MADISON WATER QUALITY REPORT 2024

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RIVERS Field Sampling Parameters

Conductivity

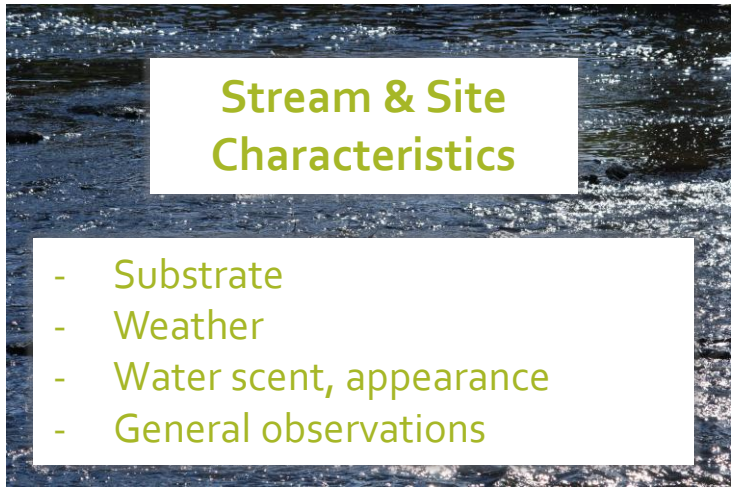
- Ability of water to pass an electrical charge
- Based on amount of charged elements [Mg+, Ca+, Cl-, NO_3-, etc.]
- Can be useful in interpreting salt loads in water bodies

Total Phosphorus

- Critical nutrient for photosynthesis and algae/plant growth
- High levels indicate elevated decomposition (including sewage inputs)

Dissolved Oxygen (DO)

- Measure of how much oxygen is available to aquatic organisms – different species require different amounts

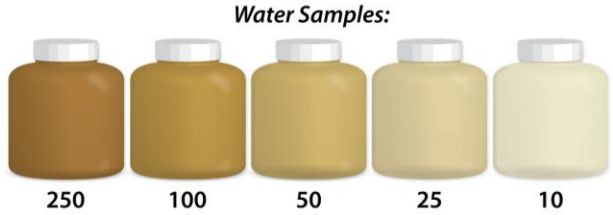


Stream & Site Characteristics

- Substrate
- Weather
- Water scent, appearance
- General observations

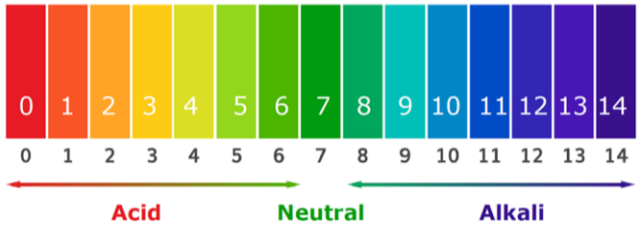
Turbidity

- Water clarity
- Determined by the amount of suspended particles and sediment



pH

- Pure water has a pH of 7, although most water in NH is closer to 6.5 (more acidic)
- The optimal range for aquatic organisms is 6.5 to 8.2



Temperature

- Influences…
  - Amount of dissolved oxygen
  - Rate of chemical reactions in water
  - Plant and algal growth
  - Activity and life cycles of aquatic organisms

Water Quality Standards & Allowable Limits

Parameter	Limit/ Standard
Conductivity	< 100 µS/cm
Total Phosphorus (TP)	< 30 µg/L
Dissolved Oxygen (DO)	6-11 mg/L , 75%-120%
Turbidity	< 10 NTU
pH	6-8, preferably close to 6.5 in NH
Temperature	No standard, but monitored for major changes

Based on NHDES and EPA Criteria

Anything above is considered "nuisance levels"

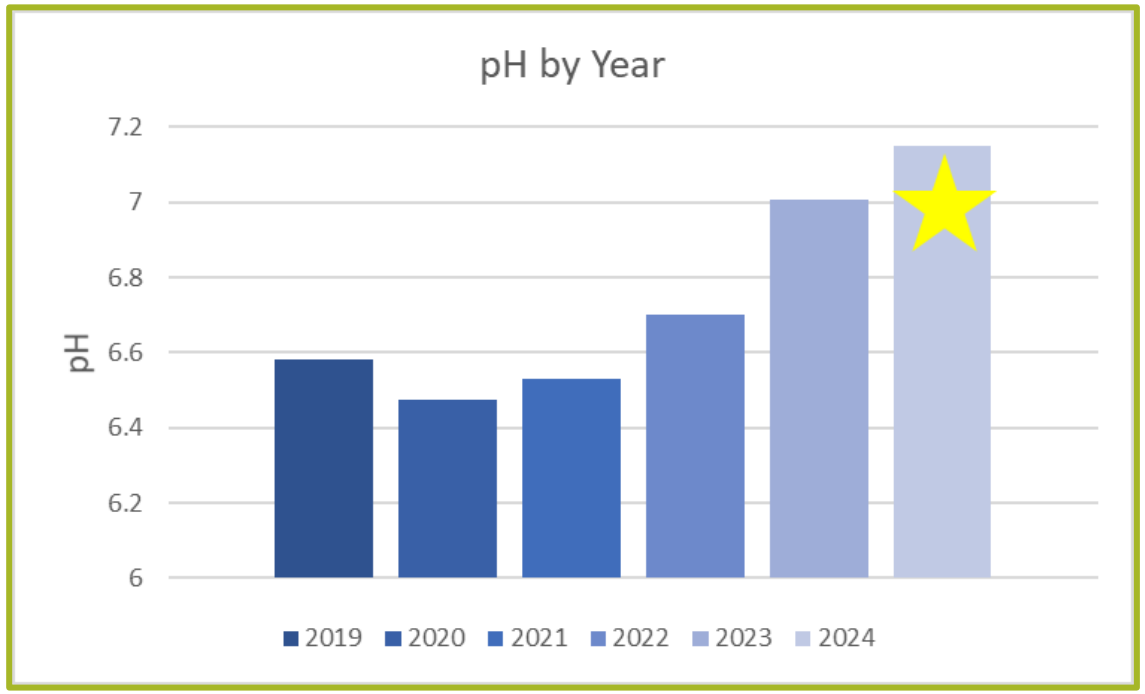
****Each site we monitor will vary in these values- a normal occurrence- due to differences in surrounding plant life, land use, infrastructure, geology, etc.**

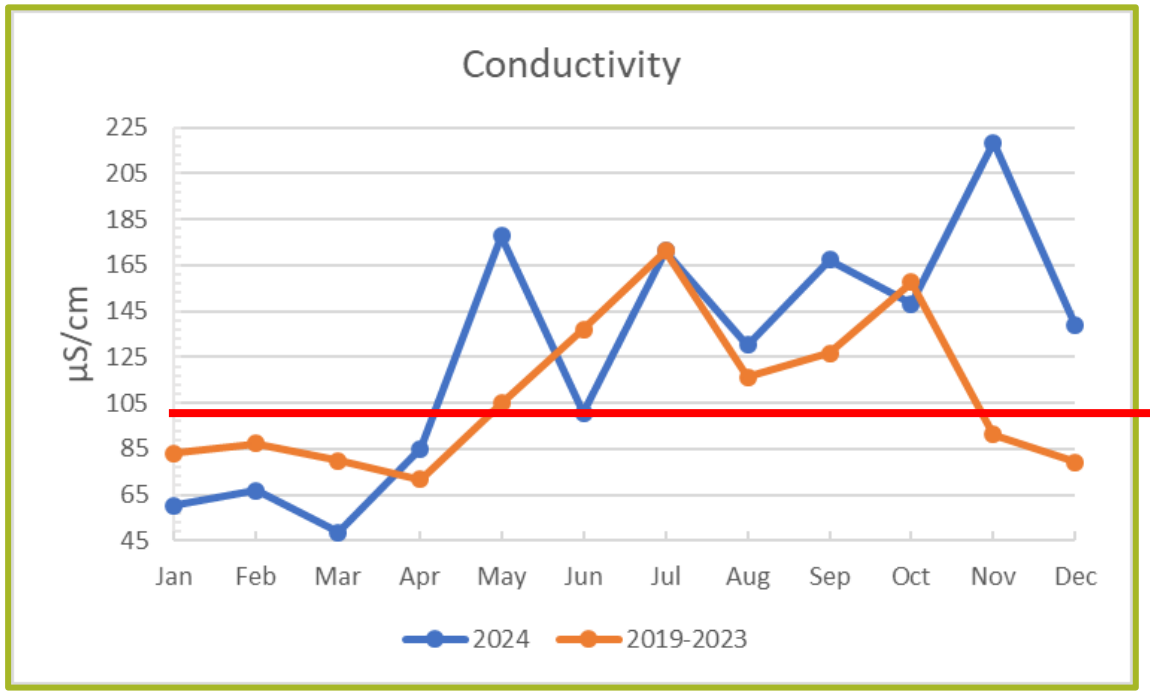
GM-1 Banfield Brook: Jan 2019-Dec 2024

- Monitored since 2002
- Parameters measured: pH, turbidity, temperature, conductivity, DO, TP, LL

Parameter	Status
Temp.	Stable.
TP	In range, part of a slight increasing trend since 2020.
Turbidity	Stable and in range. Highest median value since 2020.

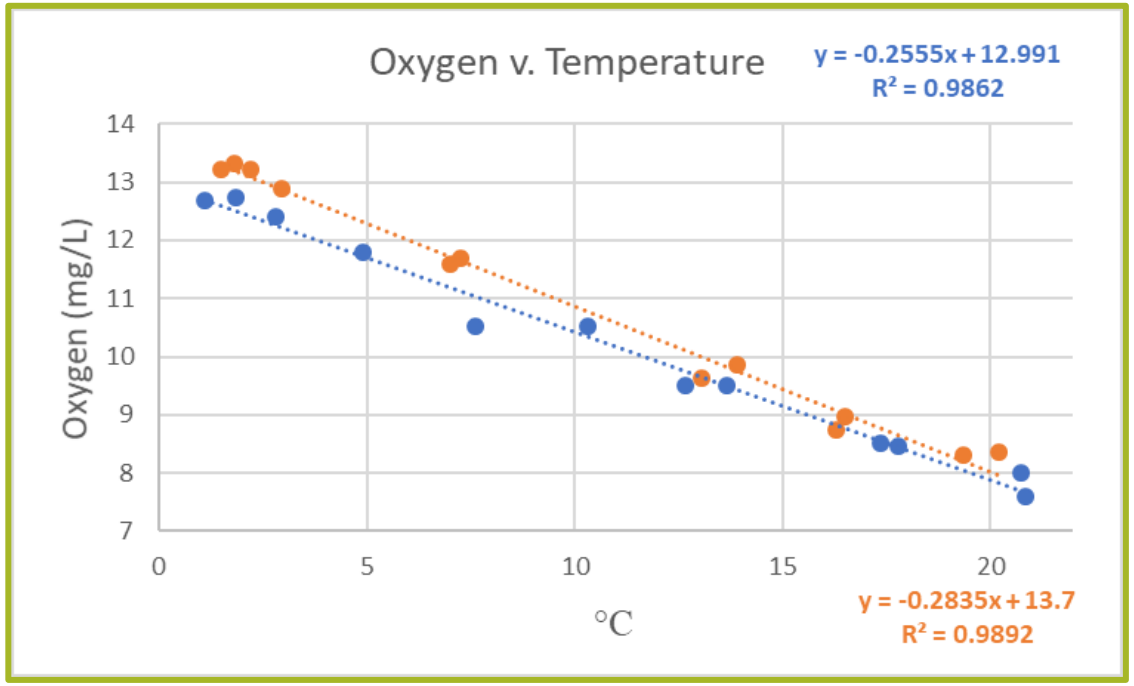
GM-1 Banfield Brook: Jan 2019-Dec 2024



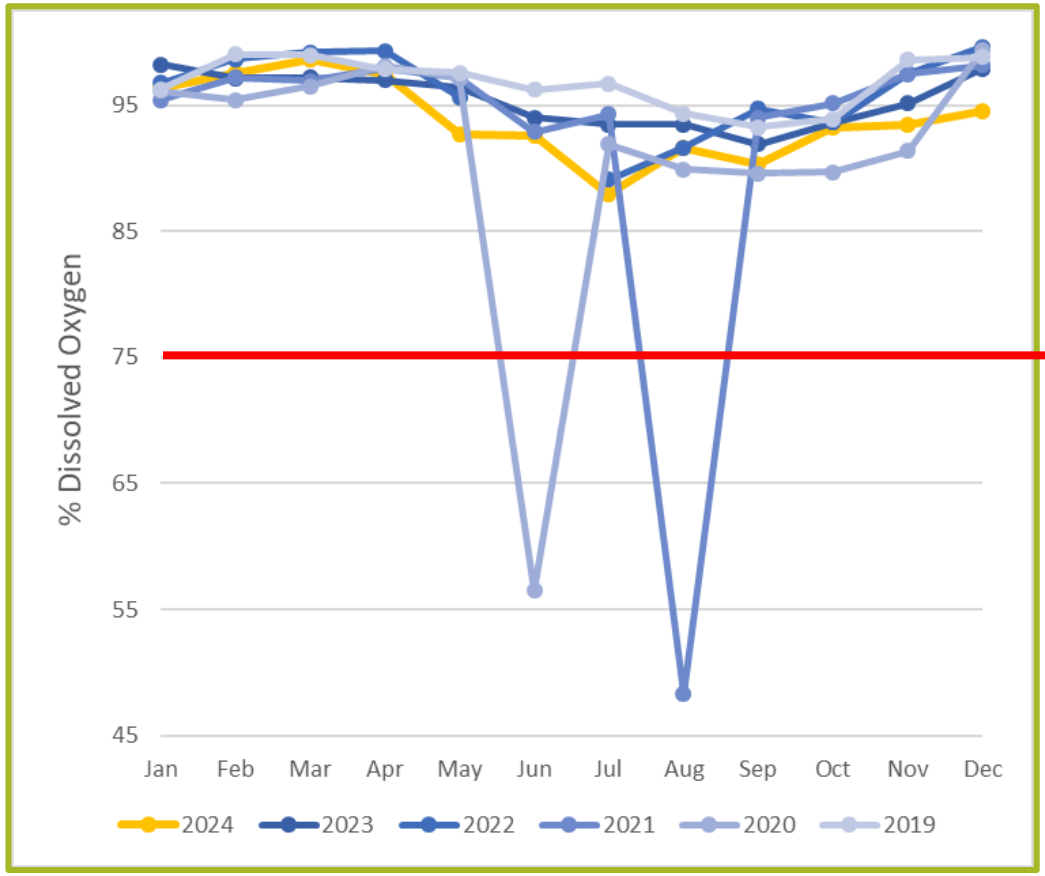


Parameter	Status
pH	pH was higher than it had been for the past five years, although all were within a healthy range.
Conductivity	Conductivity values in 2024 were fairly similar to combined values from 2019-2023, although 2024 values followed a more distinct increase from January to December and had greater maximums than 2019-2023. In 2024, the standard was exceeded May- December.

GM-1 Banfield Brook: Jan 2019-Dec 2024



DO should have an inverse relationship with temperature- colder water can dissolve more oxygen.



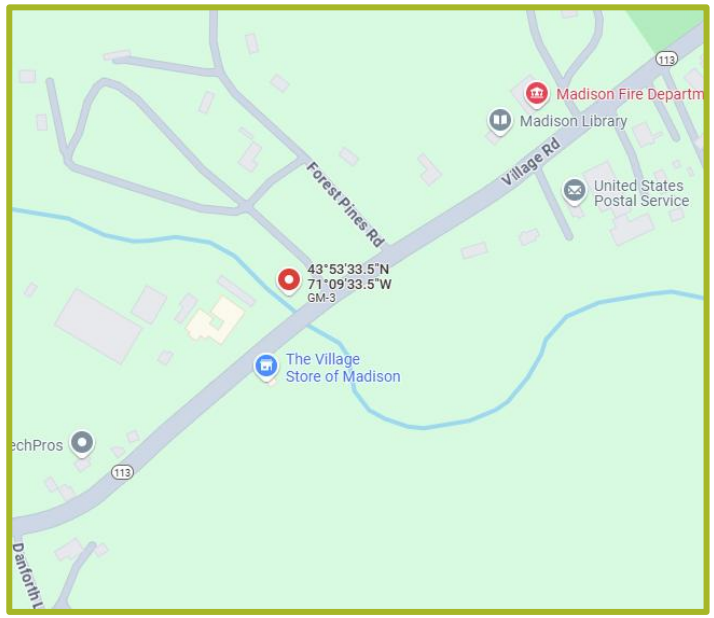
Parameter	Status
DO (mg/L)	The R^2 value from 2024 (blue) was similar to the R^2 value from 2019-2023 (orange) which indicates a consistent relationship between parameters at this site. 2024 DO (mg/L) values were slightly lower than combined values from 2019-2023, although all values were within a healthy range.
DO (%)	In 2024, DO % was similar to most values from 2019-2023. Only once in 2020 and once in 2021 were values outside of a healthy range.

GM-1 Banfield Brook * 2024 data only

Parameter	Months Sampled	Typical Pristine Surface Water Concentrations	Status
Ammonium	Jan-Jun, Sep-Oct	< 200 µg/L	In range
Orthophosphate	Jan-Dec	< 10 µg/L	Exceeded in Jan, Apr, and Oct. Oct value is of acute concern
Dissolved Organic Carbon	Jan-Jun, Sep-Oct	1-10 mg/L	In range
Total Dissolved Nitrogen	Jan-Jun, Sep-Oct	< 0.5 mg/L	Exceeded in Jan
Dissolved Organic Nitrogen	Mar-Jun, Sep-Oct	n/a	In range
Nitrate	Mar-Jun, Sep-Oct	< 0.05 mg/L	Exceeded every month sampled except Jun
Chloride	Mar-Jun, Sep-Oct	< 10 mg/L	Exceeded every month sampled
Sulfate	Mar-Jun, Sep-Oct	< 80 mg/L	In range
Sodium	Mar-Jun, Sep-Oct	< 50 mg/L	In range
Potassium	Mar-Jun, Sep-Oct	< 10 mg/L	In range, neared the limit in Oct
Magnesium	Mar-Jun, Sep-Oct	1-100 mg/L	Below 1 mg/L every month sampled except Oct
Calcium	Mar-Jun, Sep-Oct	< 15 mg/L	In range

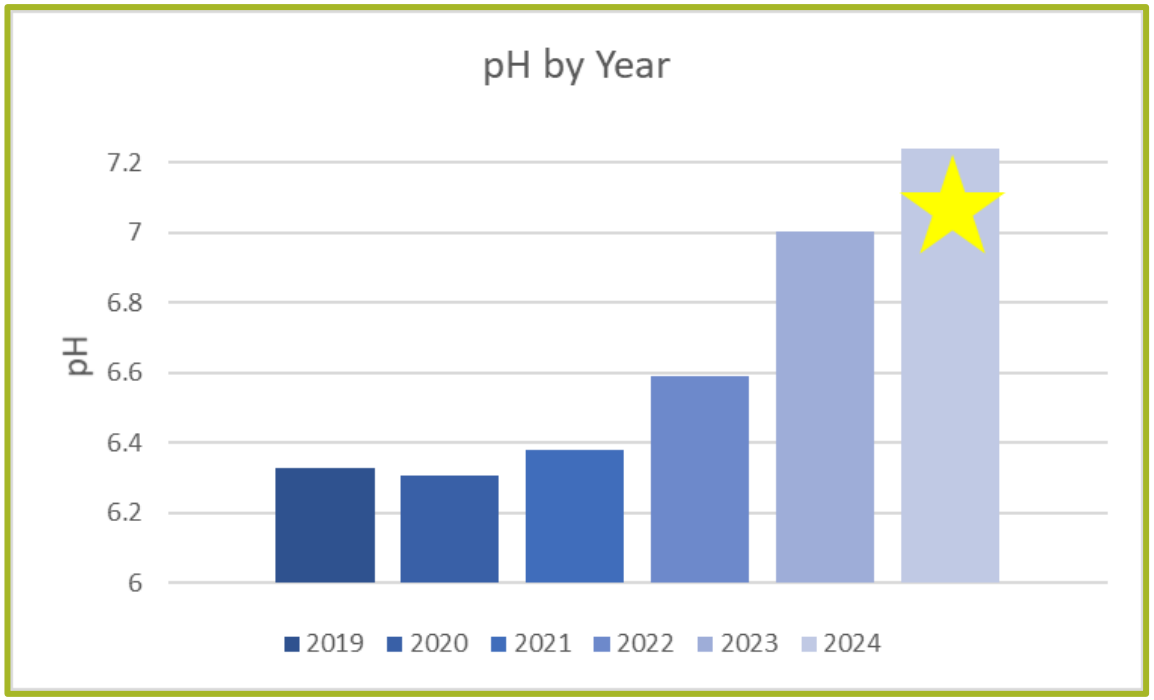
GM-3 Forrest Brook: May 2019-Oct 2024

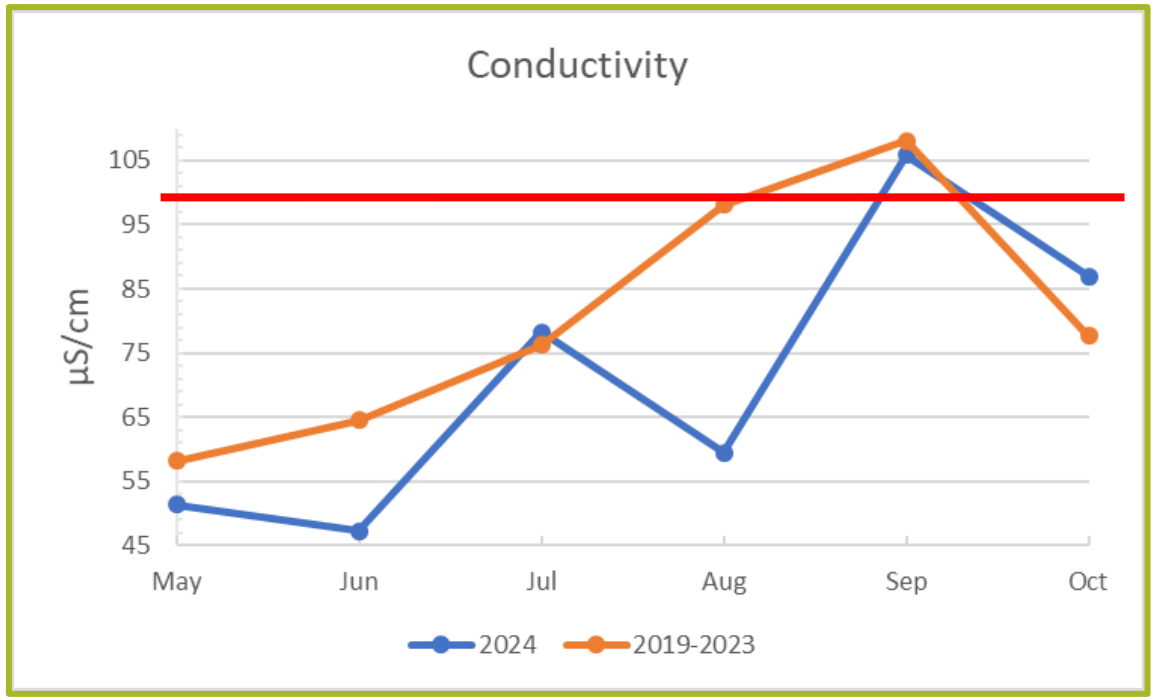
- Monitored since 2003
- Parameters measured: pH, turbidity, temperature, conductivity, DO, TP



Parameter	Status
Temp.	Stable, highest median value since 2020.
TP	Stable and in range.
Turbidity	Stable and in range.

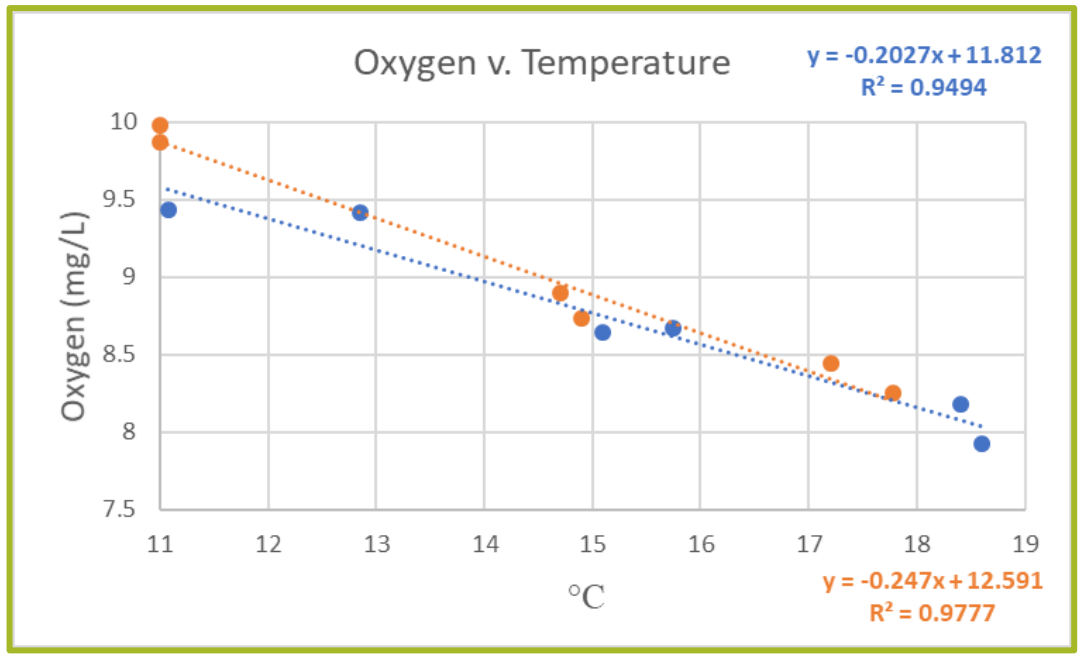
GM-3 Forrest Brook: May 2019-Oct 2024

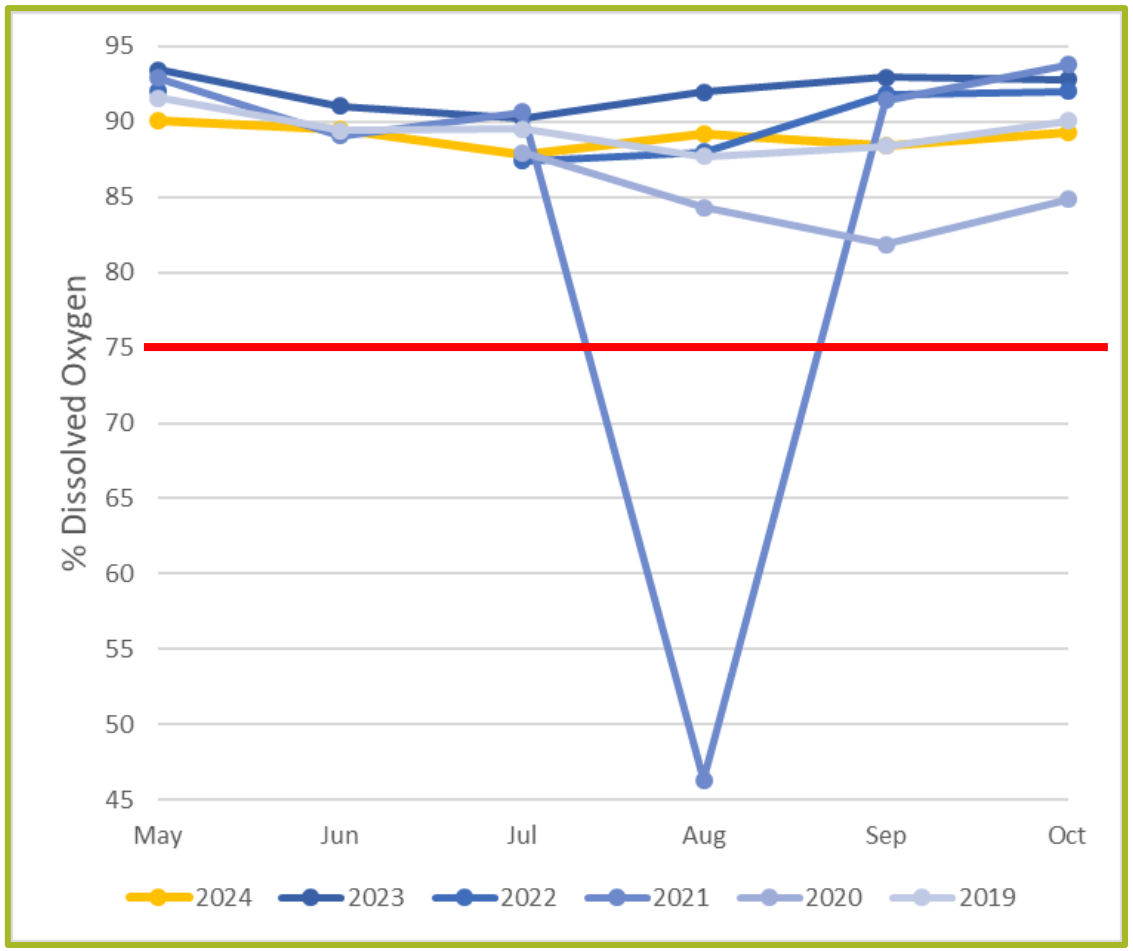




Parameter	Status
pH	pH was higher than it had been for the past five years, although all were within a healthy range.
Conductivity	Conductivity in 2024 was lower than combined values from 2019-2023 with the exception of July and October. In 2024, the standard was exceeded in September.

GM-3 Forrest Brook: May 2019-Oct 2024





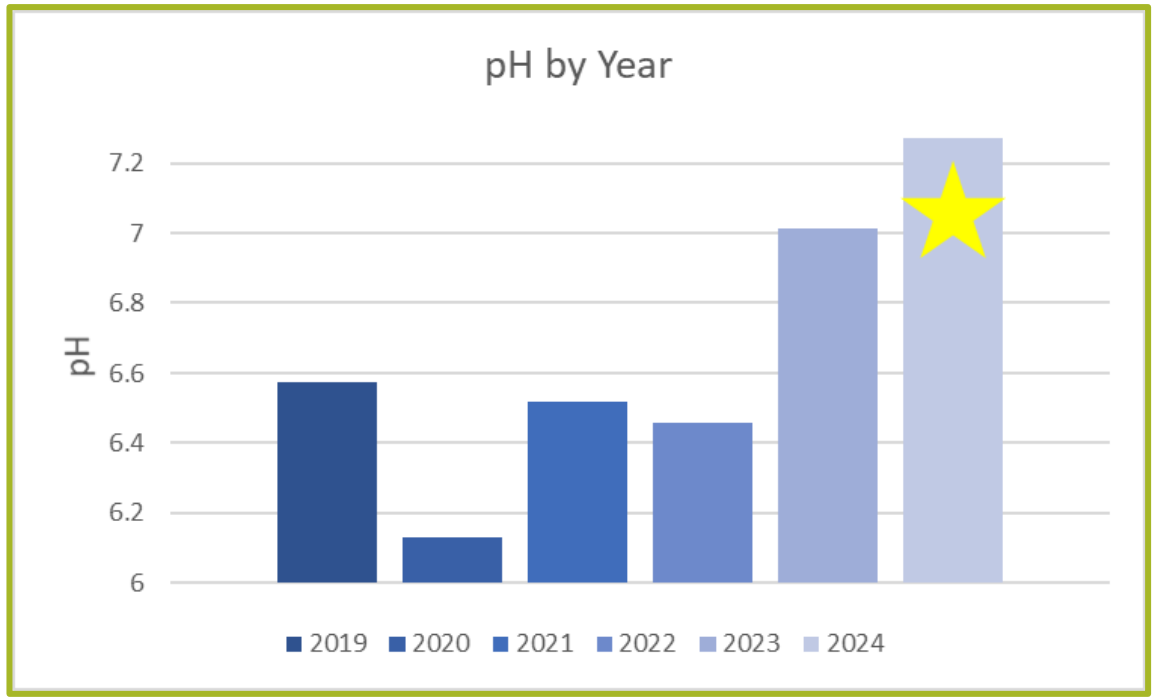
Parameter	Status
DO (mg/L)	The R^2 value from 2024 (blue) was similar to the R^2 value from 2019-2023 (orange) which indicates a consistent relationship between parameters at this site. All values were within a healthy range.
DO (%)	In 2024, DO % values were similar to those from 2019-2023, and all values except for August of 2021 were within a healthy range.

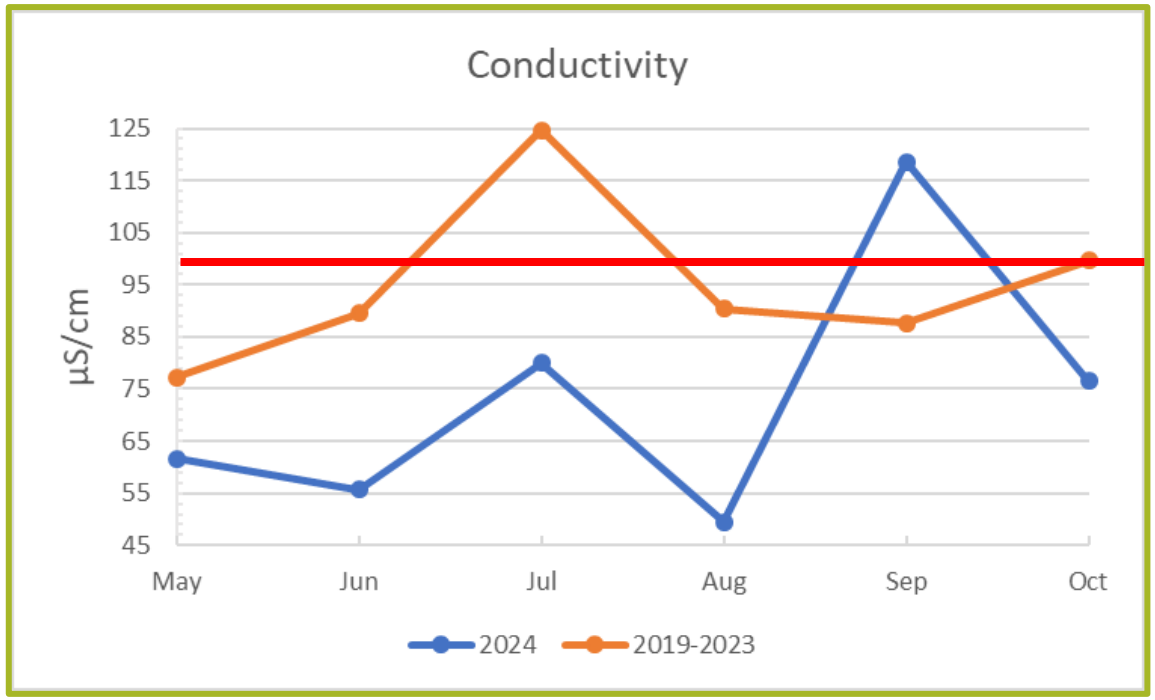
GM-4 Ferrin Brook: May 2019-Oct 2024

- Monitored since 2013
- Parameters measured: pH, turbidity, temperature, conductivity, DO, TP

Parameter	Status
Temp.	Stable.
TP	Stable and in range. Lowest median value of the past six years.
Turbidity	Stable and in range, lowest median value since 2020.

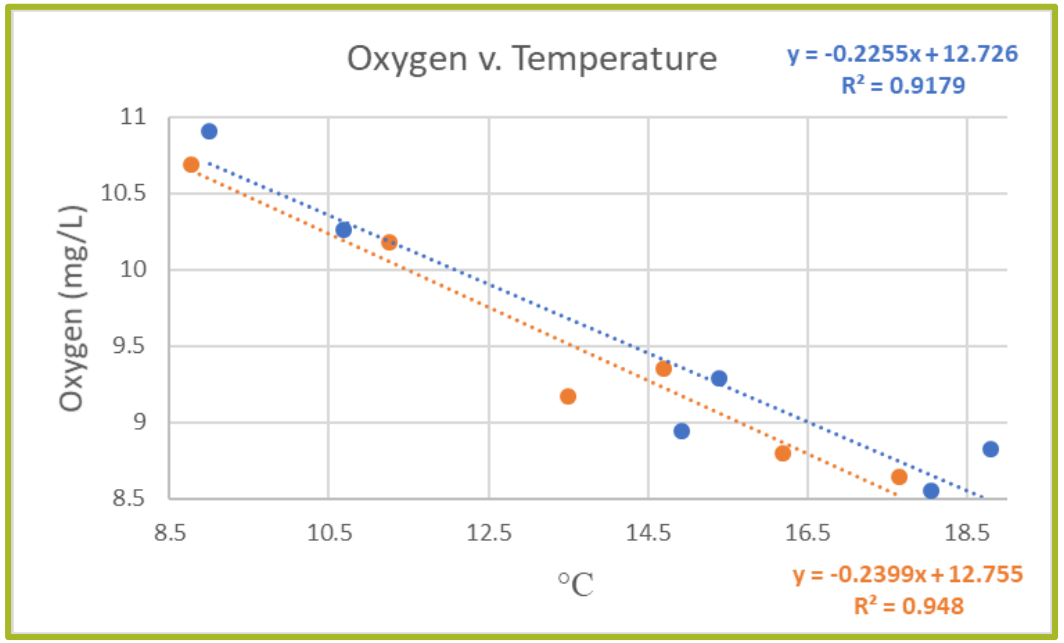
GM-4 Ferrin Brook: May 2019-Oct 2024

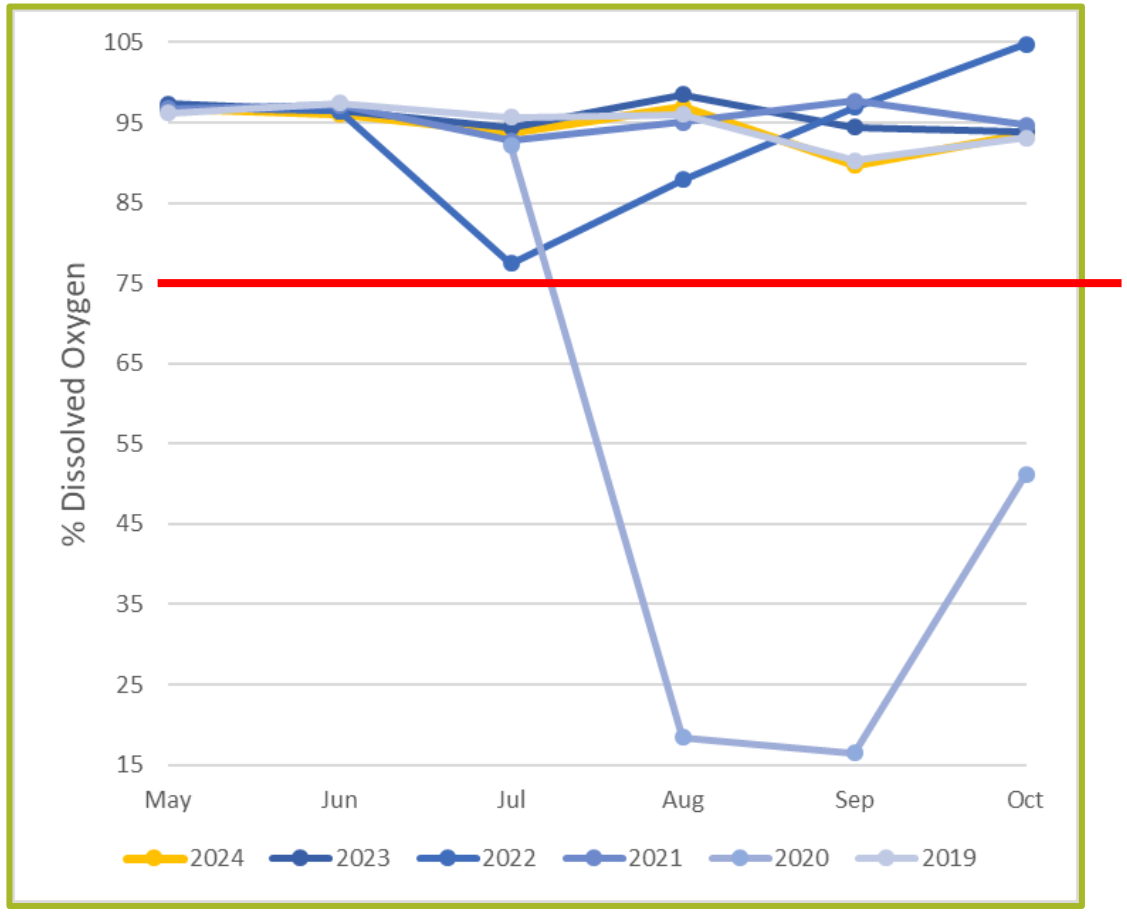




Parameter	Status
pH	pH was higher than it had been for the past five years, although all were within a healthy range.
Conductivity	Conductivity in 2024 was lower than combined values from 2019-2023 with the exception of September. In 2024, the standard was exceeded in September.

GM-4 Ferrin Brook: May 2019-Oct 2024





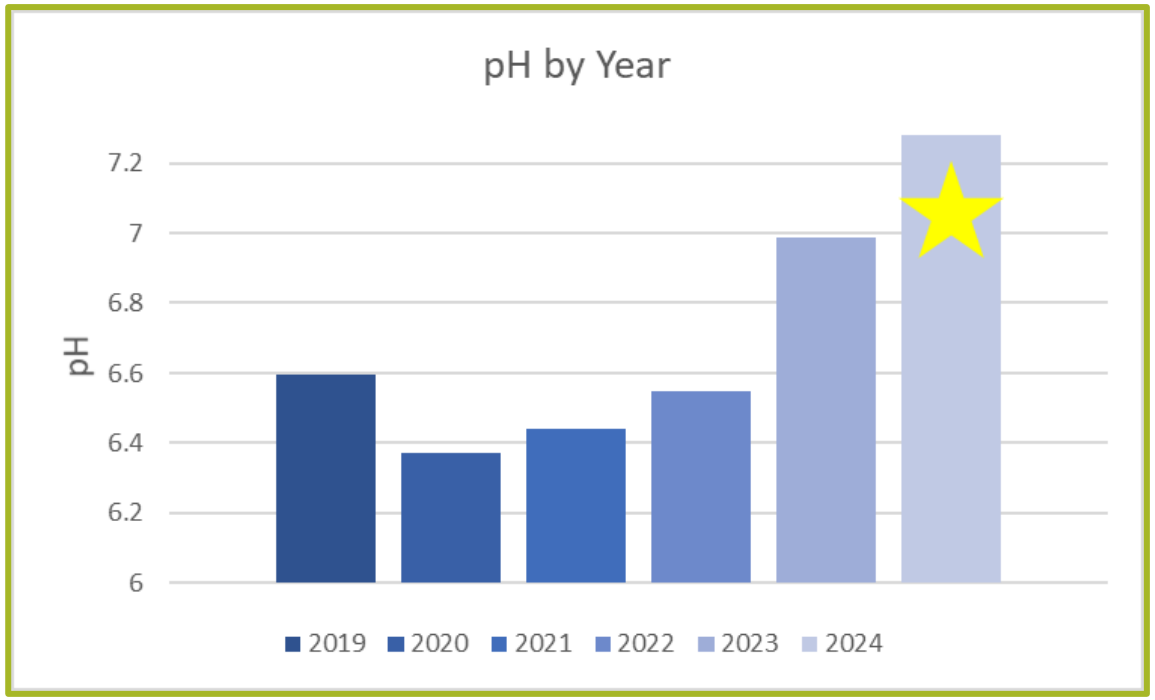
Parameter	Status
DO (mg/L)	The R^2 value from 2024 (blue) was similar to the R^2 value from 2019-2023 (orange) which indicates a consistent relationship between parameters at this site. All values were within a healthy range.
DO (%)	In 2024, DO % values were similar to those from 2019-2023, and all values except for August-October of 2020 were within a healthy range.

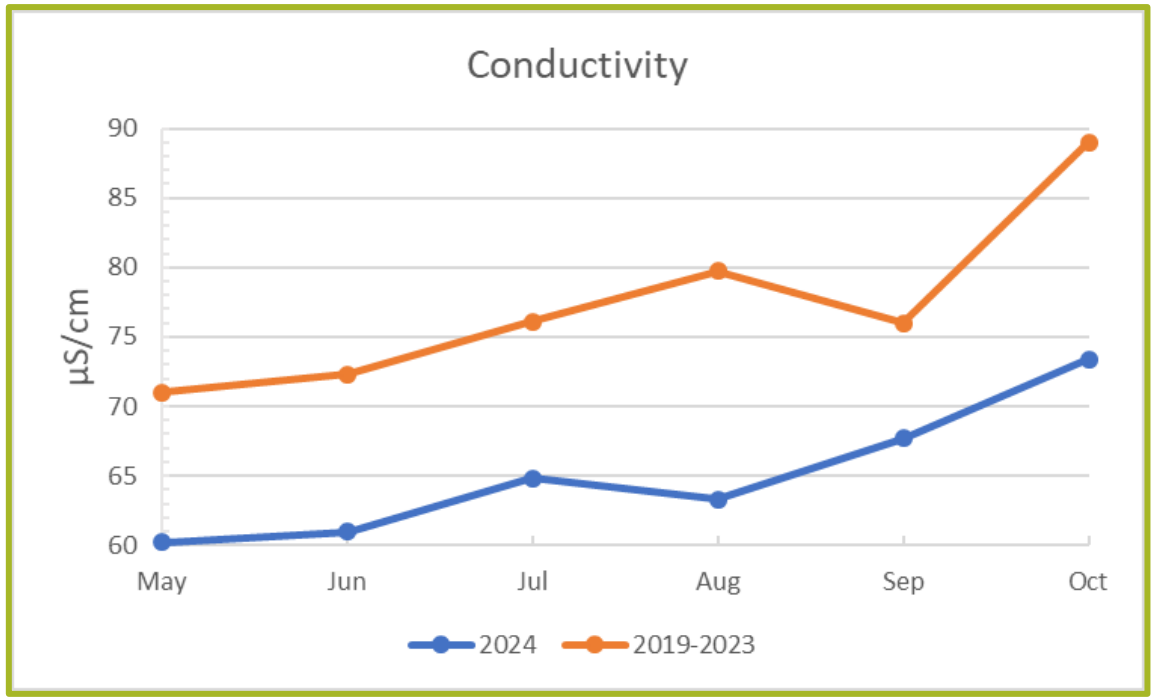
GM-5 Mill Brook: May 2019-Oct 2024

- Monitored since 2013
- Parameters measured: pH, turbidity, temperature, conductivity, DO, TP

Parameter	Status
Temp.	Stable.
TP	Stable and in range.
Turbidity	Stable and in range.

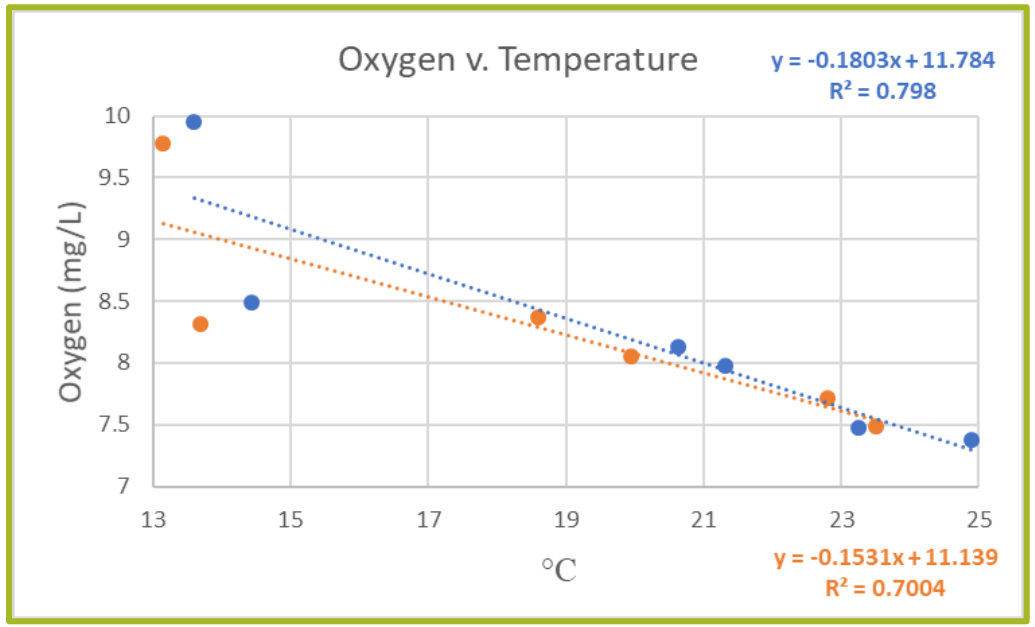
GM-5 Mill Brook: May 2019-Oct 2024

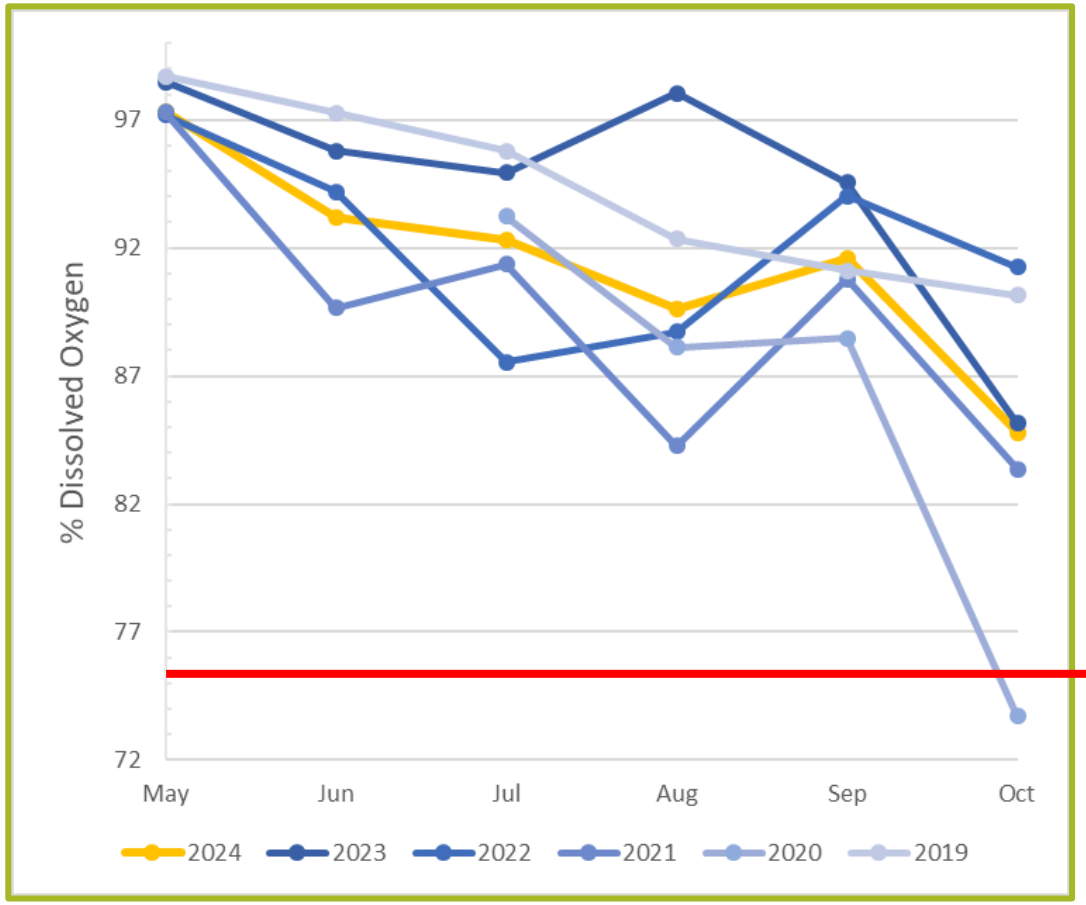




Parameter	Status
pH	pH was higher than it had been for the past five years, although all were within a healthy range.
Conductivity	Conductivity in 2024 was consistently lower than combined values from 2019-2023. All values were within a healthy range.

GM-5 Mill Brook: May 2019-Oct 2024





Parameter	Status
DO (mg/L)	The R^2 value from 2024 (blue) was slightly larger than the R^2 value from 2019-2023 (orange), although both values are not close to 1.0, which may indicate a weaker relationship between parameters at this site. All values were within a healthy range.
DO (%)	In 2024, DO % values were similar to those from 2019-2023, and all values except for October of 2020 were within a healthy range.

Overview of Findings

The majority of parameters tested fell within the acceptable limits for surface waters set by the New Hampshire Department of Environmental Services (NHDES) and/or the Environmental Protection Agency. Our findings do not indicate any trends or incidences of immediate concern.

Across **all sites visited**, pH was higher in 2024 than in the previous five years. While there were no instances of pH values exceeding the healthy range, the trend is nonetheless worth paying attention to.

At **GM-1**, orthophosphate exceeded pristine surface water standards in January, April and October. Notably, the October value exceeded 50 µS/cm- the recommended limit set by the EPA for rivers discharging to lakes and ponds. This may indicate excessive nutrient loading in Banfield Brook.

The conductivity standard of <100 µS/cm was exceeded at three sites in 2024:

- At **GM-1** May-December
- At **GM-3** in September
- At **GM-4** in September

At **GM-1**, chloride exceeded pristine surface water standards every month sampled, and nitrate exceeded standards every month sampled except June. Total dissolved nitrogen also exceeded standards in January. Notably, none of these heightened values neared concentrations that would be of acute concern for ecosystem/ human health.

What steps can Madison take to protect its waters?

At Home

- Encourage residents to get their septic systems regularly checked and maintained
- Use Best Management practices (BMPs) for proper disposal of chemicals and waste materials

On Roads

- Reduce salt application on roadways, especially near bodies of water and sensitive habitats, like wetlands
  - Consider brining: an equally effective and more environmentally conscious method for keeping roads clear

In Town

- Monitor the effectiveness of culverts, and work to replace those posing as safety and environmental hazards (frequent flooding, erosion of surrounding earth, partial collapse, etc.)
- Maintain riparian areas(aka Streamside Management Zones) and monitor habitats near bodies of water for major changes

THANK YOU FOR YOUR TIME!

AmeriCorps

GREEN MOUNTAIN CONSERVATION GROUP

Report respectfully submitted by:
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E. Revenaugh, *AmeriCorps Water Quality Resources Assistant*