Gallatin River
Water Quality Monitoring Project

April 22, 2024

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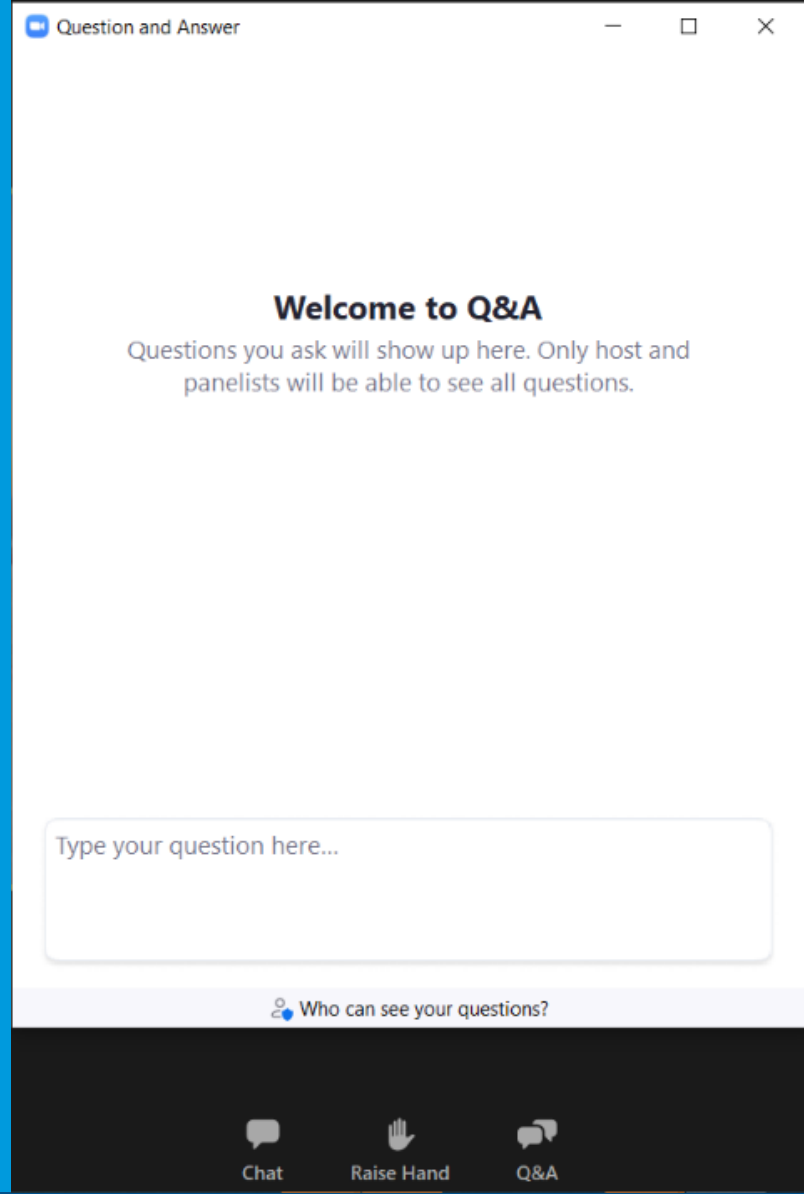
Questions or Comments

- 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



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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.

Gallatin River Monitoring Project

- Motivations & timeline
- Objectives
- Algae growth complexities
- What an impaired listing means

Gallatin Watershed Council

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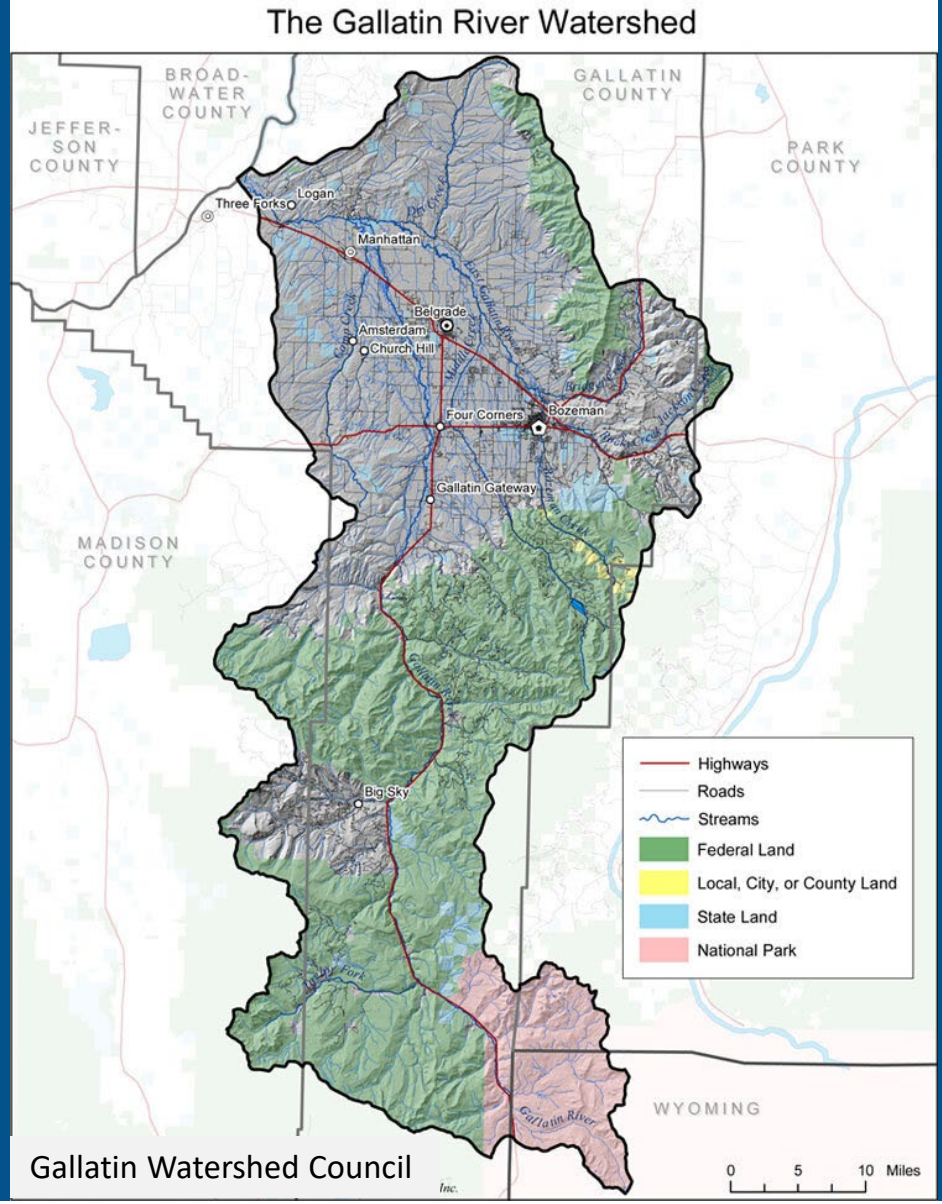
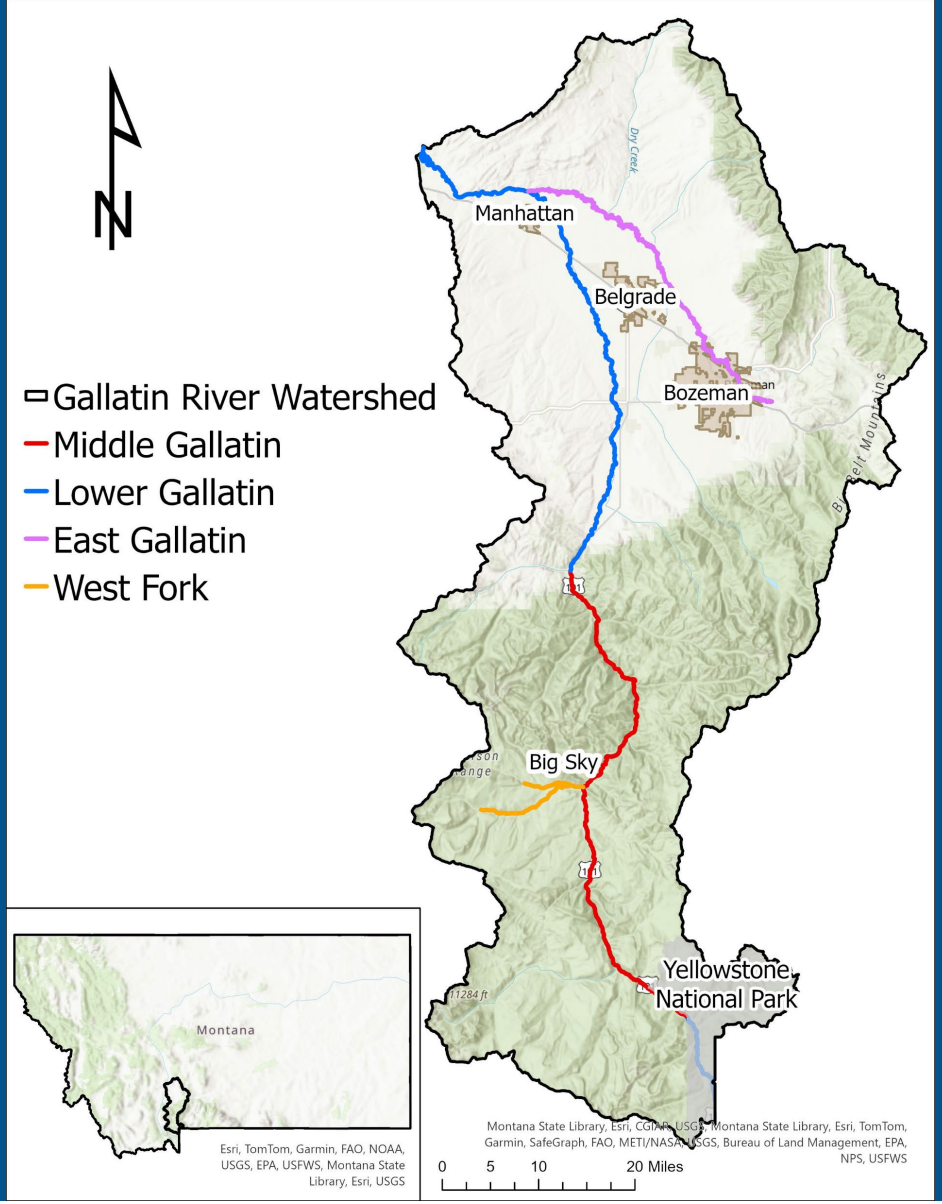
The Gallatin River Watershed

- What is a watershed?
- The Gallatin River Watershed
- Downstream transitions & jurisdictions



The Gallatin River Watershed

- Waterbody classification
- Applicable standards
- Assessment units



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Today's Agenda

DEQ study goals

- Assessment: Listing decision, further documentation of existing conditions, and intensive monitoring
- Research: Determine what is causing algae growth (Middle Gallatin)
- Sources: Location and quantity of pollutants entering river (TMDLs)
- Partnerships/solutions: Community involvement in Watershed Restoration

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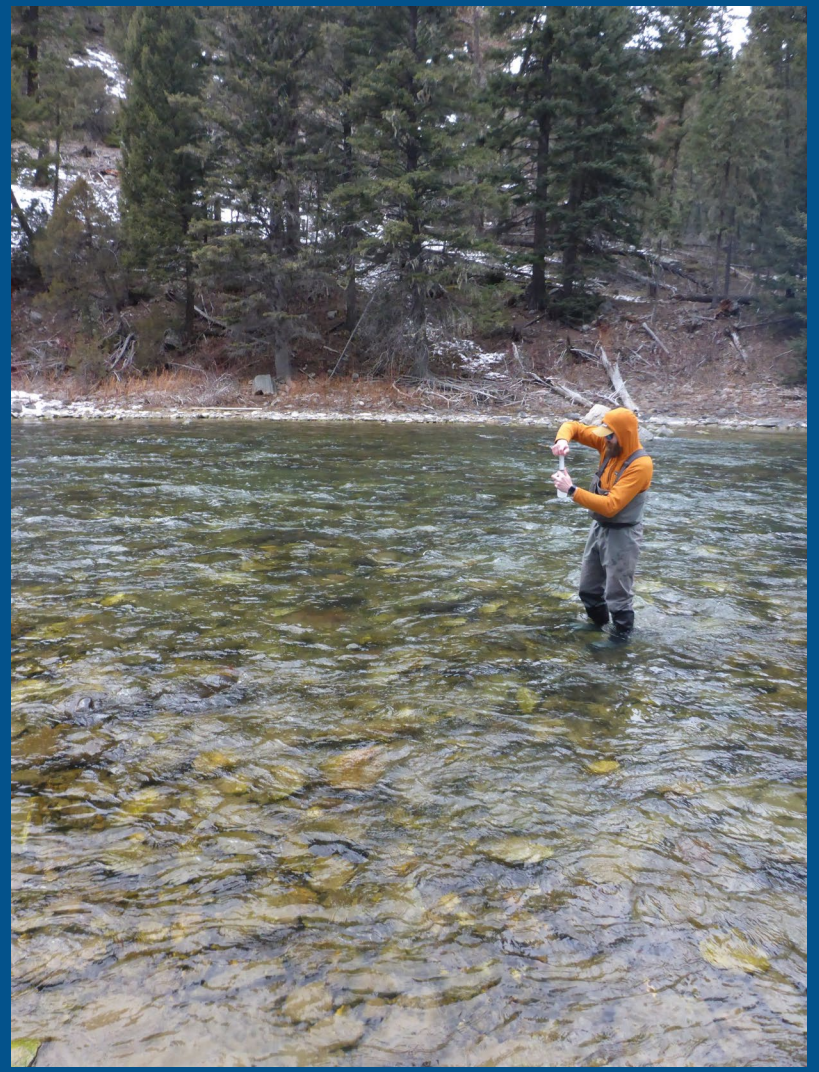
Monitoring & Assessment

- Water Quality
  - What is an impairment listing?



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Middle Gallatin Listing Decision

- March 31st, 2022 - DEQ received petition to list
  - Upper Missouri Waterkeeper
  - Montana Trout Unlimited
  - Gallatin River Task Force
  - American Rivers
  - Greater Yellowstone Coalition

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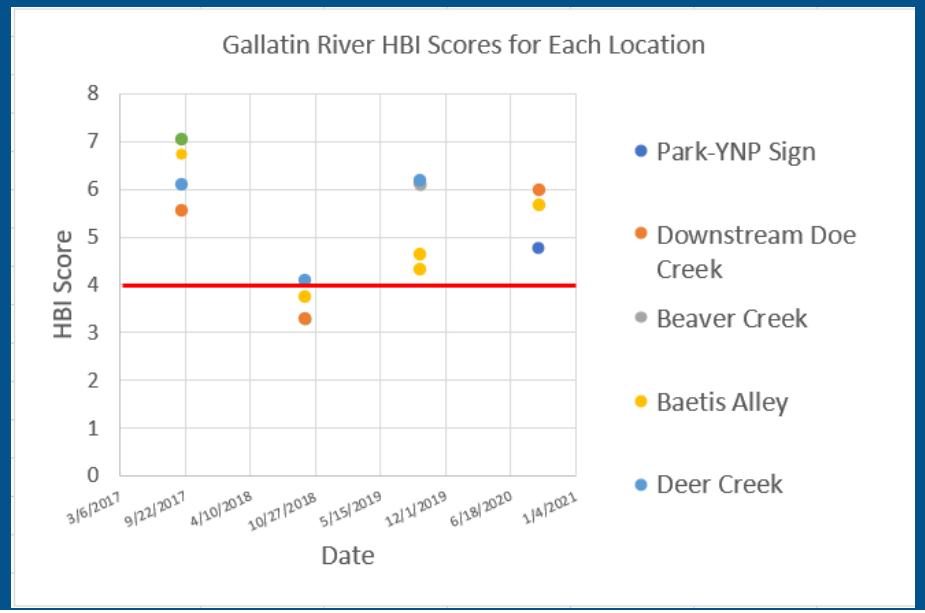
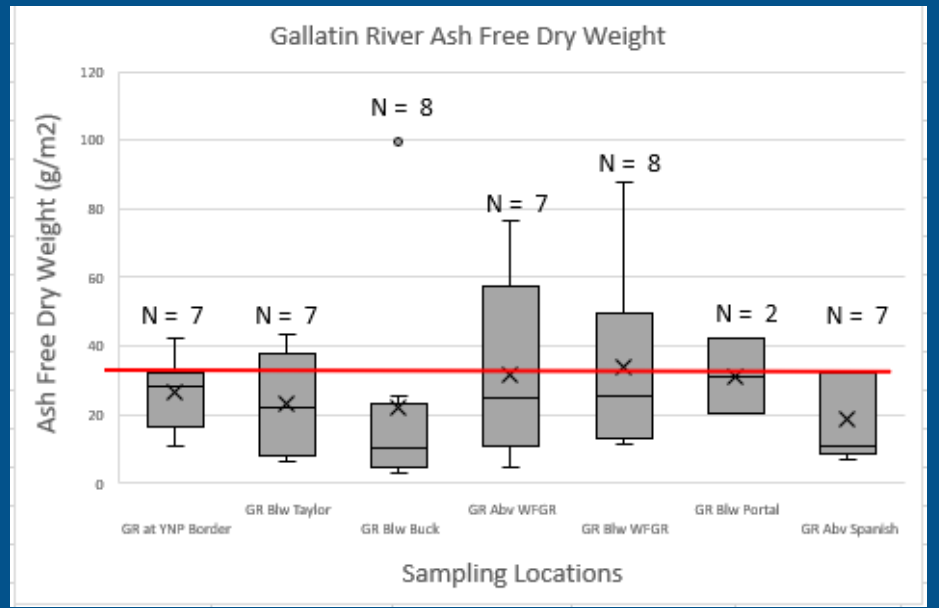
Middle Gallatin Listing Decision

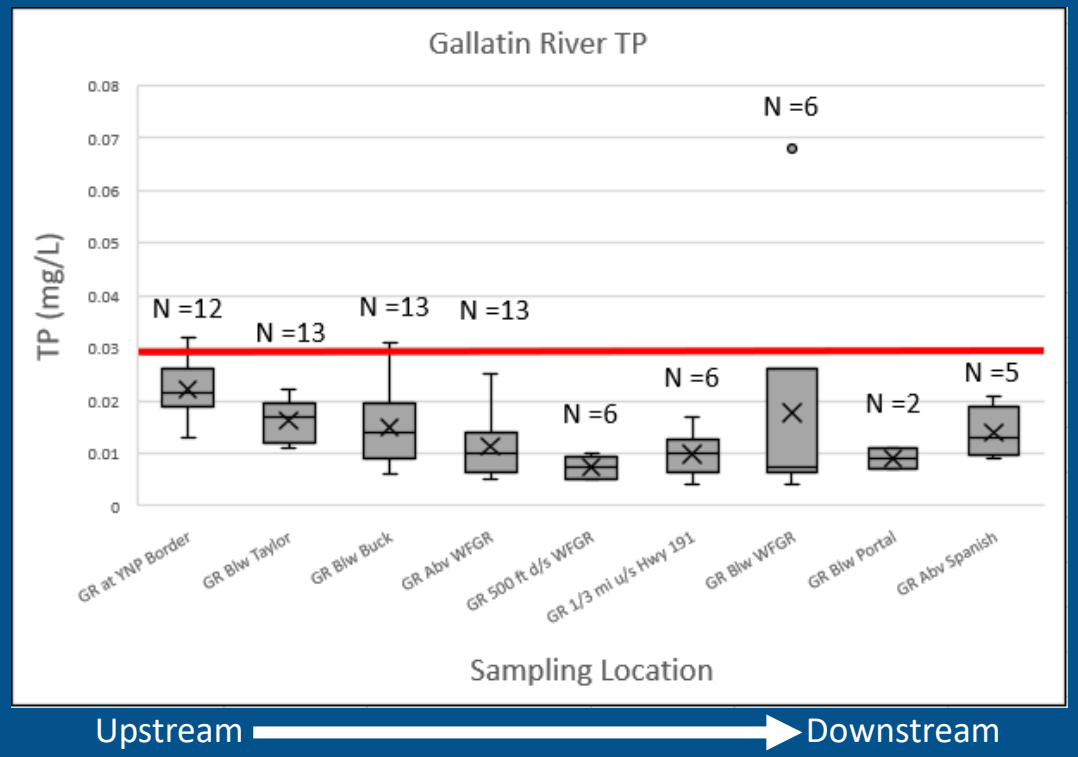
- DEQ decided to list for excess algae growth
- May 9th, 2023 – EPA approved DEQ decision to list
- Listing = more attention & resources



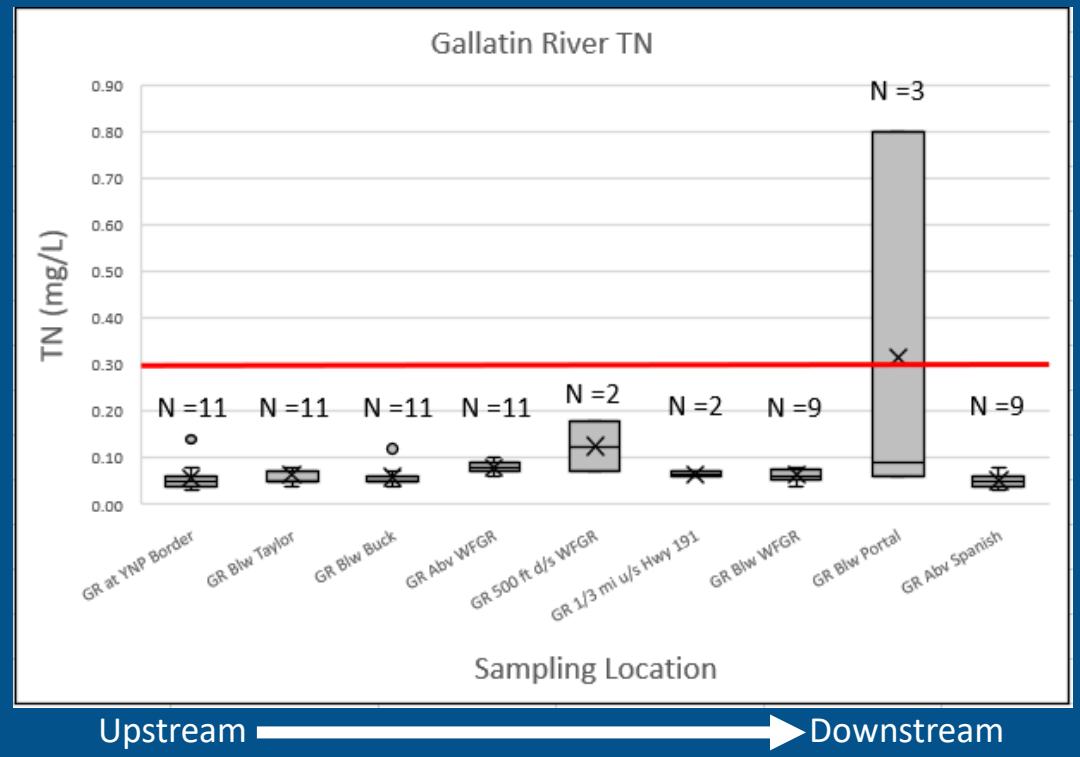


Middle Gallatin Listing Decision

- More data is needed to determine causes of algae growth



Upstream → Downstream

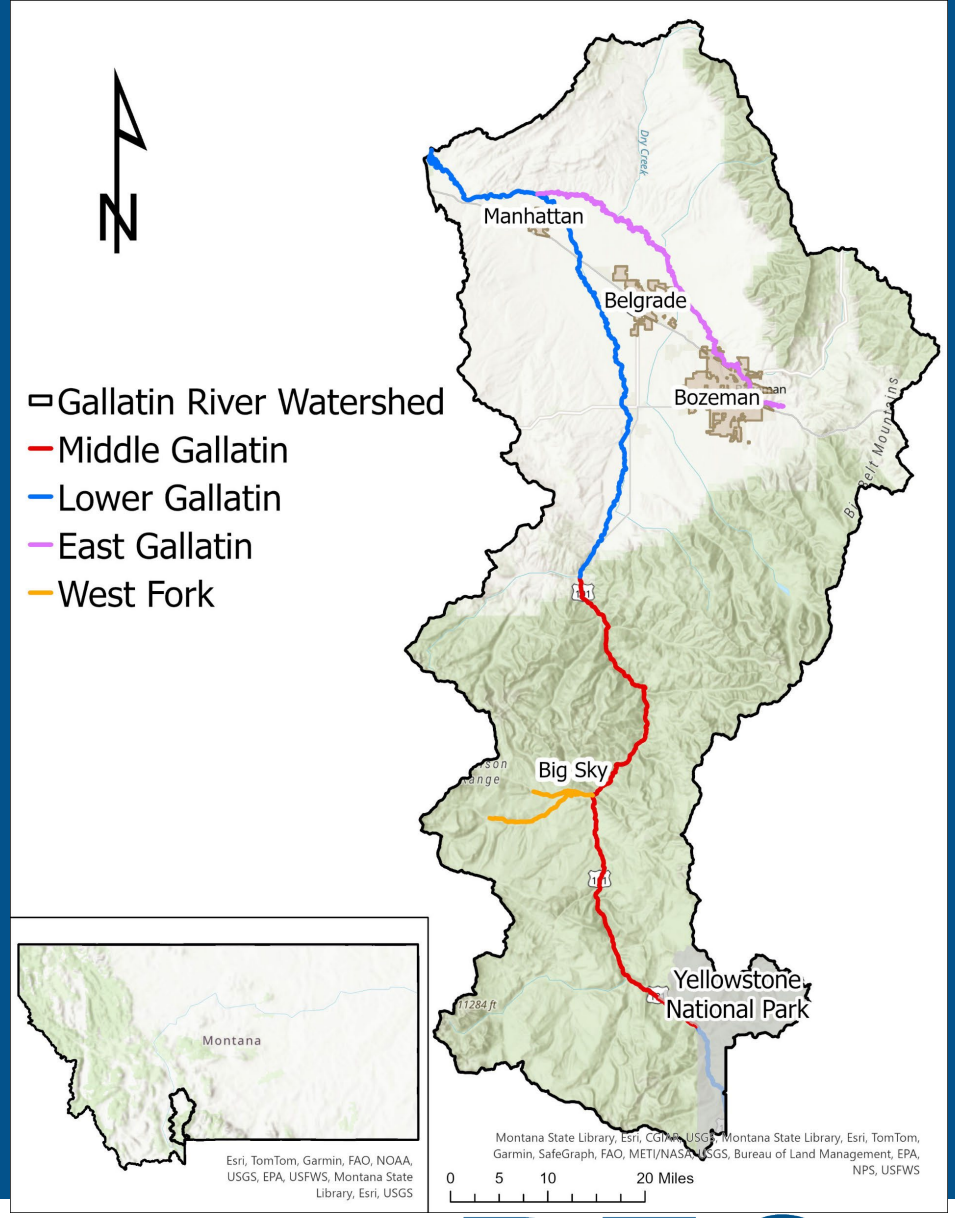


Upstream → Downstream

Monitoring

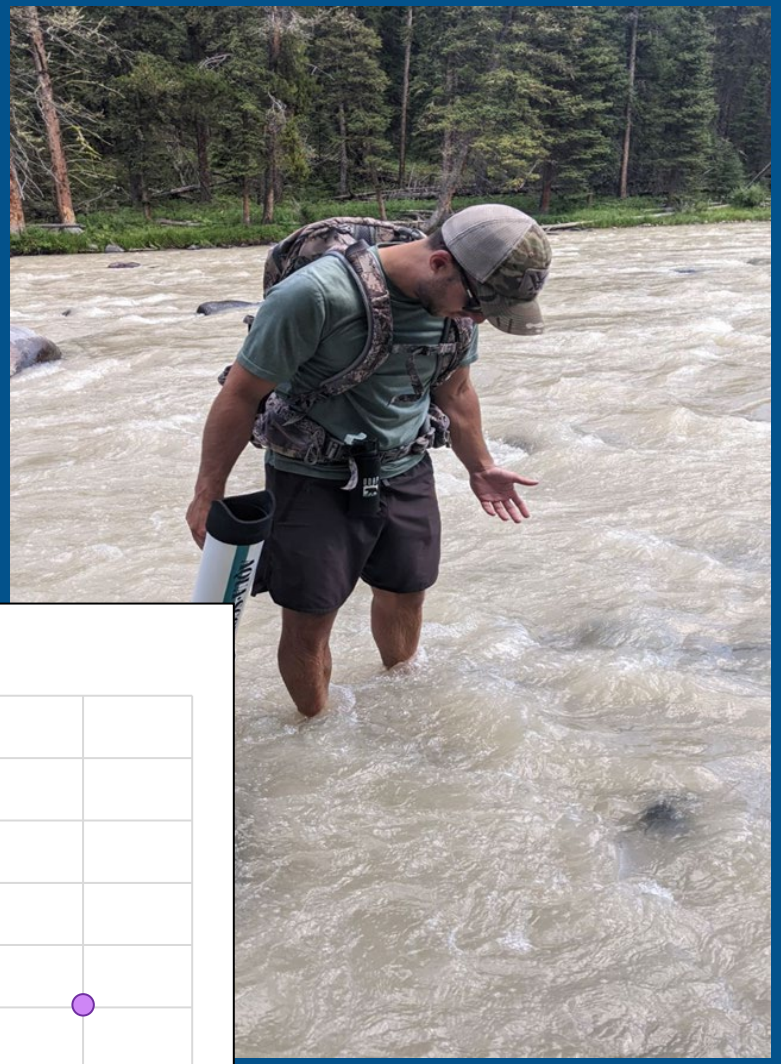
- Middle Segment
  - Tributaries
    - Gallatin River Task Force
- Algal Study
  - More extensive monitoring and experiments

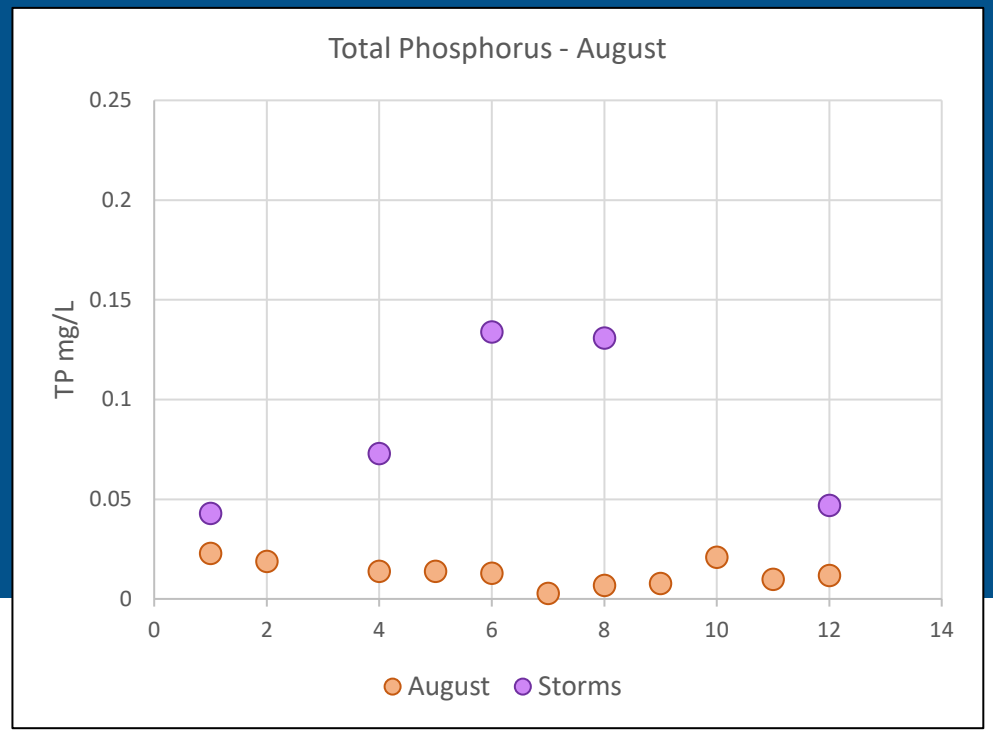
- Lower Segment & West Fork
  - Beneficial use assessment updates



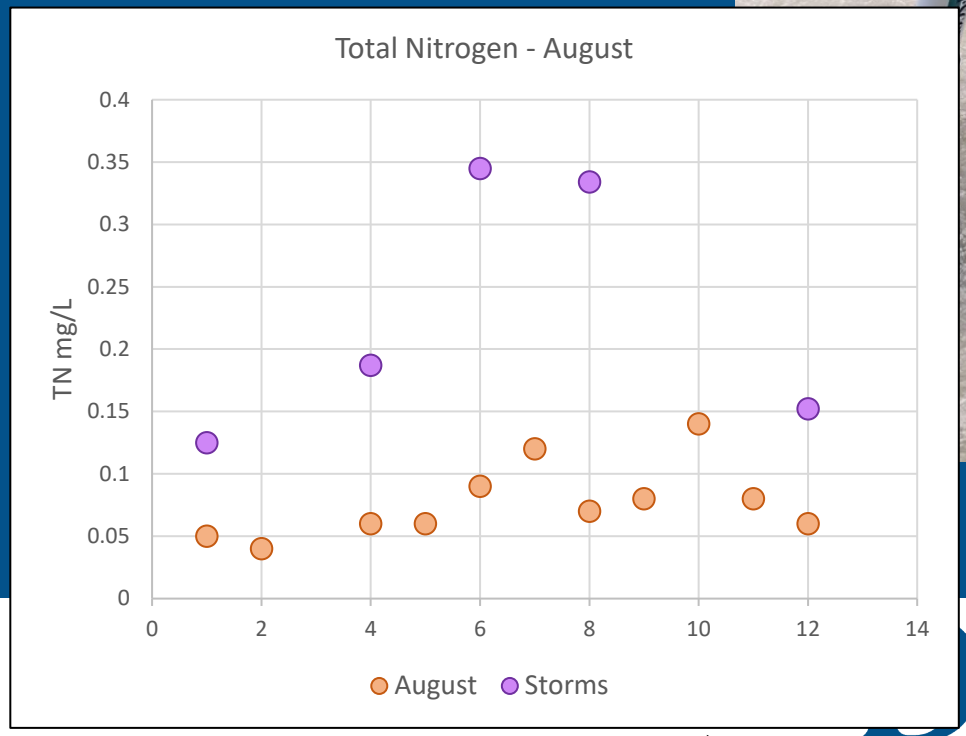
2023 Observations

- 1st year of sampling
- High flows
- Frequent storms
- Low algal growth





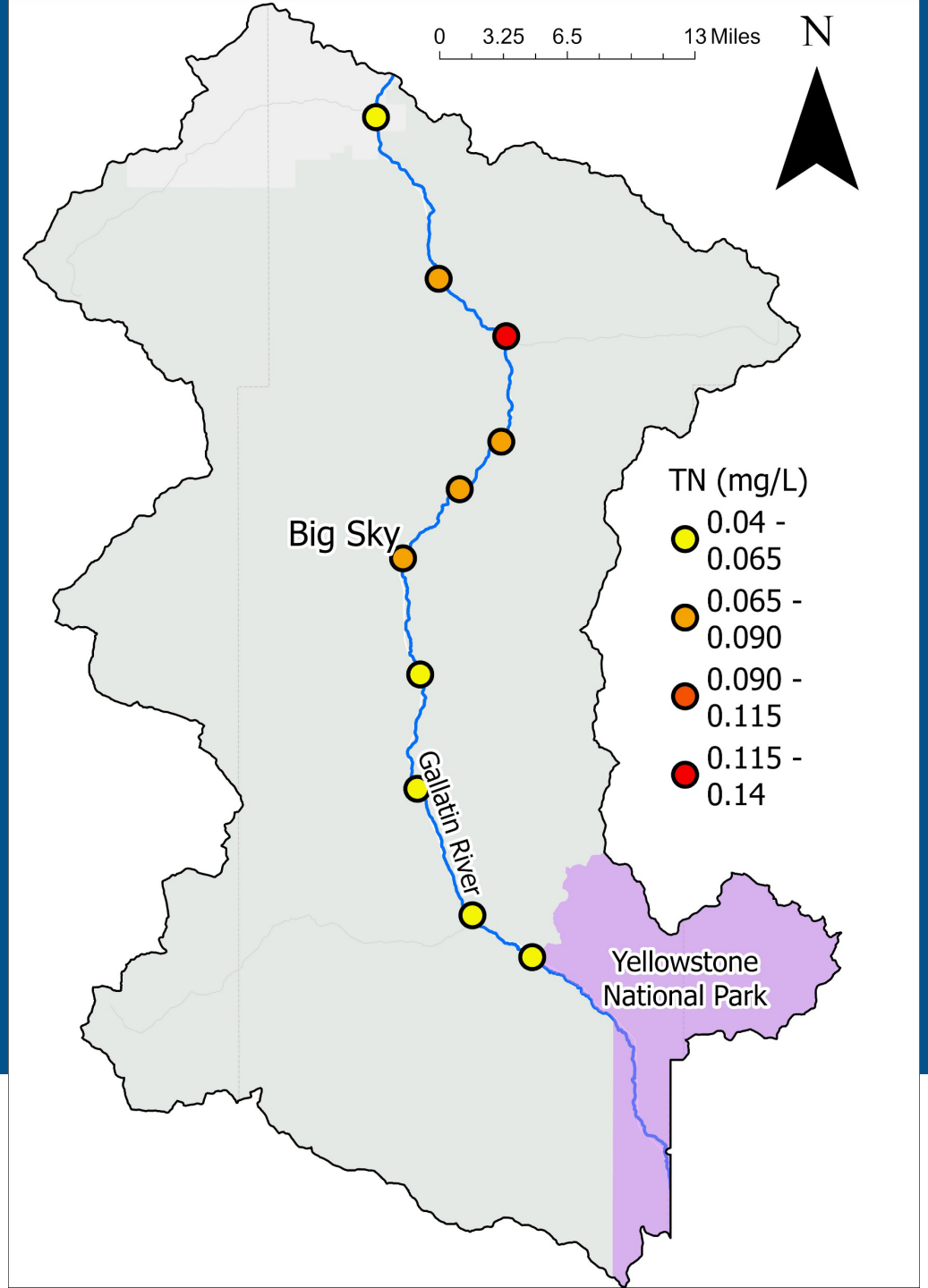
Upstream → Downstream



Upstream → Downstream

2023 Observations – Nutrients, May-October

- Total Nitrogen
  - Highest just upstream & downstream of West Fork, Swan Creek



Total Nitrogen (mg/L)

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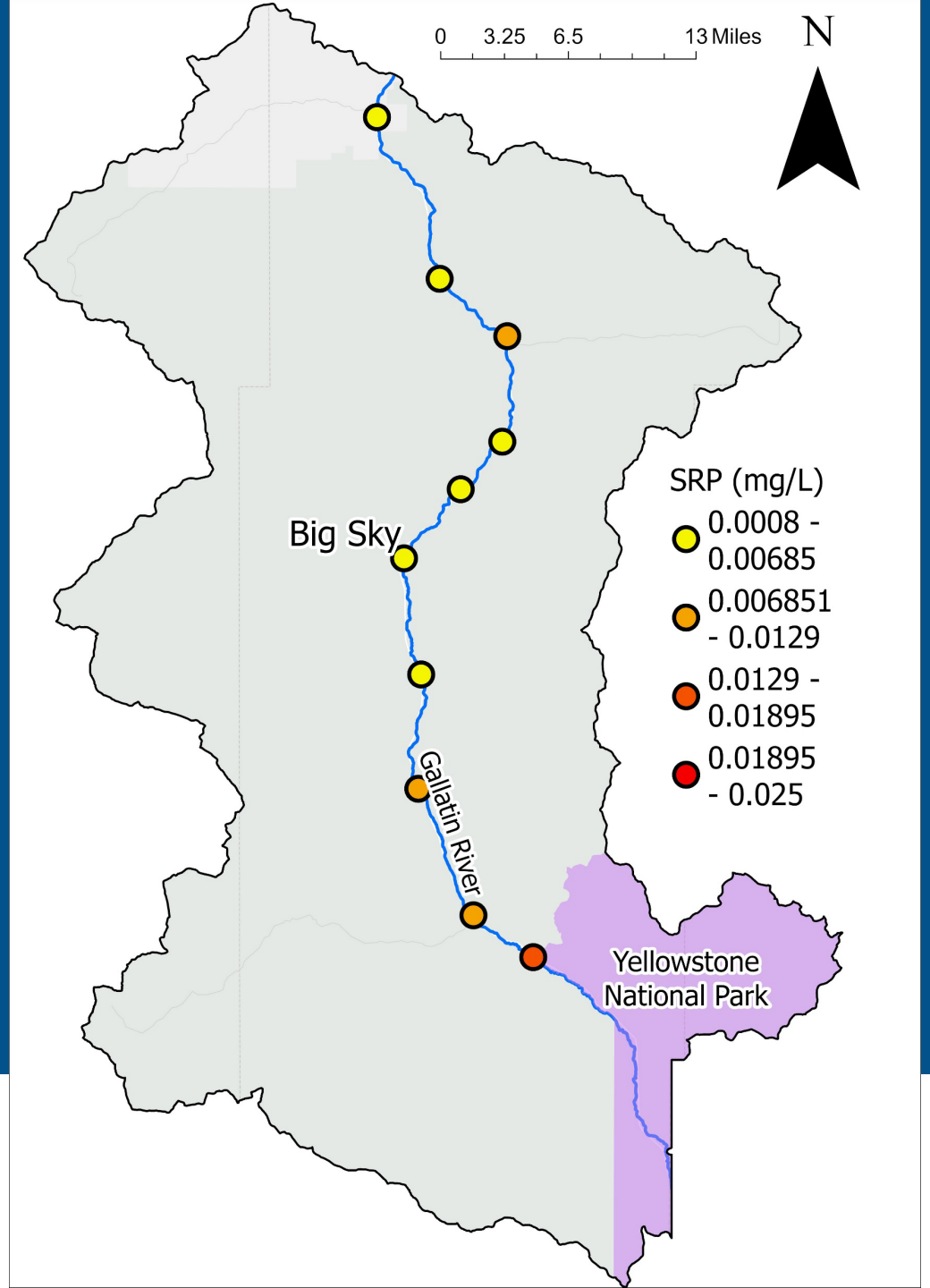

2023 Observations – Nutrients, May-October

- Total Nitrogen
  - Highest just upstream & downstream of West Fork, Swan Creek
- Soluble Reactive Phosphorus (SRP)
  - Different pattern

Soluble Reactive Phosphorus (mg/L)

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2023 Observations – Algae

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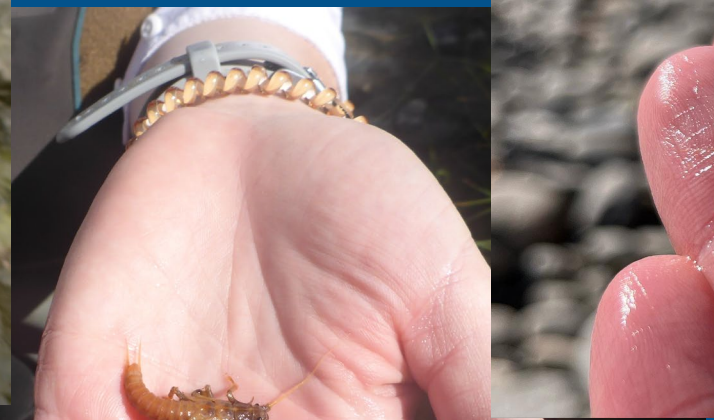
2023 Observations – Macroinvertebrates (Bugs)



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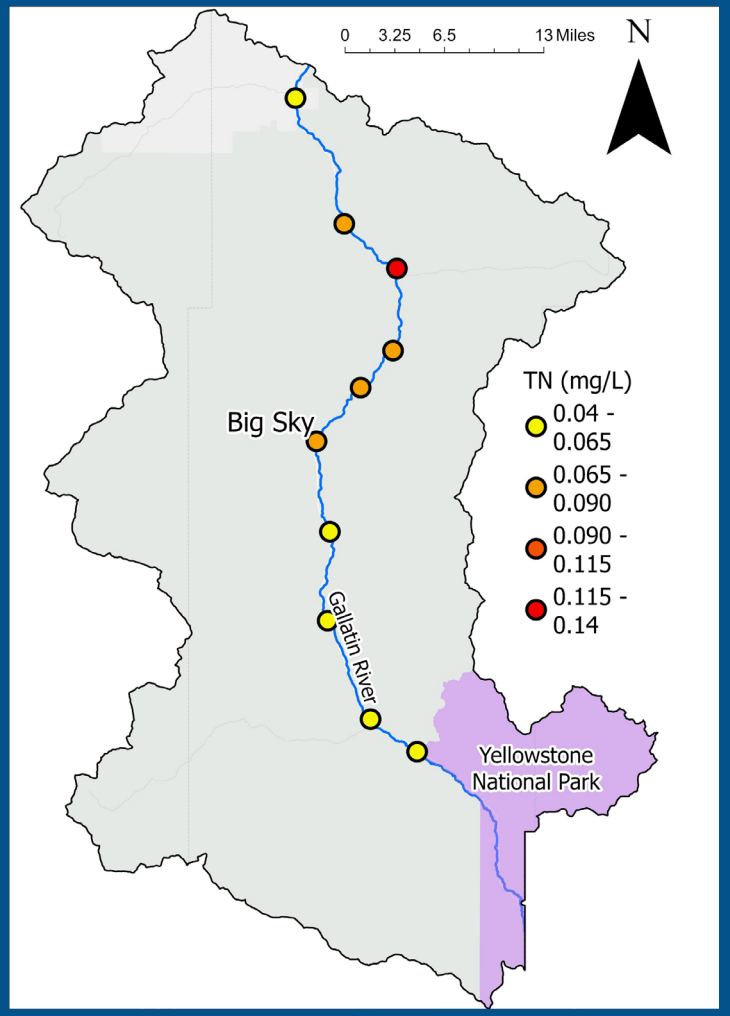
2023 Initial Findings

- More summer thunderstorms than usual
  - Large sources of natural phosphorus
- Low algae compared to previous year (higher murkiness/turbidity)
- Elevated total nitrogen concentrations just upstream & downstream of West Fork, Swan Creek



2024 Monitoring

- More sampling events
- More sampling sites
- Model sampling

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Research: What causes algae growth?

shade

Filamentous Algae Growth:
Complex Interactions

Light

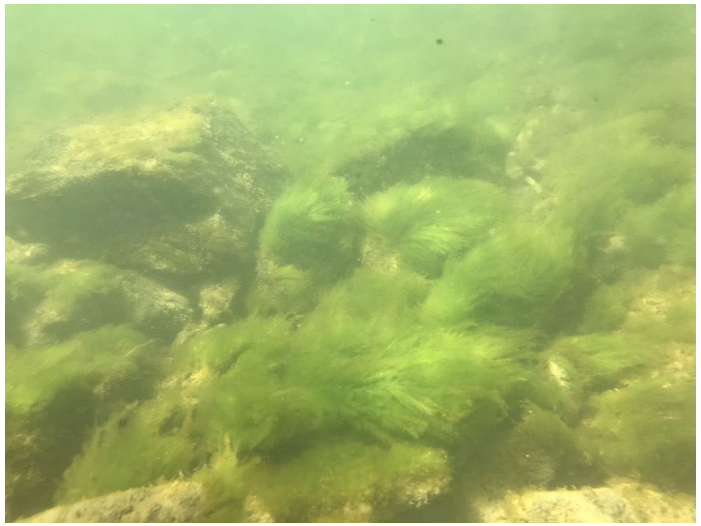
Air Temperature

Magnitude of spring flood

Water Temperature

Algae Growth & Death

Water Depth



Nutrients

Phosphorous

Nitrogen

Groundwater Interactions

Biological interactions

How to Determine Causes of Algae Growth

1. Nutrient limitation experiments
2. Patterns: when nitrogen and phosphorous, temperature, or light increase in river, does algae increase?
3. Modeling of Processes: Nutrients + Light + Temperature + Stream Flow = Algae

The Gallatin River upstream of West Fork, near Big Sky

Nutrient Limitation Experiments

Control

Add Nitrogen

Add Nitrogen and Phosphorous

Add Phosphorous

2023 Results:

-No additional growth (*chlorophyll a*) with added phosphorous

-2 X additional growth with added nitrogen

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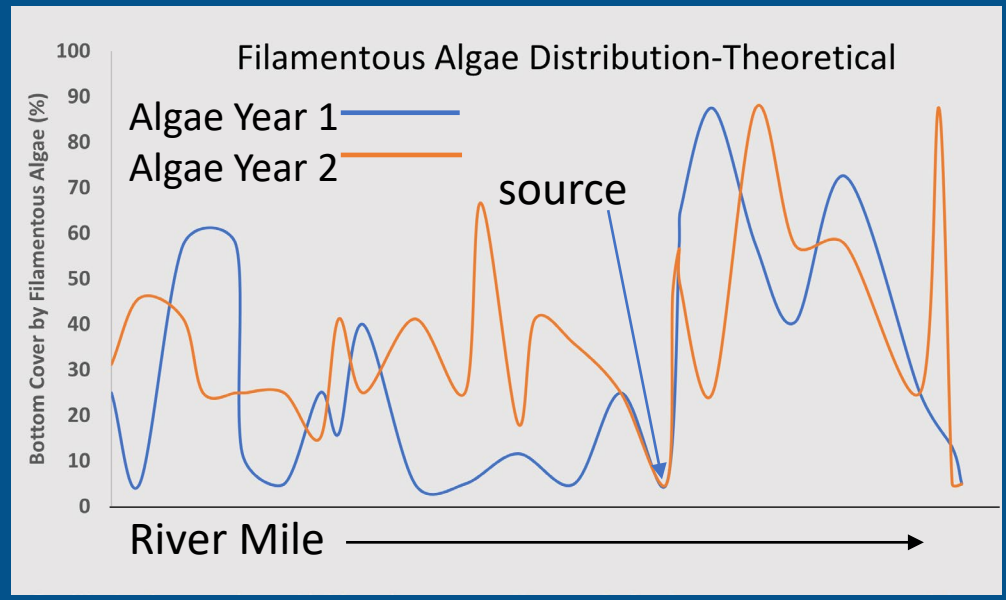
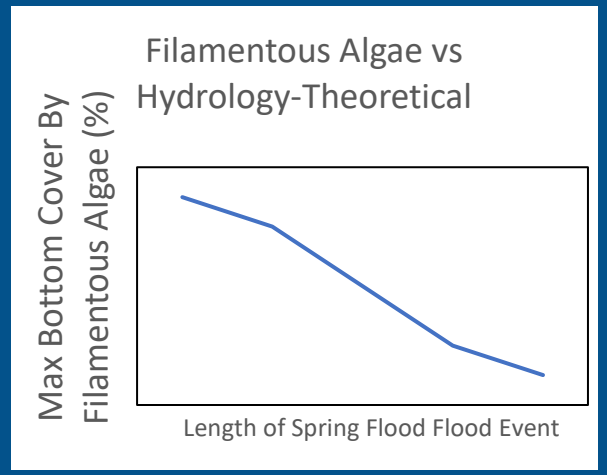
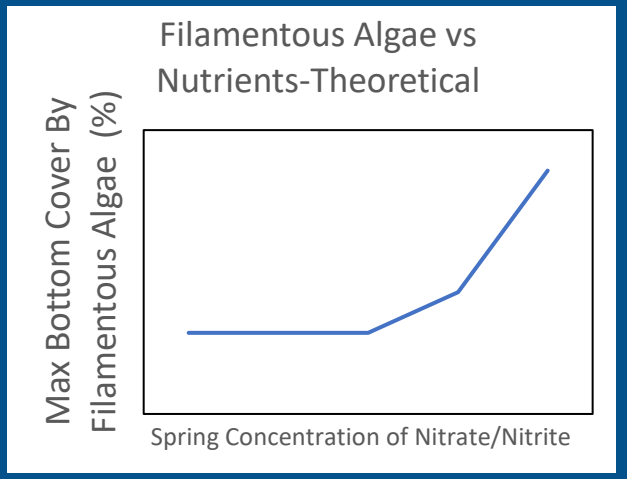
Patterns

- Nutrients
- Algae
- Suspended Sediment
- Temperature
- Light
- Dissolved Oxygen
- Stream Flow







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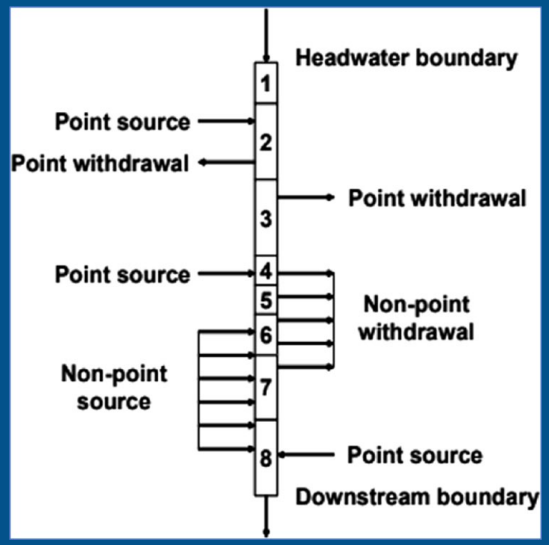
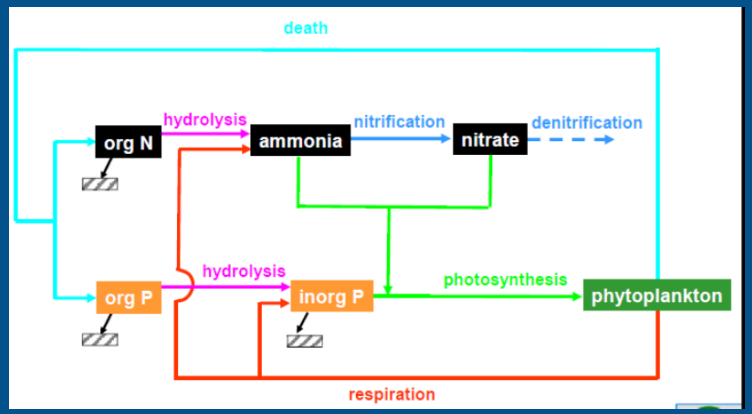
Modeling of Processes

- Identify and quantify inputs (temperature, light, and nutrients)
- Account for internal transformations (equations)
- Calibrate: adequately predict current conditions
- Simulate: how reductions in inputs would affect algae

Identify inputs



Account for internal transformations



Qual2k Model Development: Additional Monitoring

Started in 2023:

- Bioavailable phosphorous monitoring (P bound in suspended sediments)
- Aerial drone imagery

Beginning in 2024:

- Continuous turbidity and flow monitoring
- Light-turbidity relationships
- Winter and night water quality sampling

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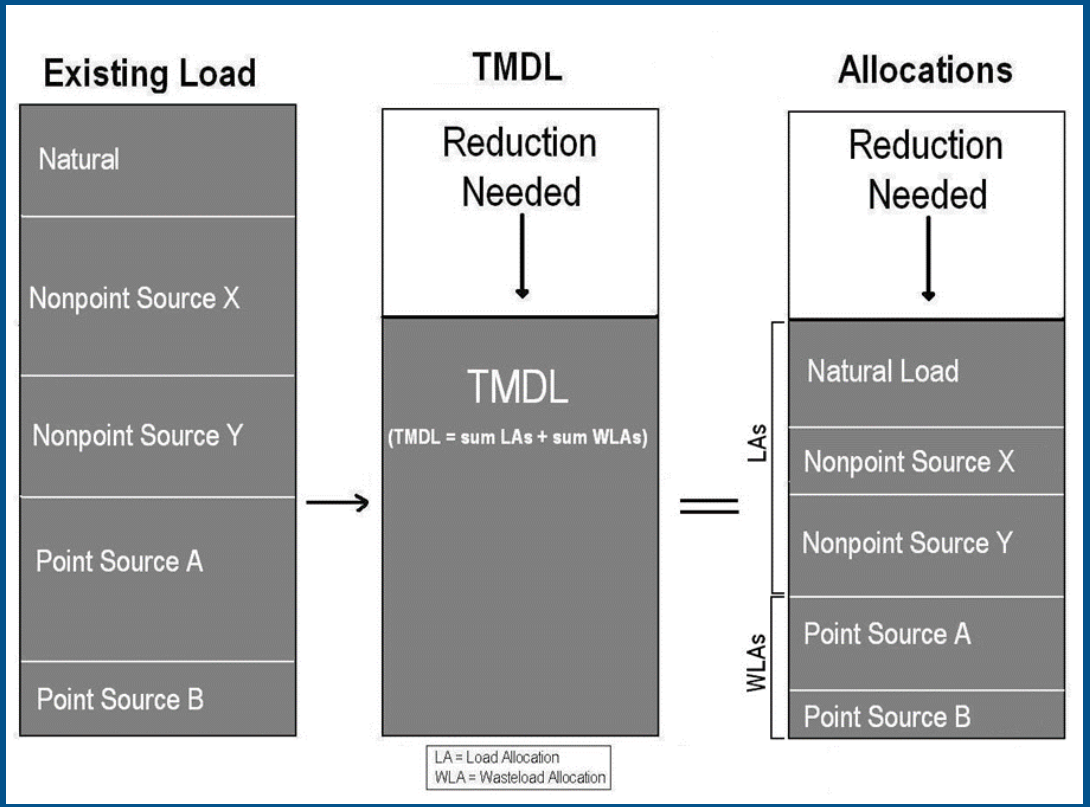
Source Assessment and TMDL Development

- Quantify pollutant loads and sources
  - Point, nonpoint, natural/background
- TMDLs are developed for each waterbody-pollutant combination
- Assign realistic reduction goals to each source
- Outline methods to achieve load reductions



Benefits of TMDLs

- Incorporate multiple source types
  - Both regulated and non-regulated
- Address cumulative impacts
- Guide future restoration work and prioritization of projects
- Help the local community and landowners identify the best ways to protect water quality

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Nonpoint Source & Wetland Section

Local Stakeholder Support for Planning & Projects

Photos: GWC

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TMDL:

- Developed by DEQ
- Identifies the pollutant sources
- Outlines reductions needed for a stream to achieve its uses
- “The math and the path”

WRP:

- Developed by community stakeholders
- Marries TMDL findings with local priorities, challenges & opportunities
- Prioritizes on-the-ground projects (restoration) that lead to water quality improvement
- “Detailed roadmap to WQ improvement”

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What can I do right now?

- Implement or plan best management practices (BMPs)
- Get involved with your local watershed group!

BMP	Description	References: Guidance documents, internet resources, NRCS Practice Standard(s), other literature	Pollutant								
			Nitrogen	Phosphorus	Sediment	Temperature	pH	Salinity	BOD	Pathogens	Toxic Chemicals
Disposal of Household Hazardous Wastes	Storing, transporting, recycling, and permanent disposal of household chemicals, batteries, used motor oil, paint, pesticides, herbicides, fertilizer, cleaning solutions, personal care products, medications, and other potentially toxic substances to prevent surface water or groundwater contamination.										X
Pet Waste Management	Removal and disposal of pet excrement, kitty litter, and soiled bedding materials to prevent them from entering surface water or groundwater.		X	X					X	X	
Septic System Maintenance	Regular inspection and cleanout of onsite wastewater treatment systems (septic systems). Repair of leaking or otherwise malfunctioning components.		X	X					X	X	X
Storm Drain Inlet Protection	Installation of grates or trash racks to catch large debris. Regular cleanout of storm drain inlets. Painting or onsite posting of information regarding storm drains discharges (e.g. a stenciled label stating " Drains to fish stream").		X	X	X				X	X	X
Lawn and Garden Fertilizer Management	Application of lawn and garden fertilizers to minimize off-site transport and deep percolation of nutrients. May include managing the amount, placement and timing of fertilizer applications.		X	X							X
Lawn and Garden Irrigation Water Management	Adjusting the amount, timing and placement of irrigation water to prevent excess surface runoff and leaching of nutrients and pesticides below the root zone. Also, choosing lawn and garden plant varieties that require the least amount of water (e.g. xeriscaping).		X	X	X	X			X		X

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Contacts

Gabrielle Metzner, DEQ, Monitoring and Assessment Section
Gallatin Monitoring Project Coordinator
Gabrielle.Metzner@mt.gov

Christy Meredith, DEQ, Standards and Modeling Section
Christy.Meredith@mt.gov

Troy Clift, DEQ, Total Maximum Daily Load Section
Troy.Clift@mt.gov

Torie Haraldson, DEQ, Nonpoint Source & Wetlands Section
Torie.Haraldson@mt.gov

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Gallatin River Task Force

Kristin Gardner
Chief Executive and Science Officer

Community Involvement in Watershed Restoration

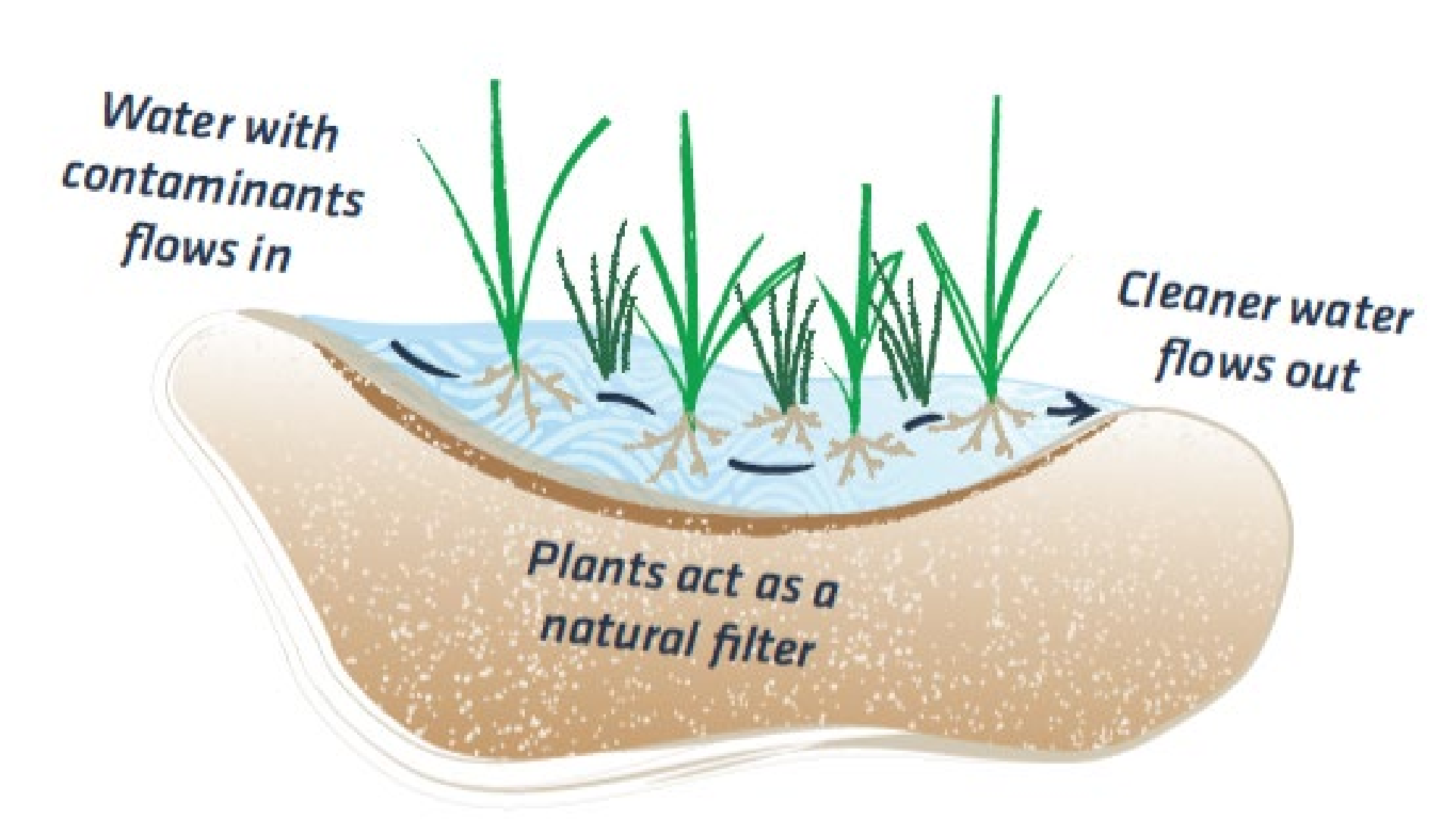
New Wastewater Treatment Plant (online as of last week)

- **75% nitrogen reduction**
- **95% phosphorous reduction**

Expansion of the Gallatin Canyon Water and Sewer District

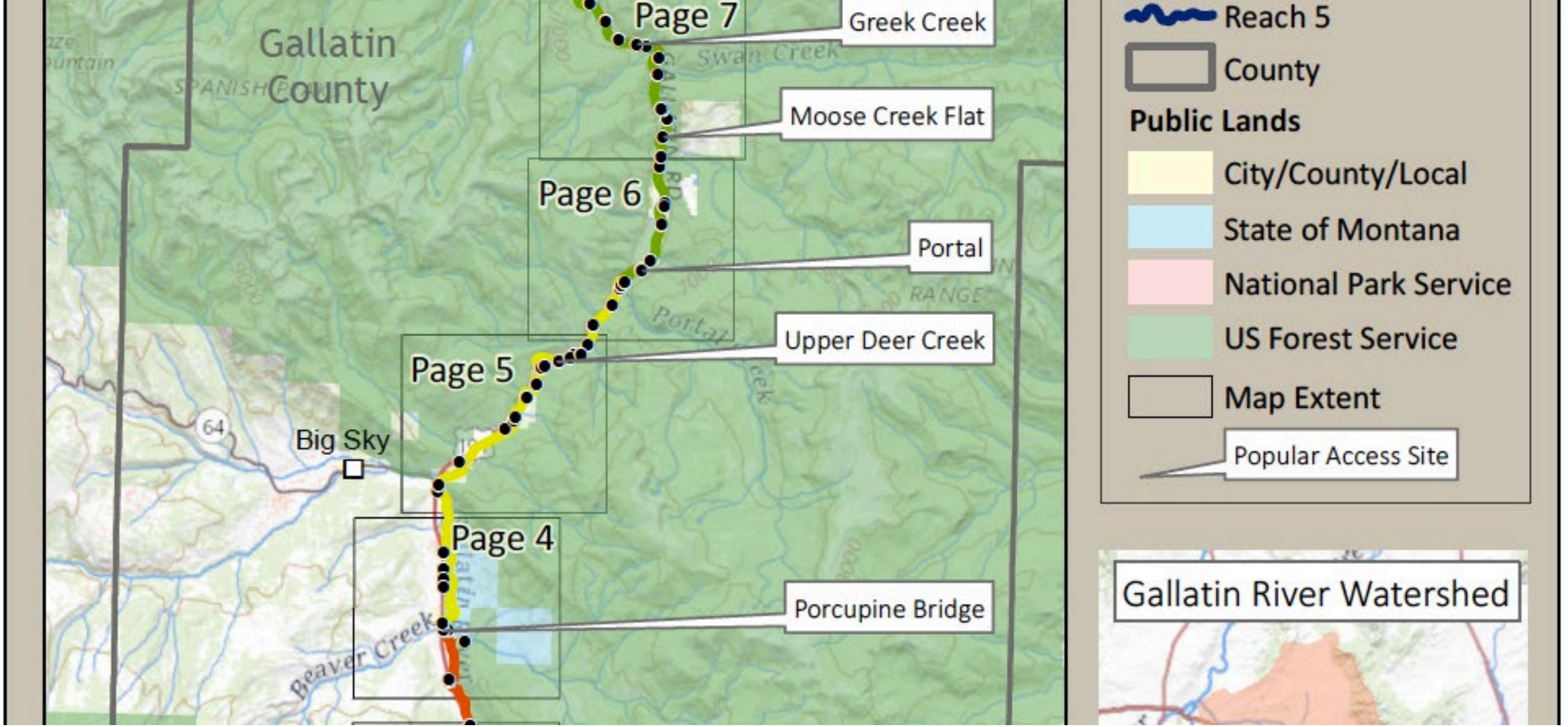
- **4 Original Landowners**
- **25 New Landowners Annexed**

Firelight Meadows Septic System



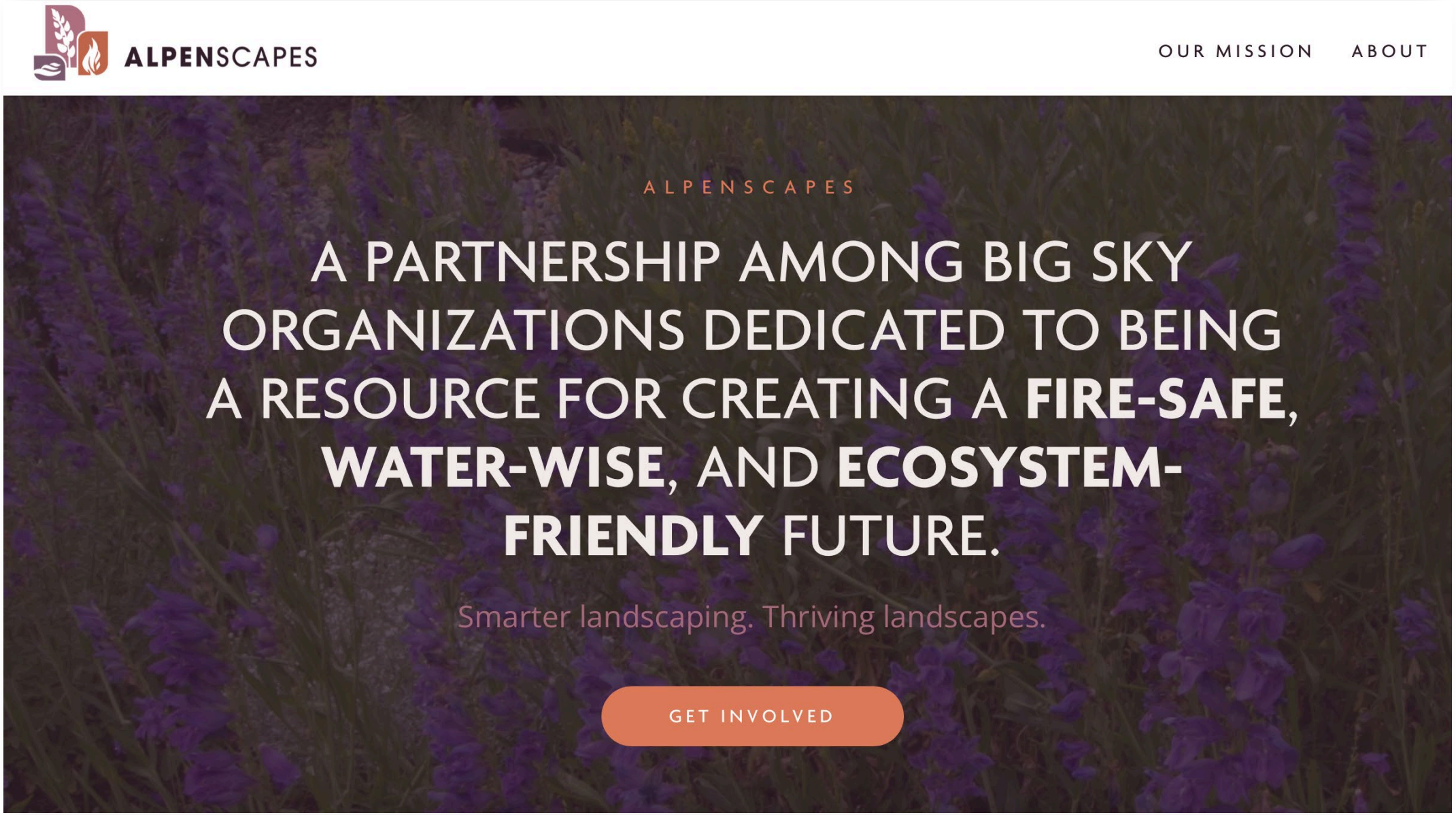
Two Wetland Water Treatment Systems

- **Up to 900 lbs nitrogen removed per year**



Gallatin River Access Restoration Strategy

- **11 Restoration Projects Advanced**



Alpenscapes - alpenscapes.org

Montana Headwaters Legacy Act

- Bill to designate 39 miles of Gallatin as Wild and Scenic
- Hoping for spring Senate committee hearing

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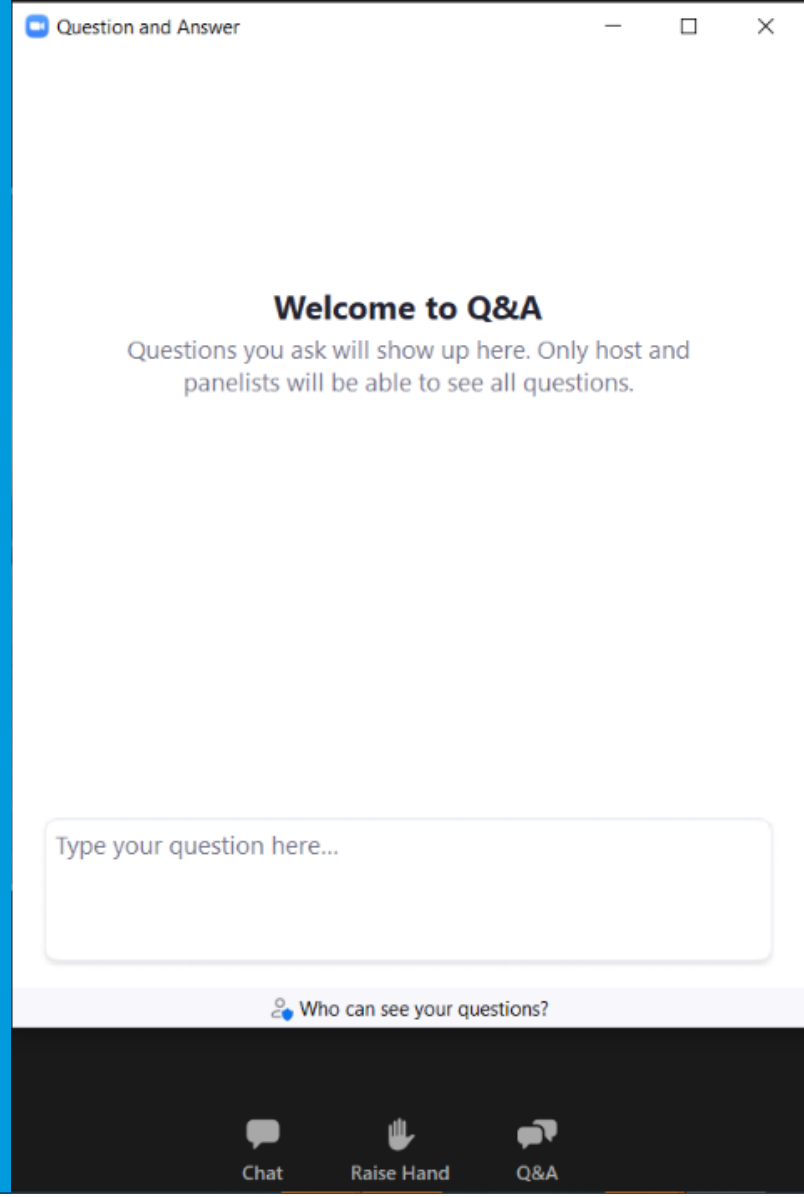

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