

# VFWD Salisbury Fish Culture Station

Salisbury, Vermont

PREPARED FOR

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# Table of Contents

<b>1</b>	<b>Introduction.....</b>	<b>1</b>
1.1	Project Background.....	1
<b>2</b>	<b>Study Area and Monitoring Network.....</b>	<b>3</b>
2.1	Monitoring Stations.....	3
2.1.1	Halnon Brook, Above Confluence (ID 524120).....	4
2.1.2	Halnon Brook, Below Confluence (ID 502252).....	4
2.1.3	Trib. 10 (ID 502254).....	4
2.2	Monitoring Activities.....	4
<b>3</b>	<b>Monitoring Results.....</b>	<b>6</b>
3.1	Precipitation and Flow.....	6
3.2	Baseflow Water Chemistry Analysis.....	8
3.2.1	Conductivity & Chloride.....	8
3.2.2	pH.....	9
3.2.3	Alkalinity.....	9
3.2.4	Turbidity.....	10
3.2.5	Nitrate.....	10
3.2.6	Total Phosphorus and Total Dissolved Phosphorus.....	11
3.2.7	Baseflow Summary.....	12
3.3	Substrate Analysis.....	12
3.3.1	Embeddedness.....	13
3.3.2	Channel Materials.....	13
3.3.3	Substrate Summary.....	15
3.4	Biomonitoring.....	16
3.4.1	Halnon Brook, Above Confluence with Trib. 10 (ID 524120).....	17
3.4.2	Halnon Brook, Below Confluence with Trib. 10 (ID 502252).....	18
3.4.3	Halnon Brook Trib. 10, Below Dam (ID 502254).....	19
3.4.4	Biomonitoring Summary.....	20
<b>4</b>	<b>Conclusions.....</b>	<b>21</b>
<b>5</b>	<b>References.....</b>	<b>22</b>

## Appendices

Appendix 1 - Water Quality Monitoring Site Map

Appendix 2 - Baseflow Water Chemistry Data

Appendix 3 – Substrate Data

Appendix 4 – Macroinvertebrate Data

## List of Tables

Table No.	Description	Page
Table 1	Summary of Monitoring Stations.....	3
Table 2	2023 Summary of Channel Material in Halnon Brook and Trib. 10.....	13
Table 3	Biomonitoring Results: Halnon Brook, Above Confluence with Trib. 10 (ID 524120).....	17
Table 4	Biomonitoring Results: Halnon Brook, Below Confluence with Trib. 10 (ID 502252).....	18
Table 5	Biomonitoring Results: Halnon Brook Trib. 10 (ID 502254).....	19

## List of Figures

Figure No.	Description	Page
Figure 1	Streamflow Conditions in Otter Creek, June-October 2023.....	7
Figure 2	Monitoring Results for Conductivity (2020-2023).....	8
Figure 3	Monitoring Results for Chloride (2020-2023).....	9
Figure 4	Monitoring Results for pH (2020-2023).....	9
Figure 5	Monitoring Results for Turbidity (2020-2023).....	10
Figure 6	Monitoring Results for Nitrate (2020-2023).....	11
Figure 7	Monitoring Results for Total Phosphorus (2020-2023).....	11
Figure 8	Monitoring Results for Total Dissolved Phosphorus (2020-2023).....	12
Figure 9	Halnon Brook Station 524120 Pebble Counts (2023).....	14
Figure 10	Halnon Brook Station 502252 Pebble Counts (2001-2023).....	14
Figure 11	Halnon Brook Trib. 10 Station 502254 Pebble Counts (2009-2023).....	15



# 1

## Introduction

On behalf of the Vermont Department of Fish & Wildlife (“VFWD”), VHB has prepared this Water Quality Monitoring Plan Report (“WQMP”). The WQMP includes a record, analysis, and an evaluation of water quality monitoring data collected during the 2023 monitoring season from the established monitoring stations on Halnon Brook and Tributary 10 (“Trib. 10”) below the VFWD Salisbury Fish Culture Station (“FCS”). This data was collected in conformance with the Project’s Quality Assurance Project Plan (“QAPP”), most recently updated January 3, 2024 (VHB, 2024a).

### 1.1 Project Background

The VFWD operates the Salisbury FCS in Salisbury, Vermont as a broodstock facility to supply juvenile fish to the other fish culture stations as part of the statewide stocking program. The facility operates as a flow-through system and is authorized to discharge effluent to Tributary 10 to Halnon Brook (“Trib. 10”) under National Pollutant Discharge Elimination System (“NPDES”) permit #3-0361. Water supplied to the FCS raceways originates as groundwater pumped from two gravel wells located east of the facility. Flow from these wells is then piped to the various production units at the facility (East Series, West Series, South Series, and the Fish culture station Building). Flow from some production units may be run serially through another production system, but all flows are ultimately discharged to Trib. 10 just east of Smead Road. The Water Quality Monitoring Site Map in Appendix 1 displays the FCS location and production units relative to the water quality monitoring stations.

The facility received a renewed NPDES permit (#3-3061) from the Vermont Department of Environmental Conservation (“DEC”) on December 8, 2022, with an effective date of January 1, 2023. Instream sampling and monitoring in Trib. 10 and Halnon Brook in 2023 was conducted in conformance with the NPDES permit for the facility. While condition I.F.3. of Permit #3-0361 only requires biomonitoring in 2024 and 2026, biomonitoring was

conducted in 2023 to continue annual analysis of phosphorus loading impacts as the FCS continues to implement adaptive management strategies.

As specified in the Vermont Water Quality Standards (“VWQS”; ANR, 2022a), compliance with nutrient criteria must be achieved either by direct compliance with the nutrient concentration values (i.e., total phosphorus threshold of 0.014 mg/L for the Otter Creek drainage of Lake Champlain), or by compliance with all nutrient response conditions (i.e., meeting the threshold values for aquatic macroinvertebrates).

The purpose of the WQMP is to document the biological condition of Halnon Brook and Trib. 10 as the FCS works to comply with the VWQS through implementation of operational changes (see the Salisbury Fish Culture Station Phosphorus Optimization Plan / Best Management Practices Annual Report, dated July 31, 2024; VHB, 2024b). As a biological system, stream taxa considered in the macroinvertebrate assessment may respond to subtle shifts in water quality that may not be easily quantified in advance and may not respond instantaneously to operational changes. Several years of adaptive management feedback and implementation of innovative practices at the FCS may be required to fully meet the VWQS criteria. The results of 2023 represent the fourth year of implementation of the WQMP and the first year under the renewed NPDES permit.

## 2

## Study Area and Monitoring Network

The monitoring program has been designed to assess Halnon Brook and Trib. 10, the receiving waters for discharges from the FCS. Water quality monitoring, biomonitoring, and substrate analysis was conducted at a total of three sampling locations near the FCS in 2023.

### 2.1 Monitoring Stations

Table 1 identifies the streams, the monitoring station identifiers, and basic information about the sampling location sites. In 2023, the reference station on Halnon Brook was moved from DEC monitoring station 502253 to a new location approximately ¼-mile upstream due to the inconsistent biological condition at Halnon Brook station 502253 since 2020. These sampling stations are shown relative to the FCS on the Water Quality Monitoring Site Map included on page 1 of Appendix 1.

**Table 1 Summary of Monitoring Stations**

Stream Name	DEC Monitoring Station ID	Elevation (ft)	Approximate Drainage Area (km <sup>2</sup> )	Approximate Drainage Area (mi <sup>2</sup> )
Halnon Brook, Above Confluence	524120	403	9.2	3.6
Halnon Brook, Below Confluence	502252	388	13.5	5.2
Halnon Brook Trib. 10, Below Wainwright Dam	502254	389	4.1	1.6

### 2.1.1 Halnon Brook, Above Confluence (ID 524120)

DEC station ID 524120 is located on Halnon Brook upstream of the confluence with Trib 10. and therefore, does not receive water discharged from the FCS. Halnon Brook station 524120 was sampled for the first time in 2023. Halnon Brook station 524120 was sampled in lieu of Halnon Brook station 502253, which had previously been used as a reference station. Halnon Brook station 502253 no longer represents a viable reference station due to the upstream migration of amphipods, resulting in the recent shift in the macroinvertebrate community composition in that reach of Halnon Brook. Station 524120 is located high enough in the Halnon Brook watershed to be outside of the influence of the amphipod source population in the lower portion of the watershed.

### 2.1.2 Halnon Brook, Below Confluence (ID 502252)

Station 502252 is on Halnon Brook downstream from the confluence with Trib. 10 (ID 502252). This station has inconsistently met the Class B(2) biocriteria since 2019 with community assessments ranging from "Fair" to "Very Good." In 2023, this station did not meet the Class B(2) biocriteria.

### 2.1.3 Trib. 10 (ID 502254)

Based on biological assessments from 1990 to 2019, DEC has identified Trib. 10 (ID 502254) as impaired and not consistently meeting the Class B(2) aquatic life support ("ALS") biocriteria for the small high-gradient stream ("SHG") classification (DEC, 2017). The Trib. 10 reach designated by DEC for water quality monitoring and macroinvertebrate assessment is located between the breached Wainwright Mill Dam (or Halnon Pond Dam) and the stream's confluence with Halnon Brook. A considerable portion of the baseflow in this reach consists of discharge from the FCS as there are no other perennial streams tributary to this location. A feasibility assessment was developed in February 2022 by SLR Consulting for the removal of the Wainwright Mill Dam. There may be potential impacts to water quality and aquatic biota that would occur during the construction and post-construction stabilization period if this dam is removed. Such impacts must be evaluated in the context of the overall benefit to the watershed but may delay the delisting of Trib. 10 based on the ALS criteria.

Trib. 10 discharges into Halnon Brook south of Lake Dunmore Road, immediately downstream of a culvert that allows Halnon Brook to pass under the road (see Appendix 1).

## 2.2 Monitoring Activities

The monitoring plan consists of the following assessments:

- › Biomonitoring;
- › Water chemistry sampling; and,
- › Substrate analysis



On September 29, 2023, all three monitoring stations were monitored for water chemistry. Water chemistry parameters monitored in 2023 included temperature, specific conductivity, pH, dissolved oxygen, turbidity, alkalinity, chloride, nitrate, nitrite, ammonia, total Kjeldahl nitrogen ("TKN"), total suspended solids, total phosphorus ("TP"), and total dissolved phosphorus ("TDP"). TP and TDP at Trib. 10 station 502254 was sampled on September 26, 2023 as part of instream sampling and was therefore not resampled on September 29. Substrate characteristics and aquatic biota ("biomonitoring") were monitored at all three stations on September 29, 2023.

Sampling results were compared to the VWQS and a determination was made as to whether the monitoring stations met the ALS criteria for a Class B(2) water.

# 3

## Monitoring Results

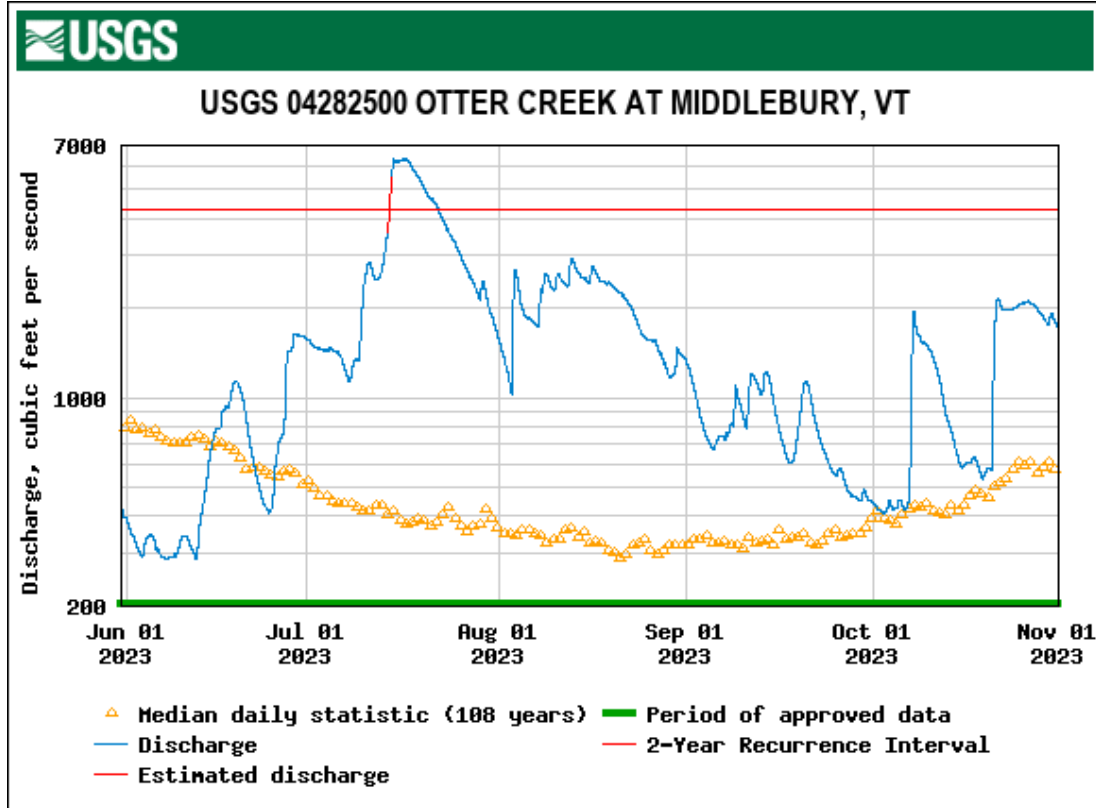
The results from the monitoring conducted in 2023 are presented below. These include a review of precipitation and flow trends, water chemistry analysis, substrate analysis, and biomonitoring.

### 3.1 Precipitation and Flow

The nearest National Oceanic and Atmospheric Administration (“NOAA”) weather station to the Project Area was the Ripton Weather Station (ID: US1VTAD0030) in Ripton, VT (approximately 5.4 miles northeast of the study area). According to precipitation data recorded at the Ripton station, a total of 38.7 inches of precipitation fell from June 1, 2023 through September 18, 2023, when the weather station stopped recording data. A considerable portion of this rainfall occurred as storm events in July, which had a total monthly precipitation of 16 inches. Several large precipitation events occurred in July and August 2023 including a 5.75-inch event over July 10-11, a 5.5-inch event over July 14-17, and a 3.1-inch event on August 4. The large precipitation events recorded at the Ripton station in July and August likely produced similar amounts of rain in the Project Area.

Though stream flows are not monitored in Halnon Brook, a United States Geological Survey (“USGS”) stream gauge is located on Otter Creek (USGS Gauge VT-04282500), the eventual receiving water of Halnon Brook, approximately 6.5 miles northwest (downstream) of the Project Area. While baseflow in Trib. 10 is relatively constant due to flow contribution from the FCS facility, the Otter Creek stream gauge provides a comparable representation of storm event stream flow in Trib. 10 at the time of flow recordings in Otter Creek. All stream flow conditions in Halnon Brook, however, are comparable to the Otter Creek stream flows. Figure 1 below depicts the discharge in cubic feet per second (“cfs”) at the Otter Creek stream gauge from June through October 2023.

Figure 1 Streamflow Conditions in Otter Creek, June-October 2023



Several peaks in streamflow can be observed throughout the summer months of 2023. The most significant of these events occurred following the high precipitation events in mid-July, when discharge in Otter Creek reached approximately 6,500 cfs. The 2023 daily streamflow in Otter Creek was higher than the historical median daily streamflow from the end of June through the end of October. Stream flows appear to have been relatively lower, and closer to historical median flows, during the days leading up to the macroinvertebrate sampling that took place on September 29, 2023.

Though a considerable portion of the baseflow that passes through Trib. 10 comes from the FCS facility, large storm events in the area would produce enough runoff to increase streamflow within Trib. 10 and the portions of Halnon Brook within the study area. VHB observed evidence of recent large streamflow events at Trib. 10 during biomonitoring on September 29, 2023. As noted in the Lotic Benthos Fieldsheets in Appendix 3, "significant vegetation loss in the riparian zone" and "moderate changes to stream geomorph[ology] due to flooding" were observed. Therefore, it is likely that the significant increase in flow observed at the Otter Creek USGS gauge in July and August, and the persistent high flows throughout the summer, likely occurred in Halnon Brook and Trib. 10 as well.

It has been anecdotally observed by DEC and others that large precipitation events can cause enough disturbance to shift macroinvertebrate community compositions. Extreme events such as those observed following Tropical Storm Irene ("TSI") and the July and August 2023 storms can cause profound effects to macroinvertebrate communities. It is likely that

the high precipitation events in 2023 impacted the macroinvertebrate communities at the biomonitoring stations on Halnon Brook and in Trib. 10.

## 3.2 Baseflow Water Chemistry Analysis

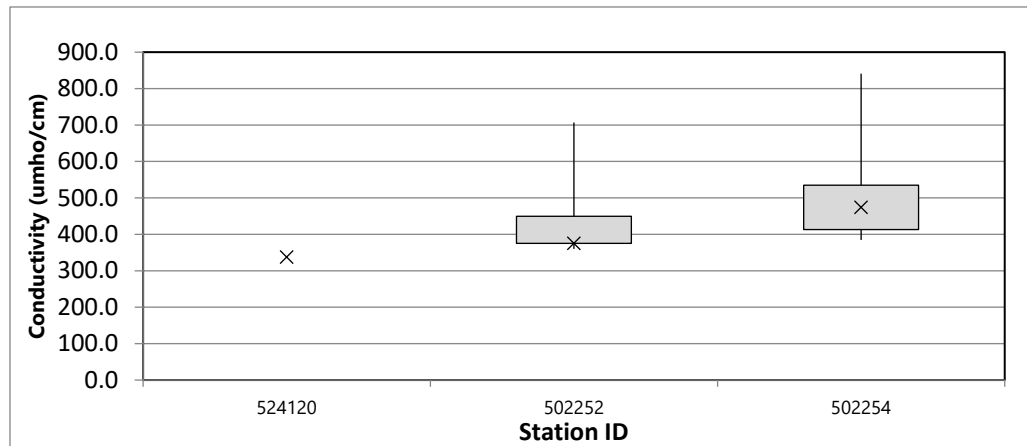
Water chemistry samples were collected on September 29, 2023 in conjunction with biomonitoring. Samples were collected from all three stations in the field by VHB and delivered to Endyne, Inc. in Williston, Vermont for laboratory analysis.

The box and whisker plots below provide a summary of the available water chemistry parameters at each monitoring station from 2020 through 2023. The box represents the 1st to 3rd quartile of the total data set. The whiskers represent the minimum and maximum values of the data set, and the 'x' represents the 2023 data points. Dashed red lines represent the relevant numerical criteria of the VWQS, where applicable. No box and whisker plots were developed for Halnon Brook station 524120 as 2023 represented the first year of sampling at this station. Appendix 2 includes the complete set of water chemistry from 2023 along with the laboratory reports for the 2023 water chemistry sampling.

### 3.2.1 Conductivity & Chloride

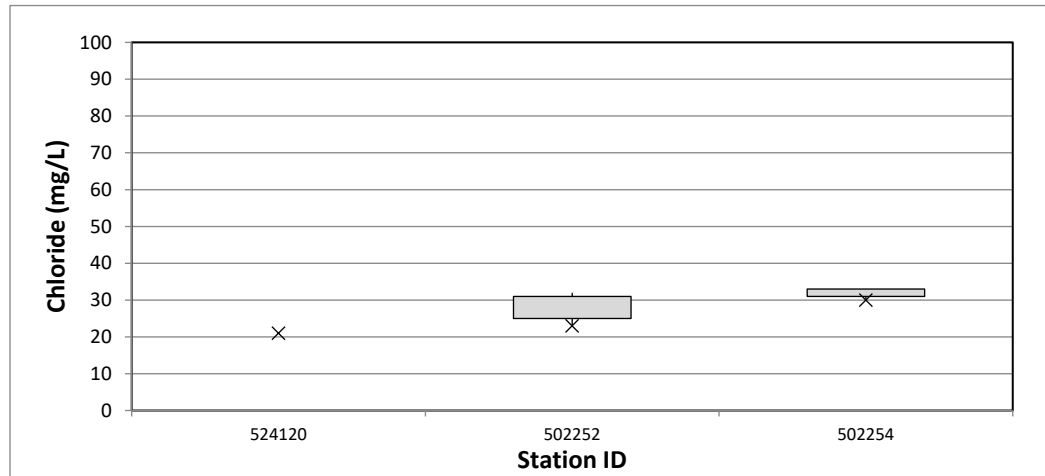
Samples were field measured for conductivity using a pre-calibrated YSI Multi-meter. Figure 2 displays the results for conductivity measurements at each station.

**Figure 2 Monitoring Results for Conductivity (2020-2023)**



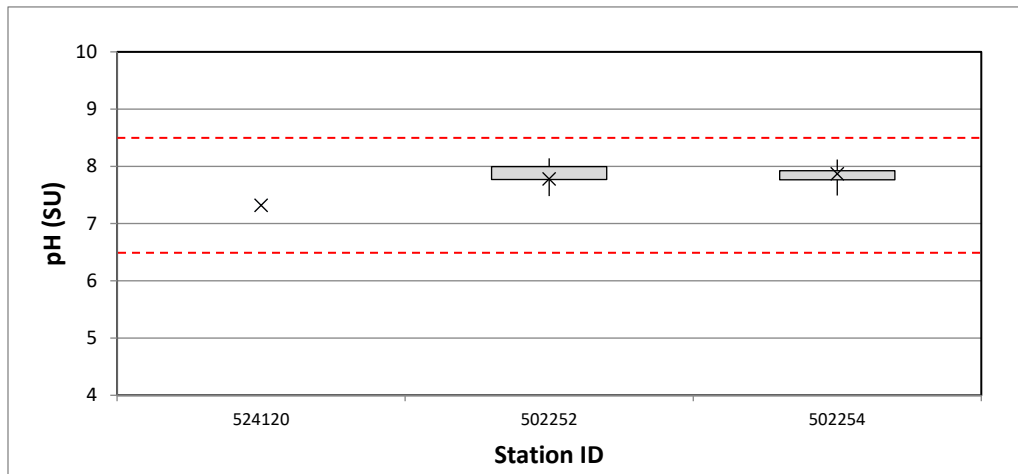
Conductivity readings were within ranges of the period of record for all stations. The maximum conductivity value of 474.1 µmho/cm observed during 2023 monitoring was recorded at Trib. 10 station 502254. Throughout the period of record, Trib. 10 has generally exhibited the highest conductivity values as compared to the other Halnon Brook stations.

Chloride samples were collected and analyzed in the laboratory. The highest chloride value of 30 mg/L was observed at Trib. 10 station 502254. All samples collected were well below the VWQS acute (860 mg/L) and chronic (230 mg/L) criteria, as seen in Figure 3 below. Due to the vertical scale of the chart, lines representing these criteria are not depicted.

**Figure 3 Monitoring Results for Chloride (2020-2023)**

### 3.2.2 pH

Samples were field measured for pH using a pre-calibrated YSI Multi-meter for both baseflow events. Figure 4 displays the results for pH.

**Figure 4 Monitoring Results for pH (2020-2023)**

pH values in 2023 were within the acceptable VWQS range of 6.5 to 8.5 at all stations in 2023. The highest pH value of 7.87 was observed at Trib. 10 station 502254.

### 3.2.3 Alkalinity

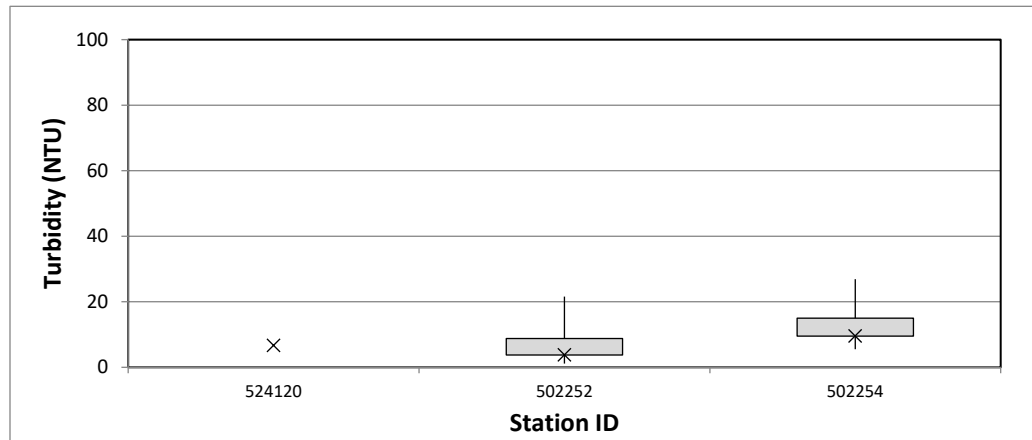
Samples were collected during the 2023 period for alkalinity at all stations. Alkalinity is a measure of the buffering capacity (or acid neutralizing) of water. Alkalinity is not a pollutant, but a measure of sensitivity to acidic inputs. For reference, waterbodies with alkalinities below 2.5 mg/L are considered acidic and may be added to the Vermont 303(d) List of Impaired Waters (DEC, 2020), however, there is no VWQS threshold for alkalinity. Samples collected and analyzed in the laboratory ranged from 138 to 185 mg/L and were well above

the 2.5 mg/L threshold for both baseflow sampling dates, indicating Hanlon Brook and Trib. 10 are relatively hard waters with high buffering capacity and are regulating pH levels within the acceptable VWQS range.

### 3.2.4 Turbidity

Samples were field analyzed for turbidity using a Geotech turbidity meter. Figure 5 displays the results for turbidity.

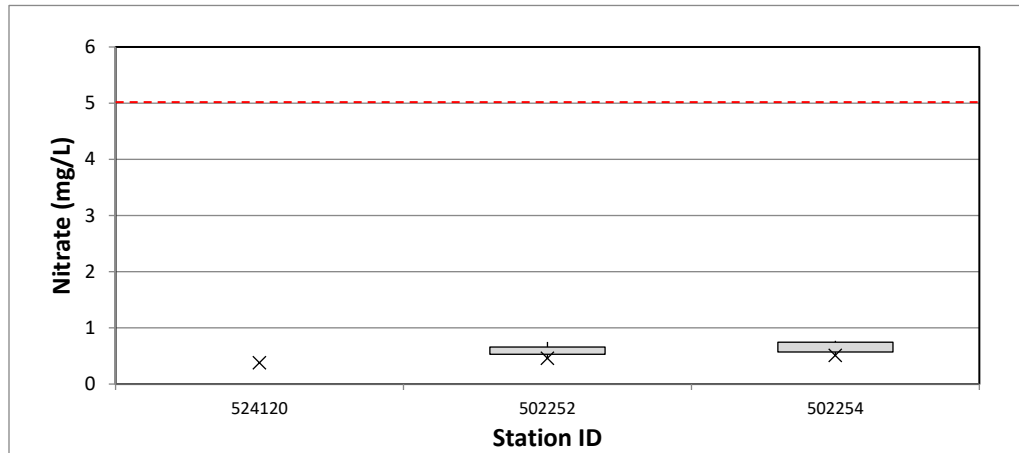
**Figure 5 Monitoring Results for Turbidity (2020-2023)**



Turbidity results for 2023 were relatively low compared to previous results but were within historical ranges. The maximum sampled value for baseflow turbidity in 2023 was 9.55 nephelometric turbidity units (“NTU”) at Trib. 10 station 502254, and the lowest value of 3.82 NTU was observed at Halnon Brook station 502252. For reference, the VWQS turbidity criteria is 25 NTU as an *annual average* under dry weather base-flow conditions. Although these results are representative of base-flow conditions, one sample point does not represent the annual average.

### 3.2.5 Nitrate

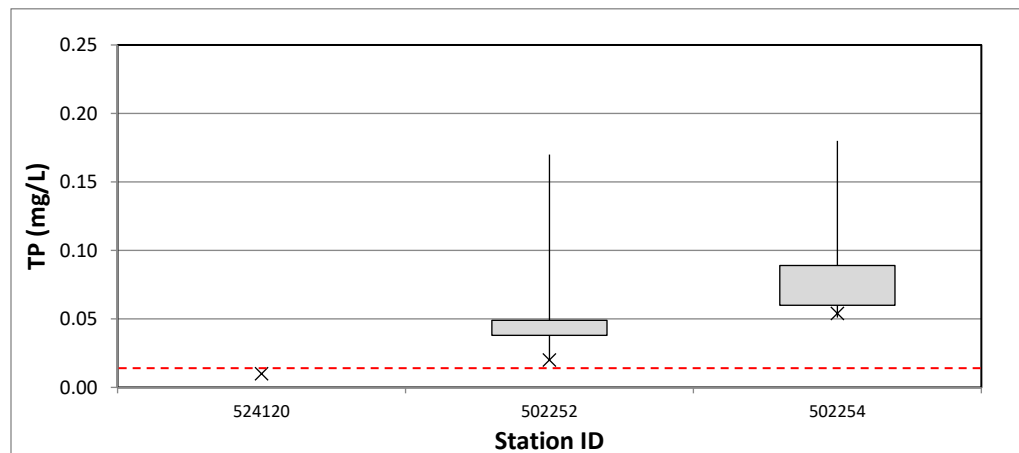
Nitrate samples were collected at all stations in 2023 and analyzed in the laboratory. Figure 6 displays the results for nitrate.

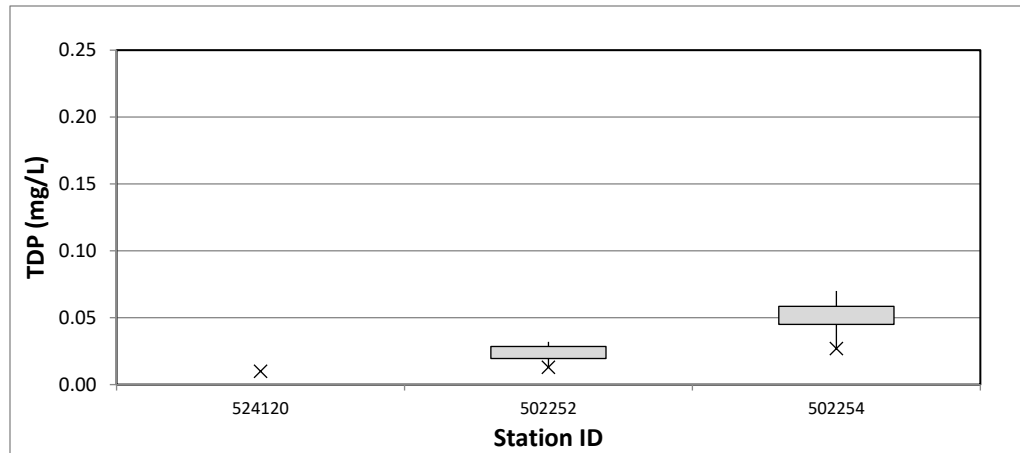
**Figure 6 Monitoring Results for Nitrate (2020-2023)**

Nitrate results for 2023 represent the lowest recorded concentrations for the period of record for all stations. The highest nitrate value of 0.51 mg/L was observed in Trib. 10 station 502254. Samples collected from all stations were well below the VWQS threshold of 5 mg/L.

### 3.2.6 Total Phosphorus and Total Dissolved Phosphorus

In addition to TP and TDP collected for Instream sampling, TP and TDP samples were collected in conjunction with 2023 biomonitoring and analyzed in the laboratory. Figures 7 and 8 below display TP and TDP concentrations at the time of biomonitoring at all three monitoring stations.

**Figure 7 Monitoring Results for Total Phosphorus (2020-2023)**

**Figure 8 Monitoring Results for Total Dissolved Phosphorus (2020-2023)**

TP and TDP results for 2023 represent the lowest recorded concentrations for the period of record for all stations. With the exception of Halnon Brook station 524120 (upstream), TP concentrations exceeded the VWQS threshold of 0.014 mg/L during all sampling events. The highest recorded TP concentration of 0.054 mg/L was at Trib 10 station 502254, which generally has exhibited the highest TP concentrations over the period of record. The highest TDP concentration was also recorded in Trib. 10 at 0.027 mg/L. For Trib. 10 and the reach of Halnon Brook below the confluence with Trib. 10, elevated concentrations of TP and TDP are likely associated with discharge from the Salisbury FCS.

### 3.2.7 Baseflow Summary

In 2023, the Halnon Brook monitoring stations exhibited chloride values well below the VWQS acute (860 mg/L) and chronic (230 mg/L) criteria in all samples. Turbidity values were below the 25 NTU threshold at all stations. pH values were within the acceptable VWQS range.

Percent oxygen saturation was above the 70% VWQS threshold at all stations during all sampling events. Nitrate concentrations in 2023 were the lowest recorded within the period of record for all stations, showing an improvement over previous sampling events. Likewise, TP and TDP concentrations in 2023 were the lowest recorded within the period of record for all stations, though these concentrations still exceeded the VWQS threshold at Trib. 10 station 502254 and Halnon Brook station 502252.

## 3.3 Substrate Analysis

In 2023, streambed substrate composition analyses were conducted at all three stations. These analyses were completed to evaluate stream bed material composition, and a summary of the substrate data for each station is provided in Appendix 3. Habitat and physical characteristics were evaluated, including characterization of periphyton cover, evaluation of substrate type and embeddedness and in-stream organic materials, channel geomorphic characteristics, and riparian vegetation characteristics.



### 3.3.1 Embeddedness

The percentage of substrate embeddedness was observed at the three monitoring stations using estimates to the nearest 5% and is recorded in accordance with the DEC Lotic Benthos Field Sheet (2021 edition). Substrate embeddedness is evaluated because it is a key factor in the health of macroinvertebrate populations, with lower degrees of embeddedness typically corresponding to higher macroinvertebrate populations and vice-versa. Embeddedness ratios below 50 percent are desirable, with ratios between 0 and 5 percent considered excellent, between 5 and 25 percent considered very good, between 25 and 50 percent considered good, between 50 and 75 percent considered fair and above 75 percent considered poor. Substrate embeddedness was estimated as 25 percent at Halnon Brook station 524120, as 30 percent at Hanlon Brook 502252, and as 35 percent at Trib. 10 station 502254. All of these results correspond to an embeddedness rate of "Good" (25-50%).

### 3.3.2 Channel Materials

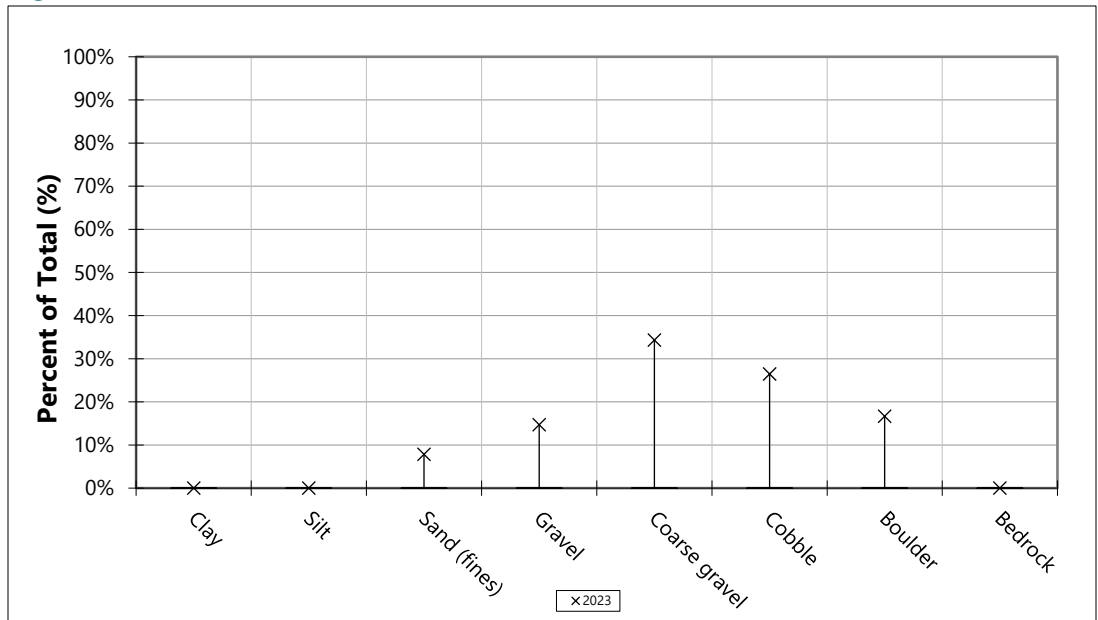
The Wolman Pebble Count Procedure (Harrelson, et al. 1994) provided data that were used to calculate the D50 particle size (i.e., median particle), the percentage of sands and fines (materials finer than 2 millimeters), and the percentage of fines (silts, clays, and organic materials less than 0.062 millimeters) at each substrate monitoring station. These three parameters provide a broad understanding of the major channel material, and the proportion of coarser materials (i.e., cobbles, boulders) compared to finer materials (i.e., organic material, sand, gravels). Table 2 below displays the substrate metrics for 2023.

**Table 2 2023 Summary of Channel Material in Halnon Brook and Trib. 10**

Station	Percent <2mm (sands and fines)	D50 Particle Size	Particle Size Range (mm)	Embeddedness Estimate (%)
Halnon Brook, Above Confluence (ID 524120)	8%	Coarse Gravel	16-64	25%
Halnon Brook, Below Confluence (ID 502252)	11%	Coarse Gravel	16-64	30%
Halnon Brook Trib. 10 (ID 502254)	3%	Cobble	64-256	35%

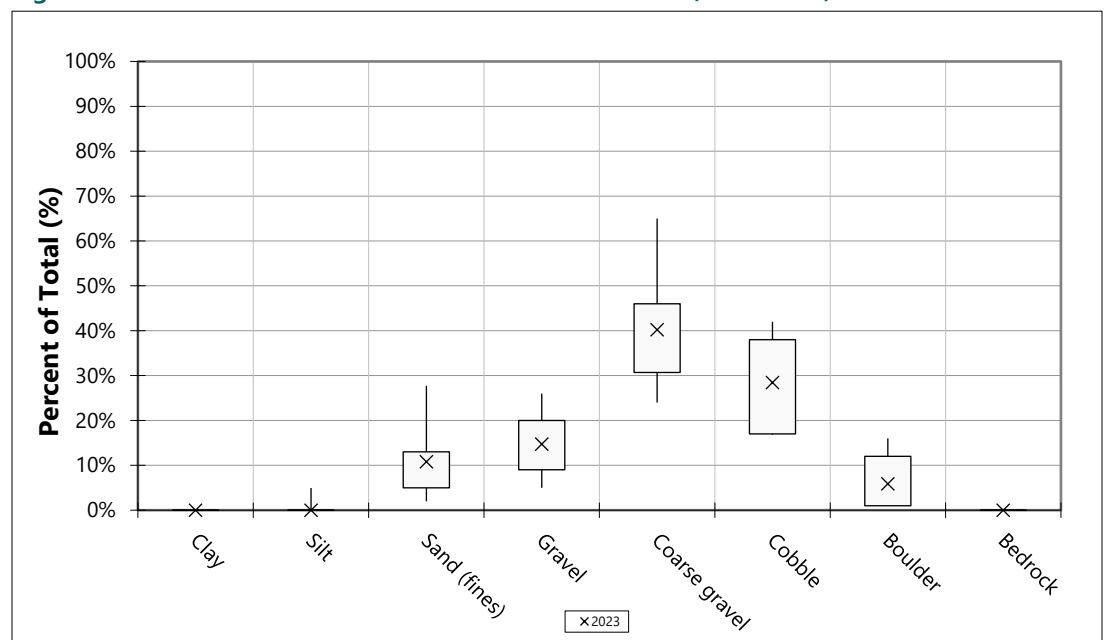
The box and whisker plots below provide a summary of the substrate monitoring results at each monitoring station from 2001 to 2023, with the exception of Halnon Brook station 524120, as 2023 represents the first year in which substrate monitoring occurred at this station. The box represents the 1st to 3rd quartile of the total data set. The whiskers represent the minimum and maximum values of the data set, and the 'x' represents the 2023 data points. Data for each substrate type is presented as the percent of that particle size that represents the total pebble count. Detailed substrate monitoring results are shown graphically for each station on Figures 9 through 11 below and in Appendix 4.

**Figure 9 Halnon Brook Station 524120 Pebble Counts (2023)**



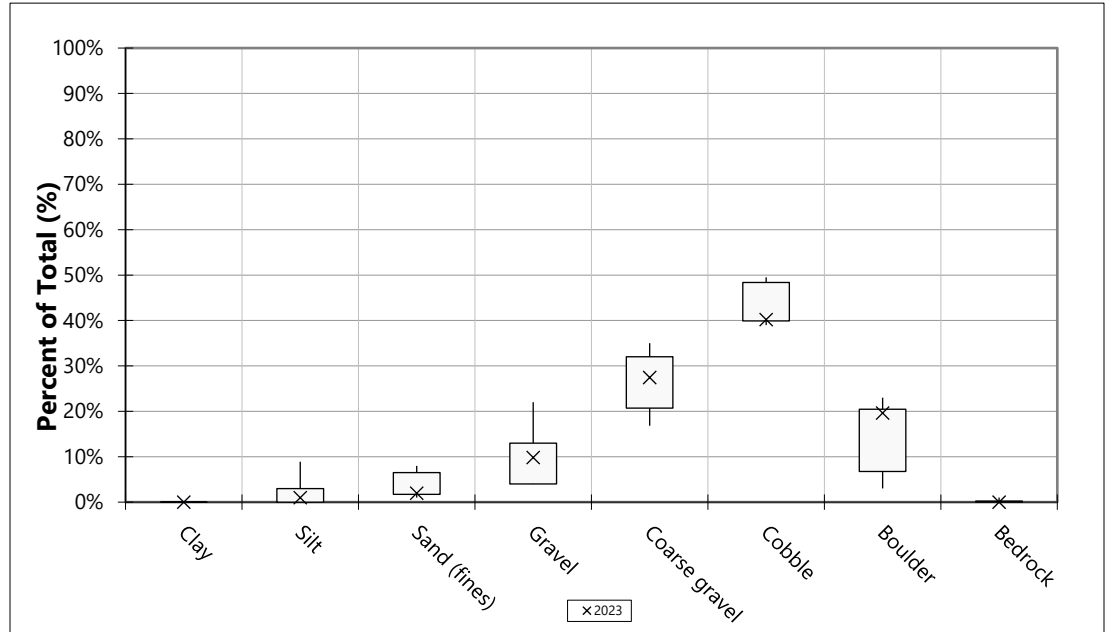
As shown in Figure 9, Halnon Brook station 524120 is dominated by coarse gravel, though cobble and boulder also represent a sizeable portion of the substrate at this station. The percentage of substrate comprised of sand at this station is relatively low at 8 percent. Results from the 2023 pebble count indicated that the substrate composition at Halnon Brook station 524120 is low in sand and high in coarse gravel and cobble. The substrate present at this station should be able to support a health macroinvertebrate community.

**Figure 10 Halnon Brook Station 502252 Pebble Counts (2001-2023)**



Results from the 2023 pebble count at Halnon Brook station 502252 indicate that the substrate composition was similar to what has been observed within the period of record. The high presence of coarse gravel and cobble and low percentage of sand indicate suitable habitat available for macroinvertebrates.

**Figure 11 Halnon Brook Trib. 10 Station 502254 Pebble Counts (2009-2023)**



Results from the 2023 pebble count at Trib. 10 station 502254 indicate that the substrate composition was similar to what has been observed within the period of record. It should be noted, however, that the percent composition of cobble was at the lower end of the historical record while the percent composition of boulder was at the higher end. In spite of this slight shift, Trib. 10 remains dominated by cobble.

### 3.3.3 Substrate Summary

Results for estimated embeddedness from 2023 are similar to previous assessments made by DEC and VHB. D50 particle size decreased at Halnon Brook station 502252 from 64-256 in 2022 analyses to 16-64 in 2023. The D50 particle size appears to shift between the two classes due to natural variability in the substrate composition in this reach of Halnon Brook and varies between individual pebble counts. In the 2023 substrate analysis, Halnon Brook station 502252 had the highest percentage of small particles (fines and sands) with 11%, which was still relatively low compared to other substrate classes present in this reach of Halnon Brook. The macroinvertebrate communities at each station do not appear to be adversely impacted by the substrate composition.

## 3.4 Biomonitoring

Biomonitoring data from 2023 was analyzed for ALS use attainment in comparison to the DEC scoring guidelines for small-size high gradient ("SHG") Class B(2) waters. Results for each station are discussed in detail below and the complete data set is included in Appendix 4. In summary, the eight aquatic macroinvertebrate metrics are density; richness; Ephemeroptera, Plecoptera, Trichoptera ("EPT") index; Percent Model Affinity of Orders ("PMA-O"); Biotic Index ("BI"); percent Oligochaeta; EPT/EPT + C; and the Pinkham-Pearson Coefficient of Similarity - Functional Groups - ("PPCS-FG"). A brief explanation of each index is as follows:

**Density** is a general indicator of community viability and productivity and represents the relative abundance of animals in a sample (density per unit sampling effort). Density is based on the total number of individual invertebrate organisms collected in each sample, irrespective of species of taxonomic classification.

**Richness** is an indicator of taxonomic structure and represents the number of distinct taxa in a sample unit. Richness is calculated as the total number of distinct taxa identified in a sample. Note that immature larva identified to family or genus are not considered a unique taxon if a genus or species identification has also been identified within that taxonomic group.

The **EPT** index is an indicator of taxonomic structure and of tolerance or intolerance to water pollution. The EPT index is a subset of the above richness measure and is calculated as the number of distinct taxa from the generally more environmentally sensitive insect orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) identified in a sample unit. Note that the same rules apply as above for Total Richness in determining the number of unique taxa.

The Percent Model Affinity of Orders (**PMA-O**) index is an indicator of taxonomic structure. It measures the degree of similarity of the order-level distribution of organisms to a model based on the reference stream.

The Hilsenhoff Biotic Index (**BI**) is an indicator of tolerance or intolerance to pollution. The BI is a measure of the macroinvertebrate assemblage tolerance toward organic (nutrient) enrichment. Most common taxa are assigned a BI number between zero (highly sensitive to enrichment) and ten (highly tolerant of enrichment). In many ways this index is both an indicator taxa metric and functional group metric, since those taxa which become more dominant in moderately enriched streams are those which are taking advantage of shifts in the available food base in the stream.

Percent Oligochaeta (**% Oligo.**) is an indicator of tolerance or intolerance to pollution and sedimentation. The percent Oligochaeta is a measure of the percent of the macroinvertebrate community made up of the order Oligochaeta. Percent Oligochaeta is calculated by dividing the number of individuals of the order Oligochaeta by the total number of animals in the sample (the density).

**EPT/EPT + C** is an indicator of taxonomic structure and pollution tolerance or intolerance. EPT/EPT + C is a measure of the ratio of the abundance of the generally pollution intolerant EPT orders to the generally more tolerant Diptera family Chironomidae. EPT/EPT + C is

calculated by dividing the total number of individual organisms from the orders Ephemeroptera, Trichoptera and Plecoptera, by the above plus the number of individual organisms from the order Chironomidae in the sample.

The Pinkham-Pearson Coefficient of Similarity - Functional Groups - (**PPCS-FG**) is an indicator of functional structure. The PPCS-FG index is a measure of functional feeding group similarity to a model of expected feeding group distribution based on the reference streams. It is similar in concept to the PMA-O above; however, it measures functional feeding group structure and distribution, instead of taxonomic structure and distribution. To calculate PPCS-FG, determine the percent composition of six major functional groups in a sample (collector-gatherer, collector-filterer, predator, shredder-detritivore, shredder-herbivore, scraper) as assigned by DEC based on published literature. For each functional group determine the ratio (min/max) between the sample and the reference model for that stream type. Sum these calculations and divide by six (i.e., the number of functional groups).

On September 29, 2023, kick net sampling was conducted by VHB in accordance with the DEC protocol (ANR, 2022b). This biomonitoring occurred at all three monitoring stations in 2023. Sampling locations are shown on the Water Quality Monitoring Site Map in Appendix 1. Tables 3 through 5 below display the biometrics at all three monitoring stations from 1990 to 2023<sup>1</sup>. Charts of all biometrics evaluated at these stations in 2023 are provided in Appendix 5.

### 3.4.1 Halnon Brook, Above Confluence with Trib. 10 (ID 524120)

**Table 3 Biomonitoring Results: Halnon Brook, Above Confluence with Trib. 10 (ID 524120)**

Year	Density	Richness	EPT	% PMA-O	BI	% Oligo.	EPT / EPT+C	% PPCS-FG	Outcome/ Biological Integrity
<b>Class B(2) SHG Criteria<sup>1</sup></b>	<b>≥ 300</b>	<b>≥ 27</b>	<b>≥ 16</b>	<b>≥ 45</b>	<b>≤ 4.50</b>	<b>≤ 12</b>	<b>≥ 0.45</b>	<b>≥ 40</b>	
VHB 2023	1,188	34.5	<b>13.5</b>	67.6	<b>4.58</b>	1.09	0.70	46.3	Does Not Meet Class B(2) Criteria

<sup>1</sup> **Bolded** values indicate that metric did not meet Class B(2) Criteria

One biometric, EPT Richness, did not meet the threshold for Class B(2) criteria in 2023 while another biometric, Biotic Index, was indeterminate. The low EPT Richness and high Biotic Index at this station may be indicative of a recent disturbance event (likely the July and August 2023 flooding). A significant factor in the high BI score at this station can be attributed to the abundance of *Simulium* sp. and *Baetis tricaudatus*, both of which are known to colonize recently disturbed areas. The high abundance of these species can also lower the EPT Richness score due to the sample processing methodology. Because the sample processing methodology incorporates a subsampling technique, and the whole sample is not always counted, the overabundance of a few species can prevent other species present

<sup>1</sup> Data shown prior to 2020 was collected by DEC and was obtained from the Vermont Integrated Watershed Information System ("IWIS").

in the sample from being identified once the minimum count requirement is reached. Therefore, the high presence of *Simulium* sp. and *B. tricaudatus*, compounded with the high precipitation that occurred in summer 2023, likely had an adverse impact on the EPT Richness at Halnon Brook station 524120. Regardless, the factors affecting the EPT Richness and Biotic Index metrics at this station are unrelated to the Salisbury FCS.

### 3.4.2 Halnon Brook, Below Confluence with Trib. 10 (ID 502252)

**Table 4** Biomonitoring Results: Halnon Brook, Below Confluence with Trib. 10 (ID 502252)

Year	Density	Richness	EPT	% PMA-O	BI	% Oligo.	EPT / EPT+C	% PPCS -FG	Outcome/ Biological Integrity
Class B(2) SHG Criteria <sup>1</sup>	≥ 300	≥ 27	≥ 16	≥ 45	≤ 4.50	≤ 12	≥ 0.45	≥ 40	
DEC 1990	2,587	48.0	21.0	63.1	3.32	0.87	0.71	49.0	Meets Class B(2) Criteria
DEC 2001	4,270	43.5	23.0	75.3	3.28	0.04	0.94	58.0	Meets Class B(2) Criteria
DEC 2009	2,932	42.5	21.0	69.3	3.74	0.14	0.94	54.0	Meets Class B(2) Criteria
DEC 2019	2,380	39.0	17.0	<b>37.9</b>	4.00	0.34	0.77	54.0	Does Not Meet Class B(2) Criteria
VHB 2020	3,188	41.0	21.0	56.4	3.97	0.13	0.96	57.9	Meets Class B(2) Criteria
VHB 2021	1,402	<b>25.0</b>	<b>13.5</b>	50.5	3.59	0.28	0.95	44.6	Does Not Meet Class B(2) Criteria
VHB 2022	4,574	40.5	18.5	54.0	4.38	0.84	0.92	45.9	Meets Class B(2) Criteria
VHB 2023	3,400	39.0	16.0	54.9	<b>5.15</b>	0.79	0.70	44.8	Does Not Meet Class B(2) Criteria

<sup>1</sup> **Bolded** values indicate that metric did not meet Class B(2) Criteria

Results for all eight biometrics were within the established thresholds for meeting Class B(2) criteria in 2023, with the exception of Biotic Index. As with Halnon Brook station 524120, the high BI score at Halnon Brook station 502252 is likely due to the abundance of *Simulium* sp. and *B. tricaudatus*. The high presence of these species is, as mentioned above, indicative of recent disturbance in Halnon Brook, likely caused by the summer 2023 high precipitation events. The high BI can also be attributed to the high presence of several other species with high BI scores, such as *Eukiefferiella claripennis* (group) and *Gammarus pseudolimnaeus*. The overall high abundance (Density) at this station can likely be attributed to the high phosphorus concentrations that have historically been observed in this reach of Halnon Brook.

The results of the 2023 biomonitoring at this station are similar to results from 2022 and sampling years prior to 2021, with the exception of a higher BI score, indicating the results are likely attributable to disturbance and are expected to meet the VWQS in years with normal precipitation patterns.

### 3.4.3 Halnon Brook Trib. 10, Below Dam (ID 502254)

**Table 5**      **Biomonitoring Results: Halnon Brook Trib. 10 (ID 502254)**

Year	Density	Richness	EPT	% PMA-O	BI	% Oligo.	EPT / EPT+C	% PPCS -FG	Outcome/ Biological Integrity
<b>Class B(2) SHG Criteria<sup>1</sup></b>	<b>≥ 300</b>	<b>≥ 27</b>	<b>≥ 16</b>	<b>≥ 45</b>	<b>≤ 4.50</b>	<b>≤ 12</b>	<b>≥ 0.45</b>	<b>≥ 40</b>	
DEC 1990	5,613	33.5	<b>7.0</b>	<b>30.8</b>	<b>5.62</b>	8.60	<b>0.15</b>	<b>37.0</b>	Does Not Meet Class B(2) Criteria
DEC 1990	5,166	42.5	<b>11.0</b>	55.1	<b>5.53</b>	0.21	0.69	52.0	Does Not Meet Class B(2) Criteria
DEC 2009	3,202	<b>24.5</b>	<b>9.5</b>	<b>31.4</b>	<b>5.37</b>	0.00	0.58	<b>32.0</b>	Does Not Meet Class B(2) Criteria
DEC 2010	4,992	32.0	<b>13.0</b>	47.4	<b>4.99</b>	0.00	0.58	<b>35.0</b>	Does Not Meet Class B(2) Criteria
DEC 2012	2,748	<b>25.0</b>	<b>10.0</b>	53.1	<b>4.74</b>	0.00	0.80	<b>31.0</b>	Does Not Meet Class B(2) Criteria
DEC 2019	3,592	<b>24.0</b>	<b>7.0</b>	<b>39.7</b>	<b>4.81</b>	0.45	0.27	<b>35.0</b>	Does Not Meet Class B(2) Criteria
VHB 2020	3,860	30.0	<b>12.0</b>	<b>36.8</b>	<b>5.25</b>	0.31	0.80	<b>34.6</b>	Does Not Meet Class B(2) Criteria
VHB 2021	2,748	27.0	<b>15.0</b>	47.0	<b>4.65</b>	0.44	0.99	<b>39.3</b>	Does Not Meet Class B(2) Criteria
VHB 2022	4,692	33.0	<b>13.0</b>	61.8	4.27	1.11	0.74	43.1	Does Not Meet Class B(2) Criteria
VHB 2023	2,272	30.0	<b>9.0</b>	59.2	<b>5.55</b>	0.35	0.63	<b>28.4</b>	Does Not Meet Class B(2) Criteria

<sup>1</sup> **Bolded** values indicate that metric did not meet Class B(2) Criteria

As indicated by the 2023 biomonitoring results and historical macroinvertebrate assessments conducted by DEC, Halnon Brook Trib. 10 station 502254 has consistently failed to meet Class B(2) criteria. In all sampling years, EPT Richness has failed to meet the threshold. Additionally in 2023, Biotic Index and %-PPCS-FG did not meet the Class B(2) criteria at Trib. 10 station 502254. The high BI score at Halnon Brook station 502254 is likely due to the abundance of *G. pseudolimnaeus* and *B. tricaudatus*. As at Halnon Brook station 524120, the relatively high presence of these two species in the sample likely skews the identification of EPT species using the subsample methodology. Additionally, the severe flooding in summer

2023 caused significant disturbance in Trib. 10, as described in Section 3.1, which likely further contributed to the dislocation of EPT species and the proliferation of *B. tricaudatus* at this station. Similar to Halnon Brook station 502252, the high overall abundance (Density) at this station is likely attributable to the high phosphorus concentrations that have historically been observed in Trib. 10. However, it should be noted that the Density observed at Trib. 10 station 502254 in 2023 was the lowest Density observed within the period of record.

### 3.4.4 Biomonitoring Summary

In 2023, none of the three monitoring stations met the Class B(2) biocriteria. Generally, the metrics that were not met were EPT Richness and Biotic Index. The non-support of these metrics can likely be attributed to a significant disruptive event within the Halnon Brook watershed. At all stations, the high presence of *B. tricaudatus* (as well as *Simulium* sp. at both Halnon Brook stations) was indicative of disturbance as these species are widely recognized as being well adapted to thrive in disturbed settings. The high precipitation events that occurred in summer 2023 that caused severe flooding in the area, as well as the consistently high phosphorus concentrations at Halnon Brook station 502252 and Trib. 10 station 502254, likely allowed these species to flourish in 2023. Evidence of the summer 2023 flooding was observed at Trib. 10, as noted in Section 3.1. Additionally, the high abundance of the amphipod *G. pseudolimnaeus* at Halnon Brook station 502252 and at Trib. 10 station 502254 likely also contributed to the low EPT Richness and high BI observed in 2023.



# 4

## Conclusions

Water quality monitoring downstream of the Salisbury FCS was conducted in 2023 in accordance with the requirements of the QAPP. The 2023 water chemistry data results show elevated concentrations of total phosphorus and total dissolved phosphorus at Halnon Brook Trib. 10 (ID 502554) and Halnon Brook (ID 502552). However, it should be noted that total phosphorus and total dissolved phosphorus concentrations in 2023 were the lowest recorded within the period of record for all stations.

In 2023, biomonitoring took place at all three monitoring stations. All three monitoring stations did not meet the Class B(2) biocriteria. These results are likely due to disturbance caused by the high precipitation events that occurred in summer 2023. The disturbed habitat was largely recolonized by macroinvertebrate species with high BI scores that take advantage of recent disturbance, therefore resulting in high BI scores at all stations and depressing the EPT populations at the stations. Additionally, high Density due to elevated phosphorus concentrations and high abundance of *G. pseudolimnaeus* continue to be observed at Halnon Brook station 502252 and Trib. 10 station 502254.

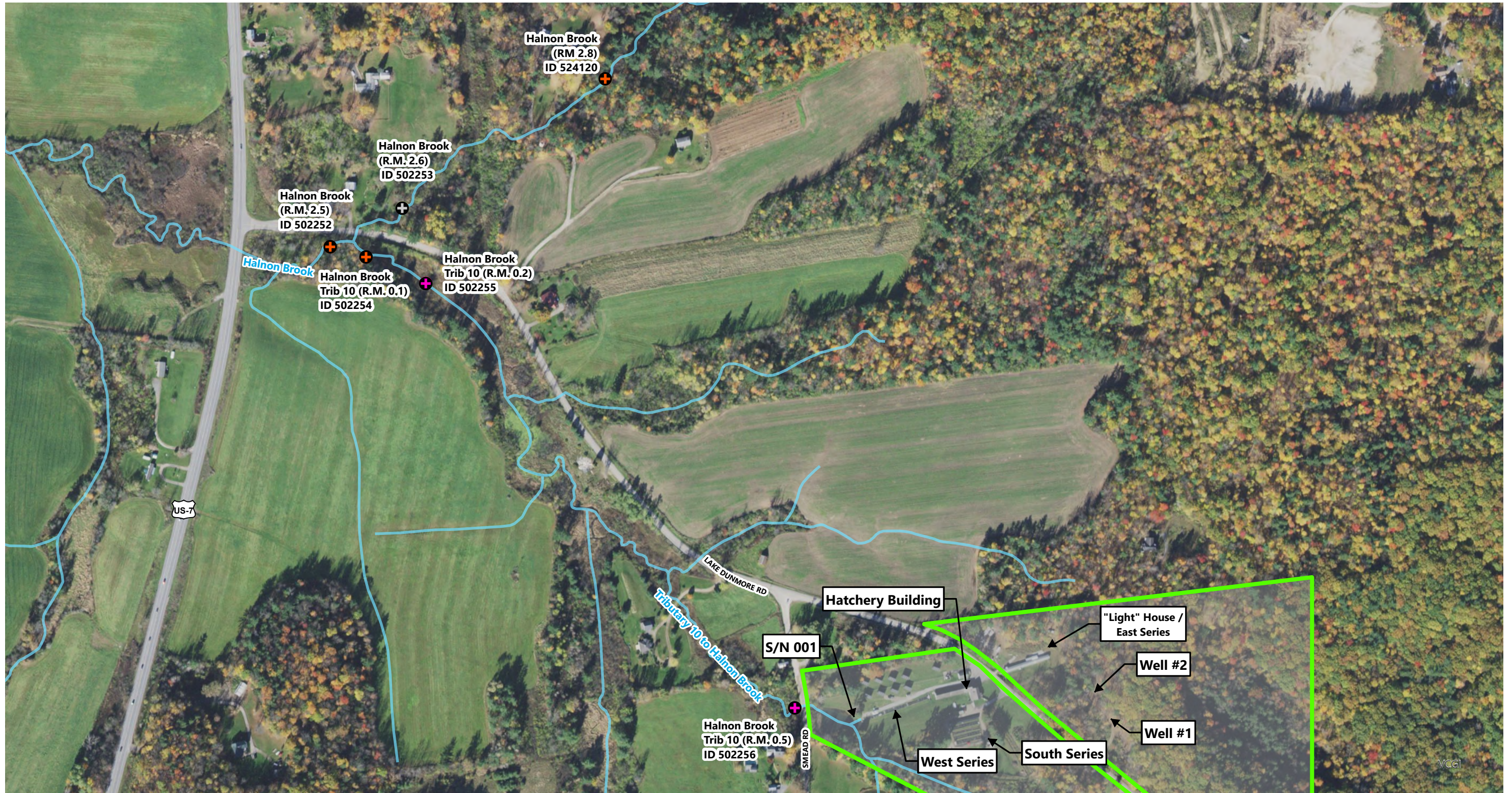
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# APPENDIX 1



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**Legend**

- + Instream Monitoring Stations
- + Biomonitoring Stations
- + Former Biomonitoring Station
- Salisbury Fish Culture Station
- Stream (VHD)

Vermont Department of Fish and Wildlife | Salisbury, Vermont

**Salisbury Fish Culture Station  
Water Quality Monitoring Site Map**

Sources:  
 Background Imagery and Hillshade by VCGI  
 VCGI (Vermont Center for Geographic Information - Various Dates)  
 VTrans (Vermont Agency of Transportation - Various Dates)  
 ACRPC (Addison County Regional Planning Commission - 2011)



# APPENDIX 2

VFWD Salisbury Fish Hatchery, Salisbury, Vermont  
 Water Quality Monitoring (Baseflow Chemistry)  
 Halnon Brook (Above East Brook Rd Culvert) - DEC ID 524120  
 Prepared by VHB on: January 4, 2024



Date Sampled in Field	Time Sampled in Field	Phosphorus, Total (mg/L)	Phosphorus, Total Dissolved (mg/L)	Suspended Solids, Total (mg/L)	Chloride (mg/L)	Nitrate as N (mg/L)	Nitrite as N (mg/L)	Ammonia as N (mg/L)	TKN (mg/L)	Alkalinity (mg/L)	Water Temp (°C)	pH (SU)	Dissolved Oxygen (%)	Conductivity (µmho/cm)	Turbidity (NTU)
<b>VWQS Threshold</b>		0.014 mg/L (Otter Creek Basin)			≥ 230 mg/L	5.0		EPA: 17 mg/L acute, 1.9 mg/L chronic @ pH 7, 20°C				≥ 6.5 and ≤ 8.5	> 70%		≤ 25
9/29/2023	9:20 AM	< 0.010	< 0.010	10.0	21	0.38	< 0.100	< 0.06	0.18	138	11.6	7.32	104.9	337.7	6.69

2023 STATISTICS															
Mean	***	0.010	0.010	10.0	21	0.38	0.100	0.06	0.18	138	11.6	7.32	104.9	337.7	6.69
2020-2023 STATISTICS															
Mean	***	0.010	0.010	10.0	21	0.38	0.100	0.06	0.18	138	11.6	7.32	104.9	337.7	6.69
Min	***	0.010	0.010	10.0	21	0.38	0.100	0.06	0.18	138	11.6	7.32	104.9	337.7	6.69
Max	***	0.010	0.010	10.0	21	0.38	0.100	0.06	0.18	138	11.6	7.32	104.9	337.7	6.69
n	***	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Notes:  
 Blank cells indicates no data available  
 \*\*\* indicates not applicable

VFWD Salisbury Fish Hatchery, Salisbury, Vermont  
 Water Quality Monitoring (Baseflow Chemistry)  
 Halnon Brook (Below Confluence with Trib 10) - DEC ID 502252  
 Prepared by VHB on: January 4, 2024



Date Sampled in Field	Time Sampled in Field	Phosphorus, Total (mg/L)	Phosphorus, Total Dissolved (mg/L)	Suspended Solids, Total (mg/L)	Chloride (mg/L)	Nitrate as N (mg/L)	Nitrite as N (mg/L)	Ammonia as N (mg/L)	TKN (mg/L)	Alkalinity (mg/L)	Water Temp (°C)	pH (SU)	Dissolved Oxygen (%)	Conductivity (µmho/cm)	Turbidity (NTU)
<b>VWQS Threshold</b>		<b>0.014 mg/L (Otter Creek Basin)</b>			<b>≥ 230 mg/L</b>	<b>5.0</b>		<b>EPA: 17 mg/L acute, 1.9 mg/L chronic @ pH 7, 20°C</b>				<b>≥ 6.5 and ≤ 8.5</b>	<b>&gt; 70%</b>		<b>≤ 25</b>
6/24/2020	10:12 AM	0.091													
7/22/2020	11:43 AM	0.044													
9/17/2020	12:30 PM	0.039	0.032	3	32	0.75	0.026	< 0.08	0.38	139	11.5	7.94	86.3	380.7	4.43
10/6/2020	10:10 AM	0.049	0.027	6	32	0.69	< 0.020	0.15	0.38	151	10.6	7.48	84.1	360.1	5.00
9/3/2021	9:55 AM	0.041	0.025	6	25	0.55	0.023	< 0.08	0.27	139	12.2	8.05	92.0	497.7	3.70
9/13/2021	3:39 PM	0.038	0.026	< 2	25	0.51	< 0.020	< 0.08	0.23	155	14.3	8.14	100.1	707.0	1.14
9/16/2022	9:40 AM	0.032	0.014	8	29	0.59	< 0.040	< 0.50	< 0.50	153	10.3	7.79	117.6	374.9	12.60
9/29/2022	10:45 AM	0.170	0.030	16	30	0.63	< 0.080	< 0.50	< 0.15	143	10.3	7.76	98.5	401.3	21.60
9/29/2023	11:00 AM	0.020	0.013	9	23	0.46	< 0.100	< 0.06	0.19	138	11.4	7.78	104.0	375.5	3.82

2023 STATISTICS															
Mean	***	0.020	0.013	9	23	0.46	0.100	0.06	0.19	138	11.4	7.78	104.0	375.5	3.82
2020-2023 STATISTICS															
Mean	***	0.058	0.024	7	28	0.60	0.044	0.21	0.30	145	11.5	7.85	97.5	442.5	7.47
Min	***	0.020	0.013	2	23	0.46	0.020	0.06	0.15	138	10.3	7.48	84.1	360.1	1.14
Max	***	0.170	0.032	16	32	0.75	0.100	0.50	0.50	155	14.3	8.14	117.6	707.0	21.60
n	***	9	7	7	7	7	7	7	7	7	7	7	7	7	7

Notes:  
 Blank cells indicates no data available  
 \*\*\* indicates not applicable

VFWD Salisbury Fish Hatchery, Salisbury, Vermont  
 Water Quality Monitoring (Baseflow Chemistry)  
 Halnon Brook Trib 10 - R.M 0.1 (Below Dam) - DEC ID 502254  
 Prepared by VHB on: January 4, 2024



Date Sampled in Field	Time Sampled in Field	Phosphorus, Total (mg/L)	Phosphorus, Total Dissolved (mg/L)	Suspended Solids, Total (mg/L)	Chloride (mg/L)	Nitrate as N (mg/L)	Nitrite as N (mg/L)	Ammonia as N (mg/L)	TKN (mg/L)	Alkalinity (mg/L)	Water Temp (°C)	pH (SU)	Dissolved Oxygen (%)	Conductivity (µmho/cm)	Turbidity (NTU)
<b>VWQS Threshold</b>		<b>0.014 mg/L (Otter Creek Basin)</b>			<b>≥ 230 mg/L</b>	<b>5.0</b>		<b>EPA: 17 mg/L acute, 1.9 mg/L chronic @ pH 7, 20°C</b>				<b>≥ 6.5 and ≤ 8.5</b>	<b>&gt; 70%</b>		<b>≤ 25</b>
6/24/2020	10:22 AM	0.180													
7/22/2020	11:50 AM	0.074													
9/17/2020	1:15 PM	0.074	0.058	8	33	0.77	0.041	0.08	0.50	155	10.9	8.12	77.0	403.3	5.52
10/6/2020	12:00 PM	0.089	0.050	15	33	0.73	< 0.020	0.21	0.58	171	10.6	7.49	88.5	384.7	15.30
9/3/2021	10:10 AM	0.090	0.052	27	31	0.60	0.048	0.12	0.57	162	11.5	7.95	91.7	595.6	12.10
9/13/2021	3:53 PM	0.078	0.059	< 7.0	31	0.54	< 0.033	< 0.08	0.39	165	13.7	7.90	97.5	841.0	9.50
9/16/2022	9:50 AM	0.051	0.070	18	33	0.66	< 0.040	< 0.50	< 0.50	165	9.9	7.66	102.5	422.9	14.70
9/29/2022	12:45 PM	0.060	0.040	35	33	0.76	< 0.080	< 0.50	< 0.15	172	10.7	7.90	103.2	440.9	26.90
9/26/2023	8:40 AM	0.054	0.027												
9/29/2023	12:15 PM			7	30	0.51	< 0.100	0.12	0.32	185	10.4	7.87	100.1	474.1	9.55

2023 STATISTICS															
Mean	***	0.054	0.027	7	30	0.51	0.100	0.12	0.32	185	10.4	7.87	100.1	474.1	9.55
2020-2023 STATISTICS															
Mean	***	0.083	0.051	17	32	0.65	0.052	0.230	0.43	168	11.1	7.84	94.4	509	13.37
Min	***	0.051	0.027	7	30	0.51	0.020	0.080	0.15	155	9.9	7.49	77.0	385	5.520
Max	***	0.180	0.070	35	33	0.77	0.100	0.500	0.58	185	13.7	8.12	103.2	841	26.90
n	***	9	7	7	7	7	7	7	7	7	7	7	7	7	7

Notes:  
 Blank cells indicates no data available  
 \*\*\* indicates not applicable





# APPENDIX 3



**VFWD Salisbury Fish Hatchery  
Water Quality Monitoring Plan 2023  
Substrate Sampling Summary  
Last Updated by VHB on: January 19, 2024**

**Pebble Count and Sediment Monitoring Observations 2019-2023**

Stream	Station	Year Sampled	Estimated Embeddedness	% < 2 mm	% Sand	D50 Particle Size (mm)
<b>Halnon Brook (Above Confluence with Trib 10)</b>	<b>DEC ID 524120</b>	2023 (VHB)	25%	8%	8%	16-64

Stream	Station	Year Sampled	Estimated Embeddedness	% < 2 mm	% Sand	D50 Particle Size (mm)
<b>Halnon Brook (Below Confluence with Trib 10)</b>	<b>DEC ID 502252</b>	2019 (DEC)	25%	---	---	64-256
		2020 (VHB)	30%	2%	2%	64-256
		2021 (VHB)	30%	33%	28%	16-64
		2022 (VHB)	25%	5%	5%	64-256
		2023 (VHB)	30%	11%	11%	16-64

Stream	Station	Year Sampled	Estimated Embeddedness	% < 2 mm	% Sand	D50 Particle Size (mm)
<b>Tributary 10 to Halnon Brook</b>	<b>DEC ID 502254</b>	2019 (DEC)	20%	---	---	64-256
		2020 (VHB)	40%	11%	2%	64-256
		2021 (VHB)	20%	7%	6%	64-256
		2022 (VHB)	20%	4%	3%	64-256
		2023 (VHB)	35%	3%	3%	64-256

Notes:  
--- no data available

**VFWD Salisbury Fish Hatchery**

**Water Quality Monitoring Plan 2023**

**Sample Location: Halnon Brook (Above Confluence with Trib 10) - DEC ID 524120**

**Sampling Date: 9/29/23**

**Samplers: RTC, RFA**

**Last Updated by VHB on: January 19, 2024**

Station Habitat Observations	Sub-1
Canopy cover:	60%
Embeddedness:	25%
Bank stability:	Very Good

Category	Median Size (mm)	Sample Count	% of Total	Cumulative Total	Total Cumulative Frequency (%)
Clay	< 0.004	0	0%	0	0
Silt	0.004 - 0.06	0	0%	0	0
Sand (fines)	0.062-2	8	8%	8	8
Gravel	2-16	15	15%	23	23
Coarse gravel	16-64	35	34%	58	57
Cobble	64-256	27	26%	85	83
Boulder	>256	17	17%	102	100
Bedrock	bedrock	0	0%	102	100
Sample Size (n)		102	100%		
Longitudinal Distance (ft)		0'-100'			

<b>D50 Particle Size</b>	Coarse gravel
<b>Dominant Size Class</b>	Coarse gravel
<b>% Fines</b>	8%
<b>% Particles &lt; 2 mm</b>	8%

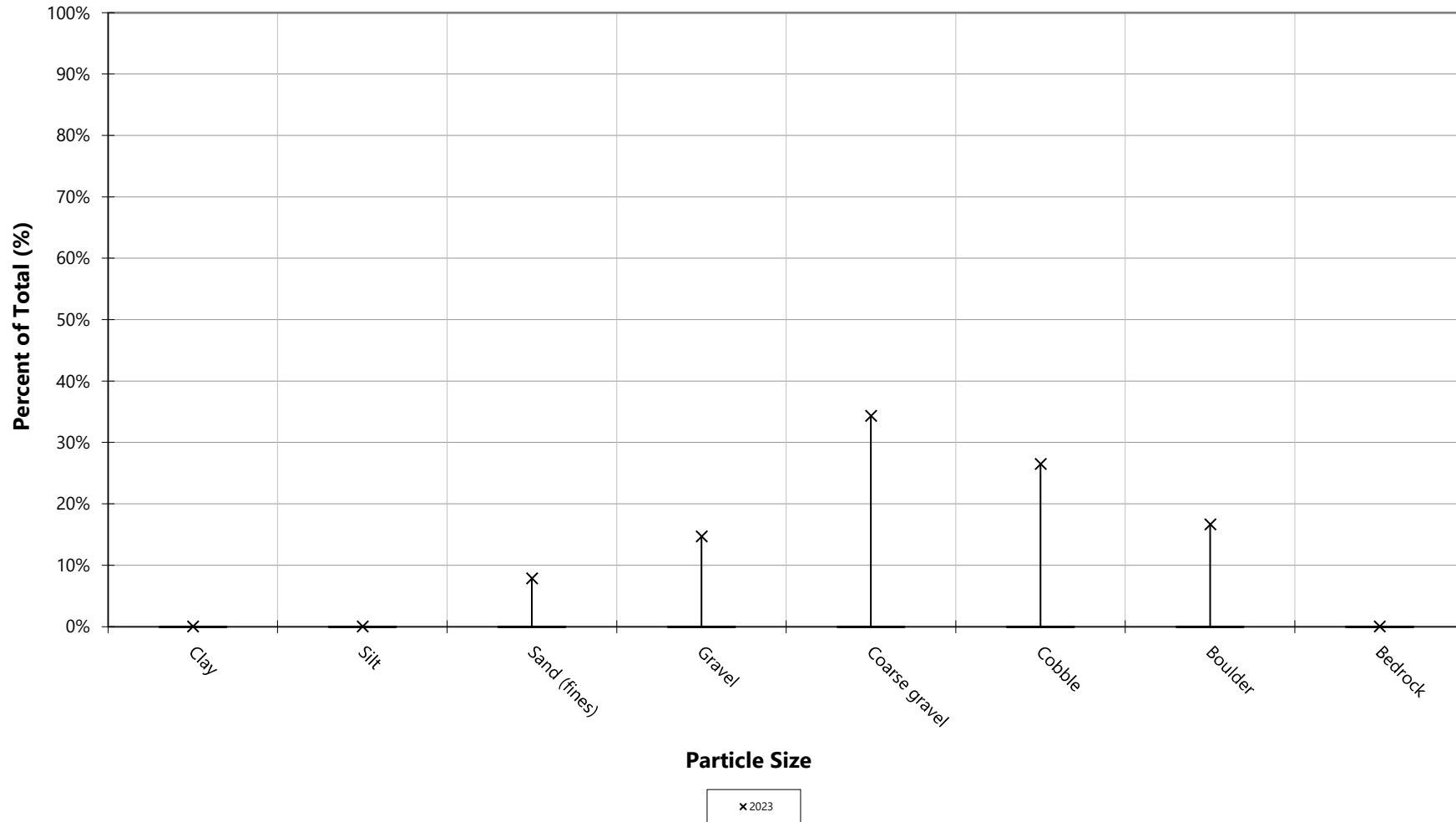
Moss Cover Index				
Category	0	1 (< 5%)	2 (5-25%)	3 (> 25%)
<b>Tally</b>	99	0	2	1

Macro-Algae Cover Index				
Category	0	1 (<5%)	2 (5-25%)	5 (>25%)
<b>Tally</b>	94	0	0	0

Micro-Algae Cover Index							
Category	0	1 (slimy)	2 (draw line)	3 (0.5-1mm)	4 (1-5mm)	5 (5-20mm)	6 (> 20mm)
<b>Tally</b>	54	38	2	0	0	0	0

Other Macro or Micro (FeP at Seep) Cover Index						
Category	0	1 (slimy)	2 (draw line)	3 (0.5-1mm)	4 (1-5mm)	5 (5-20mm)
<b>Tally</b>	0	0	0	0	0	0

**Pebble Counts (2023)**  
**Percent of Total (%)**  
**Station - Halnon Brook (Above Confluence with Trib 10) - DEC ID 524120**



**VFWD Salisbury Fish Hatchery**

**Water Quality Monitoring Plan 2023**

**Sample Location: Halnon Brook (Below Confluence with Trib 10) - DEC ID 502252**

**Sampling Date: 9/29/23**

**Samplers: RTC, RFA**

**Last Updated by VHB on: January 19, 2024**

Station Habitat Observations	Sub-1
Canopy cover:	60%
Embeddedness:	30%
Bank stability:	Good

Category	Median Size (mm)	Sample Count	% of Total	Cumulative Total	Total Cumulative Frequency (%)
Clay	< 0.004	0	0%	0	0
Silt	0.004 - 0.06	0	0%	0	0
Sand (fines)	0.062-2	11	11%	11	11
Gravel	2 - 16	15	15%	26	25
Coarse gravel	16-64	41	40%	67	66
Cobble	64-256	29	28%	96	94
Boulder	>256	6	6%	102	100
Bedrock	bedrock	0	0%	102	100
Sample Size (n)		102	100%		
Longitudinal Distance (ft)		0'-100'			

<b>D50 Particle Size</b>	Coarse gravel
<b>Dominant Size Class</b>	Coarse gravel
<b>% Fines</b>	11%
<b>% Particles &lt; 2 mm</b>	11%

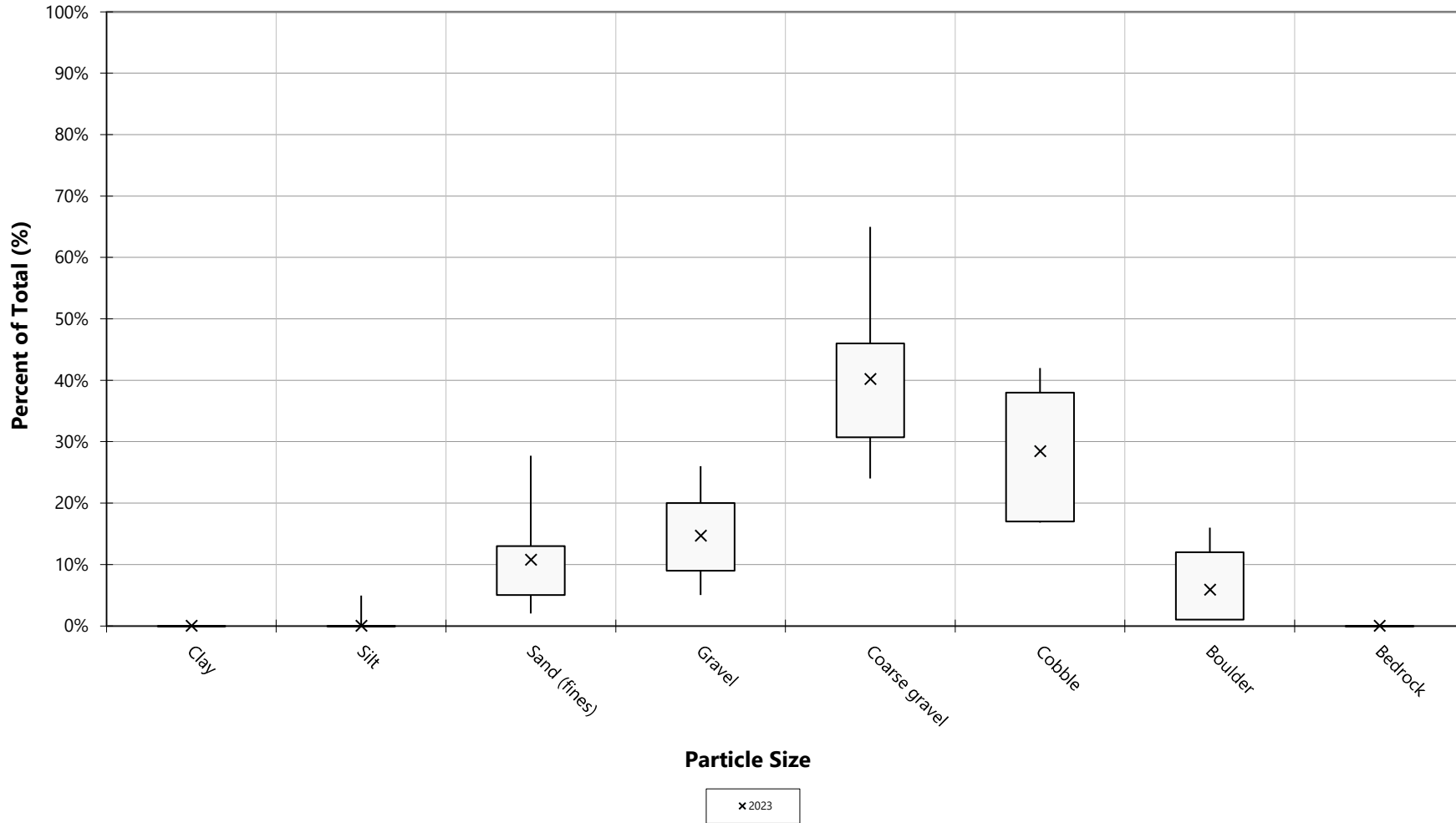
Moss Cover Index				
Category	0	1 (< 5%)	2 (5-25%)	3 (> 25%)
<b>Tally</b>	101	1	0	0

Macro-Algae Cover Index				
Category	0	1 (<5%)	2 (5-25%)	5 (>25%)
<b>Tally</b>	101	0	0	0

Micro-Algae Cover Index							
Category	0	1 (slimy)	2 (draw line)	3 (0.5-1mm)	4 (1-5mm)	5 (5-20mm)	6 (> 20mm)
<b>Tally</b>	62	39	0	0	0	0	0

Other Macro or Micro (FeP at Seep) Cover Index						
Category	0	1 (slimy)	2 (draw line)	3 (0.5-1mm)	4 (1-5mm)	5 (5-20mm)
<b>Tally</b>	0	0	0	0	0	0

**Pebble Counts (2001-2023)**  
**Percent of Total (%)**  
**Station - Halnon Brook (Below Confluence with Trib 10) - DEC ID 502252**





**VFWD Salisbury Fish Hatchery**  
**Water Quality Monitoring Plan 2023**  
**Sample Location: Halnon Brook Trib 10 (Below Dam) - DEC ID 502254**  
**Sampling Date: 9/29/23**  
**Samplers: RTC, RFA**  
**Last Updated by VHB on: January 19, 2024**

Station Habitat Observations	Sub-1
Canopy cover:	30%
Embeddedness:	35%
Bank stability:	Very Good

Category	Median Size (mm)	Sample Count	% of Total	Cumulative Total	Total Cumulative Frequency (%)
Clay	< 0.004	0	0%	0	0
Silt	0.004 - 0.06	1	1%	1	1
Sand (fines)	0.062-2	2	2%	3	3
Gravel	2 - 16	10	10%	13	13
Coarse gravel	16-64	28	27%	41	40
Cobble	64-256	41	40%	82	80
Boulder	>256	20	20%	102	100
Bedrock	bedrock	0	0%	102	100
Sample Size (n)		102	100%		
Longitudinal Distance (ft)		0'-100'			

<b>D50 Particle Size</b>	Cobble
<b>Dominant Size Class</b>	Cobble
<b>% Fines</b>	3%
<b>% Particles &lt; 2 mm</b>	3%

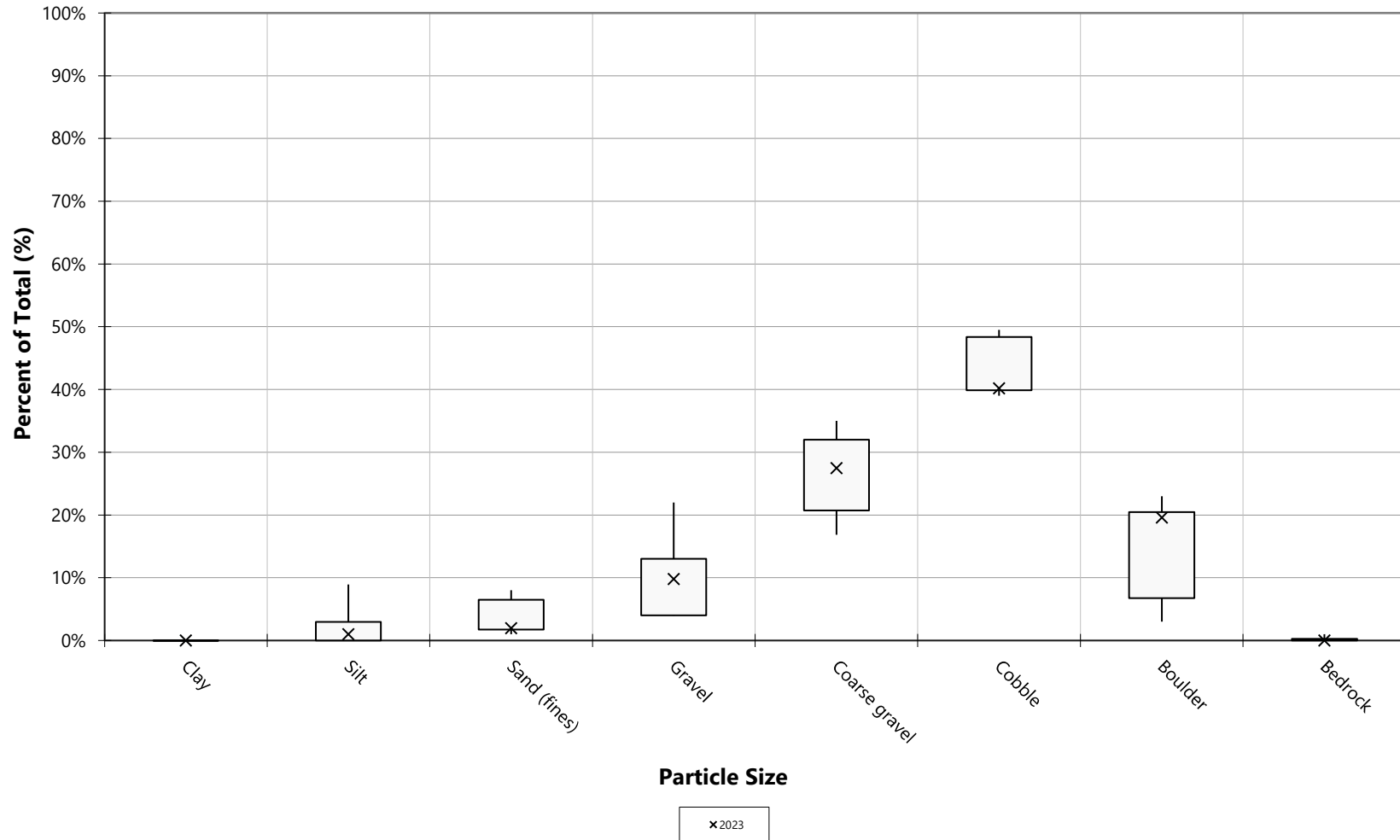
Moss Cover Index				
Category	0	1 (< 5%)	2 (5-25%)	3 (> 25%)
<b>Tally</b>	98	0	3	1

Macro-Algae Cover Index				
Category	0	1 (<5%)	2 (5-25%)	5 (>25%)
<b>Tally</b>	96	0	0	0

Micro-Algae Cover Index							
Category	0	1 (slimy)	2 (draw line)	3 (0.5-1mm)	4 (1-5mm)	5 (5-20mm)	6 (> 20mm)
<b>Tally</b>	35	54	7	0	0	0	0

Other Macro or Micro (FeP at Seep) Cover Index						
Category	0	1 (slimy)	2 (draw line)	3 (0.5-1mm)	4 (1-5mm)	5 (5-20mm)
<b>Tally</b>	0	0	0	0	0	0

**Pebble Counts (2009-2023)**  
**Percent of Total (%)**  
**Station - Halnon Brook Trib 10 (Below Dam) - DEC ID 502254**





LOTIC BENTHOS FIELD SHEET  
(2021 edition)

Stream Name Halon Brook (upstream)  
DEC Site ID \_\_\_\_\_ Date 9/29  
Crew RA/RC

River Mile \_\_\_\_\_ New Site:  Y |  N  
Latitude 43.93188 N Longitude 73.10376 W  
Site Type: WWTF | USFS | SENT | PROB | Other \_\_\_\_\_

Site/Access Description:  
Site accessed by walking upstream from Lake Dunmore Rd; located ~75m upstream from culvert under private driveway on East Brook Rd

**Water Chemistry**

Sampler (lab parameters) RFA Flow Type: Baseflow | Freshet Flow Level: High | Medium | Low

Weather/Flow Comments (previous 2 days - 2 weeks) dry

Other Chemistry Comments \_\_\_\_\_

**Lab Parameters:**

Chem Lab ID \_\_\_\_\_ Dup Lab ID (if applicable) \_\_\_\_\_  
Time \_\_\_\_\_ Dup Time (if applicable) \_\_\_\_\_  
Parameters collected (circle): Alk | TP | DP | TN | NOx | NH3 | Cl | SO4 | Turb | DOC | Earth Metals | Total Metals | Other \_\_\_\_\_

**Field Parameters:**

Meter used \_\_\_\_\_  
Water Temp (°C) 11.6 pH 7.32 Cond (uS) 357 Turbidity (NTU) 6.69 D.O. (%) 104.9 D.O. (mg/l) 1.37  
Calibrated within 7 days (pH/Cond/Turb):  Y |  N Calibrated on site (D.O.):  Y |  N

**Macroinvertebrates**

Sampler RSC Method KN Composites/Rep 4/2  
Trophic Rating 1 (0=Oligotrophic, 5=Eutrophic)  
Comments \_\_\_\_\_

Low Gradient Habitat (if applicable): Poor | Fair | Good | VG | Exc  
Low Gradient Composites (sum = 4):  
Macrophytes \_\_\_\_\_ Woody snags \_\_\_\_\_ Root wads \_\_\_\_\_  
Overhanging herbaceous \_\_\_\_\_ Overhanging branches \_\_\_\_\_

**Stream Characteristics**

Habitat type: Riffle | Low Gradient | Other \_\_\_\_\_  
Bankfull Width ft 15 Wetted Width ft 14  
Velocity: Slow (<0.4 ft/sec) | Medium (0.4-2 ft/sec) | Fast (>2 ft/sec)  
Bank Stability: Poor | Fair | Good | VG | Exc  
Large Woody Debris (>4" diameter): # 25 /100m

**Riparian Characteristics**

Riparian Width (facing upstream - 25m max): L 25 (m) R 25 (m) Canopy (estimate) 60 %  
Overstory (>5m, should be <= 100% combined): Softwood 10 % Hardwood 90 %  
Understory (<5m, can overlap and be >100%): Woody/shrub 30 % Herbaceous 30 % Grass (lawn/pasture) 5 %

**Substrate Characteristics**

Embeddedness (% estimate) 25 Silt Rating: 1 (0=none, 5=heavy plume) CPOM (leaf packs): 1 (0= none, 5=high)  
Periphyton Cover - Qualitative (See back for Substrate Periphyton Cover Form):  
Diatom 50 % Filamentous Green \_\_\_\_\_ % Blue Green \_\_\_\_\_ % Moss 5 % Green 1 % Other \_\_\_\_\_ %  
Calcareous Deposits \_\_\_\_\_ % Iron Precipitate \_\_\_\_\_ %

**General Habitat Observations and Comments**

(e.g. site sketch, aesthetics, land use, pollution, water clarity/color, etc)

Minor black and orange staining



# LOTIC BENTHOS FIELD SHEET

(2021 edition)

Stream Name Hahn Brook (Downstream)  
DEC Site ID 502252 Date 9/29/23  
Crew RA  
Site/Access Description: \_\_\_\_\_

River Mile \_\_\_\_\_ New Site: Y | N  
Latitude \_\_\_\_\_ Longitude \_\_\_\_\_  
Site Type: WWTF | USFS | SENT | PROB | Other \_\_\_\_\_  
Other Monitoring: Fish | SGA-lite | Temp | Other \_\_\_\_\_

## Water Chemistry

Sampler (lab parameters) RA Flow Type: Baseflow | Freshet Flow Level: High | Medium | Low

Weather/Flow Comments (previous 2 days - 2 weeks) dry last week

Other Chemistry Comments \_\_\_\_\_

## Lab Parameters:

Chem Lab ID \_\_\_\_\_ Dup Lab ID (if applicable) \_\_\_\_\_

Time 11:00 Dup Time (if applicable) \_\_\_\_\_

Parameters collected (circle): Alk | TP | DP | TN | NOx | NH3 | Cl | SO4 | Turb | DOC | Earth Metals | Total Metals | Other \_\_\_\_\_

## Field Parameters:

Meter used \_\_\_\_\_

Water Temp (°C) 11.1 pH 7.78 Cond (uS) 375.5 Turbidity (NTU) 3.82 D.O.(%) 104.0 D.O. (mg/l) 11.34

Calibrated within 7 days (pH/Cond/Turb): Y | N

Calibrated on site (D.O.): Y | N

## Macroinvertebrates

Sampler FTC Method KN Composites/Rep 4/2

Trophic Rating 2 (0=Oligotrophic, 5=Eutrophic)

Comments \_\_\_\_\_

Low Gradient Habitat (if applicable): Poor | Fair | Good | VG | Exc

Low Gradient Composites (sum = 4):

Macrophytes \_\_\_\_\_ Woody snags \_\_\_\_\_ Root wads \_\_\_\_\_

Overhanging herbaceous \_\_\_\_\_ Overhanging branches \_\_\_\_\_

## Stream Characteristics

Habitat type: Riffle | Low Gradient | Other \_\_\_\_\_

Bankfull Width ft 15 Wetted Width ft 12

Velocity: Slow (<0.4 ft/sec) | Medium (0.4-2 ft/sec) | Fast (>2 ft/sec)

Bank Stability: Poor | Fair | Good | VG | Exc

Large Woody Debris (>4" diameter): # 2 /100m

*undercutting on left bank*

## Riparian Characteristics

Riparian Width (facing upstream - 25m max): L 30 (m) R 40 (m)

Canopy (estimate) 60 %

Overstory (>5m, should be <= 100% combined): Softwood 10 % Hardwood 90 %

Understory (<5m, can overlap and be >100%): Woody/shrub 70 % Herbaceous 60 % Grass (lawn/pasture) 5 %

## Substrate Characteristics

Embeddedness (% estimate) 30 Silt Rating: 2 (0=none, 5=heavy plume) CPOM (leaf packs): 2 (0= none, 5=high)

Periphyton Cover - Qualitative (See back for Substrate Periphyton Cover Form):

Diatom 60 % Filamentous Green \_\_\_\_\_ % Blue Green Tr % Moss 5 % Green 2 % Other \_\_\_\_\_ %

Calcareous Deposits \_\_\_\_\_ % Iron Precipitate \_\_\_\_\_ %

## General Habitat Observations and Comments

(e.g. site sketch, aesthetics, land use, pollution, water clarity/color, etc)

*Sample in recent  
mid story more open than previous years  
minor changes to stream geomorph due to flooding*

Site 502252 Halton Downstream

Crew PTC/RFA

Date 9/29/23

### Pebble Count Field Form

(Complete "% Estimate" substrate only if no pebble count)

Particle	Millimeters	% Estimate	Tally (100 minimum)	Total #
Clay	<.004			
Silt	.004 -0.6			
Sand	0.06 - 2.0		HHH HHH	11
Gravel	2.0 -16		HHH HHH HHH	15
Coarse Gravel	16 - 64		HHH HHH HHHHHH HHH HHH HHH HHH 1	41
Cobble	64 - 256		HHH HHH HHH HHH HHH	29
Boulder	>256		HHH 1	6
Bedrock				
<b>TOTALS:</b>				102

#### Periphyton Cover Observations

Moss Cover Index				
Category	0	1 (<5%)	2 (5-25%)	3 (>25%)
Tally				

Macro-Algae Cover Index				
Category	0	1 (<5%)	2 (5-25%)	3 (>25%)
Tally				

Micro-Algae Cover Index						
Category	0	1 (slimy)	2 (draw line)	3 (0.5-1mm)	4 (1-5mm)	5 (5-20mm)
Tally		HHH HHH HHH HHH HHH HHH HHH				

Other Percent Cover Index (e.g. Didymo, Riverweed)				
Category	0	1 (<5%)	2 (5-25%)	3 (>25%)
Tally				

Other Thickness Cover Index (e.g. Iron precipitate, Calcareous deposits)						
Category	0	1 (slimy)	2 (draw line)	3 (0.5-1mm)	4 (1-5mm)	5 (5-20mm)
Tally						

# LOTIC BENTHOS FIELD SHEET

(2021 edition)

Stream Name Trib 10  
DEC Site ID 502254 Date 9/29/23  
Crew RL/RA  
Site/Access Description: \_\_\_\_\_

River Mile \_\_\_\_\_ New Site: Y |  N  
Latitude \_\_\_\_\_ Longitude \_\_\_\_\_  
Site Type: WWTF | USFS | SENT | PROB | Other \_\_\_\_\_  
Other Monitoring: Fish | SGA-lite | Temp | Other \_\_\_\_\_

## Water Chemistry

Sampler (lab parameters) RA Flow Type:  Baseflow | Freshet Flow Level: High |  Medium | Low  
Weather/Flow Comments (previous 2 days - 2 weeks) dry last week  
Other Chemistry Comments \_\_\_\_\_

## Lab Parameters:

Chem Lab ID \_\_\_\_\_ Dup Lab ID (if applicable) \_\_\_\_\_  
Time 12:10 Dup Time (if applicable) \_\_\_\_\_  
Parameters collected (circle): Alk | TP | DP | TN | NOx | NH3 | Cl | SO4 | Turb | DOC | Earth Metals | Total Metals | Other \_\_\_\_\_

## Field Parameters:

Meter used \_\_\_\_\_  
Water Temp (°C) 10.4 pH 7.87 Cond (uS) 474.1 Turbidity (NTU) 9.55 D.O. (%) 100.1 D.O. (mg/l) 11.20  
Calibrated within 7 days (pH/Cond/Turb): Y | N Calibrated on site (D.O.): Y | N

## Macroinvertebrates

Sampler RIC Method KN Composites/Rep 4/1  
Trophic Rating 3 (0=Oligotrophic, 5=Eutrophic)  
Comments \_\_\_\_\_

## Stream Characteristics

Habitat type:  Riffle | Low Gradient | Other \_\_\_\_\_  
Bankfull Width ft 10 Wetted Width ft 10  
Velocity: Slow (<0.4 ft/sec) | Medium (0.4-2 ft/sec) | Fast (>2 ft/sec)  
Bank Stability: Poor | Fair | Good |  VG | Exc  
Large Woody Debris (>4" diameter): # 4 /100m

Low Gradient Habitat (if applicable): Poor | Fair | Good | VG | Exc  
Low Gradient Composites (sum = 4):  
Macrophytes \_\_\_\_\_ Woody snags \_\_\_\_\_ Root wads \_\_\_\_\_  
Overhanging herbaceous \_\_\_\_\_ Overhanging branches \_\_\_\_\_

## Riparian Characteristics

Riparian Width (facing upstream - 25m max): L 20 (m) R >25 (m) Canopy (estimate) 30 %  
Overstory (>5m, should be <= 100% combined): Softwood 0 % Hardwood 100 %  
Understory (<5m, can overlap and be >100%): Woody/shrub 50 % Herbaceous 20 % Grass (lawn/pasture) 2 %

## Substrate Characteristics

Embeddedness (% estimate) 35 Silt Rating: 4 (0=none, 5=heavy plume) CPOM (leaf packs): 1 (0= none, 5=high)  
Periphyton Cover - Qualitative (See back for Substrate Periphyton Cover Form):  
Diatom 80 % Filamentous Green 2 % Blue Green 0 % Moss 5 % Green 1 % Other \_\_\_\_\_ %  
Calcareous Deposits \_\_\_\_\_ % Iron Precipitate \_\_\_\_\_ %

## General Habitat Observations and Comments

(e.g. site sketch, aesthetics, land use, pollution, water clarity/color, etc)

Sculpin  
Significant vegetation loss in riparian zone  
moderate changes to stream geomorph due to flooding

Site 502254 Trib 10

Crew RTC/RFA

Date 9/29/23

### Pebble Count Field Form

(Complete "% Estimate" substrate only if no pebble count)

Particle	Millimeters	% Estimate	Tally (100 minimum)	Total #
Clay	<.004			
Silt	.004 - 0.6		I	1
Sand	0.06 - 2.0		II	2
Gravel	2.0 - 16			10
Coarse Gravel	16 - 64		III	28
Cobble	64 - 256		I	41
Boulder	>256			20
Bedrock				
<b>TOTALS:</b>				102

### Periphyton Cover Observations

Moss Cover Index				
Category	0	1 (<5%)	2 (5-25%)	3 (>25%)
Tally				I

Macro-Algae Cover Index				
Category	0	1 (<5%)	2 (5-25%)	3 (>25%)
Tally				

Micro-Algae Cover Index						
Category	0	1 (slimy)	2 (draw line)	3 (0.5-1mm)	4 (1-5mm)	5 (5-20mm)
Tally						

Other Percent Cover Index (e.g. Didymo, Riverweed)				
Category	0	1 (<5%)	2 (5-25%)	3 (>25%)
Tally				

Other Thickness Cover Index (e.g. Iron precipitate, Calcareous deposits)						
Category	0	1 (slimy)	2 (draw line)	3 (0.5-1mm)	4 (1-5mm)	5 (5-20mm)
Tally						



# APPENDIX 4

Macroinvertebrate data submittal form - VT DEC July 2022 version

Project Name: Salisbury FCS
VT DEC Lab ID:
Stream Name: Halnon Brook
Station: 524120 Halnon Upstream

Note: a minimum of 25% of sample and no less than 300 animals must be processed; no fewer than 24 grids (squares) should be used to process a sample

Table with 2 columns: Site/Order/Date/etc and Latitude/Longitude.

Table with 3 columns: REPS, Rep 1, Rep 2. Includes Date Picked, #sq picked, Checked By, Sorted By, Sorted Date.

Main taxonomic data table with columns for Expanded Key, Order, Family, SubFamily or Tribe, Genus Group, Genus, Species Group, Species, Rep1, Rep2, Biotic Index, and Richness Metrics.

TOTALS by Rep:
GRAND TOTAL: 2375.428571 organisms

\*Notes:

- [1] ID is initial of taxonomist or organization
[2] QA is confidence of ID: A=99%, B=90%, C=75%, D=50%
[3] Count: only report a 0 in case of Rare taxa not found in subsample. Leave blank if no organisms were identified in a rep.
[4] Total Sample Count: estimated count for entire sample, based on ratio of # squares picked to # squares total

Summary table with columns: Total BI Score, Total # Organisms, # of Organisms w/o BI, Total # Organisms with BI, Biotic Index, Total Richness, Total EPT-R, Total Richness, Total EPT-R.





**Major Taxonomic Group Statistics**

Project Salisbury FCS  
 Station 524120 Halnon Upstream  
 Stream Halnon Brook  
 VT Site ID 524120  
 Sample Date 09/29/2023

2022 Expanded Key ID#	KN-1: Numbers of Organisms										TOTAL
	COLEOPTERA	DIPTERA	EPHEMEROPTERA	TRICHOPTERA	PLECOPTERA	OLIGOCHAETA	BIVALVIA	MEGALOPTERA	ODONATA	OTHER	
01.03.00.00.005.01.00	24	0	0	0	0	0	0	0	0	0	0
01.03.00.00.005.01.03	0	0	0	0	0	0	0	0	0	0	0
01.03.00.00.005.02.02	4	0	0	0	0	0	0	0	0	0	0
01.03.00.00.006.00.00	8	0	0	0	0	0	0	0	0	0	0
01.03.00.00.006.00.01	4	0	0	0	0	0	0	0	0	0	0
01.11.00.00.001.00.01	12	0	0	0	0	0	0	0	0	0	0
02.05.01.00.085.00.05	0	12	0	0	0	0	0	0	0	0	0
02.05.03.02.108.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.03.02.121.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.05.00.005.00.00	0	4	0	0	0	0	0	0	0	0	0
02.05.05.00.008.00.00	0	8	0	0	0	0	0	0	0	0	0
02.05.05.00.029.00.01	0	56	0	0	0	0	0	0	0	0	0
02.05.05.00.029.00.02	0	4	0	0	0	0	0	0	0	0	0
02.05.05.00.029.00.08	0	96	0	0	0	0	0	0	0	0	0
02.05.05.00.075.00.00	0	4	0	0	0	0	0	0	0	0	0
02.05.05.00.109.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.05.00.114.01.04	0	20	0	0	0	0	0	0	0	0	0
02.05.05.01.018.00.01	0	16	0	0	0	0	0	0	0	0	0
02.05.05.01.065.00.05	0	0	0	0	0	0	0	0	0	0	0
02.05.05.01.065.00.06	0	0	0	0	0	0	0	0	0	0	0
02.05.05.01.065.01.00	0	12	0	0	0	0	0	0	0	0	0
02.05.05.01.065.01.02	0	0	0	0	0	0	0	0	0	0	0
02.08.00.00.001.00.00	0	0	0	0	0	0	0	0	0	0	0
02.14.00.00.005.00.00	0	404	0	0	0	0	0	0	0	0	0
02.19.00.00.001.00.00	0	4	0	0	0	0	0	0	0	0	0
02.19.00.00.016.00.00	0	0	0	0	0	0	0	0	0	0	0
03.01.00.00.001.00.00	0	0	8	0	0	0	0	0	0	0	0
03.01.00.00.001.00.03	0	0	0	0	0	0	0	0	0	0	0
03.01.00.00.001.00.09	0	0	256	0	0	0	0	0	0	0	0
03.01.00.02.006.00.01	0	0	4	0	0	0	0	0	0	0	0
03.04.00.00.004.00.00	0	0	0	0	0	0	0	0	0	0	0
03.06.00.00.007.00.00	0	0	4	0	0	0	0	0	0	0	0
03.07.00.00.000.00.01	0	0	4	0	0	0	0	0	0	0	0
04.01.00.00.002.00.01	0	0	0	4	0	0	0	0	0	0	0
04.01.00.00.002.00.06	0	0	0	0	0	0	0	0	0	0	0
04.05.00.00.002.00.00	0	0	0	0	0	0	0	0	0	0	0
04.05.00.00.003.00.01	0	0	0	0	0	0	0	0	0	0	0
04.05.00.00.004.00.01	0	0	0	4	0	0	0	0	0	0	0
04.05.00.00.004.03.03	0	0	0	8	0	0	0	0	0	0	0
04.05.00.00.004.03.04	0	0	0	0	0	0	0	0	0	0	0
04.07.00.00.001.00.00	0	0	0	4	0	0	0	0	0	0	0
04.09.00.00.000.00.01	0	0	0	12	0	0	0	0	0	0	0
04.12.00.00.002.00.00	0	0	0	188	0	0	0	0	0	0	0
04.16.00.00.001.00.00	0	0	0	16	0	0	0	0	0	0	0
04.16.00.00.001.00.01	0	0	0	16	0	0	0	0	0	0	0
04.16.00.00.001.03.09	0	0	0	12	0	0	0	0	0	0	0
05.05.00.00.002.00.00	0	0	0	0	28	0	0	0	0	0	0
05.09.00.00.003.00.00	0	0	0	0	4	0	0	0	0	0	0
13.02.00.00.000.00.00	0	0	0	0	0	0	4	0	0	0	0
13.02.00.00.002.00.00	0	0	0	0	0	0	4	0	0	0	0
18.02.00.00.000.00.00	0	0	0	0	0	4	0	0	0	0	0
18.04.00.00.000.00.00	0	0	0	0	0	12	0	0	0	0	0
18.05.00.00.000.00.00	0	0	0	0	0	4	0	0	0	0	0
<b>Total</b>	<b>52</b>	<b>640</b>	<b>276</b>	<b>264</b>	<b>32</b>	<b>20</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1292</b>
<b>Percent</b>	<b>4%</b>	<b>50%</b>	<b>21%</b>	<b>20%</b>	<b>2%</b>	<b>2%</b>	<b>1%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>100%</b>



**Major Taxonomic Group Statistics**

**Project** Salisbury FCS  
**Station** 524120 Halnon Upstream  
**Stream** Halnon Brook  
**VT Site ID** 524120  
**Sample Date** 09/29/2023

2022 Expanded Key ID#	KN-2: Numbers of Organisms										TOTAL
	COLEOPTERA	DIPTERA	EPHEMEROPTERA	TRICHOPTERA	PLECOPTERA	OLIGOCHAETA	BIVALVIA	MEGALOPTERA	ODONATA	OTHER	
01.03.00.00.005.01.00	17.14285714	0	0	0	0	0	0	0	0	0	0
01.03.00.00.005.01.03	3.428571429	0	0	0	0	0	0	0	0	0	0
01.03.00.00.005.02.02	0	0	0	0	0	0	0	0	0	0	0
01.03.00.00.006.00.00	6.857142857	0	0	0	0	0	0	0	0	0	0
01.03.00.00.006.00.01	3.428571429	0	0	0	0	0	0	0	0	0	0
01.11.00.00.001.00.01	3.428571429	0	0	0	0	0	0	0	0	0	0
02.05.01.00.085.00.05	0	6.8571429	0	0	0	0	0	0	0	0	0
02.05.03.02.108.00.00	0	3.4285714	0	0	0	0	0	0	0	0	0
02.05.03.02.121.00.00	0	3.4285714	0	0	0	0	0	0	0	0	0
02.05.05.00.005.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.05.00.008.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.05.00.029.00.01	0	41.142857	0	0	0	0	0	0	0	0	0
02.05.05.00.029.00.02	0	3.4285714	0	0	0	0	0	0	0	0	0
02.05.05.00.029.00.08	0	123.42857	0	0	0	0	0	0	0	0	0
02.05.05.00.075.00.00	0	6.8571429	0	0	0	0	0	0	0	0	0
02.05.05.00.109.00.00	0	3.4285714	0	0	0	0	0	0	0	0	0
02.05.05.00.114.01.04	0	27.428571	0	0	0	0	0	0	0	0	0
02.05.05.01.018.00.01	0	6.8571429	0	0	0	0	0	0	0	0	0
02.05.05.01.065.00.05	0	3.4285714	0	0	0	0	0	0	0	0	0
02.05.05.01.065.00.06	0	3.4285714	0	0	0	0	0	0	0	0	0
02.05.05.01.065.01.00	0	0	0	0	0	0	0	0	0	0	0
02.05.05.01.065.01.02	0	3.4285714	0	0	0	0	0	0	0	0	0
02.08.00.00.001.00.00	0	3.4285714	0	0	0	0	0	0	0	0	0
02.14.00.00.005.00.00	0	277.71429	0	0	0	0	0	0	0	0	0
02.19.00.00.001.00.00	0	0	0	0	0	0	0	0	0	0	0
02.19.00.00.016.00.00	0	6.8571429	0	0	0	0	0	0	0	0	0
03.01.00.00.001.00.00	0	0	6.857142857	0	0	0	0	0	0	0	0
03.01.00.00.001.00.03	0	0	3.428571429	0	0	0	0	0	0	0	0
03.01.00.00.001.00.09	0	0	264	0	0	0	0	0	0	0	0
03.01.00.02.006.00.01	0	0	3.428571429	0	0	0	0	0	0	0	0
03.04.00.00.004.00.00	0	0	10.28571429	0	0	0	0	0	0	0	0
03.06.00.00.007.00.00	0	0	0	0	0	0	0	0	0	0	0
03.07.00.00.000.00.01	0	0	0	0	0	0	0	0	0	0	0
04.01.00.00.002.00.01	0	0	0	3.428571429	0	0	0	0	0	0	0
04.01.00.00.002.00.06	0	0	0	6.857142857	0	0	0	0	0	0	0
04.05.00.00.002.00.00	0	0	0	6.857142857	0	0	0	0	0	0	0
04.05.00.00.003.00.01	0	0	0	6.857142857	0	0	0	0	0	0	0
04.05.00.00.004.00.01	0	0	0	0	0	0	0	0	0	0	0
04.05.00.00.004.03.03	0	0	0	0	0	0	0	0	0	0	0
04.05.00.00.004.03.04	0	0	0	17.14285714	0	0	0	0	0	0	0
04.07.00.00.001.00.00	0	0	0	0	0	0	0	0	0	0	0
04.09.00.00.000.00.01	0	0	0	0	0	0	0	0	0	0	0
04.12.00.00.002.00.00	0	0	0	89.14285714	0	0	0	0	0	0	0
04.16.00.00.001.00.00	0	0	0	24	0	0	0	0	0	0	0
04.16.00.00.001.00.01	0	0	0	48	0	0	0	0	0	0	0
04.16.00.00.001.03.09	0	0	0	0	0	0	0	0	0	0	0
05.05.00.00.002.00.00	0	0	0	0	20.57142857	0	0	0	0	0	0
05.09.00.00.003.00.00	0	0	0	0	3.428571429	0	0	0	0	0	0
13.02.00.00.000.00.00	0	0	0	0	0	0	0	0	0	0	0
13.02.00.00.002.00.00	0	0	0	0	0	0	3.4285714	0	0	0	0
18.02.00.00.000.00.00	0	0	0	0	0	3.428571429	0	0	0	0	0
18.04.00.00.000.00.00	0	0	0	0	0	3.428571429	0	0	0	0	0
18.05.00.00.000.00.00	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>34.28571429</b>	<b>524.57143</b>	<b>288</b>	<b>202.2857143</b>	<b>24</b>	<b>6.857142857</b>	<b>3.428571</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1083.4</b>
<b>Percent</b>	<b>3%</b>	<b>48%</b>	<b>27%</b>	<b>19%</b>	<b>2%</b>	<b>1%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>100%</b>



**Functional Feeding Group Analysis**

**Project** Salisbury FCS  
**Station** 524120 Halnon Upstream  
**Stream** Halnon Brook  
**Location** 524120  
**Sample Date** 09/29/2023

2022 Expanded Key ID#	KN-1: Numbers of Organisms							KN-2: Numbers of Organisms								
	CG	CF	PRD	SRD	SHR	SCR	No FG Designation	Total	CG	CF	PRD	SRD	SHR	SCR	No FG Designation	Total
01.03.00.00.005.01.00	0	0	0	0	0	24	0		0	0	0	0	0	17.14286	0	
01.03.00.00.005.01.03	0	0	0	0	0	0	0		0	0	0	0	0	3.428571	0	
01.03.00.00.005.02.02	0	0	0	0	0	4	0		0	0	0	0	0	0	0	
01.03.00.00.006.00.00	0	0	0	0	0	8	0		0	0	0	0	0	6.857143	0	
01.03.00.00.006.00.01	0	0	0	0	0	4	0		0	0	0	0	0	3.428571	0	
01.11.00.00.001.00.01	0	0	0	12	0	0	0		0	0	0	3.428571	0	0	0	
02.05.01.00.085.00.05	12	0	0	0	0	0	0		6.857143	0	0	0	0	0	0	
02.05.03.02.108.00.00	0	0	0	0	0	0	0		0	3.428571	0	0	0	0	0	
02.05.03.02.121.00.00	0	0	0	0	0	0	0		3.428571	0	0	0	0	0	0	
02.05.05.00.005.00.00	0	0	0	4	0	0	0		0	0	0	0	0	0	0	
02.05.05.00.008.00.00	0	0	8	0	0	0	0		0	0	0	0	0	0	0	
02.05.05.00.029.00.01	56	0	0	0	0	0	0		41.14286	0	0	0	0	0	0	
02.05.05.00.029.00.02	4	0	0	0	0	0	0		3.428571	0	0	0	0	0	0	
02.05.05.00.029.00.08	96	0	0	0	0	0	0		123.4286	0	0	0	0	0	0	
02.05.05.00.075.00.00	4	0	0	0	0	0	0		6.857143	0	0	0	0	0	0	
02.05.05.00.109.00.00	0	0	0	0	0	0	0		3.428571	0	0	0	0	0	0	
02.05.05.00.114.01.04	20	0	0	0	0	0	0		27.42857	0	0	0	0	0	0	
02.05.05.01.018.00.01	0	0	0	0	16	0	0		0	0	0	0	6.857143	0	0	
02.05.05.01.065.00.05	0	0	0	0	0	0	0		3.428571	0	0	0	0	0	0	
02.05.05.01.065.00.06	0	0	0	0	0	0	0		3.428571	0	0	0	0	0	0	
02.05.05.01.065.01.00	12	0	0	0	0	0	0		0	0	0	0	0	0	0	
02.05.05.01.065.01.02	0	0	0	0	0	0	0		3.428571	0	0	0	0	0	0	
02.08.00.00.001.00.00	0	0	0	0	0	0	0		0	0	3.428571	0	0	0	0	
02.14.00.00.005.00.00	0	404	0	0	0	0	0		0	277.7143	0	0	0	0	0	
02.19.00.00.001.00.00	4	0	0	0	0	0	0		0	0	0	0	0	0	0	
02.19.00.00.016.00.00	0	0	0	0	0	0	0		0	0	0	6.857143	0	0	0	
03.01.00.00.001.00.00	8	0	0	0	0	0	0		6.857143	0	0	0	0	0	0	
03.01.00.00.001.00.03	0	0	0	0	0	0	0		3.428571	0	0	0	0	0	0	
03.01.00.00.001.00.09	256	0	0	0	0	0	0		264	0	0	0	0	0	0	
03.01.00.02.006.00.01	0	0	0	0	0	4	0		0	0	0	0	0	3.428571	0	
03.04.00.00.004.00.00	0	0	0	0	0	0	0		10.28571	0	0	0	0	0	0	
03.06.00.00.007.00.00	0	0	0	0	0	4	0		0	0	0	0	0	0	0	
03.07.00.00.000.00.01	0	0	0	0	0	4	0		0	0	0	0	0	0	0	
04.01.00.00.002.00.01	0	4	0	0	0	0	0		0	3.428571	0	0	0	0	0	
04.01.00.00.002.00.06	0	0	0	0	0	0	0		0	6.857143	0	0	0	0	0	
04.05.00.00.002.00.00	0	0	0	0	0	0	0		0	6.857143	0	0	0	0	0	
04.05.00.00.003.00.01	0	0	0	0	0	0	0		0	6.857143	0	0	0	0	0	
04.05.00.00.004.00.01	0	4	0	0	0	0	0		0	0	0	0	0	0	0	
04.05.00.00.004.03.03	0	8	0	0	0	0	0		0	0	0	0	0	0	0	
04.05.00.00.004.03.04	0	0	0	0	0	0	0		0	17.14286	0	0	0	0	0	
04.07.00.00.001.00.00	0	0	0	4	0	0	0		0	0	0	0	0	0	0	
04.09.00.00.000.00.01	0	0	0	12	0	0	0		0	0	0	0	0	0	0	
04.12.00.00.002.00.00	0	188	0	0	0	0	0		0	89.14286	0	0	0	0	0	
04.16.00.00.001.00.00	0	0	16	0	0	0	0		0	0	24	0	0	0	0	
04.16.00.00.001.00.01	0	0	16	0	0	0	0		0	0	48	0	0	0	0	
04.16.00.00.001.03.09	0	0	12	0	0	0	0		0	0	0	0	0	0	0	
05.05.00.00.002.00.00	0	0	0	28	0	0	0		0	0	0	20.57143	0	0	0	
05.09.00.00.003.00.00	0	0	0	0	4	0	0		0	0	0	0	3.428571	0	0	
13.02.00.00.000.00.00	0	4	0	0	0	0	0		0	0	0	0	0	0	0	
13.02.00.00.002.00.00	0	4	0	0	0	0	0		0	3.428571	0	0	0	0	0	
18.02.00.00.000.00.00	4	0	0	0	0	0	0		3.428571	0	0	0	0	0	0	
18.04.00.00.000.00.00	12	0	0	0	0	0	0		3.428571	0	0	0	0	0	0	
18.05.00.00.000.00.00	4	0	0	0	0	0	0		0	0	0	0	0	0	0	
<b>Total</b>	<b>492</b>	<b>616</b>	<b>52</b>	<b>60</b>	<b>20</b>	<b>48</b>	<b>4</b>	<b>1292</b>	<b>517.714</b>	<b>414.857</b>	<b>75.4286</b>	<b>30.8571</b>	<b>10.2857</b>	<b>34.2857</b>	<b>0</b>	<b>1083.43</b>
<b>Percent</b>	<b>38%</b>	<b>48%</b>	<b>4%</b>	<b>5%</b>	<b>2%</b>	<b>4%</b>	<b>0%</b>	<b>100%</b>	<b>48%</b>	<b>38%</b>	<b>7%</b>	<b>3%</b>	<b>1%</b>	<b>3%</b>	<b>0%</b>	<b>100%</b>



**Functional Feeding Group Analysis**

**Project** Salisbury FCS  
**Station** 524120 Halnon Upstream  
**Stream** Halnon Brook  
**Location** 524120  
**Sample Date** 09/29/2023

FFG Summary:							
	Model			Kicknet 1 vs. SHG		Kicknet 2 vs. SHG	
	SHG	MHG	WWMG	KN-1	PPCS	KN-2	PPCS
<b>Col. Gath.</b>	31%	32%	22%	38.1%	81.4%	47.8%	64.9%
<b>Col. Filt.</b>	18%	30%	36%	47.7%	37.8%	38.3%	47.0%
<b>Predator</b>	19%	13%	7%	4.0%	21.2%	7.0%	36.6%
<b>Shred-Det.</b>	15%	4%	2%	4.6%	31.0%	2.8%	19.0%
<b>Shred- Herb.</b>	1%	1%	5%	1.55%	64.6%	0.95%	94.9%
<b>Scraper</b>	12%	13%	22%	3.72%	30.96%	3.16%	26.4%
				<b>PPCS-FG =</b>	<b>44.5%</b>	<b>PPCS-FG =</b>	<b>48.1%</b>

CG = Collector/Gatherer  
 CF = Collector/Filterer  
 PRD = Predator  
 SRD = Shredder - Detritus  
 SHR = Shredder - Herbivore  
 SCR = Scraper



## Percent Model Affinity of Orders (PMA-O) Calculations

**Project** Salisbury FCS

**Station** 524120 Halnon Upstream

**Stream** Halnon Brook

**VT Site ID** 524120

**Sample Date** 09/29/2023

**Class** Small, High Gradient, B2

**Sampler** CCS

Order	Model			Kicknet 1 vs. Model (SHG)		Kicknet 2 vs. Model (SHG)	
	SHG	MHG	WWMG	%	difference	%	difference
<b>Coleoptera</b>	8%	6%	13%	4.02%	3.98	3.16%	4.84
<b>Diptera</b>	19%	18%	13%	49.5%	30.54	48.4%	29.418
<b>Ephemeroptera</b>	23%	34%	32%	21.4%	1.6	26.58%	3.6
<b>Plecoptera</b>	21%	8%	8%	2.5%	18.5	2.2%	18.8
<b>Trichoptera</b>	28%	33%	33%	20.4%	7.6	18.7%	9.3
<b>Oligochaeta</b>	0.5%	0.5%	1.0%	1.55%	1.05	0.63%	0.13
<b>Other</b>	0.5%	0.5%	1.0%	0.62%	0.119	0.32%	0.184
				Sum diff	63.4		66.3
				Sum diff * 0.5	31.7		33.1
				100-(sum diff * 0.5)	68.3		66.9
				<b>% model affinity</b>	<b>68.3%</b>		<b>66.9%</b>



## EPT / EPT+C Calculations

**Project** Salisbury FCS

**Station** 524120 Halnon Upstream

**Stream** Halnon Brook

**Location** 524120

**Sample Date** 09/29/2023

**Class** Small, High Gradient, B2

**Sampler** CCS

	<b>KN-1</b>	<b>KN-2</b>
<b>#EPT organisms</b>	572	514.2857
<b>#C organisms</b>	232	236.5714
<b>EPT/EPT+C</b>	0.71	0.68

## Biometric Summary

**Project** Salisbury FCS  
**Station** 524120 Halnon Upstream  
**Stream** Halnon Brook  
**Location** 524120  
**Sample Date** 09/29/2023  
**Class** Small, High Gradient, B2  
**Sampler** CCS

Replicate # Sampling Method	1 KN	2 KN	Average KN
<b>Biometrics:</b>			
Density/Unit	1292	1083	1188
Species Richness	34.0	35.0	34.5
EPT Richness	14.0	13.0	13.5
Old Bio Index (0 to 5)	2.01	2.17	2.09
New Bio Index (0 to 10)	4.39	4.76	4.58
% dominant taxa	31.3%	25.6%	28.5%
EPT/EPT+C	0.711	0.685	0.698
EPT/Richness	0.412	0.371	0.391
% Model Affinity (orders)	68.3%	66.9%	67.6%
PPCS - functional groups	44.5%	48.1%	46.3%
<b>Major Groups:</b>			
Coleoptera (%)	4.02%	3.16%	3.59%
Diptera (%)	49.5%	48.4%	49.0%
Ephemeroptera (%)	21.4%	26.58%	23.97%
Trichoptera (%)	20.4%	18.7%	19.6%
Plecoptera (%)	2.5%	2.2%	2.3%
Oligochaeta (%)	1.55%	0.63%	1.09%
Bivalvia (%)	0.62%	0.32%	0.47%
Megaloptera (%)	0.00%	0.00%	0.00%
Odonata (%)	0.00%	0.00%	0.00%
Other (%)	0.00%	0.00%	0.00%
Total (%)	100%	100%	100%
<b>Feeding Groups:</b>			
Collector Gatherer (%)	38.1%	47.8%	42.9%
Collector Filterer (%)	47.7%	38.29%	43.0%
Predator (%)	4.0%	7.0%	5.5%
Shredder - Detritus (%)	4.6%	2.8%	3.7%
Shredder - Herbivore (%)	1.55%	0.95%	1.25%
Scraper (%)	3.72%	3.16%	3.44%
No FG Designation (%)	0.31%	0.00%	0.15%
Total (%)	100%	100%	100%



**Project** Salisbury FCS  
**Station** 524120 Halnon Upstream **Latitude** 0  
**Stream** Halnon Brook **Longitude** 0  
**Location** 524120 **Class** Small, High Gradient, B2  
**Sample Date** 09/29/2023 **Sampler** CCS

APPLICATION OF STATE OF VERMONT DEC BIOCRITERIA (1/15/2017)

Metric	Value	Metric Scoring Results					
		Based on DEC Thresholds for SHG Streams					
		Class B2		Class B1		Class A	
		Threshold	Outcome	Threshold	Outcome	Threshold	Outcome
Density	1187.7	≥300	Pass	≥400	Pass	≥500	Pass
Richness	34.5	≥27	Pass	≥31	Pass	≥35	I
EPT	13.5	≥16	Fail	≥19	Fail	≥21	Fail
% PMA-O	67.6%	≥45%	Pass	≥55%	Pass	≥65%	Pass
BI (New 1-10)	4.58	≤4.50	I	≤3.50	Fail	≤3.00	Fail
% Oligo	1.09%	≤12%	Pass	≤5	Pass	≤2	Pass
EPT/EPT+C	0.698	≥0.45	Pass	≥0.55	Pass	≥0.65	Pass
% PPCS-FG	46.3%	≥ 40%	Pass	≥ 45%	Pass	≥ 50%	I
<b>Outcome:</b>		<b>Biocriteria are not met</b>					
<b>The following metrics do not meet Class B2 thresholds:</b>		EPT (Fail), BI (I)					

**Individual Metric Outcome Guidelines (using the table below)**

- 1) A metric is scored "Pass" when the result meets the threshold requirements
- 2) A metric is scored "I" when the result is between the threshold level and the non-support level
- 3) A metric is scored "Fail" when the result is below the non-support requirements

**Overall Outcome Guidelines**

- 1) Biocriteria are "met" when all metrics are scored "Pass" and no metrics have a score of "I" or "Fail"
- 2) Biocriteria are "not met" when one or more metrics are scored "Fail"
- 3) In situations where neither items 1 or 2 are the result, an "Indeterminate" finding will be made

**Scoring Guidelines - Wadeable Stream Category SHG**

WQ Class	Score	Density	Richness	EPT	PMA-O	BI	% Oligo	EPT/EPT+C	PPCS-F
A1	Threshold	≥500	≥35	≥21	≥65%	≤3	≤2%	≥0.65	≥50%
	Non-Support	<450	<34	<20	<60%	>3.30	>3%	<0.63	<45%
B1	Threshold	≥400	≥31	≥19	≥55%	≤3.5	≤5%	≥0.55	≥45%
	Non-Support	<350	<30	<18	<50%	>3.65	>6.5%	<0.53	<40%
B2	Threshold	≥300	≥27	≥16	≥45%	≤4.5	≤12%	≥0.45	≥40%
	Non-Support	<250	<26	<15	<40%	>4.65	>14.5%	<0.43	<35%





**Project** Salisbury FCS  
**Station** 524120 Halnon Upstream      **Latitude** 0  
**Stream** Halnon Brook                      **Longitude** 0  
**Location** 0                                      **Class** 0  
**Sample Date** 09/29/23                      **Sampler** Ryan Colarusso

Halnon Brook (ID 524120) - 75m upstream of a perched culvert on a private driveway off of East Brook Rd.									
Date	Density	Richness	EPT Richness	PMA-O	B.I.	Oligo. %	EPT/EPT + Chiro	PPCS-F	Outcome/ Biological Integrity
VHB 2023	1,188	34.5	13.5	67.6	4.58	1.09	0.70	46.3	Does Not Meet Class B2 Criteria

Support (Pass)	≥300	≥27	≥16	≥45	≤4.50	≤12	≥0.45	≥0.40	In accordance with the 2016 Vermont Water Quality Standards, the "Indeterminate + (+)" range was eliminated from metric scoring. All metrics that meet the threshold are considered supporting aquatic life use for that metric.
Below Threshold (I)	≥250	≥26	≥15	≥40	≤4.65	≤14.5	≥0.43	≥0.35	
Non-Support (Fail)	<250	<26	<15	<40	>4.65	>14.5	<0.43	<0.35	



Macroinvertebrate data submittal form - VT DEC July 2022 version

Project Name: Salisbury FCS
VT DEC Lab ID:
Stream Name: Halnon Brook
Station: 502252 Halnon Downstream

Note: a minimum of 25% of sample and no less than 300 animals must be processed; no fewer than 24 grids (squares) should be used to process a sample

Table with site information: Site lat/long, or VT Site ID, Date collected, # Reqs Collected, # Rep Picked, Collection Method, Collector.

Table with replication details: REPS, Picked By, Date Picked, #sq picked, #sq total, Checked By, Sorted By, Sorted Date.

Main taxonomic data table with columns for Expanded Key, Order, Family, SubFamily Or Tribe, Genus Group, Genus, Species Group, Species, and various counts for Rep1 and Rep2. Includes a Biotic Index section at the bottom right.

TOTALS by Rep: GRAND TOTAL: 6800 organisms. Summary table with columns for Total BI Score, Total # Organisms, # of Organisms w/o BI, Total # Organisms with BI, Biotic Index, Total Richness, Total EPT-R, Richness, EPT-R.

\*Notes: [1] ID is initial of taxonomist or organization, [2] QA is confidence of ID, [3] Count: only report a 0 in case of Rare taxa not found in subsample, [4] Total Sample Count: estimated count for entire sample, based on ratio of # squares picked to # squares total



**Major Taxonomic Group Statistics**

Project Salisbury FCS  
 Station 502252 Halnon Downstream  
 Stream Halnon Brook  
 VT Site ID 502252  
 Sample Date 09/29/2023

2022 Expanded Key ID#	KN-1: Numbers of Organisms										TOTAL
	COLEOPTERA	DIPTERA	EPHEMEROPTERA	TRICHOPTERA	PLECOPTERA	OLIGOCHAETA	BIVALVIA	MEGALOPTERA	ODONATA	OTHER	
01.03.00.00.005.01.00	56	0	0	0	0	0	0	0	0	0	0
01.03.00.00.005.01.03	8	0	0	0	0	0	0	0	0	0	0
01.03.00.00.005.02.02	36	0	0	0	0	0	0	0	0	0	0
01.03.00.00.006.00.00	12	0	0	0	0	0	0	0	0	0	0
01.05.00.00.001.00.00	4	0	0	0	0	0	0	0	0	0	0
01.09.00.00.000.00.00	4	0	0	0	0	0	0	0	0	0	0
02.03.00.02.000.00.00	0	4	0	0	0	0	0	0	0	0	0
02.05.01.00.085.00.05	0	16	0	0	0	0	0	0	0	0	0
02.05.03.00.098.00.00	0	4	0	0	0	0	0	0	0	0	0
02.05.03.02.121.00.00	0	4	0	0	0	0	0	0	0	0	0
02.05.04.00.022.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.04.00.066.00.00	0	4	0	0	0	0	0	0	0	0	0
02.05.05.00.005.00.00	0	8	0	0	0	0	0	0	0	0	0
02.05.05.00.007.00.00	0	4	0	0	0	0	0	0	0	0	0
02.05.05.00.017.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.05.00.029.00.01	0	8	0	0	0	0	0	0	0	0	0
02.05.05.00.029.00.02	0	8	0	0	0	0	0	0	0	0	0
02.05.05.00.029.00.08	0	268	0	0	0	0	0	0	0	0	0
02.05.05.00.075.00.00	0	4	0	0	0	0	0	0	0	0	0
02.05.05.00.109.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.05.00.114.01.04	0	208	0	0	0	0	0	0	0	0	0
02.14.00.00.005.00.00	0	1376	0	0	0	0	0	0	0	0	0
02.19.00.00.001.00.00	0	8	0	0	0	0	0	0	0	0	0
02.19.00.00.003.00.00	0	0	0	0	0	0	0	0	0	0	0
02.19.00.00.006.00.00	0	16	0	0	0	0	0	0	0	0	0
02.19.00.00.016.00.00	0	8	0	0	0	0	0	0	0	0	0
03.01.00.00.001.00.00	0	0	44	0	0	0	0	0	0	0	0
03.01.00.00.001.00.03	0	0	4	0	0	0	0	0	0	0	0
03.01.00.00.001.00.09	0	0	1040	0	0	0	0	0	0	0	0
03.01.00.00.001.01.01	0	0	52	0	0	0	0	0	0	0	0
03.01.00.02.006.00.01	0	0	8	0	0	0	0	0	0	0	0
03.04.00.00.004.00.00	0	0	48	0	0	0	0	0	0	0	0
03.04.00.00.004.00.01	0	0	0	0	0	0	0	0	0	0	0
04.01.00.00.002.00.01	0	0	0	8	0	0	0	0	0	0	0
04.03.00.00.002.00.00	0	0	0	12	0	0	0	0	0	0	0
04.05.00.00.002.00.00	0	0	0	16	0	0	0	0	0	0	0
04.05.00.00.003.00.01	0	0	0	4	0	0	0	0	0	0	0
04.05.00.00.004.00.01	0	0	0	4	0	0	0	0	0	0	0
04.05.00.00.004.02.02	0	0	0	4	0	0	0	0	0	0	0
04.05.00.00.004.03.03	0	0	0	20	0	0	0	0	0	0	0
04.05.00.00.004.03.04	0	0	0	76	0	0	0	0	0	0	0
04.12.00.00.002.00.00	0	0	0	76	0	0	0	0	0	0	0
04.16.00.00.001.00.00	0	0	0	16	0	0	0	0	0	0	0
04.16.00.00.001.00.01	0	0	0	44	0	0	0	0	0	0	0
04.16.00.00.001.03.09	0	0	0	4	0	0	0	0	0	0	0
04.18.00.00.001.00.00	0	0	0	0	0	0	0	0	0	0	0
05.05.00.00.002.00.00	0	0	0	0	8	0	0	0	0	0	0
05.08.00.00.001.00.02	0	0	0	0	4	0	0	0	0	0	0
05.09.00.00.003.00.00	0	0	0	0	32	0	0	0	0	0	0
09.01.00.00.001.00.00	0	0	0	0	0	0	0	0	0	268	0
10.01.00.00.001.00.00	0	0	0	0	0	0	0	0	0	0	0
14.01.00.00.000.00.00	0	0	0	0	0	0	0	0	0	0	0
18.02.00.00.000.00.00	0	0	0	0	0	0	0	0	0	0	0
18.04.00.00.000.00.00	0	0	0	0	0	8	0	0	0	0	0
18.06.00.00.000.00.00	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>120</b>	<b>1948</b>	<b>1196</b>	<b>284</b>	<b>44</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>268</b>	<b>3868</b>
<b>Percent</b>	<b>3%</b>	<b>50%</b>	<b>31%</b>	<b>7%</b>	<b>1%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>7%</b>	<b>100%</b>



**Major Taxonomic Group Statistics**

Project Salisbury FCS  
 Station 502252 Halnon Downstream  
 Stream Halnon Brook  
 VT Site ID 502252  
 Sample Date 09/29/2023

2022 Expanded Key ID#	KN-2: Numbers of Organisms										TOTAL
	COLEOPTERA	DIPTERA	EPHEMEROPTERA	TRICHOPTERA	PLECOPTERA	OLIGOCHAETA	BIVALVIA	MEGALOPTERA	ODONATA	OTHER	
01.03.00.00.005.01.00	232	0	0	0	0	0	0	0	0	0	0
01.03.00.00.005.01.03	0	0	0	0	0	0	0	0	0	0	0
01.03.00.00.005.02.02	8	0	0	0	0	0	0	0	0	0	0
01.03.00.00.006.00.00	68	0	0	0	0	0	0	0	0	0	0
01.05.00.00.001.00.00	8	0	0	0	0	0	0	0	0	0	0
01.09.00.00.000.00.00	0	0	0	0	0	0	0	0	0	0	0
02.03.00.02.000.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.01.00.085.00.05	0	16	0	0	0	0	0	0	0	0	0
02.05.03.00.098.00.00	0	4	0	0	0	0	0	0	0	0	0
02.05.03.02.121.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.04.00.022.00.00	0	8	0	0	0	0	0	0	0	0	0
02.05.04.00.066.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.05.00.005.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.05.00.007.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.05.00.017.00.00	0	4	0	0	0	0	0	0	0	0	0
02.05.05.00.029.00.01	0	8	0	0	0	0	0	0	0	0	0
02.05.05.00.029.00.02	0	12	0	0	0	0	0	0	0	0	0
02.05.05.00.029.00.08	0	176	0	0	0	0	0	0	0	0	0
02.05.05.00.075.00.00	0	0	0	0	0	0	0	0	0	0	0
02.05.05.00.109.00.00	0	4	0	0	0	0	0	0	0	0	0
02.05.05.00.114.01.04	0	180	0	0	0	0	0	0	0	0	0
02.14.00.00.005.00.00	0	1012	0	0	0	0	0	0	0	0	0
02.19.00.00.001.00.00	0	20	0	0	0	0	0	0	0	0	0
02.19.00.00.003.00.00	0	4	0	0	0	0	0	0	0	0	0
02.19.00.00.006.00.00	0	8	0	0	0	0	0	0	0	0	0
02.19.00.00.016.00.00	0	0	0	0	0	0	0	0	0	0	0
03.01.00.00.001.00.00	0	0	56	0	0	0	0	0	0	0	0
03.01.00.00.001.00.03	0	0	0	0	0	0	0	0	0	0	0
03.01.00.00.001.00.09	0	0	584	0	0	0	0	0	0	0	0
03.01.00.00.001.01.01	0	0	16	0	0	0	0	0	0	0	0
03.01.00.02.006.00.01	0	0	0	0	0	0	0	0	0	0	0
03.04.00.00.004.00.00	0	0	8	0	0	0	0	0	0	0	0
03.04.00.00.004.00.01	0	0	4	0	0	0	0	0	0	0	0
04.01.00.00.002.00.01	0	0	0	0	0	0	0	0	0	0	0
04.03.00.00.002.00.00	0	0	0	12	0	0	0	0	0	0	0
04.05.00.00.002.00.00	0	0	0	12	0	0	0	0	0	0	0
04.05.00.00.003.00.01	0	0	0	0	0	0	0	0	0	0	0
04.05.00.00.004.00.01	0	0	0	4	0	0	0	0	0	0	0
04.05.00.00.004.02.02	0	0	0	0	0	0	0	0	0	0	0
04.05.00.00.004.03.03	0	0	0	4	0	0	0	0	0	0	0
04.05.00.00.004.03.04	0	0	0	20	0	0	0	0	0	0	0
04.12.00.00.002.00.00	0	0	0	32	0	0	0	0	0	0	0
04.16.00.00.001.00.00	0	0	0	12	0	0	0	0	0	0	0
04.16.00.00.001.00.01	0	0	0	12	0	0	0	0	0	0	0
04.16.00.00.001.03.09	0	0	0	0	0	0	0	0	0	0	0
04.18.00.00.001.00.00	0	0	0	4	0	0	0	0	0	0	0
05.05.00.00.002.00.00	0	0	0	0	0	0	0	0	0	0	0
05.08.00.00.001.00.02	0	0	0	0	4	0	0	0	0	0	0
05.09.00.00.003.00.00	0	0	0	0	24	0	0	0	0	0	0
09.01.00.00.001.00.00	0	0	0	0	0	0	0	0	0	304	0
10.01.00.00.001.00.00	0	0	0	0	0	0	0	0	0	4	0
14.01.00.00.000.00.00	0	0	0	0	0	0	0	0	0	4	0
18.02.00.00.000.00.00	0	0	0	0	0	4	0	0	0	0	0
18.04.00.00.000.00.00	0	0	0	0	0	32	0	0	0	0	0
18.06.00.00.000.00.00	0	0	0	0	0	4	0	0	0	0	0
<b>Total</b>	<b>316</b>	<b>1456</b>	<b>668</b>	<b>112</b>	<b>28</b>	<b>40</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>312</b>	<b>2932</b>
<b>Percent</b>	<b>11%</b>	<b>50%</b>	<b>23%</b>	<b>4%</b>	<b>1%</b>	<b>1%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>11%</b>	<b>100%</b>



**Functional Feeding Group Analysis**

**Project** Salisbury FCS  
**Station** 502252 Halnon Downstream  
**Stream** Halnon Brook  
**Location** 502252  
**Sample Date** 09/29/2023

2022 Expanded Key ID#	KN-1: Numbers of Organisms							Total	KN-2: Numbers of Organisms							Total
	CG	CF	PRD	SRD	SHR	SCR	No FG Designation		CG	CF	PRD	SRD	SHR	SCR	No FG Designation	
01.03.00.00.005.01.00	0	0	0	0	0	56	0	0	0	0	0	0	232	0		
01.03.00.00.005.01.03	0	0	0	0	0	8	0	0	0	0	0	0	0	0		
01.03.00.00.005.02.02	0	0	0	0	0	36	0	0	0	0	0	0	8	0		
01.03.00.00.006.00.00	0	0	0	0	0	12	0	0	0	0	0	0	68	0		
01.05.00.00.001.00.00	0	0	0	0	0	4	0	0	0	0	0	0	8	0		
01.09.00.00.000.00.00	0	0	0	0	4	0	0	0	0	0	0	0	0	0		
02.03.00.02.000.00.00	0	0	0	0	0	0	4	0	0	0	0	0	0	0		
02.05.01.00.085.00.05	16	0	0	0	0	0	0	16	0	0	0	0	0	0		
02.05.03.00.098.00.00	0	4	0	0	0	0	0	0	4	0	0	0	0	0		
02.05.03.02.121.00.00	4	0	0	0	0	0	0	0	0	0	0	0	0	0		
02.05.04.00.022.00.00	0	0	0	0	0	0	0	8	0	0	0	0	0	0		
02.05.04.00.066.00.00	4	0	0	0	0	0	0	0	0	0	0	0	0	0		
02.05.05.00.005.00.00	0	0	0	8	0	0	0	0	0	0	0	0	0	0		
02.05.05.00.007.00.00	4	0	0	0	0	0	0	4	0	0	0	0	0	0		
02.05.05.00.017.00.00	0	0	0	0	0	0	0	4	0	0	0	0	0	0		
02.05.05.00.029.00.01	8	0	0	0	0	0	0	8	0	0	0	0	0	0		
02.05.05.00.029.00.02	8	0	0	0	0	0	0	12	0	0	0	0	0	0		
02.05.05.00.029.00.08	268	0	0	0	0	0	0	176	0	0	0	0	0	0		
02.05.05.00.075.00.00	4	0	0	0	0	0	0	0	0	0	0	0	0	0		
02.05.05.00.109.00.00	0	0	0	0	0	0	0	4	0	0	0	0	0	0		
02.05.05.00.114.01.04	208	0	0	0	0	0	0	180	0	0	0	0	0	0		
02.14.00.00.005.00.00	0	1376	0	0	0	0	0	0	1012	0	0	0	0	0		
02.19.00.00.001.00.00	8	0	0	0	0	0	0	20	0	0	0	0	0	0		
02.19.00.00.003.00.00	0	0	0	0	0	0	0	0	0	4	0	0	0	0		
02.19.00.00.006.00.00	0	0	16	0	0	0	0	0	0	8	0	0	0	0		
02.19.00.00.016.00.00	0	0	0	8	0	0	0	0	0	0	0	0	0	0		
03.01.00.00.001.00.00	44	0	0	0	0	0	0	56	0	0	0	0	0	0		
03.01.00.00.001.00.03	4	0	0	0	0	0	0	0	0	0	0	0	0	0		
03.01.00.00.001.00.09	1040	0	0	0	0	0	0	584	0	0	0	0	0	0		
03.01.00.00.001.01.01	52	0	0	0	0	0	0	16	0	0	0	0	0	0		
03.01.00.02.006.00.01	0	0	0	0	0	8	0	0	0	0	0	0	0	0		
03.04.00.00.004.00.01	48	0	0	0	0	0	0	8	0	0	0	0	0	0		
03.04.00.00.004.00.01	0	0	0	0	0	0	0	4	0	0	0	0	0	0		
04.01.00.00.002.00.01	0	8	0	0	0	0	0	0	0	0	0	0	0	0		
04.03.00.00.002.00.00	0	0	0	0	0	12	0	0	0	0	0	12	0	0		
04.05.00.00.002.00.00	0	16	0	0	0	0	0	0	12	0	0	0	0	0		
04.05.00.00.003.00.01	0	4	0	0	0	0	0	0	0	0	0	0	0	0		
04.05.00.00.004.00.01	0	4	0	0	0	0	0	0	4	0	0	0	0	0		
04.05.00.00.004.02.02	0	4	0	0	0	0	0	0	0	0	0	0	0	0		
04.05.00.00.004.03.03	0	20	0	0	0	0	0	0	4	0	0	0	0	0		
04.05.00.00.004.03.04	0	76	0	0	0	0	0	0	20	0	0	0	0	0		
04.12.00.00.002.00.00	0	76	0	0	0	0	0	0	32	0	0	0	0	0		
04.16.00.00.001.00.00	0	0	16	0	0	0	0	0	0	12	0	0	0	0		
04.16.00.00.001.00.01	0	0	44	0	0	0	0	0	0	12	0	0	0	0		
04.16.00.00.001.03.09	0	0	4	0	0	0	0	0	0	0	0	0	0	0		
04.18.00.00.001.00.00	0	0	0	0	0	0	0	0	0	0	0	0	4	0		
05.05.00.00.002.00.00	0	0	0	8	0	0	0	0	0	0	0	0	0	0		
05.08.00.00.001.00.02	0	0	0	4	0	0	0	0	0	0	4	0	0	0		
05.09.00.00.003.00.00	0	0	0	0	32	0	0	0	0	0	24	0	0	0		
09.01.00.00.001.00.00	268	0	0	0	0	0	0	304	0	0	0	0	0	0		
10.01.00.00.001.00.00	0	0	0	0	0	0	0	4	0	0	0	0	0	0		
14.01.00.00.000.00.00	0	0	0	0	0	0	0	0	0	4	0	0	0	0		
18.02.00.00.000.00.00	0	0	0	0	0	0	0	4	0	0	0	0	0	0		
18.04.00.00.000.00.00	8	0	0	0	0	0	0	32	0	0	0	0	0	0		
18.06.00.00.000.00.00	0	0	0	0	0	0	0	4	0	0	0	0	0	0		
<b>Total</b>	<b>1996</b>	<b>1588</b>	<b>80</b>	<b>28</b>	<b>36</b>	<b>136</b>	<b>4</b>	<b>3868</b>	<b>1444</b>	<b>1088</b>	<b>40</b>	<b>4</b>	<b>24</b>	<b>332</b>	<b>0</b>	<b>2932</b>
<b>Percent</b>	<b>52%</b>	<b>41%</b>	<b>2%</b>	<b>1%</b>	<b>1%</b>	<b>4%</b>	<b>0%</b>	<b>100%</b>	<b>49%</b>	<b>37%</b>	<b>1%</b>	<b>0%</b>	<b>1%</b>	<b>11%</b>	<b>0%</b>	<b>100%</b>

**Functional Feeding Group Analysis**

**Project** Salisbury FCS  
**Station** 502252 Halnon Downstream  
**Stream** Halnon Brook  
**Location** 502252  
**Sample Date** 09/29/2023

FFG Summary:							
	Model			Kicknet 1 vs. SHG		Kicknet 2 vs. SHG	
	SHG	MHG	WWMG	KN-1	PPCS	KN-2	PPCS
<b>Col. Gath.</b>	31%	32%	22%	51.6%	60.1%	49.2%	62.9%
<b>Col. Filt.</b>	18%	30%	36%	41.1%	43.8%	37.1%	48.5%
<b>Predator</b>	19%	13%	7%	2.1%	10.9%	1.4%	7.2%
<b>Shred-Det.</b>	15%	4%	2%	0.7%	4.8%	0.1%	0.9%
<b>Shred- Herb.</b>	1%	1%	5%	0.93%	93.1%	0.82%	81.9%
<b>Scraper</b>	12%	13%	22%	3.52%	29.30%	11.32%	94.4%
				<b>PPCS-FG =</b>	<b>40.3%</b>	<b>PPCS-FG =</b>	<b>49.3%</b>

CG = Collector/Gatherer  
 CF = Collector/Filterer  
 PRD = Predator  
 SRD = Shredder - Detritus  
 SHR = Shredder - Herbivore  
 SCR = Scraper



## Percent Model Affinity of Orders (PMA-O) Calculations

**Project** Salisbury FCS

**Station** 502252 Halnon Downstream

**Stream** Halnon Brook

**VT Site ID** 502252

**Sample Date** 09/29/2023

**Class** Small, High Gradient, B2

**Sampler** CCS

Order	Model			Kicknet 1 vs. Model (SHG)		Kicknet 2 vs. Model (SHG)	
	SHG	MHG	WWMG	%	difference	%	difference
<b>Coleoptera</b>	8%	6%	13%	3.10%	4.90	10.78%	2.78
<b>Diptera</b>	19%	18%	13%	50.4%	31.36	49.7%	30.659
<b>Ephemeroptera</b>	23%	34%	32%	30.9%	7.9	22.78%	0.2
<b>Plecoptera</b>	21%	8%	8%	1.1%	19.9	1.0%	20.0
<b>Trichoptera</b>	28%	33%	33%	7.3%	20.7	3.8%	24.2
<b>Oligochaeta</b>	0.5%	0.5%	1.0%	0.21%	0.29	1.36%	0.86
<b>Other</b>	0.5%	0.5%	1.0%	6.93%	6.429	10.64%	10.141
				Sum diff	91.4		88.9
				Sum diff * 0.5	45.7		44.4
				100-(sum diff * 0.5)	54.3		55.6
				<b>% model affinity</b>	<b>54.3%</b>		<b>55.6%</b>



## EPT / EPT+C Calculations

**Project** Salisbury FCS

**Station** 502252 Halnon Downstream

**Stream** Halnon Brook

**Location** 502252

**Sample Date** 09/29/2023

**Class** Small, High Gradient, B2

**Sampler** CCS

	<b>KN-1</b>	<b>KN-2</b>
<b>#EPT organisms</b>	1524	808
<b>#C organisms</b>	536	412
<b>EPT/EPT+C</b>	0.74	0.66



## Biometric Summary

**Project** Salisbury FCS  
**Station** 502252 Halnon Downstream  
**Stream** Halnon Brook  
**Location** 502252  
**Sample Date** 09/29/2023  
**Class** Small, High Gradient, B2  
**Sampler** CCS

Replicate # Sampling Method	1 KN	2 KN	Average KN
<b>Biometrics:</b>			
Density/Unit	3868	2932	3400
Species Richness	42.0	36.0	39.0
EPT Richness	19.0	13.0	16.0
Old Bio Index (0 to 5)	2.30	2.27	2.28
New Bio Index (0 to 10)	5.16	5.14	5.15
% dominant taxa	35.6%	34.5%	35.0%
EPT/EPT+C	0.740	0.662	0.701
EPT/Richness	0.452	0.361	0.410
% Model Affinity (orders)	54.3%	55.6%	54.9%
PPCS - functional groups	40.3%	49.3%	44.8%
<b>Major Groups:</b>			
Coleoptera (%)	3.10%	10.78%	6.94%
Diptera (%)	50.4%	49.7%	50.0%
Ephemeroptera (%)	30.9%	22.78%	26.85%
Trichoptera (%)	7.3%	3.8%	5.6%
Plecoptera (%)	1.1%	1.0%	1.0%
Oligochaeta (%)	0.21%	1.36%	0.79%
Bivalvia (%)	0.00%	0.00%	0.00%
Megaloptera (%)	0.00%	0.00%	0.00%
Odonata (%)	0.00%	0.00%	0.00%
Other (%)	6.93%	10.64%	8.78%
Total (%)	100%	100%	100%
<b>Feeding Groups:</b>			
Collector Gatherer (%)	51.6%	49.2%	50.4%
Collector Filterer (%)	41.1%	37.11%	39.1%
Predator (%)	2.1%	1.4%	1.7%
Shredder - Detritus (%)	0.7%	0.1%	0.4%
Shredder - Herbivore (%)	0.93%	0.82%	0.87%
Scraper (%)	3.52%	11.32%	7.42%
No FG Designation (%)	0.10%	0.00%	0.05%
Total (%)	100%	100%	100%

**Project** Salisbury FCS  
**Station** 502252 Halnon Downstre: **Latitude** 0  
**Stream** Halnon Brook **Longitude** 0  
**Location** 502252 **Class** Small, High Gradient, B2  
**Sample Date** 09/29/2023 **Sampler** CCS

APPLICATION OF STATE OF VERMONT DEC BIOCRITERIA (1/15/2017)

Metric	Value	Metric Scoring Results					
		Based on DEC Thresholds for SHG Streams					
		Class B2		Class B1		Class A	
		Threshold	Outcome	Threshold	Outcome	Threshold	Outcome
Density	3400.0	≥300	Pass	≥400	Pass	≥500	Pass
Richness	39.0	≥27	Pass	≥31	Pass	≥35	Pass
EPT	16.0	≥16	Pass	≥19	Fail	≥21	Fail
% PMA-O	54.9%	≥45%	Pass	≥55%	I	≥65%	Fail
BI (New 1-10)	5.15	≤4.50	Fail	≤3.50	Fail	≤3.00	Fail
% Oligo	0.79%	≤12%	Pass	≤5	Pass	≤2	Pass
EPT/EPT+C	0.701	≥0.45	Pass	≥0.55	Pass	≥0.65	Pass
% PPCS-FG	44.8%	≥ 40%	Pass	≥ 45%	I	≥ 50%	Fail
<b>Outcome:</b>		<b>Biocriteria are not met</b>					
<b>The following metrics do not meet Class B2 thresholds:</b>		BI (Fail)					

**Individual Metric Outcome Guidelines (using the table below)**

- 1) A metric is scored "Pass" when the result meets the threshold requirements
- 2) A metric is scored "I" when the result is between the threshold level and the non-support level
- 3) A metric is scored "Fail" when the result is below the non-support requirements

**Overall Outcome Guidelines**

- 1) Biocriteria are "met" when all metrics are scored "Pass" and no metrics have a score of "I" or "Fail"
- 2) Biocriteria are "not met" when one or more metrics are scored "Fail"
- 3) In situations where neither items 1 or 2 are the result, an "Indeterminate" finding will be made

**Scoring Guidelines - Wadeable Stream Category SHG**

WQ Class	Score	Density	Richness	EPT	PMA-O	BI	% Oligo	EPT/EPT+C	PPCS-F
A1	Threshold	≥500	≥35	≥21	≥65%	≤3	≤2%	≥0.65	≥50%
	Non-Support	<450	<34	<20	<60%	>3.30	>3%	<0.63	<45%
B1	Threshold	≥400	≥31	≥19	≥55%	≤3.5	≤5%	≥0.55	≥45%
	Non-Support	<350	<30	<18	<50%	>3.65	>6.5%	<0.53	<40%
B2	Threshold	≥300	≥27	≥16	≥45%	≤4.5	≤12%	≥0.45	≥40%
	Non-Support	<250	<26	<15	<40%	>4.65	>14.5%	<0.43	<35%



**Project** Salisbury FCS

**Station** 502252 Halnon Downs **Latitude** 0

**Stream** Halnon Brook **Longitude** 0

**Location** 0 **Class** 0

**Sample Date** 09/29/23

**Sampler** Ryan Colarusso

Halnon Brook (ID 502252) - 200 Meters below Tributary 10 from Salisbury Fish Hatchery									
Date	Density	Richness	EPT Richness	PMA-O	B.I.	Oligo. %	EPT/EPT + Chiro	PPCS-F	Outcome/ Biological Integrity
DEC 1990	2,587	48.0	21.0	63.1	3.32	0.87	0.71	49.0	Meets Class B2 Criteria
DEC 2001	4,270	42.5	22.0	75.3	3.28	0.04	0.94	58.0	Meets Class B2 Criteria
DEC 2009	2,932	42.0	20.5	69.3	3.74	0.14	0.94	54.0	Meets Class B2 Criteria
DEC 2019	2,380	39.0	17.0	37.9	4.00	0.34	0.77	54.0	Does Not Meet Class B2 Criteria
VHB 2020	3,188	36.0	19.0	56.4	3.97	0.13	0.96	57.9	Meets Class B2 Criteria
VHB 2021	1,402	25.0	13.5	50.5	3.59	0.28	0.95	44.6	Does Not Meet Class B2 Criteria
VHB 2022	4,574	40.5	18.5	54.0	4.38	0.84	0.92	45.9	Meets Class B2 Criteria
VHB 2023	3,400	39.0	16.0	54.9	5.15	0.79	0.70	44.8	Does Not Meet Class B2 Criteria

Support (Pass)	≥300	≥27	≥16	≥45	≤4.50	≤12	≥0.45	≥0.40	In accordance with the 2016 Vermont Water Quality Standards, the "Indeterminate + (I+)" range was eliminated from metric scoring. All metrics that meet the threshold are considered supporting aquatic life use for that metric.
Below Threshold (I)	≥250	≥26	≥15	≥40	≤4.65	≤14.5	≥0.43	≥0.35	
Non-Support (Fail)	<250	<26	<15	<40	>4.65	>14.5	<0.43	<0.35	

<b>Project Name:</b>	Salisbury FCS
<b>VT DEC Lab ID:</b>	
<b>Stream Name:</b>	Trib 10
<b>Station:</b>	502254 Trib 10

Note: a minimum of 25% of sample and no less than 300 animals must be processed; no fewer than 24 grids (squares) should be used to process a sample

<b>Site lat/long:</b>	Latitude (NAD83)	Longitude (NAD83)
<b>or VT Site ID:</b>		
<b>Date collected:</b>	9/29/2023	
<b># Reqs Collected:</b>	1	
<b># Rep Picked:</b>	1	
<b>Collection Method:</b>	Kicknet	
<b>Collector:</b>	Ryan Colarusso	

<b>REPS:</b>	<b>Rep 1</b>
<b>Picked By:</b>	AK
<b>Date Picked:</b>	1/22/2024
<b>#sq picked:</b>	6
<b>#sq total:</b>	24
<b>Checked By:</b>	MC
<b>Sorted By:</b>	AK
<b>Sorted Date:</b>	1/22/2024

Expanded Key	Order	Family	SubFamily Or Tribe	Genus Group	Genus	Species Group	Species	Rep1				NOTES	FFG	Chiro	Biotic Index				Richness Metrics			
								ID [1]	QA [2]	Count [3]	Total Sample Count [4]				Biotic Index Scores		Old Biotic Index (1-5)	New Biotic Index (1-10)	Richness	EPT		
															Old BI	New BI	KN-1	KN-1			KN-1	KN-1
01.03.00.00.005.01.00	COLEOPTERA	ELMIDAE	N/A	N/A	DPTIOSERVU	fastiditus group	sp	MBC	a	2	8	larvae, not	SCR	N	2	4	16	32	-	-		
01.03.00.00.005.01.03	COLEOPTERA	ELMIDAE	N/A	N/A	DPTIOSERVU	fastiditus group	ovalis	MBC	a	1	4	adults	SCR	N	1	3	4	12	1	0		
01.03.00.00.005.02.02	COLEOPTERA	ELMIDAE	N/A	N/A	DPTIOSERVU	elegans group	tardellus	MBC	a	6	24		SCR	N	2	2	48	48	1	0		
01.05.00.00.001.00.00	COLEOPTERA	PSEPHENIDAE	N/A	N/A	ECTOPRIA	N/A	sp	MBC	a	1	4		SCR	N	2	5	8	20	1	0		
02.05.01.00.085.00.05	DIPTERA	CHIRONOMIDAE	CHIRONOMIN	N/A	POLYPEDILUM	N/A	aviceps	MBC	a	1	4		CG	Y	3	4	12	16	1	0		
02.05.03.00.098.00.02	DIPTERA	CHIRONOMIDAE	TANYTARSINI	N/A	EOTANYTARS	N/A	exiguus	MBC	a	3	12		CF	Y	3	6	36	72	1	0		
02.05.03.02.121.00.00	DIPTERA	CHIRONOMIDAE	TANYTARSINI	OPSEC/TANYT	OPSEC/TANYT	OPSEC/TANYT	N/A	sp	MBC	a	3	12		CG	Y	3	6	36	72	1	0	
02.05.05.00.029.00.01	DIPTERA	CHIRONOMIDAE	RTHOCLADIIN	N/A	JKIEFFERIELL	N/A	devonica grp	MBC	a	18	72		CG	Y	3	6	216	432	1	0		
02.05.05.00.029.00.08	DIPTERA	CHIRONOMIDAE	RTHOCLADIIN	N/A	JKIEFFERIELL	N/A	claripennis grp	MBC	a	79	316		CG	Y	3	8	948	2528	1	0		
02.05.05.00.075.00.00	DIPTERA	CHIRONOMIDAE	RTHOCLADIIN	N/A	EMMETRIOCNE	N/A	sp	MBC	a	1	4		CG	Y	3	5	12	20	1	0		
02.05.05.00.109.00.00	DIPTERA	CHIRONOMIDAE	RTHOCLADIIN	N/A	ENEMANNIE	N/A	sp	MBC	a	1	4		CG	Y	2	5	8	20	1	0		
02.05.05.00.114.01.04	DIPTERA	CHIRONOMIDAE	RTHOCLADIIN	N/A	TVETENIA	bavarica grp	paucunca	MBC	a	30	120		CG	Y	2	4	240	480	1	0		
02.05.05.01.000.00.00	DIPTERA	CHIRONOMIDAE	RTHOCLADIIN	OPUS/ORTHO	N/A	N/A	sp	MBC	a	4	16		Y	4	7	64	112	-	0			
02.05.05.01.065.00.03	DIPTERA	CHIRONOMIDAE	RTHOCLADIIN	OPUS/ORTHO	RTHOCLADI	N/A	dubitatus	MBC	b	2	8		CG	Y	3	7	24	56	1	0		
02.05.08.00.059.00.00	DIPTERA	CHIRONOMIDAE	YPODINAE-O	N/A	NATARSIA	N/A	sp	MBC	a	1	4		PRD	Y	3	8	12	32	1	0		
02.08.00.00.006.00.00	DIPTERA	EMPIDIDAE	N/A	N/A	COEDERIODE	N/A	sp	MBC	a	1	4		PRD	N	3	6	12	24	1	0		
02.14.00.00.005.00.00	DIPTERA	SIMULIDAE	N/A	N/A	SIMULIUM	N/A	sp	MBC	a	29	116		CF	N	2	5	232	580	1	0		
02.19.00.00.001.00.00	DIPTERA	TIPULIDAE	N/A	N/A	ANTOCHA	N/A	sp	MBC	a	14	56		CG	N	3	4	168	224	1	0		
03.01.00.00.001.00.00	EPHEMEROPTERA	BAETIDAE	N/A	N/A	BAETIS	N/A	sp	MBC	a	2	8	early insta	CG	N	3	6	24	48	-	-		
03.01.00.00.001.00.09	EPHEMEROPTERA	BAETIDAE	N/A	N/A	BAETIS	N/A	tricaudatus	MBC	a	101	404		CG	N	3	6	1212	2424	1	1		
03.01.00.00.001.01.01	EPHEMEROPTERA	BAETIDAE	N/A	N/A	BAETIS	runneicolor/plute	brunneicolor	MBC	b	62	248		CG	N	2	4	496	992	1	1		
04.05.00.00.002.00.00	TRICHOPTERA	HYDROPSYCHIDAE	N/A	N/A	EUMATOPSYCH	N/A	sp	MBC	a	19	76		CF	N	3	6	228	456	1	1		
04.05.00.00.004.00.01	TRICHOPTERA	HYDROPSYCHIDAE	N/A	N/A	YDROPSYCH	N/A	betteni	MBC	a	3	12		CF	N	4	7	48	84	1	1		
04.05.00.00.004.03.03	TRICHOPTERA	HYDROPSYCHIDAE	N/A	N/A	YDROPSYCH	alh/slo/spa	slossonae	MBC	a	33	132		CF	N	2	4	264	528	1	1		
04.05.00.00.004.03.04	TRICHOPTERA	HYDROPSYCHIDAE	N/A	N/A	YDROPSYCH	alh/slo/spa	sparna	MBC	a	10	40		CF	N	2	4	80	160	1	1		
04.09.00.00.000.00.01	TRICHOPTERA	LIMNephilidae	N/A	N/A	N/A	N/A	imm	MBC	a	1	4	early insta	SRD	N	-	-	-	-	1	1		
04.16.00.00.001.00.00	TRICHOPTERA	RHYACOPHILIDAE	N/A	N/A	HYACOPHIL	N/A	sp	MBC	a	2	8	early insta	PRD	N	0	1	0	8	-	-		
04.16.00.00.001.00.01	TRICHOPTERA	RHYACOPHILIDAE	N/A	N/A	HYACOPHIL	N/A	fuscula	MBC	a	14	56		PRD	N	1	2	56	112	1	1		
04.18.00.00.001.00.00	TRICHOPTERA	UENOIDAE	N/A	N/A	NEOPHYLAX	N/A	sp	MBC	a	1	4		SCR	N	2	3	8	12	1	1		
09.01.00.00.001.00.00	AMPHIPODA	GAMMARIDAE	N/A	N/A	GAMMARUS	N/A	pseudolimnaeus	MBC	a	118	472		CG	N	2	6	944	2832	1	0		
10.01.00.00.001.00.00	ISOPODA	ASELLIDAE	N/A	N/A	CAECIDOTEA	N/A	sp	MBC	a	1	4		CG	N	5	8	20	32	1	0		
12.08.00.00.003.00.00	GASTROPODA	PHYSIDAE	N/A	N/A	PHYSELLA	N/A	sp	MBC	a	1	4	immature	CG	N	4	8	16	32	1	0		
13.02.00.00.000.00.00	BIVALVIA	SPHAERIIDAE	N/A	N/A	N/A	N/A	uid	MBC	a	1	4	immature	CF	N	4	8	16	32	1	0		
18.03.00.00.000.00.00	OLIGOCHAETA	NAIDIDAE-TUBIFICOID	N/A	N/A	N/A	N/A	Tubificoid unid	MBC	a	2	8		CG	N	-	-	-	-	1	0		
<b>TOTALS by Rep:</b>											568	2272										
<b>GRAND TOTAL:</b>	2272 organisms												<b>Total BI Score</b>	5508	12532	<b>Total Richness</b>	30	<b>Total EPT-R</b>	9			
															<b>Total # Organisms</b>	2272	2272	<b># of Organisms w/o BI</b>	12	<b>Total # Organisms with BI</b>	2260	2260
															<b>Biotic Index</b>	2.44	5.55					

\*Notes:

[1] ID is initial of taxonomist or organization

[2] QA is confidence of ID: A=99%, B=90%, C=75%, D=50%

[3] Count: only report a 0 in case of Rare taxa not found in subsample. Leave blank if no organisms were identified in a rep.

[4] Total Sample Count: estimated count for entire sample, based on ratio of # squares picked to # squares total

**Major Taxonomic Group Statistics**

**Project** Salisbury FCS  
**Station** 502254 Trib 10  
**Stream** Trib 10  
**Location** 0  
**Sample Date** 09/29/23



2022 Expanded Key ID#	KN-1: Numbers of Organisms										
	COLEOPTERA	DIPTERA	EPHEMEROPTERA	TRICHOPTERA	PLECOPTERA	OLIGOCHAETA	BIVALVIA	MEGALOPTERA	ODONATA	OTHER	TOTAL
01.03.00.00.005.01.00	8	0	0	0	0	0	0	0	0	0	
01.03.00.00.005.01.03	4	0	0	0	0	0	0	0	0	0	
01.03.00.00.005.02.02	24	0	0	0	0	0	0	0	0	0	
01.05.00.00.001.00.00	4	0	0	0	0	0	0	0	0	0	
02.05.01.00.085.00.05	0	4	0	0	0	0	0	0	0	0	
02.05.03.00.098.00.02	0	12	0	0	0	0	0	0	0	0	
02.05.03.02.121.00.00	0	12	0	0	0	0	0	0	0	0	
02.05.05.00.029.00.01	0	72	0	0	0	0	0	0	0	0	
02.05.05.00.029.00.08	0	316	0	0	0	0	0	0	0	0	
02.05.05.00.075.00.00	0	4	0	0	0	0	0	0	0	0	
02.05.05.00.109.00.00	0	4	0	0	0	0	0	0	0	0	
02.05.05.00.114.01.04	0	120	0	0	0	0	0	0	0	0	
02.05.05.01.000.00.00	0	16	0	0	0	0	0	0	0	0	
02.05.05.01.065.00.03	0	8	0	0	0	0	0	0	0	0	
02.05.08.00.059.00.00	0	4	0	0	0	0	0	0	0	0	
02.08.00.00.006.00.00	0	4	0	0	0	0	0	0	0	0	
02.14.00.00.005.00.00	0	116	0	0	0	0	0	0	0	0	
02.19.00.00.001.00.00	0	56	0	0	0	0	0	0	0	0	
03.01.00.00.001.00.00	0	0	8	0	0	0	0	0	0	0	
03.01.00.00.001.00.09	0	0	404	0	0	0	0	0	0	0	
03.01.00.00.001.01.01	0	0	248	0	0	0	0	0	0	0	
04.05.00.00.002.00.00	0	0	0	76	0	0	0	0	0	0	
04.05.00.00.004.00.01	0	0	0	12	0	0	0	0	0	0	
04.05.00.00.004.03.03	0	0	0	132	0	0	0	0	0	0	
04.05.00.00.004.03.04	0	0	0	40	0	0	0	0	0	0	
04.09.00.00.000.00.01	0	0	0	4	0	0	0	0	0	0	
04.16.00.00.001.00.00	0	0	0	8	0	0	0	0	0	0	
04.16.00.00.001.00.01	0	0	0	56	0	0	0	0	0	0	
04.18.00.00.001.00.00	0	0	0	4	0	0	0	0	0	0	
09.01.00.00.001.00.00	0	0	0	0	0	0	0	0	0	472	
10.01.00.00.001.00.00	0	0	0	0	0	0	0	0	0	4	
12.08.00.00.003.00.00	0	0	0	0	0	0	0	0	0	4	
13.02.00.00.000.00.00	0	0	0	0	0	0	4	0	0	0	
18.03.00.00.000.00.00	0	0	0	0	0	8	0	0	0	0	
<b>Total</b>	<b>40</b>	<b>748</b>	<b>660</b>	<b>332</b>	<b>0</b>	<b>8</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>480</b>	<b>2272</b>
<b>Percent</b>	<b>1.76%</b>	<b>32.9%</b>	<b>29.0%</b>	<b>14.6%</b>	<b>0.0%</b>	<b>0.35%</b>	<b>0.18%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>21.13%</b>	<b>100%</b>



### Functional Feeding Group Analysis

**Project** Salisbury FCS  
**Station** 502254 Trib 10  
**Stream** Trib 10  
**Location** 0  
**Sample Date** 09/29/23

2022 Expanded Key ID#	KN-1: Numbers of Organisms											Total
	Collector Filterer	Collector Gatherer	Parasite	Planktivore	Predator	Piercing Carnivore	Piercing Herbivore	Scraper	Shredder-Herbivore	Shredder-Detritus	Other/Unidentified	
01.03.00.00.005.01.00	0	0	0	0	0	0	0	8	0	0	0	8
01.03.00.00.005.01.03	0	0	0	0	0	0	0	4	0	0	0	4
01.03.00.00.005.02.02	0	0	0	0	0	0	0	24	0	0	0	24
01.05.00.00.001.00.00	0	0	0	0	0	0	0	4	0	0	0	4
02.05.01.00.085.00.05	0	4	0	0	0	0	0	0	0	0	0	4
02.05.03.00.098.00.02	12	0	0	0	0	0	0	0	0	0	0	12
02.05.03.02.121.00.00	0	12	0	0	0	0	0	0	0	0	0	12
02.05.05.00.029.00.01	0	72	0	0	0	0	0	0	0	0	0	72
02.05.05.00.029.00.08	0	316	0	0	0	0	0	0	0	0	0	316
02.05.05.00.075.00.00	0	4	0	0	0	0	0	0	0	0	0	4
02.05.05.00.109.00.00	0	4	0	0	0	0	0	0	0	0	0	4
02.05.05.00.114.01.04	0	120	0	0	0	0	0	0	0	0	0	120
02.05.05.01.000.00.00	0	0	0	0	0	0	0	0	0	0	16	16
02.05.05.01.065.00.03	0	8	0	0	0	0	0	0	0	0	0	8
02.05.08.00.059.00.00	0	0	0	0	4	0	0	0	0	0	0	4
02.08.00.00.006.00.00	0	0	0	0	4	0	0	0	0	0	0	4
02.14.00.00.005.00.00	116	0	0	0	0	0	0	0	0	0	0	116
02.19.00.00.001.00.00	0	56	0	0	0	0	0	0	0	0	0	56
03.01.00.00.001.00.00	0	8	0	0	0	0	0	0	0	0	0	8
03.01.00.00.001.00.09	0	404	0	0	0	0	0	0	0	0	0	404
03.01.00.00.001.01.01	0	248	0	0	0	0	0	0	0	0	0	248
04.05.00.00.002.00.00	76	0	0	0	0	0	0	0	0	0	0	76
04.05.00.00.004.00.01	12	0	0	0	0	0	0	0	0	0	0	12
04.05.00.00.004.03.03	132	0	0	0	0	0	0	0	0	0	0	132
04.05.00.00.004.03.04	40	0	0	0	0	0	0	0	0	0	0	40
04.09.00.00.000.00.01	0	0	0	0	0	0	0	0	0	4	0	4
04.16.00.00.001.00.00	0	0	0	0	8	0	0	0	0	0	0	8
04.16.00.00.001.00.01	0	0	0	0	56	0	0	0	0	0	0	56
04.18.00.00.001.00.00	0	0	0	0	0	0	0	4	0	0	0	4
09.01.00.00.001.00.00	0	472	0	0	0	0	0	0	0	0	0	472
10.01.00.00.001.00.00	0	4	0	0	0	0	0	0	0	0	0	4
12.08.00.00.003.00.00	0	4	0	0	0	0	0	0	0	0	0	4
13.02.00.00.000.00.00	4	0	0	0	0	0	0	0	0	0	0	4
18.03.00.00.000.00.00	0	8	0	0	0	0	0	0	0	0	0	8
<b>Group Total</b>	<b>392</b>	<b>1744</b>	<b>0</b>	<b>0</b>	<b>72</b>	<b>0</b>	<b>0</b>	<b>44</b>	<b>0</b>	<b>4</b>	<b>16</b>	<b>2272</b>
<b>Percent of Sample Total</b>	<b>17.3%</b>	<b>76.8%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>3.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>1.9%</b>	<b>0.0%</b>	<b>0.2%</b>	<b>0.7%</b>	<b>100.0%</b>



**Functional Feeding Group Analysis**

**Project** Salisbury FCS  
**Station** 502254 Trib 10  
**Stream** Trib 10  
**Location** 0

**Sample Date** 09/29/23

	Model			Kicknet 1 vs. SHG	
	SHG	MHG	WWMG	KN-1	PPCS
<b>Col. Gath.</b>	31%	32%	22%	76.8%	40.4%
<b>Col. Filt.</b>	18%	30%	36%	17.25%	95.9%
<b>Predator</b>	19%	13%	7%	3.2%	16.7%
<b>Shred-Det.</b>	15%	4%	2%	0.2%	1.2%
<b>Shred- Herb.</b>	1%	1%	5%	0.00%	0.0%
<b>Scraper</b>	12%	13%	22%	1.94%	16.1%
				<b>PPCS-FG =</b>	<b>28.4%</b>

## Percent Model Affinity of Orders (PMA-O) Calculations



**Project** Salisbury FCS

**Station** 502254 Trib 10

**Stream** Trib 10

**Location** 0

**Class** SHG

**Sample Date** #####

**Sampler** Ryan Colarusso

Order	Model			Kicknet 1 vs. Model (SHG)	
	SHG	MHG	WWMG	%	difference
<b>Coleoptera</b>	8%	6%	13%	1.76%	6.24
<b>Diptera</b>	19%	18%	13%	32.9%	13.92
<b>Ephemeroptera</b>	23%	34%	32%	29.0%	6.05
<b>Plecoptera</b>	21%	8%	8%	0.0%	21.0
<b>Trichoptera</b>	28%	33%	33%	14.6%	13.4
<b>Oligochaeta</b>	0.5%	0.5%	1.0%	0.35%	0.15
<b>Other</b>	0.5%	0.5%	1.0%	21.30%	20.803
				Sum diff	81.5
				Sum diff * 0.5	40.8
				100-(sum diff * 0.5)	59.2
				<b>% model affinity</b>	<b>59.2%</b>





## EPT / EPT+C Calculations

**Project** Salisbury FCS

**Station** 502254 Trib 10

**Stream** Trib 10

**Location** 0

**Sample Date** 09/29/23

**Class** SHG

**Sampler** Ryan Colarusso

	<b>KN-1</b>
<b>#EPT organisms</b>	992
<b>#C organisms</b>	572
<b>EPT/EPT+C</b>	0.634



## Biometrics Summary

**Project** Salisbury FCS

**Station** 502254 Trib 10

**Stream** Trib 10

**Location** 0

**Sample Date** 09/29/23

**Class** SHG

**Sampler** Ryan Colarusso

Replicate # Sampling Method	1 KN	Average KN
<b>Biometrics:</b>		
Density/Unit	2272	2272
Species Richness	30.0	30.0
EPT Richness	9.0	9.0
Old Bio Index (0 to 5)	2.44	2.44
New Bio Index (0 to 10)	5.55	5.55
% dominant taxa	20.8%	20.8%
# dominant taxa	472	
dominant taxa ID	AMPHIPODA	AMPHIPODA
EPT/EPT+C	0.634	0.634
EPT/Richness	0.300	0.300
% Model Affinity (orders)	59.2%	59.2%
PPCS - functional groups	28.4%	28.4%
<b>Major Groups:</b>		
Coleoptera (%)	1.76%	1.76%
Diptera (%)	32.9%	32.9%
Ephemeroptera (%)	29.0%	29.0%
Trichoptera (%)	14.6%	14.6%
Plecoptera (%)	0.0%	0.0%
Oligochaeta (%)	0.35%	0.35%
Bivalvia (%)	0.18%	0.18%
Megaloptera (%)	0.00%	0.00%
Odonata (%)	0.00%	0.00%
Other (%)	0.00%	0.00%
Total (%)	79%	79%
<b>Feeding Groups:</b>		
Collector Gatherer (%)	76.8%	76.8%
Collector Filterer (%)	17.25%	17.25%
Predator (%)	3.2%	3.2%
Shredder - Detritus (%)	0.2%	0.2%
Shredder - Herbivore (%)	0.00%	0.00%
Scraper (%)	1.94%	1.94%
Other (%)	0.70%	0.70%
Total (%)	100%	100%

**Project** Salisbury FCS  
**Station** 502254 Trib 10      **Latitude** 0  
**Stream** Trib 10      **Longitude** 0  
**Location**                      0      **Class**                      0  
**Sample Date** 09/29/23      **Sampler** AK



APPLICATION OF STATE OF VERMONT DEC BIOCRITERIA (1/15/2017)

Metric	Value	Metric Scoring Results Based on DEC Thresholds for SHG Streams					
		Class B2		Class B1		Class A	
		Threshold	Outcome	Threshold	Outcome	Threshold	Outcome
Density	2272	≥300	Pass	≥400	Pass	≥500	Pass
Richness	30.0	≥27	Pass	≥31	I	≥35	Fail
EPT	9.0	≥16	Fail	≥19	Fail	≥21	Fail
PMA-O	59.2%	≥45%	Pass	≥55%	Pass	≥65%	Fail
BI (New 1-10)	5.55	≤4.50	Fail	≤3.50	Fail	≤3.00	Fail
% Oligo	0.35%	≤12%	Pass	≤5	Pass	≤2	Pass
EPT/EPT+C	0.634	≥0.45	Pass	≥0.55	Pass	≥0.65	I
PPCS-FG	28.4%	≥ 40%	Fail	≥ 45%	Fail	≥ 50%	Fail
<b>Outcome:</b>	<b>Biocriteria are not met</b>						
<b>The following metrics do not meet Class B2 thresholds:</b>	EPT (Fail), BI (Fail), PPCS-FG (Fail)						

**Individual Metric Outcome Guidelines (using the table below)**

- 1) A metric is scored "Pass" when the result meets the threshold requirements
- 2) A metric is scored "I" when the result is between the threshold level and the non-support level
- 3) A metric is scored "Fail" when the result is below the non-support requirements

**Overall Outcome Guidelines**

- 1) Biocriteria are "met" when all metrics are scored "Pass" and no metrics have a score of "I" or "Fail"
- 2) Biocriteria are "not met" when one or more metrics are scored "Fail"
- 3) In situations where neither items 1 or 2 are the result, an "Indeterminate" finding will be made

**Scoring Guidelines - Wadeable Stream Category SHG**

WQ Class	Score	Density	Richness	EPT	PMA-O	BI	% Oligo	EPT/ EPT+C	PPCS-F
A-1	Threshold	≥500	≥35	≥21	≥65%	≤3	≤2%	≥0.65	≥50%
	Non-Support	<450	<34	<20	<60%	>3.30	>3%	<0.63	<45%
B1	Threshold	≥400	≥31	≥19	≥55%	≤3.5	≤5%	≥0.55	≥45%
	Non-Support	<350	<30	<18	<50%	>3.65	>6.5%	<0.53	<40%
B2	Threshold	≥300	≥27	≥16	≥45%	≤4.5	≤12%	≥0.45	≥40%
	Non-Support	<250	<26	<15	<40%	>4.65	>14.5%	<0.43	<35%



**Project** Salisbury FCS  
**Station** 502254 Trib 10  
**Stream** Trib 10  
**Location** 0  
**Sample Date** 09/29/23  
**Latitude** 0  
**Longitude** 0  
**Class** 0  
**Sampler** Ryan Colarusso

Tributary 10 (ID 502254) - Immediately above Confluence with Halnon Brook									
Date	Density	Richness	EPT Richness	PMA-O	B.I.	Oligo. %	EPT/EPT + Chiro	PPCS-F	Outcome/ Biological Integrity
DEC June 1990	5,613	33.5	7.0	30.8	5.62	8.60	0.15	37.0	Does Not Meet Class B2 Criteria
DEC July 1990	5,166	42.5	11.0	55.1	5.53	0.21	0.69	52.0	Does Not Meet Class B2 Criteria
DEC 2009	3,202	24.5	9.5	31.4	5.37	0.00	0.58	32.0	Does Not Meet Class B2 Criteria
DEC 2010	4,992	32.0	13.0	47.4	4.99	0.00	0.58	35.0	Does Not Meet Class B2 Criteria
DEC 2012	2,748	25.0	10.0	53.1	4.74	0.00	0.80	31.0	Does Not Meet Class B2 Criteria
DEC 2019	3,592	24.0	7.0	39.7	4.81	0.45	0.27	35.0	Does Not Meet Class B2 Criteria
VHB 2020	3,860	28.0	12.0	37.0	5.25	0.31	0.80	34.6	Does Not Meet Class B2 Criteria
VHB 2021	2,748	27.0	15.0	47.0	4.651	0.44	0.99	39.3	Does Not Meet Class B2 Criteria
VHB 2022	4,692	33.0	13.0	61.8	4.27	1.11	0.74	43.1	Does Not Meet Class B2 Criteria
VHB 2023	2,272	30.0	9.0	59.2	5.55	0.35	0.63	28.4	Does Not Meet Class B2 Criteria

Support (Pass)	$\geq 300$	$\geq 27$	$\geq 16$	$\geq 45$	$\leq 4.50$	$\leq 12$	$\geq 0.45$	$\geq 0.40$	In accordance with the 2016 Vermont Water Quality Standards, the "Indeterminate + (I+)" range was eliminated from metric scoring. All metrics that meet the threshold are considered supporting aquatic life use for that metric.
Below Threshold (I)	$\geq 250$	$\geq 26$	$\geq 15$	$\geq 40$	$\leq 4.65$	$\leq 14.5$	$\geq 0.43$	$\geq 0.35$	
Non-Support (Fail)	$< 250$	$< 26$	$< 15$	$< 40$	$> 4.65$	$> 14.5$	$< 0.43$	$< 0.35$	