

FREEDOM WATER QUALITY REPORT 2025



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Turbidity

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

pH

- Pure water has pH 7
- Most NH streams have pH 6.5
- Ideal range for aquatic organisms is 6.5-8.2

Dissolved Oxygen (DO)

- Measure of how much oxygen is available to aquatic species
- Different species need different amounts

Stream & Site Characteristics

- Substrate (i.e. river bottom)
- Weather
- Water scent & appearance
- General observations



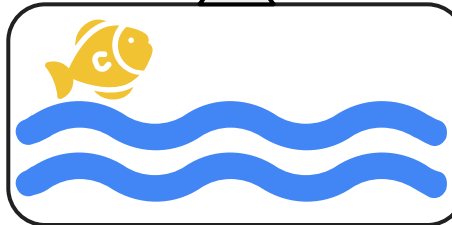
Temperature

Influences:

- Plant growth & animal activity
- DO levels
- Rate of chemical reactions

Conductivity

- Ability of water to pass electrical charge
- Based on amount of charged compounds or ions (Na⁺, Cl⁻, NO₃⁻, etc.)
- Can be used to interpret amount of salt in water



Phosphorus & Nitrogen

- Critical nutrient for plant and algae growth
- High levels indicate more decomposition (i.e. sewage) or human inputs (e.g. fertilizer runoff)

Dissolved Organic Carbon

- Occurs naturally from organic decomposition
- Elevated levels from runoff and sewage

Calcium

- Occurs naturally
- Essential for plants and animals
- Used to measure hardness

Sulfate

- Occurs naturally from weathering
- Elevated levels from mines, smelters, paper mills

Sodium

- Present in water in low concentrations, vary based on geology
- Elevated concentrations from road salt runoff

RIVERS Parameters

Magnesium

- Occurs naturally
- Essential nutrition for plants and animals
- Used to measure hardness

Chloride

- Present in water in low concentrations, vary based on geology
- Elevated concentrations from road salt runoff, sewage, or farming



Potassium

- Occurs naturally from weathering or plant decomposition
- Elevated levels from pollution, leaky septic tanks, fertilizer runoff

RIVERS Parameters - Water Quality Standards & Allowable Limits

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

- Based on NHDES & EPA criteria
- Each site will vary in these values due to differences in surrounding plant life, land use, riverbed geology, infrastructure, etc.

Also measure temperature to visualize its relationship with DO, which should be **inverse** in a healthy stream (**as temp. increases, DO decreases**).

Dependent on what form of nitrogen is being tested.

RIVERS Parameters - Water Quality Standards & Allowable Limits

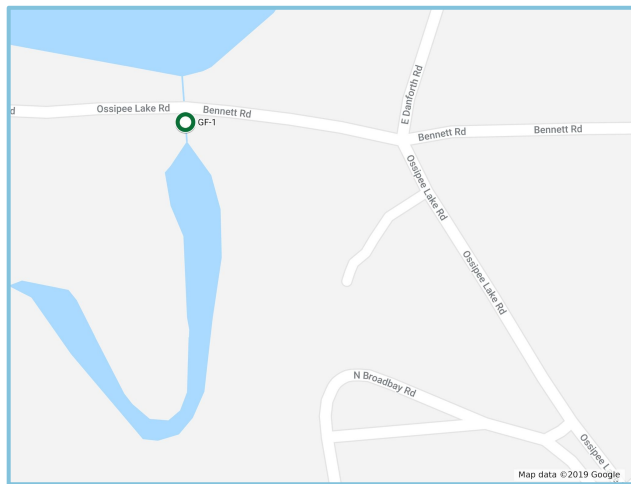
| Parameter | Limit/Standard |
|--------------------------|----------------|
| Chloride | < 10 mg/L |
| Sodium | < 50 mg/L |
| Dissolved Organic Carbon | 1-10 mg/L |
| Calcium | < 15 mg/L |
| Sulfate | < 80 mg/L |
| Magnesium | 1-100 mg/L |
| Potassium | < 10 mg/L |

- Based on NHDES & EPA criteria
- Each site will vary in these values due to differences in surrounding plant life, land use, riverbed geology, infrastructure, etc.

Danforth Brook (GF-1)

Data analyzed from May 2020 - Oct 2025

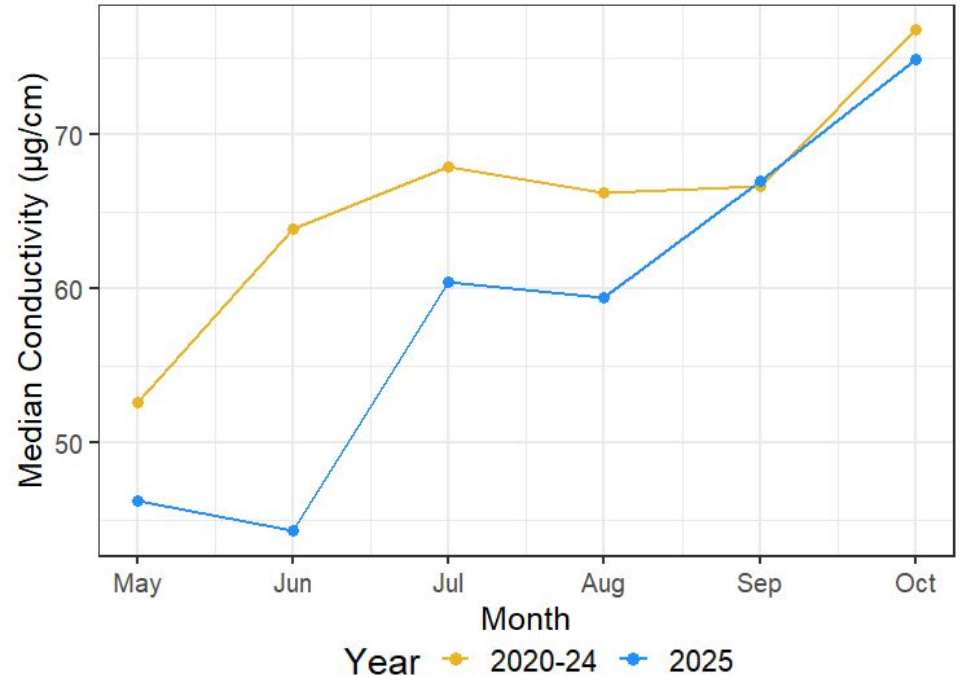
- Monitored since 2002
- Parameters measured: pH, turbidity, temperature, conductivity, DO, TP



| Parameter | Status | Change |
|-------------------|--------------------|--------------------------|
| pH | Within ideal range | Small decrease from 2024 |
| Turbidity | Within ideal range | Small decrease from 2024 |
| Total Phosphorus* | Within ideal range | Small decrease from 2024 |

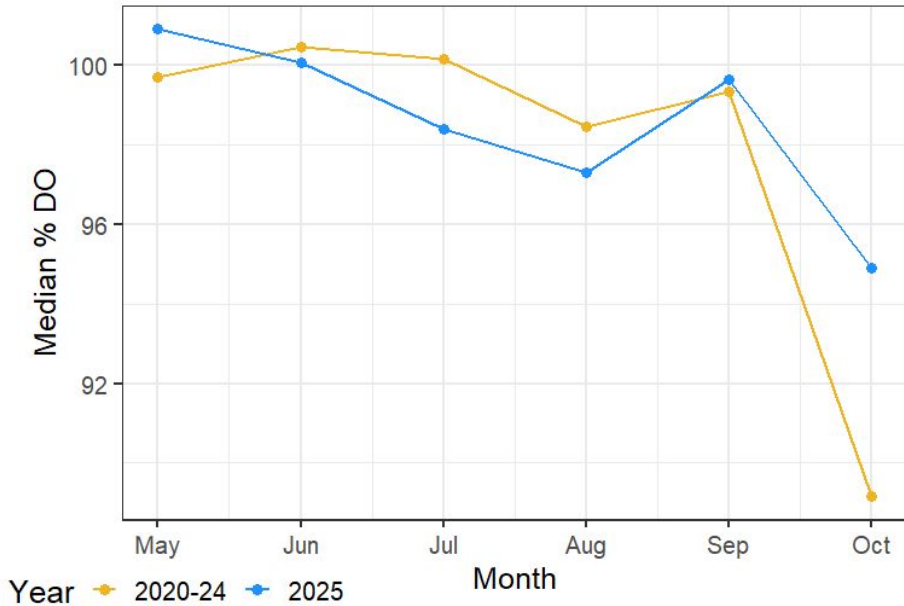
Conductivity

Increase in conductivity across the 2025 sampling period similar to previous years. All values fall in the ideal range.



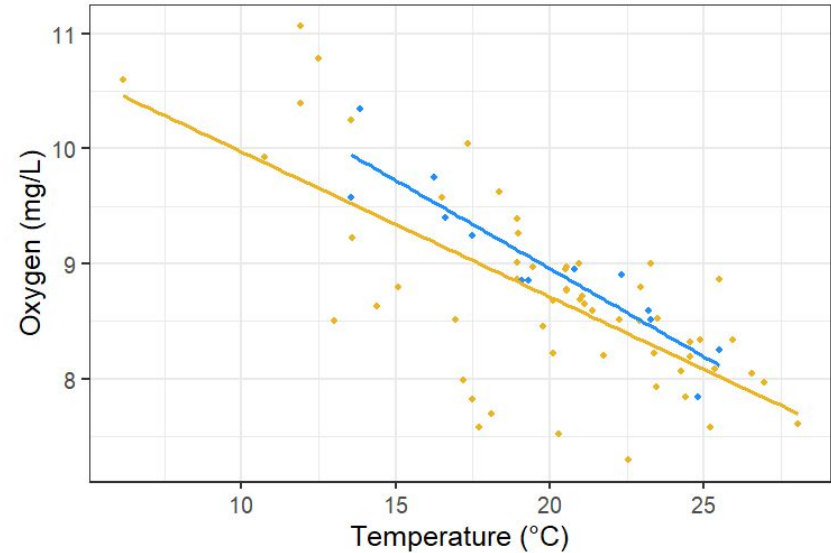
% Dissolved Oxygen

Consistent values before dipping in Oct. 2025, similar to previous years. All values falling within the ideal range.



DO & Temperature

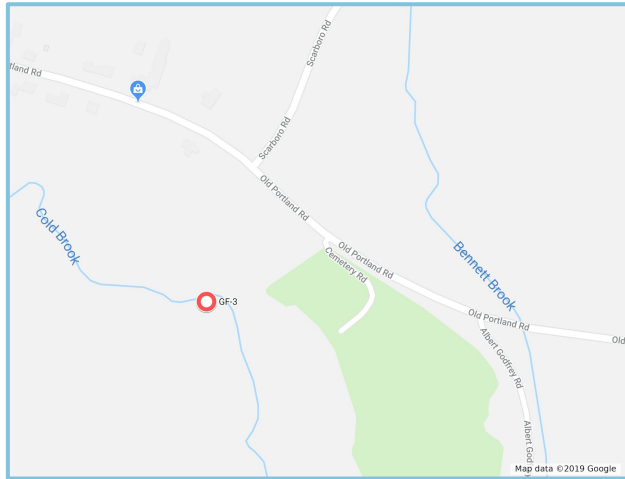
There is a stronger inverse relationship between the parameters in 2025 compared to 2020-24. All values fall within the ideal range.



Cold Brook (GF-3)

Data analyzed from Jan 2020 - Dec 2025

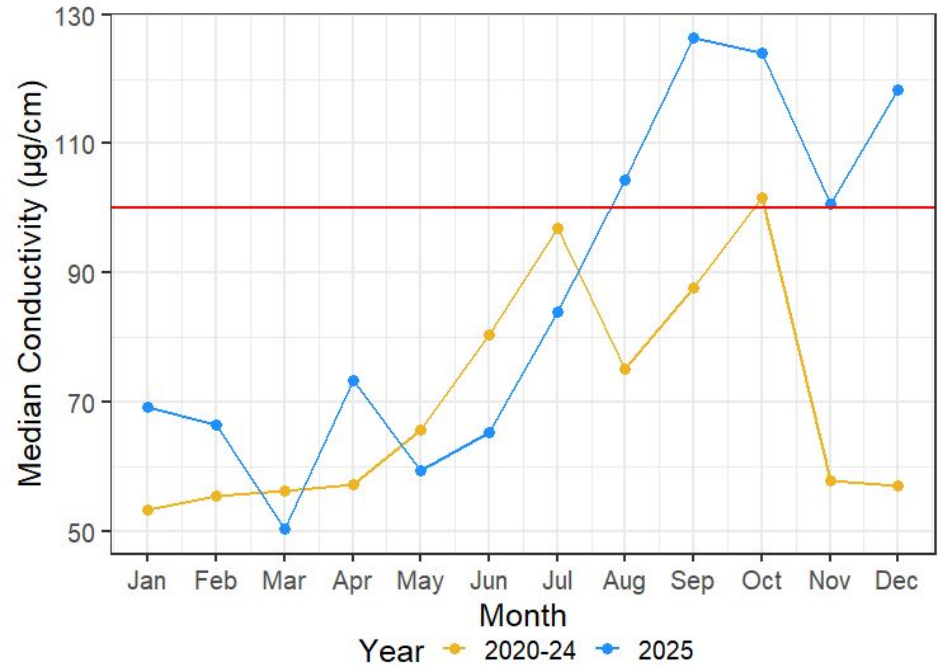
- Monitored since 2003
- Parameters measured: pH, turbidity, temperature, conductivity, DO, TP, ions



| Parameter | Status | Change |
|-------------------|--------------------|--------------------------|
| pH | Within ideal range | Small decrease from 2024 |
| Turbidity | Within ideal range | Small decrease from 2024 |
| Total Phosphorus* | Within ideal range | No change from 2024 |

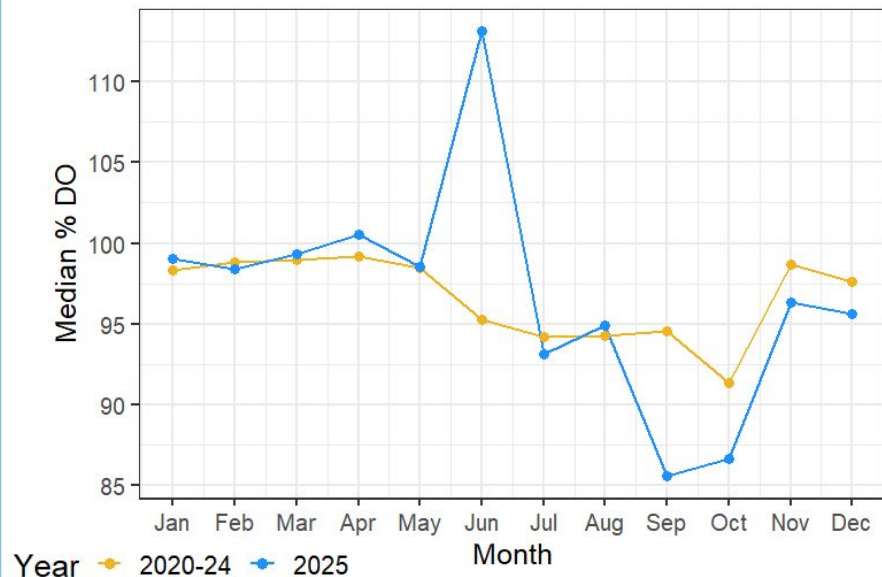
Conductivity

Conductivity spiked earlier in Apr 2025 than in previous years. The parameter remained above the standard for five months through the end of the year, unlike 2020-24.



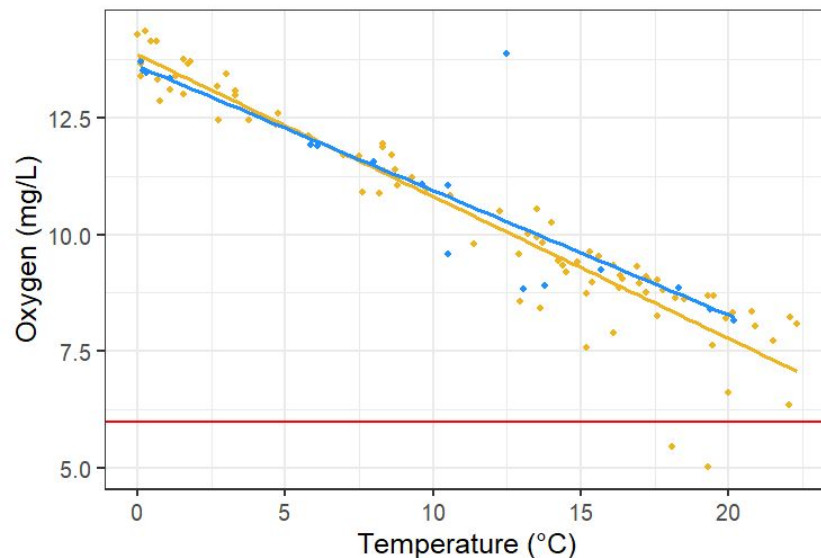
% Dissolved Oxygen

Similar trend in DO from Jan. to May across the years, before a unique peak in Jun 2025. The parameter had a larger dip at the later half of 2025 unlike 2020-24, although this is likely due to the drought. All values fell within the ideal range.



DO & Temperature

There is a consistent inverse relationship between parameters in 2020-24 and 2025. Values stayed within the ideal range in 2025.

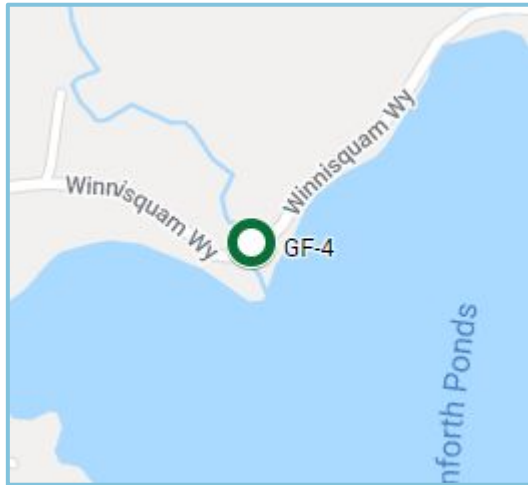


| Parameter | Limit/Standard | Status |
|--------------------------|----------------|---|
| Ammonium | < 200 µg/L | In range |
| Orthophosphate | < 10 µg/L | Exceeded standard in Aug 2024, Feb, Apr-Jun, Aug 2025 |
| Dissolved Organic Carbon | 1-10 mg/L | In range |
| Total Dissolved Nitrogen | < 0.5 mg/L | Exceeded standard in Dec, Feb |
| Nitrate | < 0.05 mg/L | Exceeded standard Aug 2024-Feb 2025, Jul-Aug 2025 |
| Chloride | < 10 mg/L | Exceeded standard entire year |
| Sulfate | < 80 mg/L | In range |
| Sodium | < 50 mg/L | In range |
| Potassium | < 10 mg/L | In range |
| Magnesium | 1-100 mg/L | Below 1 mg/L Aug-Sep 2024, Nov-Dec 2025, Feb-Jun 2025 |
| Calcium | < 15 mg/L | In range |

Shawtown Brook (GF-4)

Data analyzed from May 2022 - Oct 2025

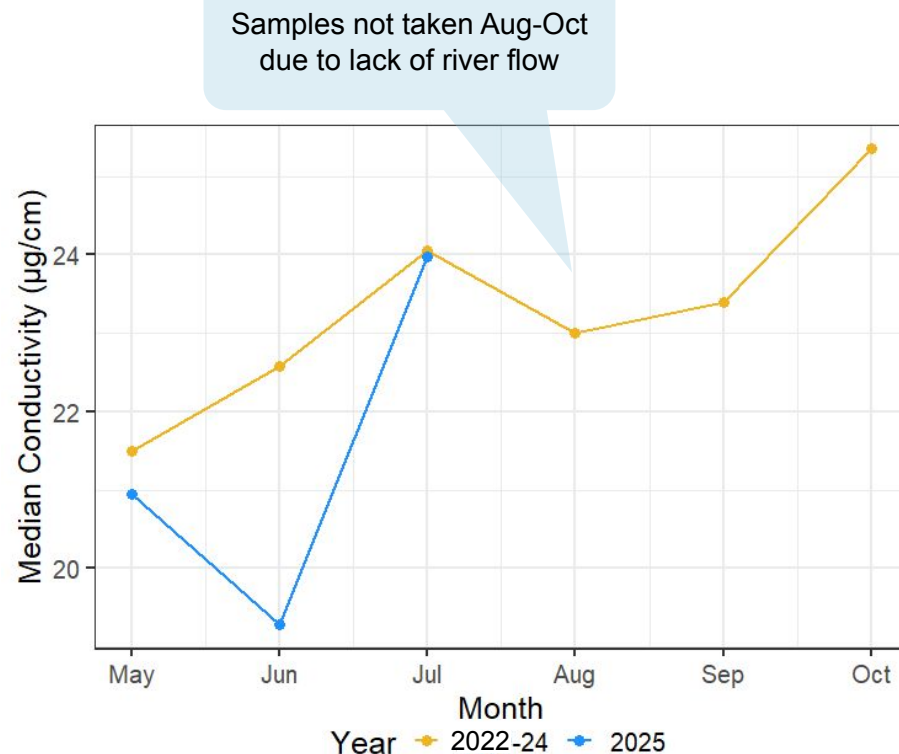
- Monitored since 2022
- Parameters measured: pH, turbidity, temperature, conductivity, DO, TP



| Parameter | Status | Change |
|-------------------|--------------------|--------------------------|
| pH | Within ideal range | Small decrease from 2024 |
| Turbidity | Within ideal range | Small decrease from 2024 |
| Total Phosphorus* | Within ideal range | Small decrease from 2024 |

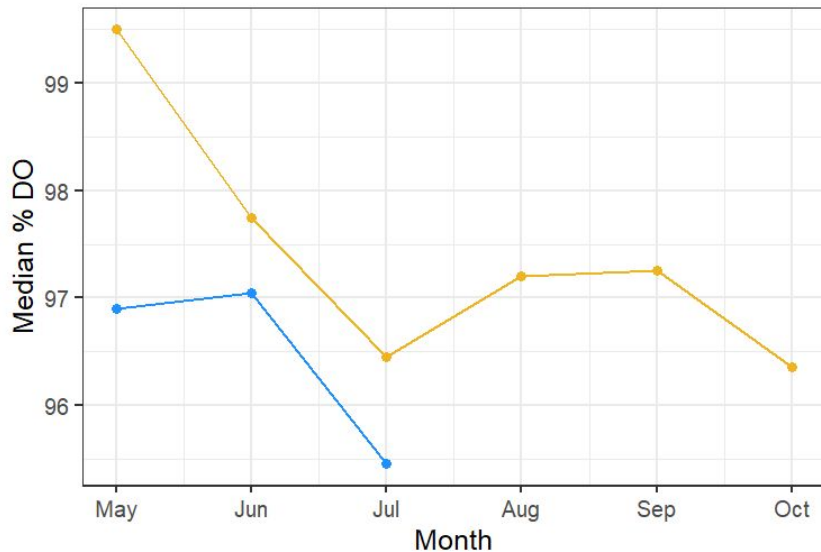
Conductivity

Similar values in May and July from 2025 and 2020-24, although Jun values are much lower than previous years. All values fell within the ideal range.



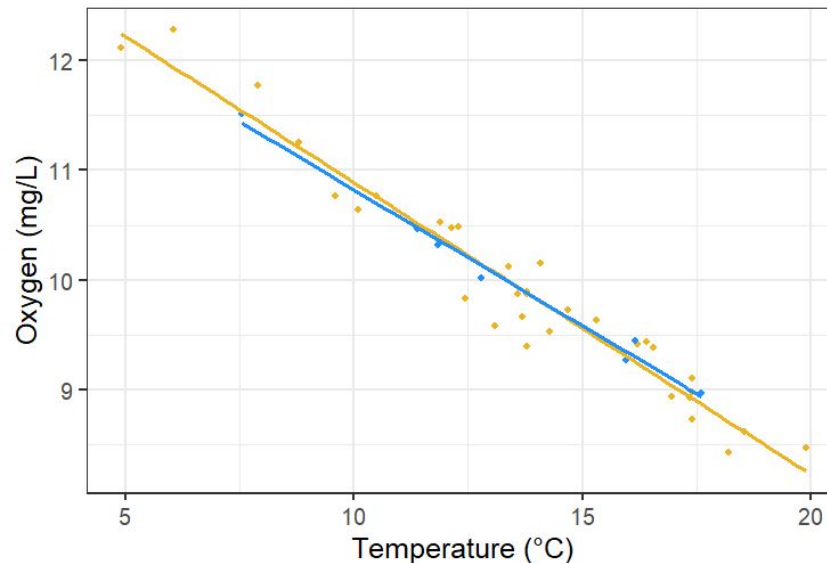
% Dissolved Oxygen

Similar decrease in DO from Jun to Jul across the years, although DO values are lower in 2025 compared to 2022-24. All values fell within the ideal range.



DO & Temperature

There is a consistent inverse relationship between parameters in 2022-24 and 2025. All values stayed within the ideal range.



Square Brook (OL-14u)

Data analyzed from Jan 2020 - Dec 2025

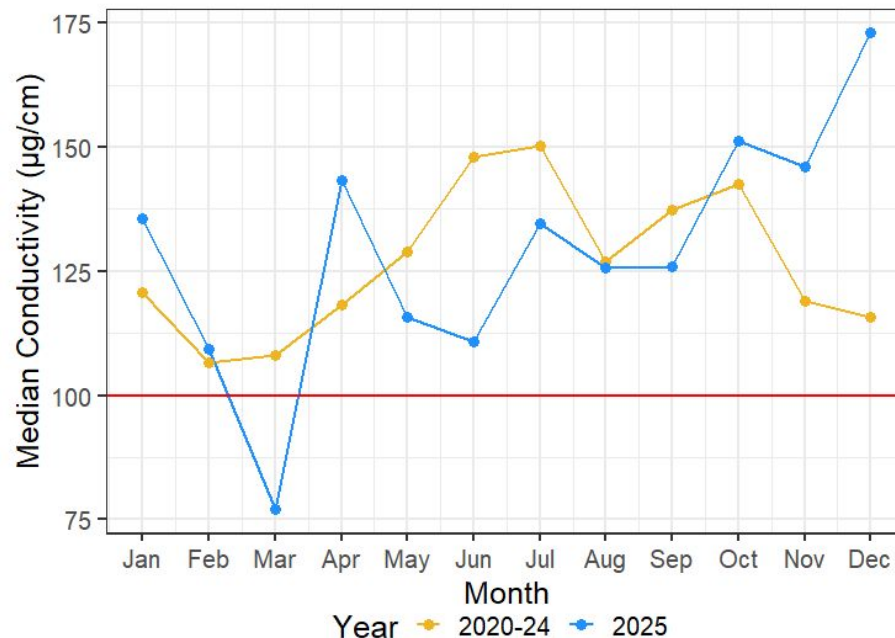
- Monitored since 2005
- Parameters measured: pH, turbidity, temperature, conductivity, DO, TP, ions



| Parameter | Status | Change |
|-------------------|--------------------|--------------------------|
| pH | Within ideal range | Small decrease from 2024 |
| Turbidity | Within ideal range | Small decrease from 2024 |
| Total Phosphorus* | Within ideal range | Small decrease from 2024 |

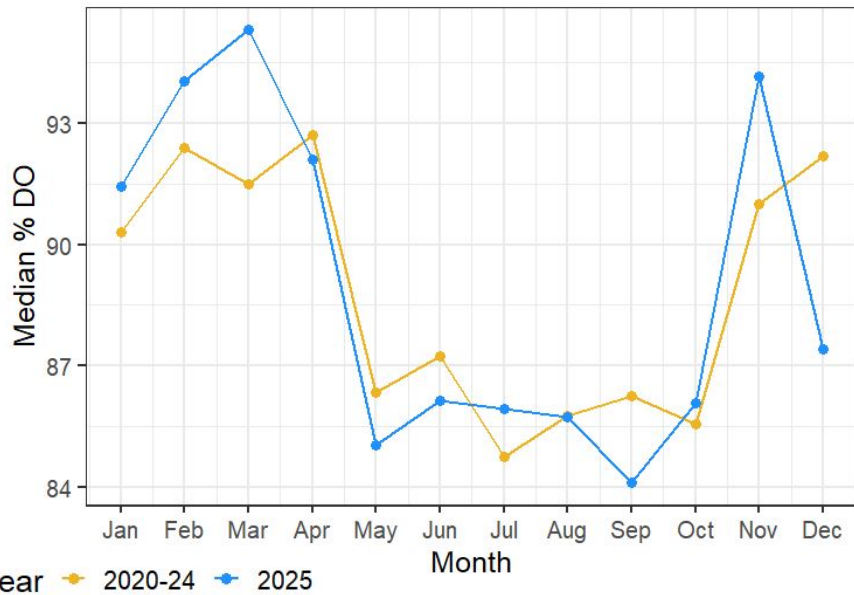
Conductivity

Almost all conductivity values fall above the ideal range in 2025, similar to 2020-24 (except for Mar). However, conductivity did not drop at the end of 2025 unlike previous years.



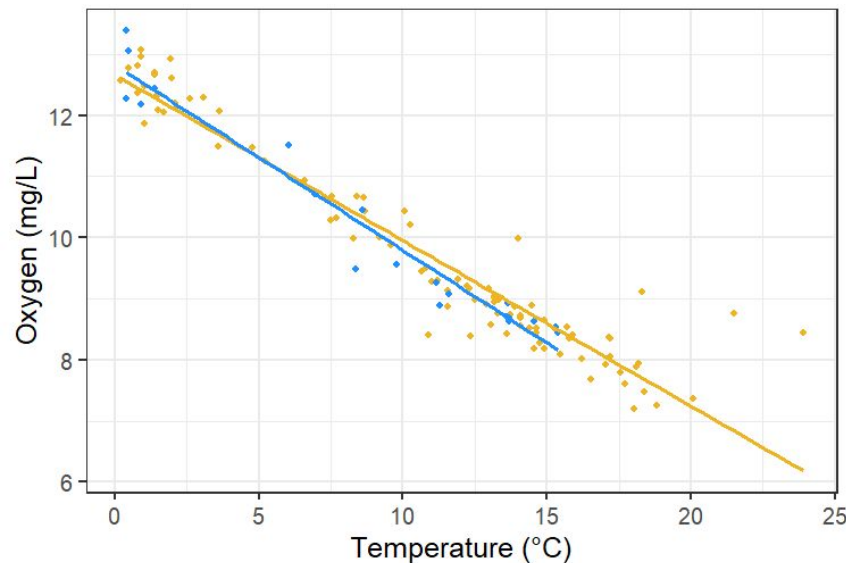
% Dissolved Oxygen

Similar trend in DO throughout 2025 compared to previous years, although the parameter dipped in Dec unlike 2020-24. All values fell within the ideal range.



DO & Temperature

There is a consistent inverse relationship between parameters in 2020-24 and 2025. All values stayed within the ideal range.

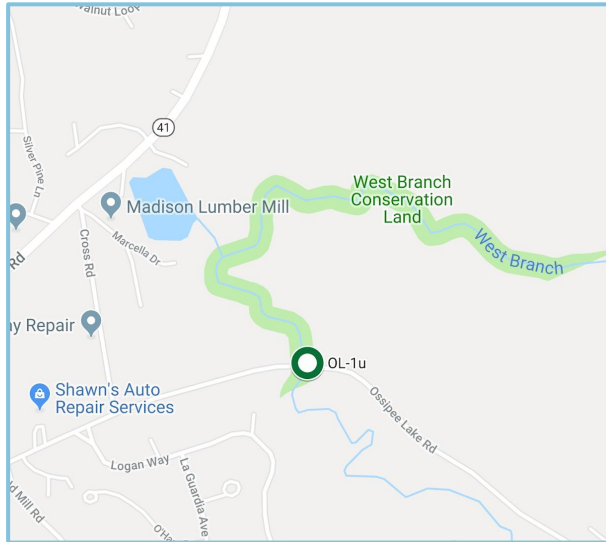


| Parameter | Limit/Standard | Status |
|--------------------------|----------------|--|
| Ammonium | < 200 µg/L | In range |
| Orthophosphate | < 10 µg/L | Exceeded standard in Oct, Nov, Apr, May, Jun |
| Dissolved Organic Carbon | 1-10 mg/L | In range |
| Total Dissolved Nitrogen | < 0.5 mg/L | In range |
| Nitrate | < 0.05 mg/L | Exceeded standard Aug 2024-Feb 2025, Apr, Jun-Aug 2025 |
| Chloride | < 10 mg/L | Exceeded standard entire year |
| Sulfate | < 80 mg/L | In range |
| Sodium | < 50 mg/L | In range |
| Potassium | < 10 mg/L | In range |
| Magnesium | 1-100 mg/L | Below 1 mg/L Mar-Jun |
| Calcium | < 15 mg/L | In range |

West Branch River (OL-1u)

Data analyzed from May 2020 - Oct 2025

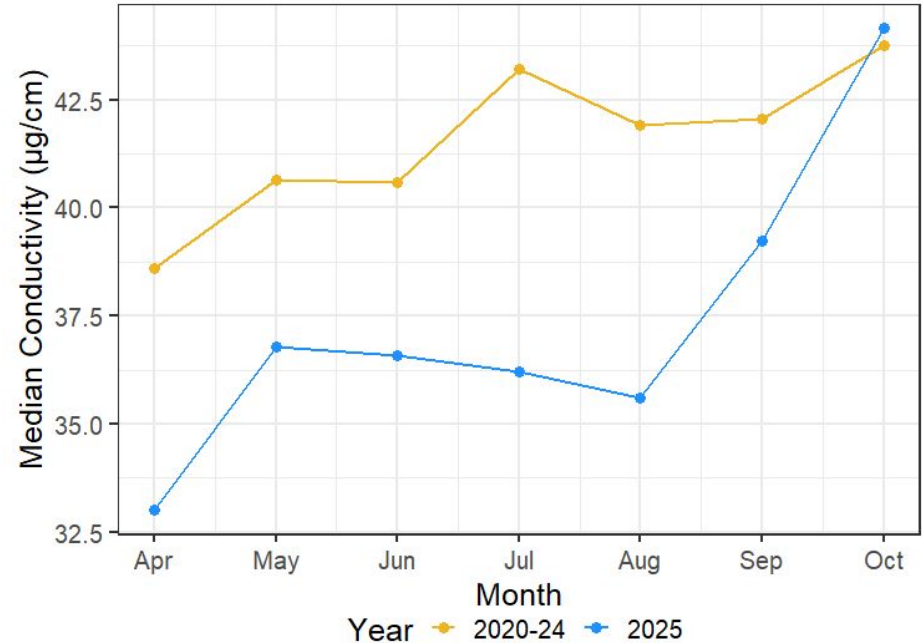
- Monitored since 2005
- Parameters measured: pH, turbidity, temperature, conductivity, DO, TP



| Parameter | Status | Change |
|-------------------|--------------------|--------------------------|
| pH | Within ideal range | Small decrease from 2024 |
| Turbidity | Within ideal range | Small decrease from 2024 |
| Total Phosphorus* | Within ideal range | Small decrease from 2024 |

Conductivity

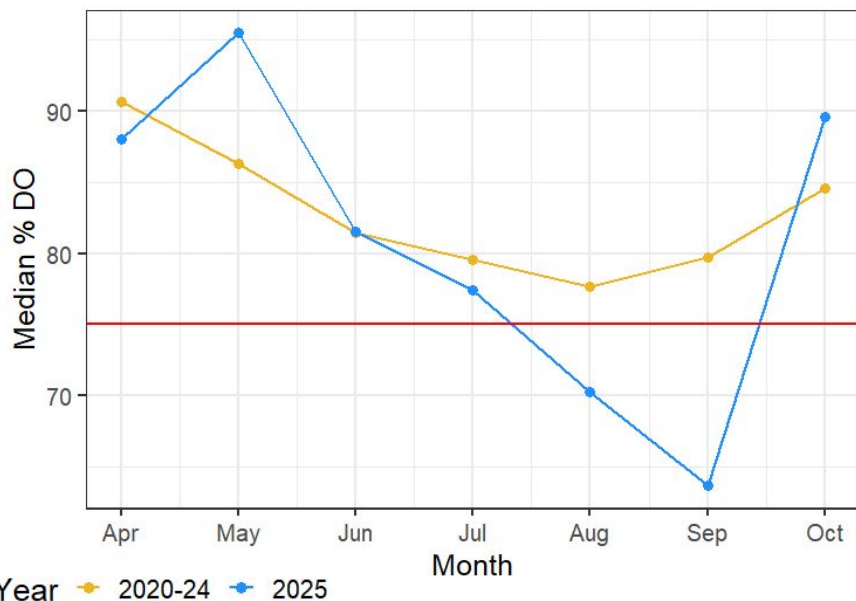
Similar rise in conductivity throughout the sampling period across the years, with a steeper increase in the parameter at the end of 2025 compared to 2020-24. All values fall within the ideal range.



*values only available up to Nov 2025

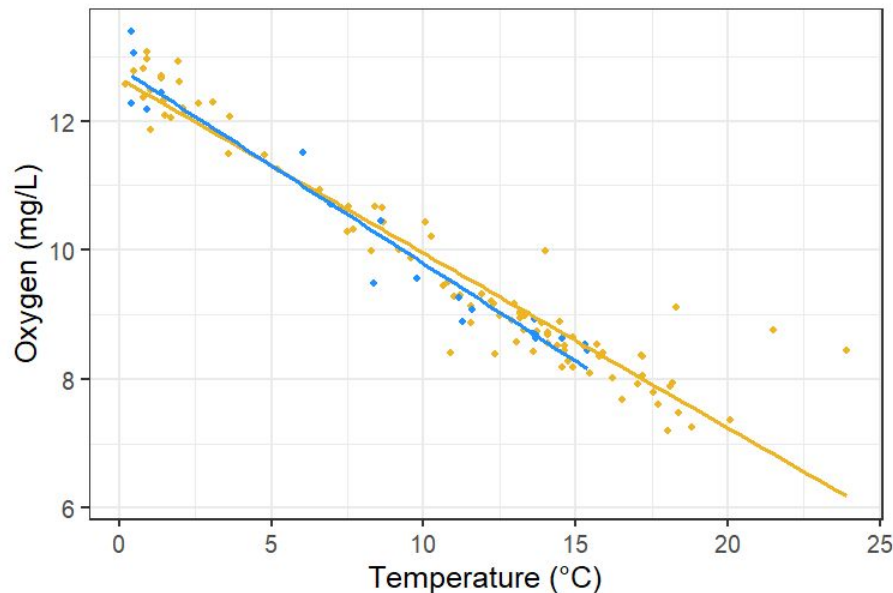
% Dissolved Oxygen

Unlike 2020-24, % DO increased after May and dipped below the ideal range in Aug and Sep. However, the parameter rose back to ideal values in Oct.



DO & Temperature

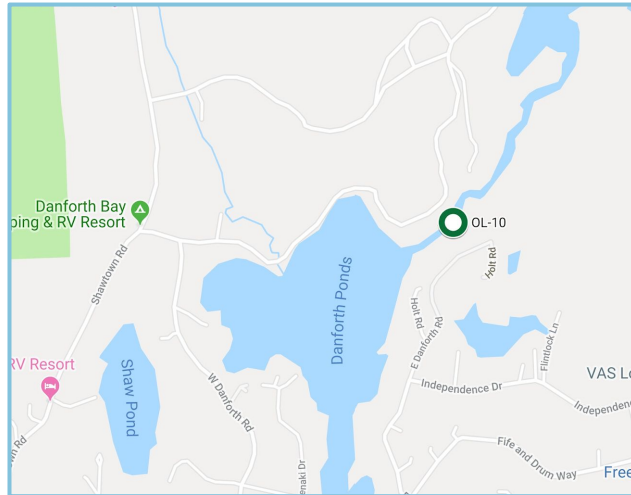
There is a consistent inverse relationship between parameters in 2020-24 and 2025. All values stayed within the ideal range.



Huckins Pond Outflow (OL-10)

Data analyzed from May 2020 - Oct 2025

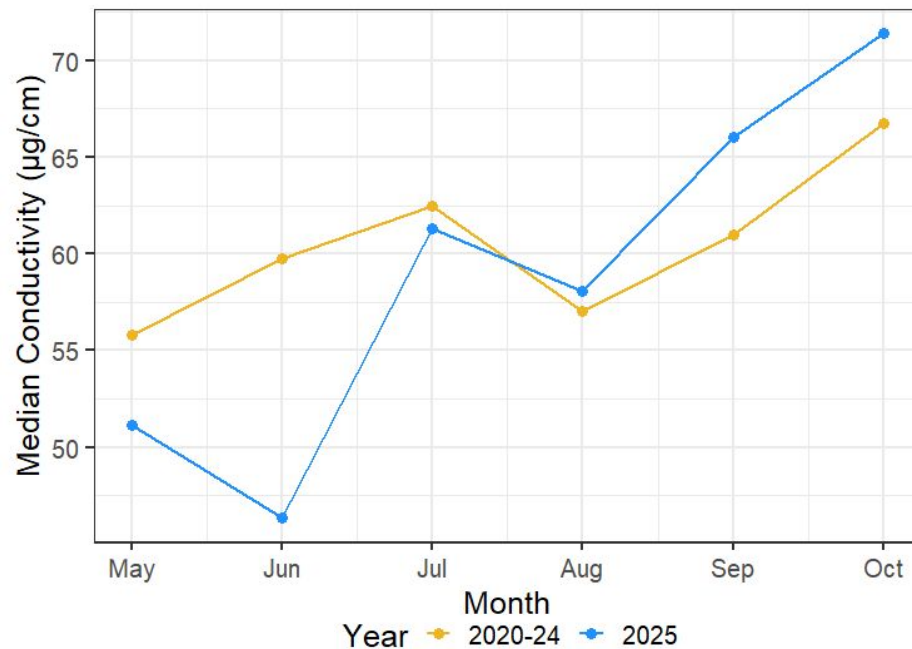
- Monitored 2003-2007, then 2013 onwards
- Parameters measured: pH, turbidity, temperature, conductivity, DO, TP



| Parameter | Status | Change |
|-------------------|--------------------|--------------------------|
| pH | Within ideal range | Small decrease from 2024 |
| Turbidity | Within ideal range | Small decrease from 2024 |
| Total Phosphorus* | Within ideal range | Small decrease from 2024 |

Conductivity

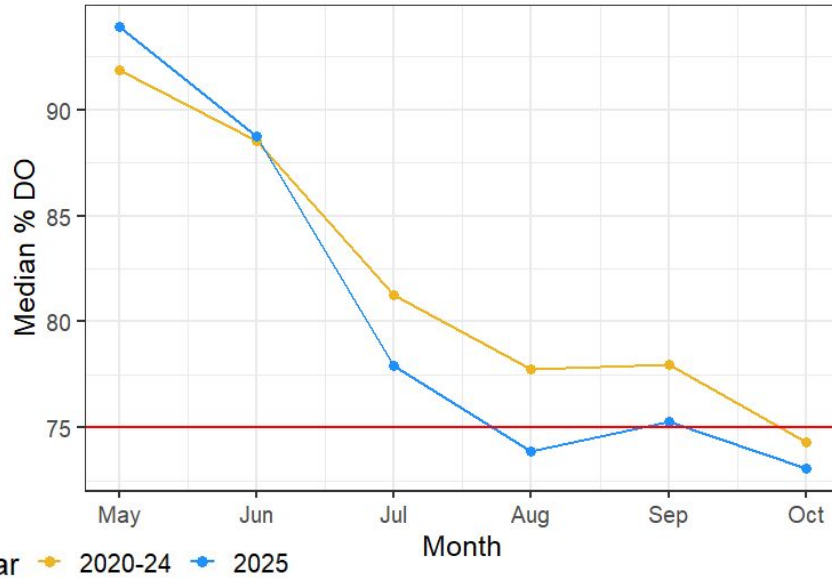
Conductivity generally followed the trend seen in 2020-24, except there was a decrease in the parameter in Jun 2025. All values fell within the ideal range.



*values only available up to Nov 2025

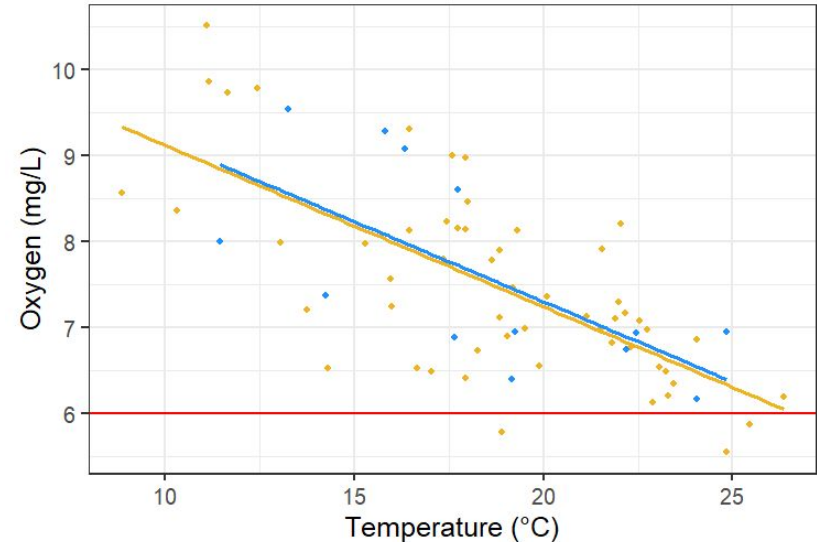
% Dissolved Oxygen

% DO followed the same general trend in 2025 as 2020-24, decreasing over the sampling period. However, lower % DO values were recorded Jul-Oct 2025 than 2020-24. The parameter dipped below the ideal range in Aug and Oct 2025 compared to falling below the standard in only Oct for 2020-24.



DO & Temperature

There is a consistent inverse relationship between parameters in 2020-24 and 2025. Values stayed within the ideal range in 2025.



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 concern.

| Parameter | Summary |
|-----------------------|--|
| Conductivity | Similar trend to previous years although with some unique high values outside the ideal range (sites GF-3, OL-14u). |
| Turbidity | Majority slightly lower than 2024, within ideal range. |
| pH | All sites exhibited a small decrease in pH, within ideal range. |
| % Dissolved Oxygen | Followed similar trends to previous years with some values falling outside the ideal range (sites OL-1u, OL-10). |
| DO & Temperature | Consistent inverse relationships. |
| Total Phosphorus (TP) | Varied across sites with a majority having decreased TP. All values fell within the ideal range |

What can Freedom do to protect its water?

In Towns

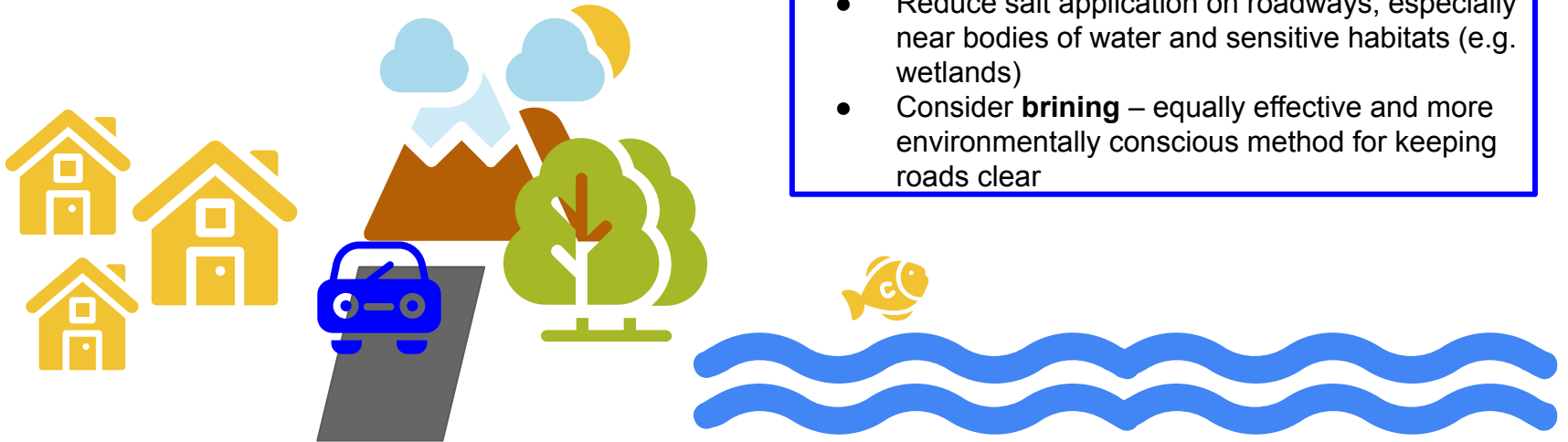
- Monitor the effectiveness of culverts
- Work to replace culverts posing as safety and environmental hazards
- Maintain riparian areas (Streamside Management Zones) and monitor habitats near bodies of water for major changes

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 (e.g. wetlands)
- Consider **brining** – equally effective and more environmentally conscious method for keeping roads clear



THANK YOU FOR YOUR TIME!

Report respectfully submitted by:

J. Emerson, *Staff Scientist*

C. Gersten, *Water Quality Resource Assistant*



AmeriCorps

