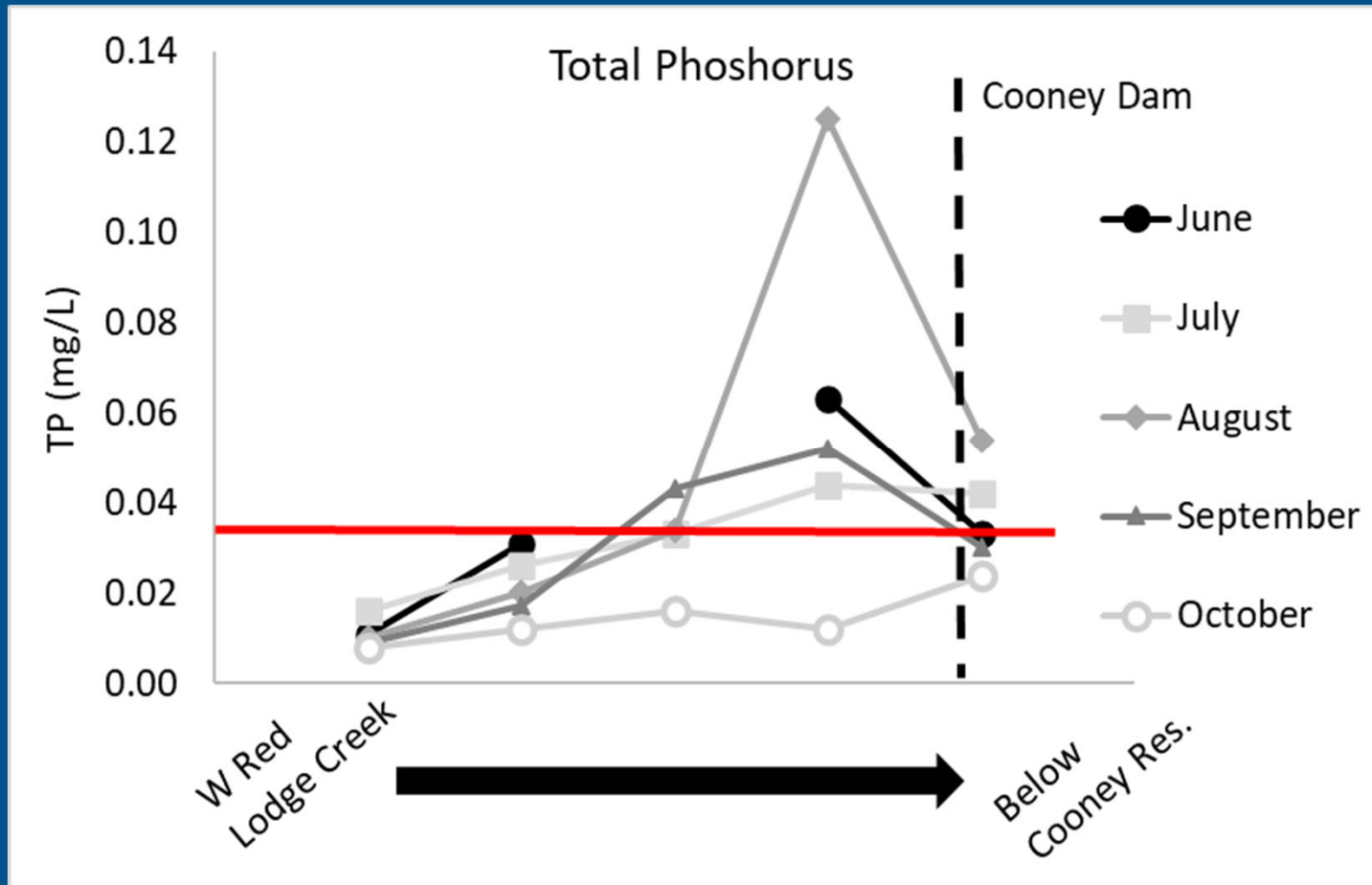


Total Nitrogen Threshold = 0.44 mg/L
Only applied July - September



Nitrate/Nitrite Threshold = 0.1 mg/L
Only applied July - September

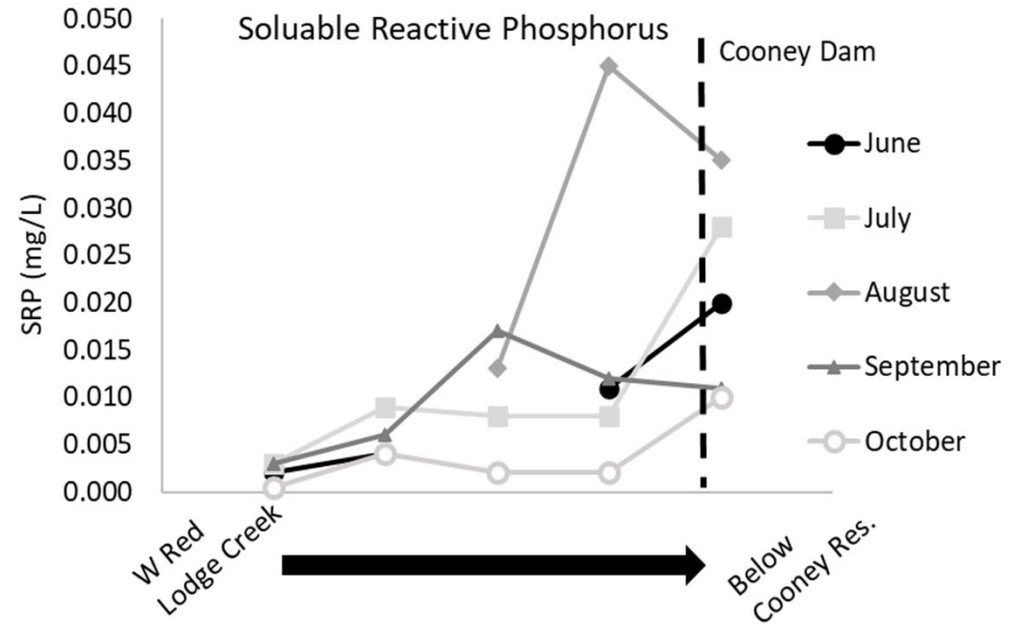
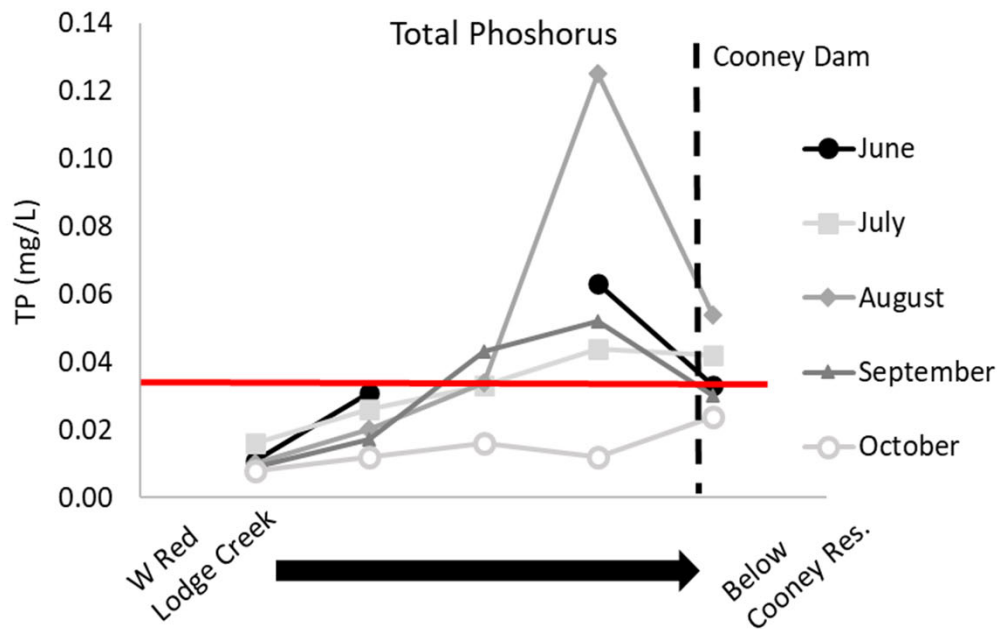
Red Lodge Creek: Phosphorus Results



Total
Phosphorus
Threshold =
0.033 mg/L

Only applied July
- September

Red Lodge Creek: Phosphorus Results



Total Phosphorus Threshold = 0.033 mg/L

Only applied July - September

A scenic photograph of a river with a dense line of trees on the opposite bank. The trees have vibrant yellow and orange autumn foliage. The water is calm, reflecting the trees and the clear blue sky. A semi-transparent blue rectangular box is centered over the middle of the image, containing the title text in white.

Clarks Fork Yellowstone Watershed Metals Results

Definitions: Metals Standards

- Chronic Standard: Long duration at a lower concentration.
- Acute Standard: Short duration at a higher concentration.
- Hardness Dependent Standards: Acute and chronic toxicity is dependent on hardness concentrations.

Clarks Fork Yellowstone River: Metals Results

- Aluminum (Aquatic Life): 2 chronic exceedances
- Copper (Aquatic Life): 2 acute exceedances and 9 chronic exceedances
- Iron (Aquatic Life): 25 chronic exceedances * Iron concentrations are high
- Lead (Aquatic Life): 9 chronic exceedances

Rock Creek: Metals Results

- Iron (Aquatic Life): 2 chronic exceedances
- Lead (Aquatic Life): 2 chronic exceedances

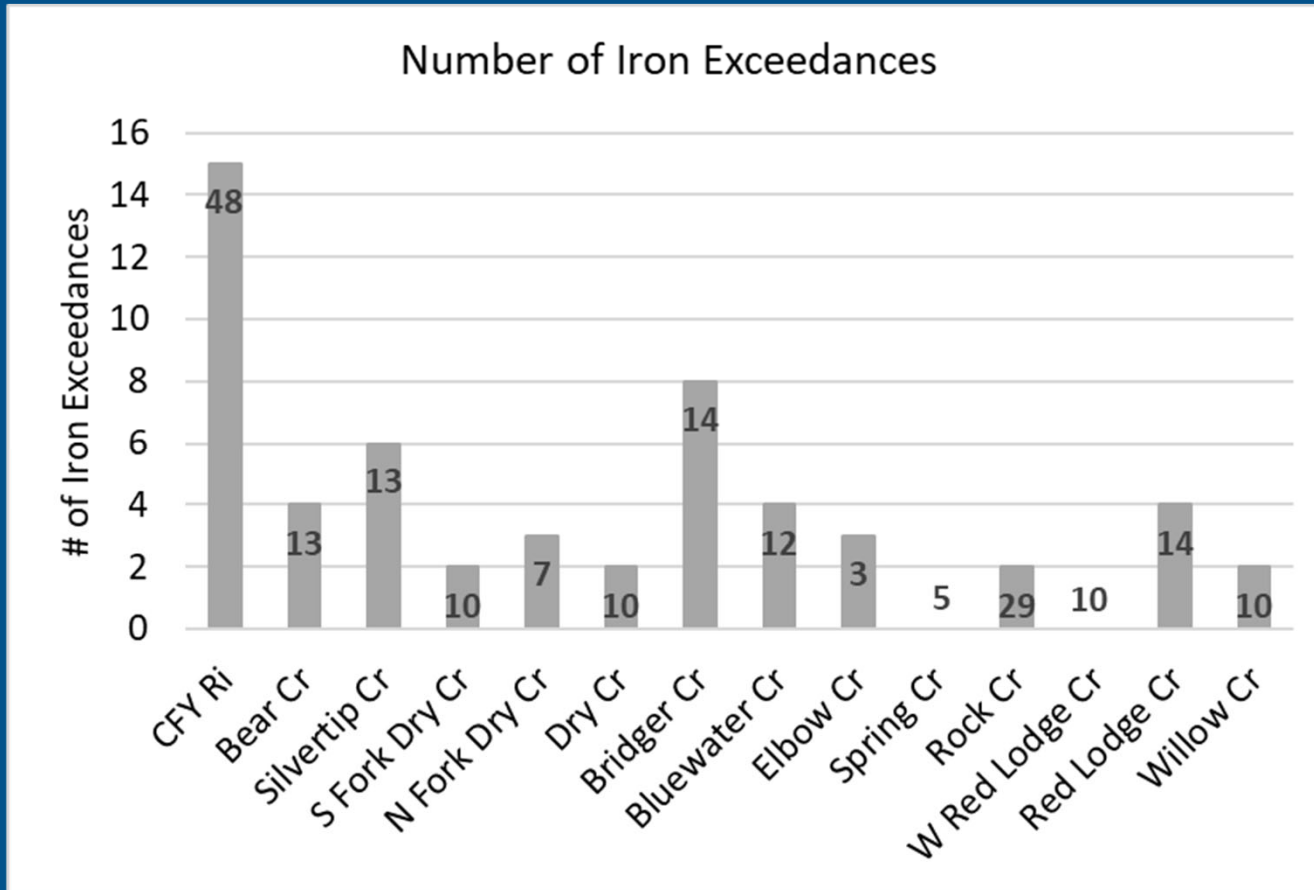
Silvertip Creek: Metals Results

- Arsenic (Human Health): 6 acute exceedances
- Lead (Human Health): 1 acute exceedance
- Copper (Aquatic Life): 1 acute exceedance
- Iron (Aquatic Life): 6 chronic exceedances
- Lead (Aquatic Life): 2 chronic exceedances

Clarks Fork Yellowstone Tributaries: Metals Results

- Selenium (Aquatic Life): 16 chronic exceedances
- Lead (Aquatic Life): 4 chronic exceedances

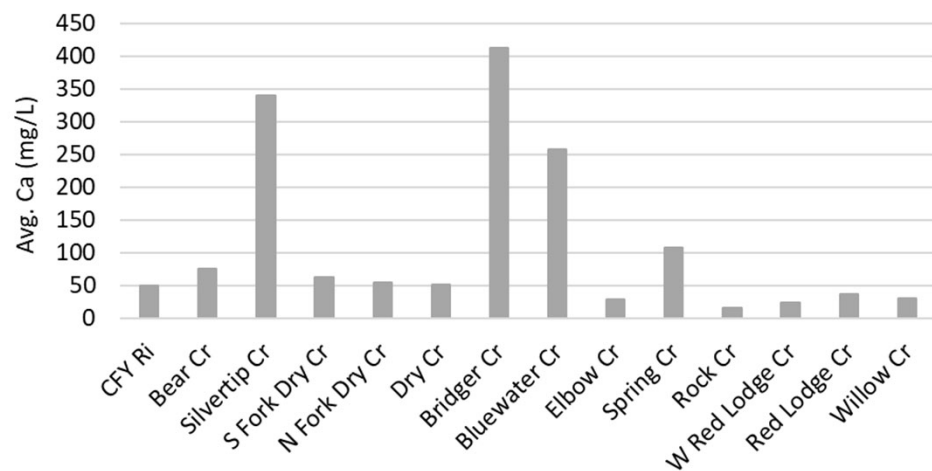
Clarks Fork Yellowstone Watershed: Iron



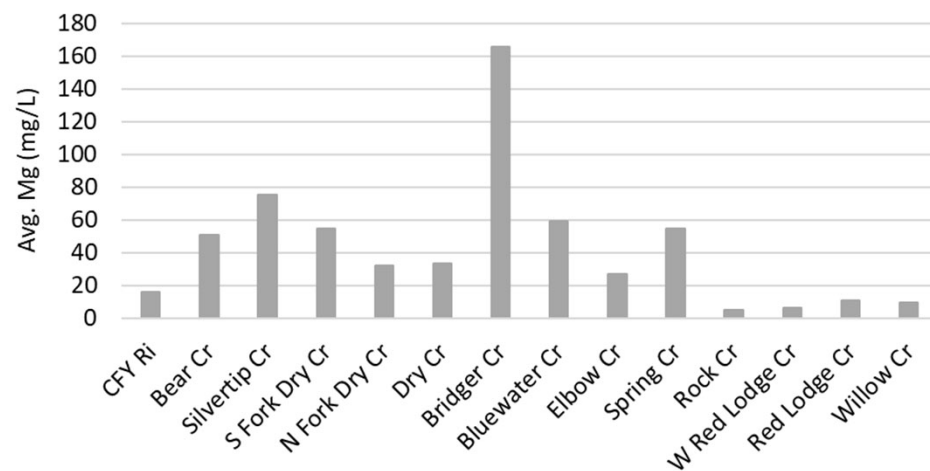
Number listed on the graph represents the total number of samples collected.

Hardness Results

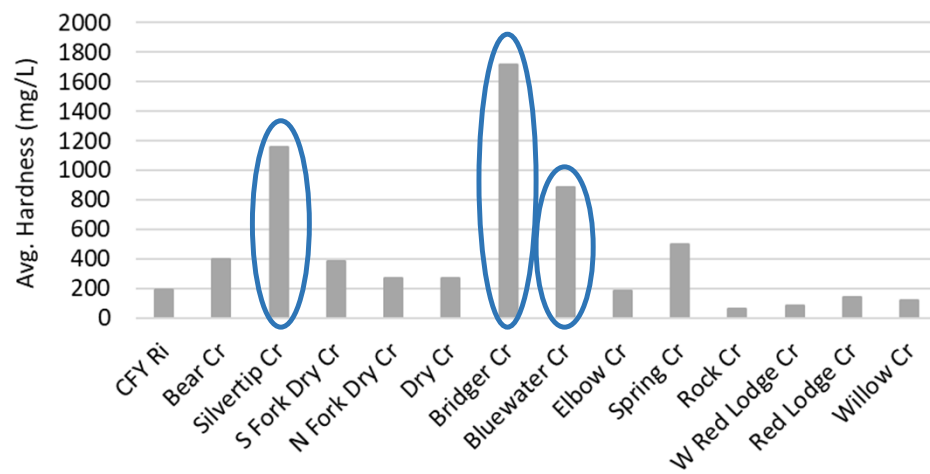
Average Calcium



Average Magnesium



Average Hardness



2022 Monitoring Key Points

- Elevated metals during runoff.
- Exceedances of nutrient thresholds
 - Important to monitor response variables



2023 Monitoring

- Cooney Reservoir: Nutrients, Algae, Metals, E.coli
- Response variable monitoring: Algae, Dissolved Oxygen, and Macroinvertebrates)
- E.coli monitoring on CFY and Rock Creek
- West Fork Rock Creek monitoring site
- One Spring Creek site will be dropped due to being dry each monitoring run.
- High Conductivity: Add sulfate, sodium, chloride, and TDS monitoring.

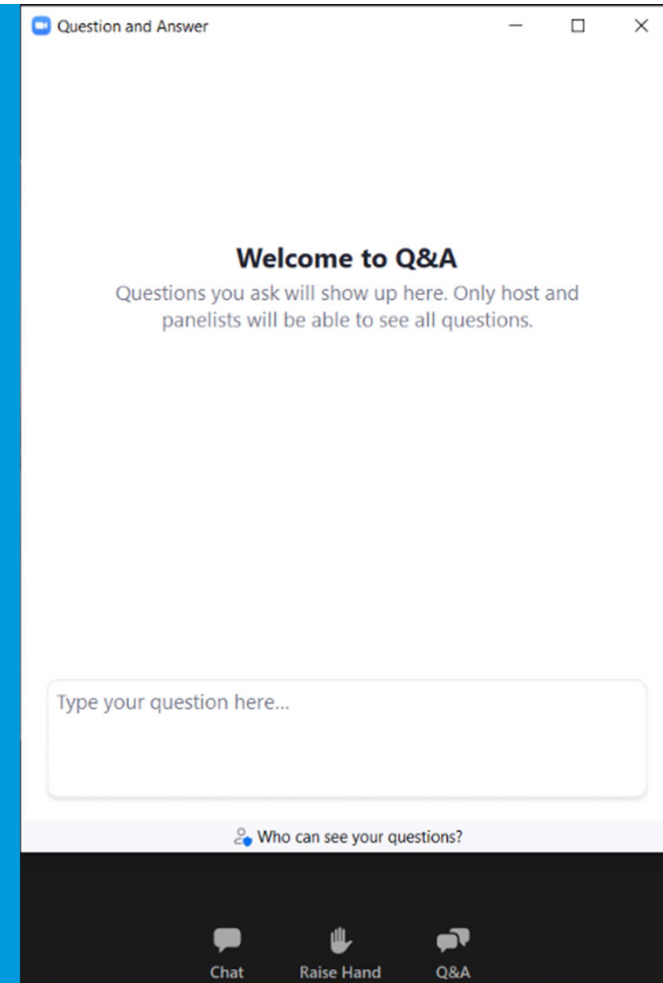
A photograph of a person walking away from the camera on a dirt path through a forest. The trees have vibrant yellow and orange autumn foliage. The person is wearing a light blue shirt, dark pants, and a hat, and is carrying a bag. The path leads towards a bright light source, possibly the sun, creating a warm glow. The text "Special Thank You!" is overlaid on the image in a semi-transparent orange box.

Special Thank You!

- Landowners
- Clarks Fork Yellowstone Partnership
- Carbon County Conservation District
- NRCS

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