

2024 Vermont Family Forest Monitoring Summary Report

Isham, Beaver Meadow and Cold Brooks

Prepared by Becky Tharp | Just Water Consulting
For Addison County River Watch Collaborative

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Summary of 2024 Findings

- Flow conditions relevant to the instream phosphorus criterion (at or below LMM) did not occur at any time in the 2024 sampling season. All TP concentrations were below 14 ug/L at all sites on all dates. The highest TP concentrations were measured on August 6 when New Haven River discharge was the highest of any sampling date (269 cfs). All other sampling dates measured TP below the laboratory's detection limit (10 µg/L) at all locations.
- The *Escherichia coli* criterion for primary contact recreation in Class B(2) waters is not to exceed a geometric mean of 126 organisms/ 100 mL obtained over a representative period of 60 days, and no more than 10% of samples above 235 organisms/ 100 mL. Beaver Meadow Brook measured 161.2 MPN/ 100 mL *E. coli* on one date (August 6) when stream flow was the highest of all sampling days. No other locations exceeded the *E. coli* criterion at any time.
- The turbidity standard for Class B streams is not to exceed 25 NTU in dry weather base-flow conditions. All turbidity samples were below 1.5 NTU. Turbidity was below the laboratory detection limit of 1 NTU on all dates except August 6 when flows were a the highest.

Study Overview

Addison County River Watch (ACRWC) began monitoring in the upper New Haven River watershed in 2021 with sites on Isham Brook (NHIO.1) and Beaver Meadow Brook (NHBM0.1). Analytes measured in 2021 included *E. coli*, chloride, nitrate, total phosphorus (TP), turbidity and temperature. In 2022, ACRWC monitored the same two sites and added a third on Cold Brook (NHCB0.1), a tributary to Baldwin Creek in the town of Bristol, which also drains to the New Haven River. And in 2023, the same three sites were monitored and a fourth was added (LOCNB0.2) on Norton

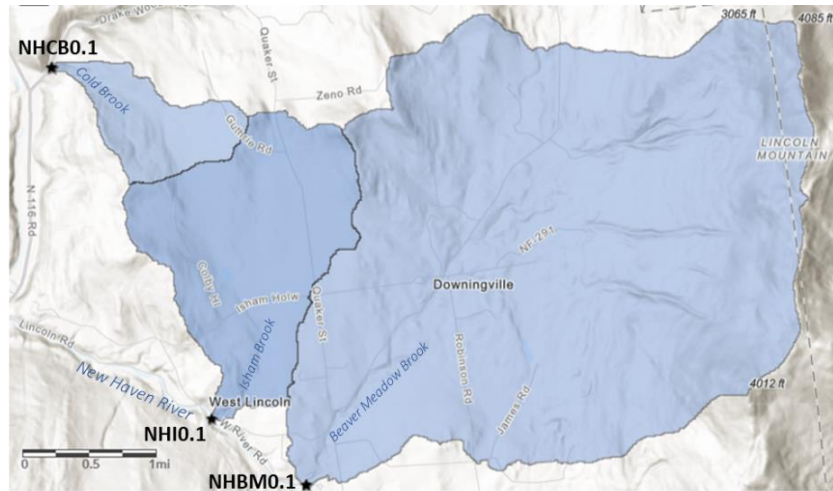


Figure 1. 2024 monitoring points and their associated watershed areas.

Site ID	Waterbody	Watershed Area (acres)
NHI.0	Isham Brook	1,500
NHBM0.1	Beaver Meadow Brook	6,800
NHCB0.1	Cold Brook	435

Brook which drains to Little Otter Creek in the town of Bristol. All sites were grab sampled for TP, *E. coli*, turbidity and temperature in 2023. Site LOCNB0.2 was also sampled for chloride and nitrate that year. Findings from 2023 identified LOCNB0.2 as having the highest concentrations of all measured analytes compared to other sites and water quality standard exceedance for TP, *E. coli*, and turbidity. In 2024, the same four sites were monitored (LOCNB0.2, NHCB0.1, NHIO.1, NHBM0.1). Data from site LOCNB0.2 in 2023 and 2024 is the subject of a separate report. This report summarizes findings from Isham, Beaver Meadow, and Cold Brooks. NHCB0.1, NHIO.1, and NHBM0.1.

Consistent with 2021, 2022 results, concentrations of phosphorus, turbidity, and bacteria were low at the three sites on Isham, Beaver Meadow, and Cold Brooks in 2023. There was an exception of one date in August 2023 following a significant rain event when all sites experienced a spike in the concentration of all measured analytes.

In 2024, samples were analyzed for total phosphorus, *E. coli*, and turbidity once per month from June to September.

Methods

In 2024, Isham, Beaver Meadow, and Cold Brooks were sampled at one location each on four dates: June 4, July 2, August 6, and September 3. No duplicate samples were collected at any site. Grab samples were collected and analyzed for TP, *E. coli*, and turbidity at all sites. All samples were analyzed at Endyne Laboratories in Williston, Vermont.

Water quality samples were collected by ACRWC volunteers in accordance with quality assurance procedures outlined in the EPA-approved Generic Quality Assurance Project Plan prepared by VTDEC.

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USGS gage on the New Haven River at Brooksville (Station ID 04282525) was referenced to determine general flow conditions on each sampling date. Rainfall data were downloaded from the Northeast RCC CLIMOD 2 weather station in Bristol, Vermont which is part of the CoCoRaHS (Community Collaborative Rain, Hail & Snow) network and managed by Cornell University.

Results

Precipitation and River Flow

2024 was marked by one very significant rain event in early July but otherwise had fewer ≥ 1 " rain events between May and September than 2023. The August sampling event took place during a storm event. All other sampling occurred between storms (Figure 1).

2024 Bristol, Vermont Rainfall and Sampling Dates

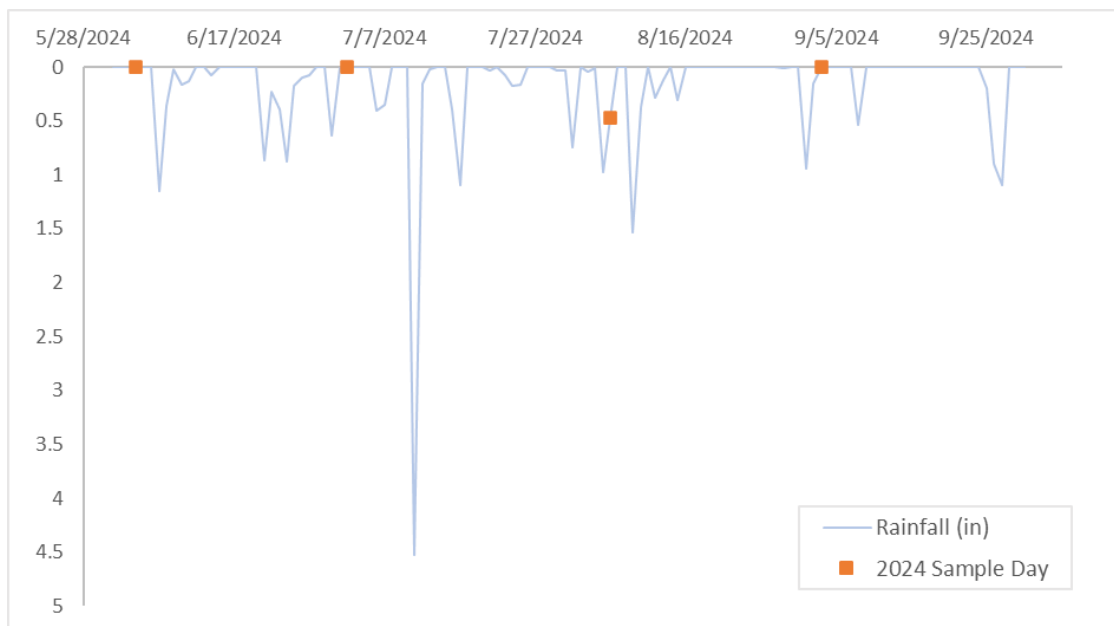


Figure 1. Rainfall as measured in Bristol, Vermont and reported by Northeast RCC CLIMOD 2

In 2024, flow in the New Haven River exceeded the low median monthly flow (LMM) (65 cfs) on all sample days. The highest measured flow at the New Haven Brooksville gage in the spring/ summer (April 1- September 1) exceeded 6,000 cfs (more than 1,000 cfs higher than the highest value in the 2023 season) (Figure 2).

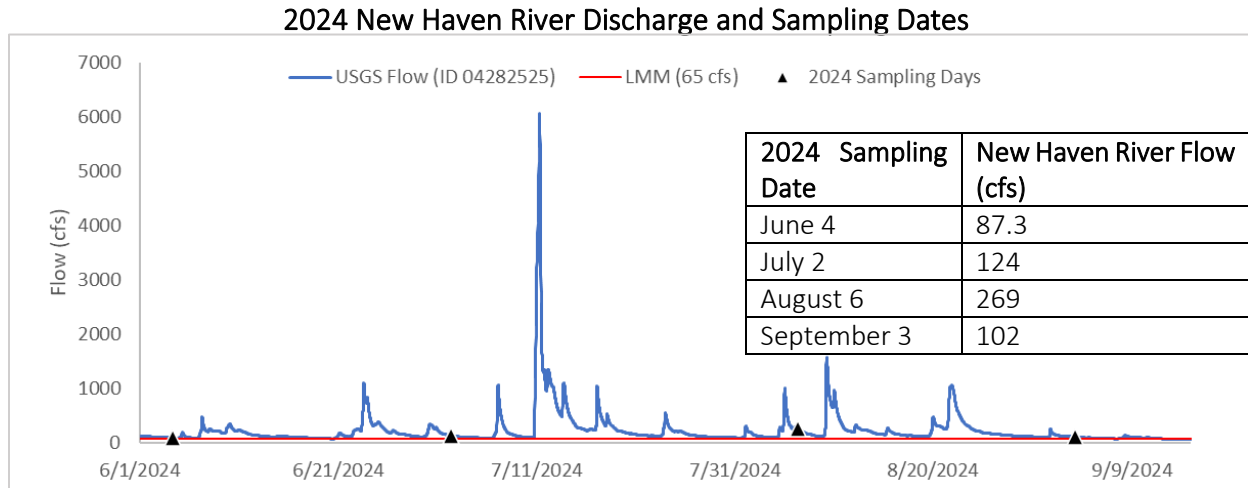


Figure 2. Flows in the New Haven River with 2024 sampling days and the corresponding river flow noted.

Flow status in the river during sampling dictates the pollutant level as it relates to a legal standard associated with concentrations during flows of a particular type. The phosphorus standard is relevant at flows below LMM. As a result, none of the 2024 sample results are directly applicable to the phosphorus water quality criterion.

Phosphorus

The instream phosphorus criterion for warm-water medium gradient (WWMG) wadable stream ecotypes in Class B waters at or below low median monthly (LMM) flow conditions from June to October is not to exceed 27 µg-P/L. Flow exceeded the LMM at all times in the summer of 2024. All samples collected on Isham, Beaver Meadow, and Cold Brook were below 27 µg-P/L on all sample days. Most samples were below the laboratory detection limit of 10 µg/L.

Escherichia coli

The primary contact recreation bacterial water quality criterion states that *E. coli* is not to exceed a geometric mean of 126 organisms (MPN)/100 mL obtained over a representative period of 60 days, and no more than 10% of samples should be above 235 organisms/100 mL. Sampling in 2024 does not qualify as a representative period of 60 days because only four total samples were collected at any site over a 90-day period but the standard provides a threshold to which the measured samples can be compared.

The *E. coli* water quality criterion for primary contact recreation was exceeded (161.2 MPN/mL) in Beaver Meadow Brook (NHBM0.1) on one date (August 6) when riverine flow was the highest of the season’s sampling days (Figure 2). Overall, Beaver Meadow Brook had the highest overall *E. coli* counts and Cold Brook had the lowest values.

Turbidity

The turbidity standard for Class B streams is not to exceed 25 NTU in dry weather base-flow conditions.

The turbidity standard was not exceeded at any sampling location on any date in 2024. In fact, turbidity did not exceed 1.5 NTU in 2024 and that value corresponds to a sample collected on Beaver Meadow Brook on

August 6, when flow was the highest of the sampling events. The majority of samples were below the laboratory detection limit of 1 NTU.

Conclusions

Water quality results in 2024 indicate very low (below detection limits) of most analytes on most sampling dates and at all locations. The only incident of an elevated value was on August 6 when riverine flow was the highest of the season's sampling days following a rain event and *E. coli* exceeded the bacterial water quality criterion in Beaver Meadow Brook (161.2 MPN/ 100 mL).

Results from 2024 monitoring in Isham, Beaver Meadow, and Cold Brooks are similar to previous years (2021-2023) when nutrients and turbidity were below laboratory detection limits on most sample days at all locations and there were occasional exceedances of the bacterial water quality standard, usually coincident with rain events.

No duplicate samples were collected in 2024. Duplicate field samples provide a quality assurance check of field protocols as two samples collected at the same time and place are expected to measure within a pre-determined range which indicates clean and consistent sampling procedures. Without field duplicates at these sites, no such cross check of results is possible. To provide a quality assurance check of field protocols, consideration should be made to include one duplicate sample at each location throughout the monitoring period in 2025.

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Raw Data from 2024

Site ID	Date	TP (ug/L)	TP (mg/L)	E. coli (MPN/100ml)	Turbidity (NTU)
NHIO.1	6/4/2024	< 10	< 0.01	29.2	< 1
NHIO.1	7/2/2024	< 10	< 0.01	14.5	< 1
NHIO.1	8/6/2024	13	0.013	73.3	1.1
NHIO.1	9/3/2024	< 10	< 0.01	14.8	< 1
NHCB0.1	6/4/2024	< 10	< 0.01	9.8	< 1
NHCB0.1	7/2/2024	< 10	< 0.01	9.7	< 1
NHCB0.1	8/6/2024	13	0.013	63.1	< 1
NHCB0.1	9/3/2024	< 10	< 0.01	16	< 1
NHBM0.1	6/4/2024	< 10	< 0.01	61.6	< 1
NHBM0.1	7/2/2024	< 10	< 0.01	31.7	< 1
NHBM0.1	8/6/2024	12	0.012	161.2	1.5
NHBM0.1	9/3/2024	< 10	< 0.01	22.8	< 1