Stream Survey Data Report

NYSDEC SMAS

Report Date: 2021-11-19

# General

Belleayre Mountain has proposed upgrades to the ski area and as part of its Unit Management Plan (UMP) is required to conduct water quality monitoring to document impacts of construction and long-term effects of a proposed snow-making pond. Five locations were selected to assess construction impacts and bracket the proposed pond location. Additional considerations for site selection include sample sites upstream and downstream of an existing pond: Pine Hill Lake. A single visit will provide baseline macroinvertebrate community condition, habitat, substrate information, and water chemistry.

The Steam Monitoring and Assessment Section (SMAS) conducted targeted stream monitoring that included:

1. Benthic Macroinvertebrate Community Analysis
2. Water Quality Measurements
3. Stream Reach Physical Habitat Characteristics
4. Observer Ranking of Recreational Ability

This data report includes two sections: I) an overview of the sampling events described above, and II) a site-specific data summary to present all major findings for each site. Additional sections (III, IV) include literature cited and appendices covering all references and additional source material.

The Birch Creek site descriptions (Table ) and locations (Figure ), and sampling dates (Table ) are included below.

Table . Sampling locations.

| **Location ID** | **Group** | **Stream** | **WI/PWL ID** | **Waterbody   Classification** | **Description** | **Latitude** | **Longitude** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 13-BRCH\_T4-1.4 | Upstream | Unnamed Tributary To Birch Creek | 1307-0037 | B(TS) | 240 m below bellayre mountain rd. Or 100 m south off old schoolhouse rd. | 42 | -75 |
| 13-BRCH\_T4-0.9 | Upstream | Unnamed Tributary To Birch Creek | 1307-0037 | B(TS) | 130 m above bonnie view ave. | 42 | -74 |
| 13-BRCH-2.7 | Upstream | Birch Creek | 1307-0037 | B(TS) | 5 m below main st. Bridge. | 42 | -74 |
| 13-BRCH\_T3-0.2 | Downstream | Unnamed Tributary To Birch Creek | 1307-0037 | B(TS) | 300 m upstream from birch creek. | 42 | -74 |
| 13-BRCH-2.3 | Downstream | Birch Creek | 1307-0037 | B(TS) | 30 m above lake st. Covered bridge. | 42 | -74 |

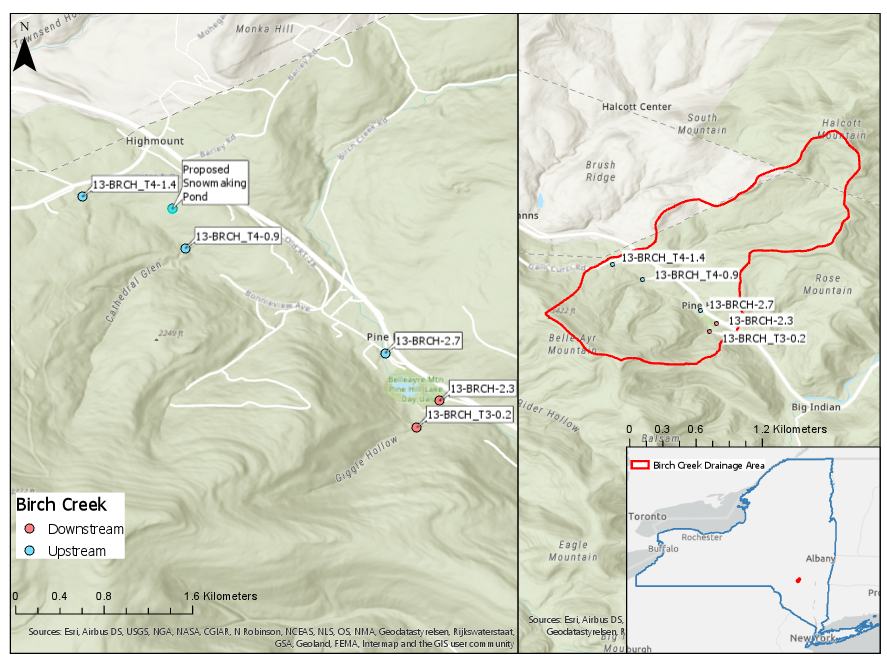


Figure . Map of sampling locations. Site names reference the Location ID and River Mile.

Table . Sampling dates and overall parameters for the study period included in this report.

| **Site** | **Date** | **Chemistry** | **Macroinvertebrates** |
| --- | --- | --- | --- |
| 13-BRCH-2.3 | 2019-07-30 | X | X |
| 13-BRCH-2.7 | 2019-07-30 | X |  |
| 13-BRCH-2.7 | 2019-07-31 |  | X |
| 13-BRCH\_T3-0.2 | 2019-07-30 | X |  |
| 13-BRCH\_T3-0.2 | 2019-08-02 |  | X |
| 13-BRCH\_T4-0.9 | 2019-07-30 | X |  |
| 13-BRCH\_T4-0.9 | 2019-08-01 |  | X |

# Section I: Overview

## Benthic Macroinvertebrate Community

Biological assessments based on the macroinvertebrate community provide the ability to detect water quality problems that are intermittent, not detected, and/or underestimated by water chemistry sampling alone. These biological assessments of water quality are generated using calculated Biological Assessment Profile (BAP) scores (SOP #208-21). BAP scores are calculated by taking the average of five normalized 10-scale community metrics and assigning that score to a four-tiered system of impact category of non (7.5-10), slight (5.0-7.5), moderate (2.5-5.0), or severe (0-2.5) impacts see (Figure ; SOP #208-21). A final BAP score below 5 is associated with significant loss of biodiversity, functional organization, and ability to support a balanced community compared to natural conditions (Karr, 1991; Davis, 1995). A BAP score above 5 indicates that aquatic life in the sampled stream reflects that of natural conditions or only slightly altered from natural (Figure ). Expected variability in the results of benthic macroinvertebrate community samples is presented in Smith and Bode (2004).

![](data:application/octet-stream;base64,)

Figure . Biological Assessment Profile (BAP) score impact categories based on the macroinvertebrate community.

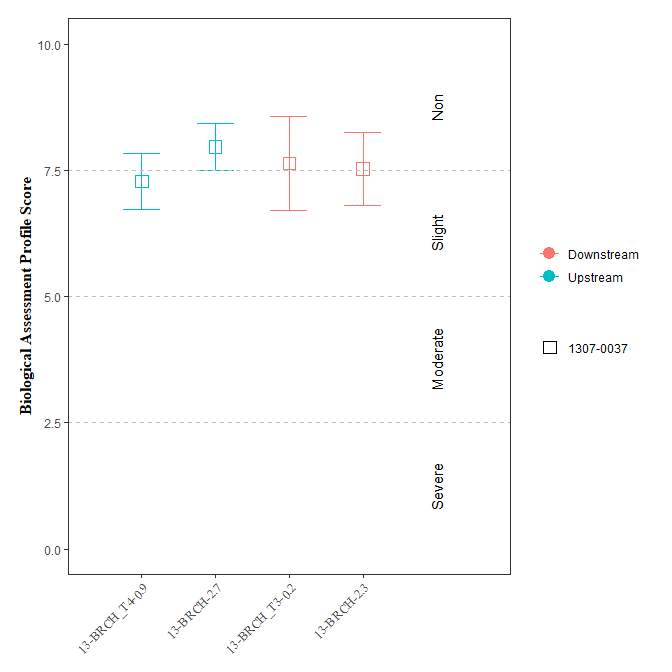


Figure . Biological Assessment Profile (BAP) Scores and 95% confidence intervals for benthic macroinvertebrate community assessment data. Symbology corresponds with WI/PWL segmentation as indicated in the plot legend.

No segments fell below a mean BAP score of 5 for the study period. (Figure ). None of the segments had a mean BAP score that would suggest inconclusive results.

## Water Quality

### Water Chemistry Collection

DEC establishes water quality standards (WQS) and guidance values for many specific substances. Waters are classified for their best uses and WQS are set to protect those uses (6 NYCRR Part 703). The data presented below does not meet the minimum data requirements for a confirmed best use assessment[[1]](#footnote-25) (CALM, 2021). For the best use assessment, please see [DEC Info Locator](https://gisservices.dec.ny.gov/gis/dil/) and factsheets[[2]](#footnote-27) for individual WI/PWL ID segments (WI/PWL ID 1307-0037).

Ambient water chemistry sampling included in-situ and lab measured water quality analytes (Table ). A total of 23 lab-measured and 8 in-situ water quality parameters were collected. Samples were collected by SMAS using the direct grab method (SOP #210-21, section 11.6). Water samples were sent for processing using a contract lab with NYS Environmental Laboratory Approval Program (ELAP) certification.

Following sample collection, all data processing followed quality assurance/quality control (QA/QC) protocols (SOP #102-20, and #110-21). Only data meeting the highest data quality standard were reported and used in this report. For water chemistry, an evaluation of the precision, accuracy, and completeness of processed water chemistry samples after lab analyses was performed following the methods detailed in SOP #102. Appendix I includes a compilation of all rejected data flagged by the process. Analytes that fell below the minimum detection limit (MDL) were replaced with 1/2 the MDL (Helsel, 1990). Where applicable, raw chemistry results were analyzed for excursions from state WQS and summarized using R programing software (R Core Team, 2017). All accepted raw chemistry results (in-situ and lab reported) with all applicable standards and excursion determinations accompany this report as Attachment I (excel file).

A total of 23 lab-measured, and 4 in-situ water quality analytes were analyzed in this study. Out of the 91 lab-measured records and 36 in-situ water quality records, there were 0 excursions from established water quality standards (6 NYCRR Part 703).

Plots illustrating the range of analyte concentration values for each site are included below. Analytes selected for presentation were subset to those of specific interest to the study and include nitrate, nitrate + nitrite (as N), nitrite (as N), total nitrogen, ammonia, total kjeldahl nitrogen (TKN), total phosphorus, and turbidity, and in-situ parameters: dissolved oxygen, temperature, pH, and specific conductance.

Table . Water chemistry analytes sampled as part of the Stream Assessment Survey. Table lists sampled analytes and analytical specifications.

| **Analytes** | **Analytical  Lab** | **Method** | **Precision** | **Accuracy** | **Calibration:   Initial** | **Calibration:   Ongoing** | **Calibration:   Blanks** | **Detection   Limit** | **Reporting   Limit** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Alkalinity | ALS | SM 2320B | ^ | ± 20% | Daily | Every 10 | Every 10 | 1.0 mg/L | 2.0 mg/L |
| Aluminum (total) | ALS | EPA 200.8 | ^ | ± 20% | Daily | Every 10 | Every 10 | 4.0 µ/L | 50 µ/L |
| Arsenic (total) | ALS | EPA 200.8 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.3 µ/L | 1 µ/L |
| Cadmium (total) | ALS | EPA 200.8 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.03 µ/L | 1 µ/L |
| Calcium | ALS | EPA 200.7 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.1 mg/L | 1.0 mg/L |
| Chloride | ALS | EPA 300.0 | ^ | ± 20% | As needed | Every 10 | Every 10 | 0.02 mg/L | 0.2 mg/L |
| Copper (total) | ALS | EPA 200.8 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.04 µ/L | 1 µ/L |
| Hardness | ALS | SM 2340C | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.3 mg/L | 2.0 mg/L |
| Iron (total) | ALS | EPA 200.7 | ^ | ± 20% | Daily | Every 10 | Every 10 | 6 µ/L | 100 µ/L |
| Lead (total) | ALS | EPA 200.8 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.08 µ/L | 1 µ/L |
| Magnesium | ALS | EPA 200.7 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.04 mg/L | 1.0 mg/L |
| Nickel (total) | ALS | EPA 200.8 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.04 µ/L | 1 µ/L |
| Ammonia | ALS | D6919-09 | ^ | ± 20% | As needed | Every 10 | Every 10 | 0.008 mg/L | 0.01 mg/L |
| Total Kjeldahl Nitrogen | ALS | EPA 351.2 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.08 mg/L | 0.1 mg/L |
| Nitrate-nitrite | ALS | EPA 351.2 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.0015 mg/L | 0.002 mg/L |
| Nitrogen, Nitrate | ALS | EPA 353.2 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.02 mg/L | 0.05 mg/L |
| Nitrogen, Nitrite | ALS | EPA 351.2 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.08 mg/L | 0.1 mg/L |
| Nitrogen, Total | ALS | Calculated | ^ |  |  |  |  |  |  |
| Total Phosphorus | ALS | EPA 365.1 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.002 mg/L | 0.003 mg/L |
| Silver (total) | ALS | EPA 200.8 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.07 µ/L | 1 µ/L |
| Turbidity | ALS | EPA 180.1 | ^ | ± 10% | Daily | Every 10 | Every 10 | 0.06 NTU | 0.1 NTU |
| Zinc (total) | ALS | EPA 200.8 | ^ | ± 20% | Daily | Every 10 | Every 10 | 0.7 µ/L | 10 µ/L |
| Dissolved Oxygen | in-situ | 4500-O G | ± 1% | ± 2% | Daily | ~ | ~ | 0% | ~ |
| pH | in-situ | 4500-H+B | ± .05 SU | ± .2 SU | Weekly | ~ | ~ | 0 SU | ~ |
| Salinity | in-situ | Calculated | 0.001 ppt | ± 1% | N/A | ~ | ~ | 0% | ~ |
| Specific Conductance | in-situ | 2510 B | ± 1µs/cm | ± 1% | Weekly | ~ | ~ | 0% | ~ |
| Temperature | in-situ | 2550 B | ± 1oC | ± 1.5oC | Factory Set | ~ | ~ | 0oC | ~ |
| ^ Precision objectives are defined by results of duplicate samples as described in SOP #102-20, and #110-21. | | | | | | | | | |
| ~ Not Applicable | | | | | | | | | |

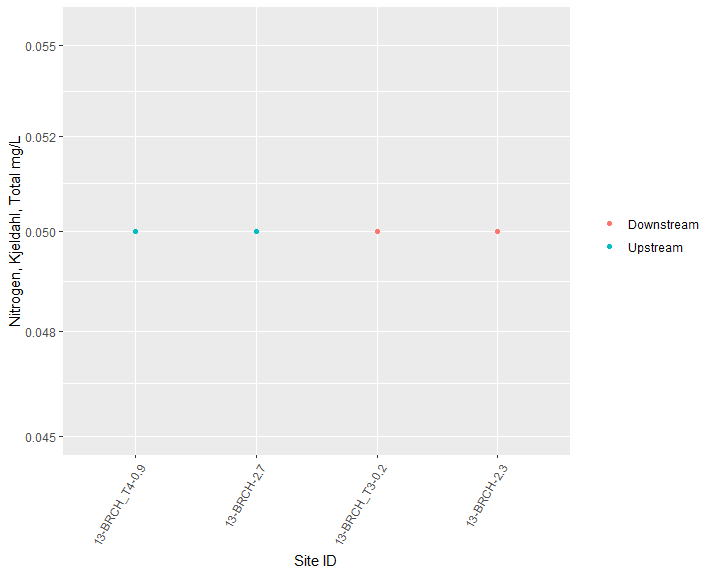


Figure . Nitrogen, Kjeldahl, Total, Horizontal lines represent the 95th, 75th, and 25th percentiles of statewide data for each endpoint. Stars at the bottom of the graph indicate an excursion of a WQS (if applicable). Axis are presented in log scale for comparison by site.

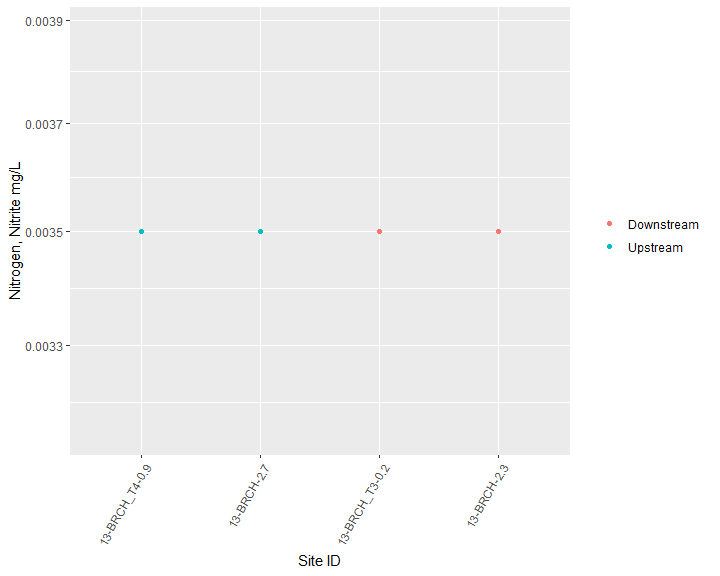


Figure . Nitrogen, Nitrite, Horizontal lines represent the 95th, 75th, and 25th percentiles of statewide data for each endpoint. Stars at the bottom of the graph indicate an excursion of a WQS (if applicable). Axis are presented in log scale for comparison by site.

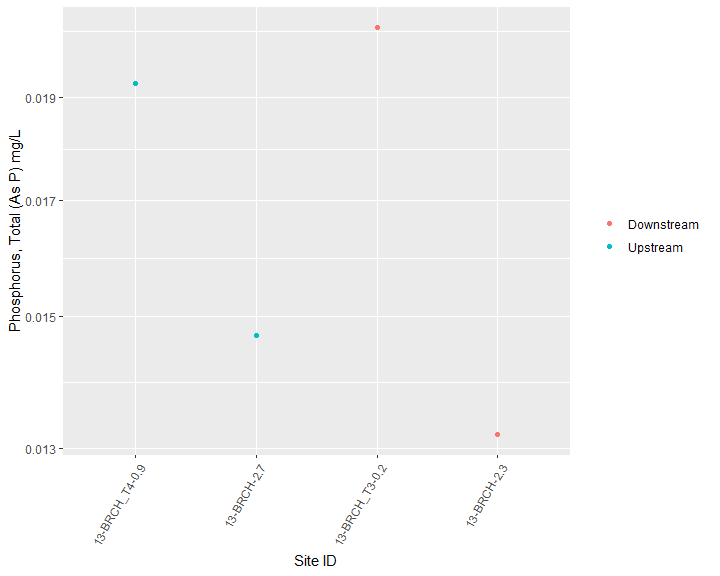


Figure . Phosphorus, Total (As P), Horizontal lines represent the 95th, 75th, and 25th percentiles of statewide data for each endpoint. Stars at the bottom of the graph indicate an excursion of a WQS (if applicable). Axis are presented in log scale for comparison by site.

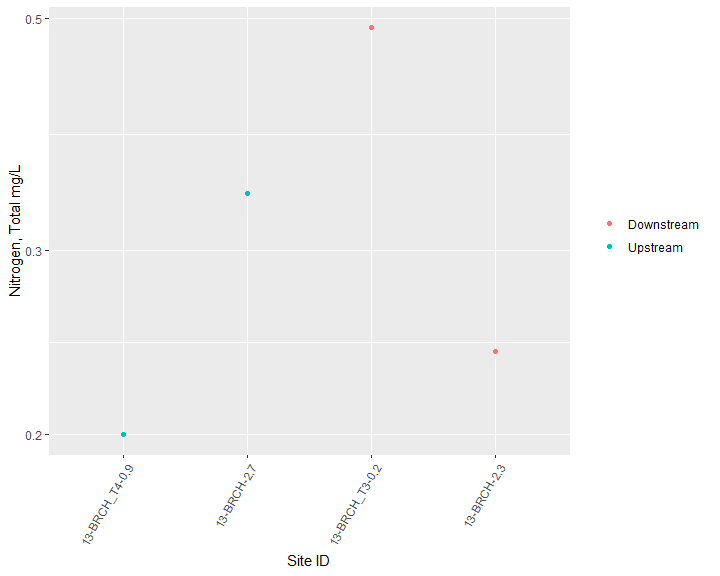


Figure . Nitrogen, Total, Horizontal lines represent the 95th, 75th, and 25th percentiles of statewide data for each endpoint. Stars at the bottom of the graph indicate an excursion of a WQS (if applicable). Axis are presented in log scale for comparison by site.

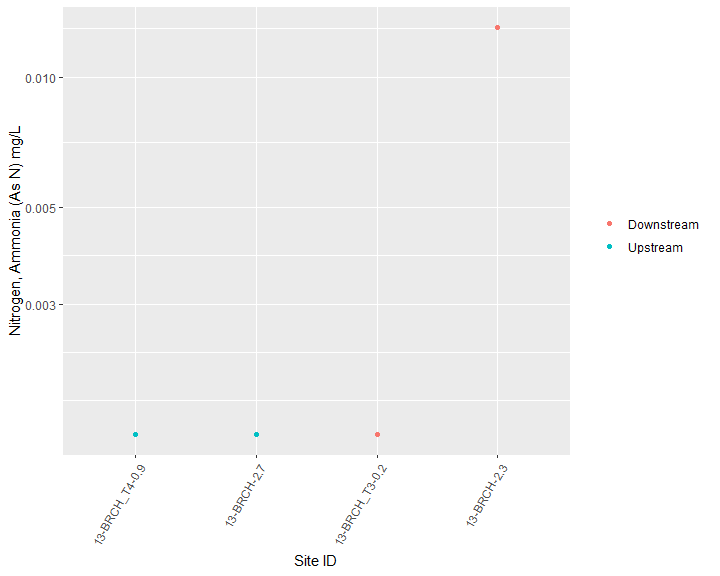


Figure . Nitrogen, Ammonia (As N), Horizontal lines represent the 95th, 75th, and 25th percentiles of statewide data for each endpoint. Stars at the bottom of the graph indicate an excursion of a WQS (if applicable). Axis are presented in log scale for comparison by site.

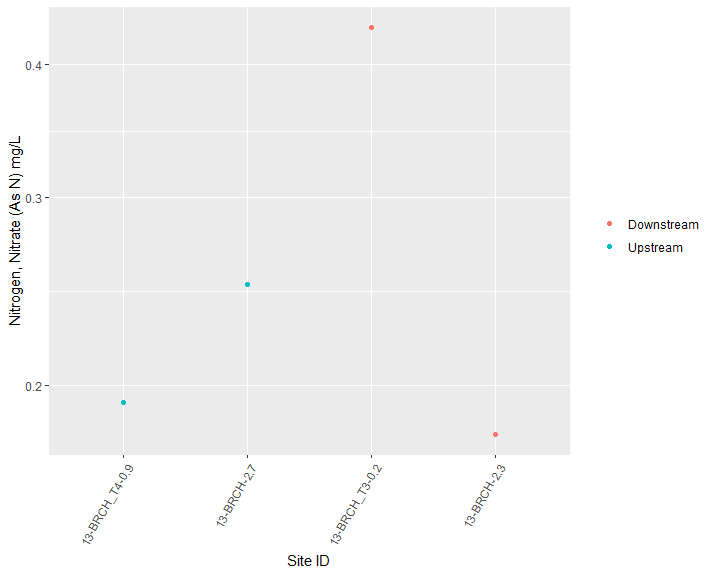


Figure . Nitrogen, Nitrate (As N), Horizontal lines represent the 95th, 75th, and 25th percentiles of statewide data for each endpoint. Stars at the bottom of the graph indicate an excursion of a WQS (if applicable). Axis are presented in log scale for comparison by site.

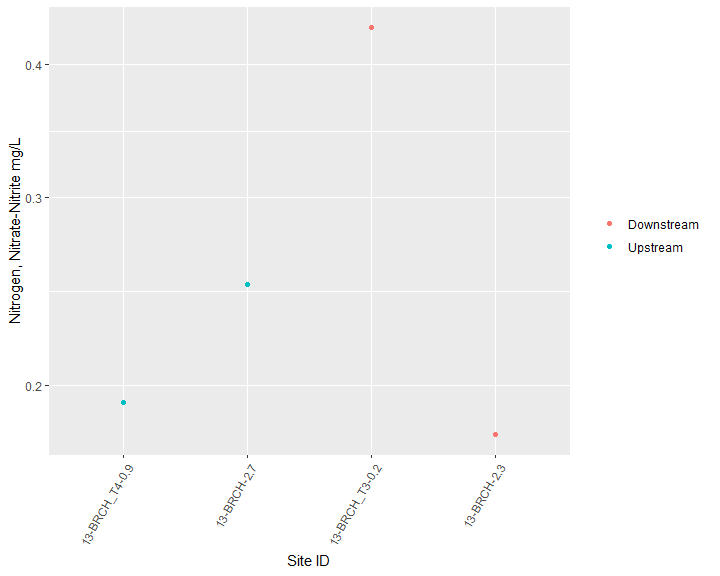


Figure . Nitrogen, Nitrate-Nitrite, Horizontal lines represent the 95th, 75th, and 25th percentiles of statewide data for each endpoint. Stars at the bottom of the graph indicate an excursion of a WQS (if applicable). Axis are presented in log scale for comparison by site.

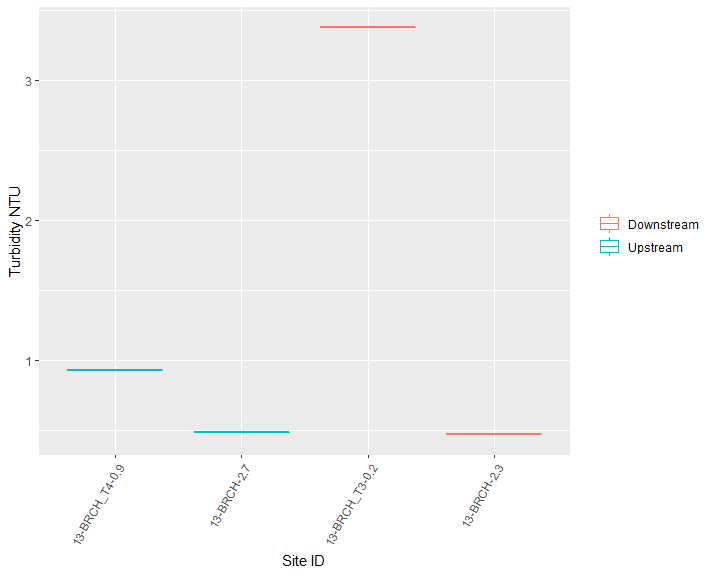


Figure . Turbidity, Horizontal lines represent the 95th, 75th, and 25th percentiles of statewide data for each endpoint. Stars at the bottom of the graph indicate an excursion of a WQS (if applicable). Axis are presented in log scale for comparison by site.

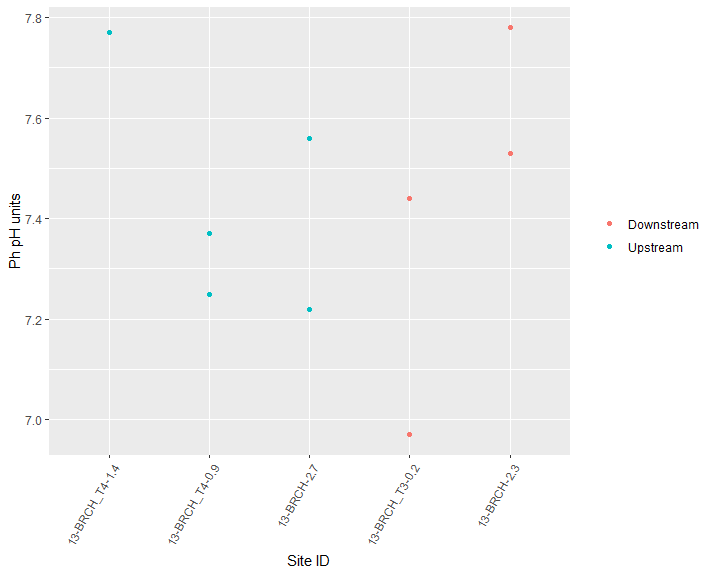


Figure . Ph, Horizontal lines represent the 95th, 75th, and 25th percentiles of statewide data for each endpoint. Stars at the bottom of the graph indicate an excursion of a WQS (if applicable). Axis are presented in log scale for comparison by site.

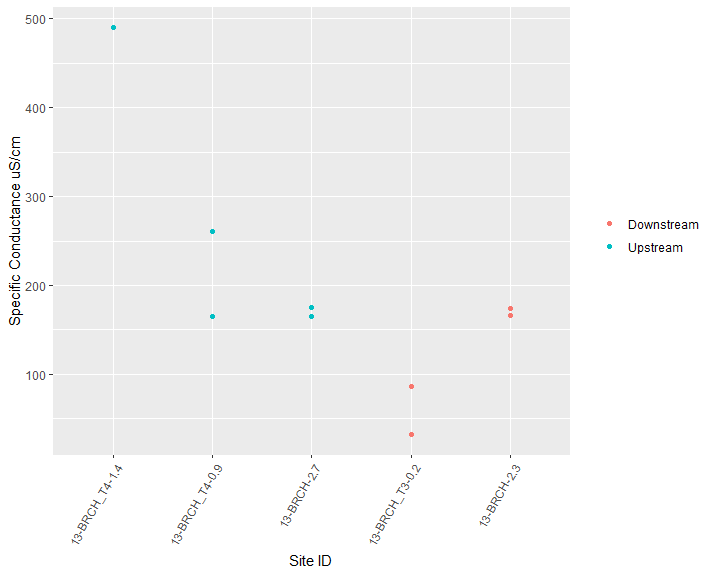


Figure . Specific Conductance, Horizontal lines represent the 95th, 75th, and 25th percentiles of statewide data for each endpoint. Stars at the bottom of the graph indicate an excursion of a WQS (if applicable). Axis are presented in log scale for comparison by site.

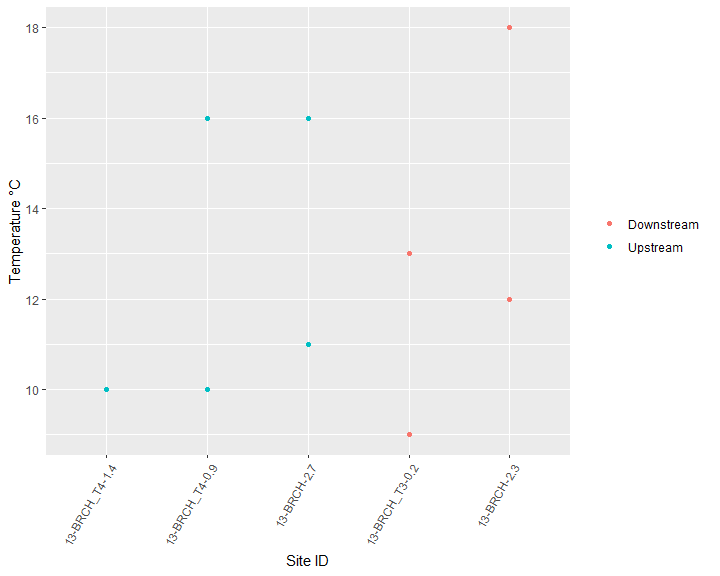


Figure . Temperature, Horizontal lines represent the 95th, 75th, and 25th percentiles of statewide data for each endpoint. Stars at the bottom of the graph indicate an excursion of a WQS (if applicable). Axis are presented in log scale for comparison by site.

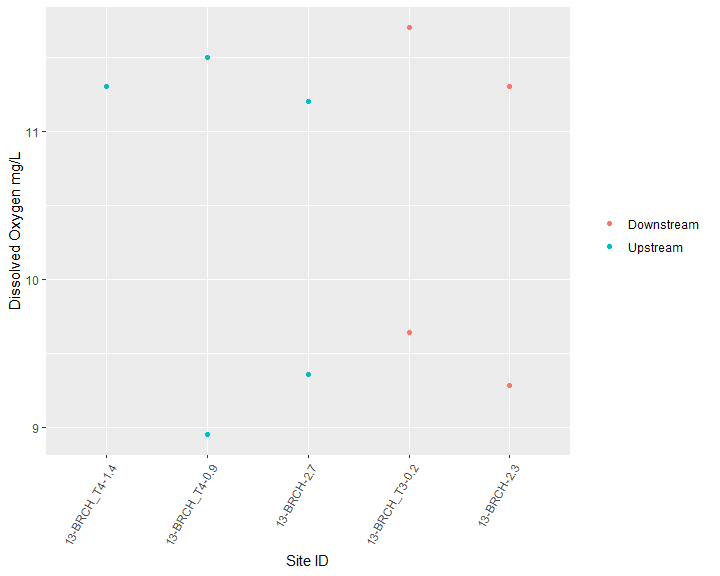


Figure . Dissolved Oxygen, Horizontal lines represent the 95th, 75th, and 25th percentiles of statewide data for each endpoint. Stars at the bottom of the graph indicate an excursion of a WQS (if applicable). Axis are presented in log scale for comparison by site.

## Stream Reach Physical Characteristics

Assessments of the physical habitat was also collected to calculate the Habitat Model Affinity (HMA) (Table 3). HMA is an overall estimate of habitat quality which describes potential habitat stress on biologic community. The HMA is based on rankings of individual habitat characteristics on a scale from 0 (poor) to 20 (optimal) which are then compared to a statewide reference condition (SOP #208-19). HMA scores are used to make final physical habitat assessments; Natural (80-100), Altered (70 – 80), Moderate (60 – 70), and Severe (< 60). Results are described in terms of percent similarity to the reference condition.

Habitat model affinity (HMA) scores and resulting final physical habitat assessments are presented below (Table).

Table . Ranked habitat characteristics and calculated HMA. Epifaunal substrate (Epi. Cover); Embeddedness/Pool Substrate Characterization (Embed. Pool.); Velocity Depth Regime/Pool Variability (Vel/Dep Reg.); Sediment Deposition (Sed. Dep.); Channel Flow Status (Flow Status); Channel Alteration (Chan. Alt.); Riffle Frequency/Stream Sinuosity (Rif. Freq.); Left and Right Bank Stability (L.B. and R.B. Stability); Left and Right Bank Vegetation (L.B. and R.B. Veg); Width of Left and Right Bank Vegetative Zone (L.B. and R.B. Veg Zone); Habitat Model Affinity Score (HMA Score); HMA Assessment (HMA Assess.)

| **PWL** | **Site** | **Gradient** | **Epi.  Cover** | **Embed.   Pool.** | **Vel/Dep.   Reg.** | **Sed.   Dep.** | **Flow   Status** | **Chan.   Alt** | **Rif.   Freq** | **L.B.   Stability** | **R.B.   Stability** | **L.B.   Veg** | **R.B.  Veg** | **L.B.   Veg Zone** | **R.B.   Veg Zone** | **HMA   Score** | **HMA   Assess.** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1307-0037 | 13-BRCH-2.3 | High | 13 | 9 | 13 | 15 | 17 | 17 | 16 | 9 | 9 | 8 | 9 | 9 | 9 | 84 | Natural |
| 13-BRCH-2.7 | High | 17 | 14 | 18 | 14 | 15 | 17 | 16 | 8 | 9 | 6 | 7 | 4 | 8 | 84 | Natural |
| 13-BRCH\_T3-0.2 | High | 18 | 16 | 12 | 20 | 15 | 20 | 19 | 10 | 10 | 10 | 10 | 10 | 10 | 93 | Natural |
| 13-BRCH\_T4-0.9 | High | 18 | 14 | 13 | 10 | 10 | 14 | 18 | 7 | 6 | 8 | 7 | 10 | 10 | 78 | Altered |

## User Perception

Perceptions of recreational ability were ranked at all sampling locations as per standard site visit protocols (SOP #208-19). The observer ranking of recreational ability is a method of evaluating impacts to recreational use of a stream segment. Impacts to recreational use have been correlated with biological impairment from nutrient enrichment and rankings below slightly impacted (rank of 3) are indicative of significant impacts to recreational ability (Smith et al., 2014). The ranking assesses primary (1°) and secondary (2°) contact recreation, as well as a user’s desire to fish.

The first two questions of the recreational use evaluation describe the observers perceived ability to participate in 1° and 2° contact recreation. Results of this ranking are the primary gauge of whether the Birch Creek sites are achieving the designated recreational uses. Figure illustrates the average observer ranking for desire to participate in 1° and 2° contact recreation at each sampling location. User rankings of recreational desirability ranged from 0 (best) to 5 (worst) where,as described above, a measurable impact was related to a ranking of 3 (Smith et al., 2014). Values of 6 were the result of 1° or 2° degree contact not being applicable due to site condition and were removed from mean aggregations. Results of this survey suggest observers (NYSDEC field staff) considered the desire to participate in 1° and 2° contact recreation to be slightly impacted (ranked > 3) at 0 WI/PWL segments (Figure ).

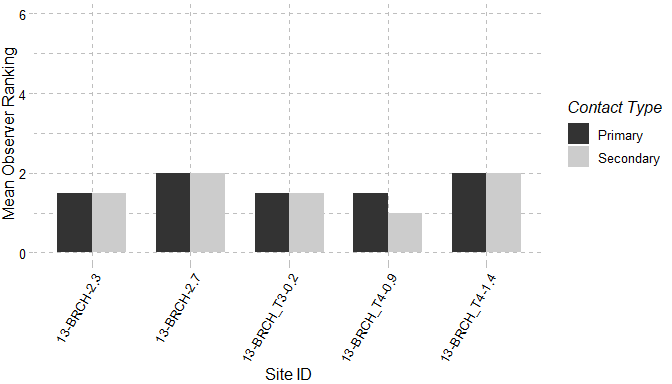


Figure . Mean observer ranking of recreational ability for each sampling location. Columns represent observer rankings for the desire to participate in 1° and 2° contact recreation. Ranking of recreation ability was performed for all locations during each site visit.

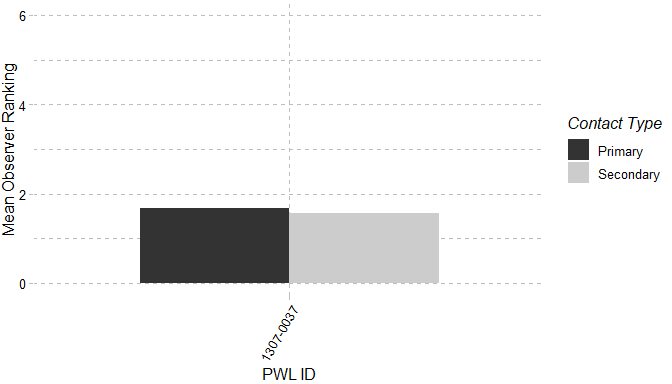


Figure . Mean observer ranking of recreational ability for sampling locations, grouped by WI/PWL. Columns represent observer rankings for the desire to participate in 1° and 2° contact recreation. Ranking of recreation ability was performed for all locations during each site visit.

Additional recreational usability questions rank in-stream and stream-side factors on a scale of 0-10 (0 – Best/Natural; 10 Worst/Severe). Those factors are: 1) Water Clarity, 2) Trash, 3) Periphyton, 4) Odor, and 5) Discharge Pipes. These visual and olfactory observations help isolate negative factors influencing the user’s perception of recreational use. Table shows the mean recorded value for these factors at each sampling location and Table lists the users selection of the most dominant impediment that reduces the observer’s desire to participate in 1° and 2° contact recreation, which can include the factors above, as well as ease of access and proximity to development.

Table . Mean observer ranked value for factors influencing desire to participate in 1° and 2° contact recreation. Factors were ranked on a 10 scale (0 – Best/Natural; 10 Worst/Severe) according to perceived impact on a location. Ranking of recreation ability was performed for all locations during each site visit

| **PWL** | **Site** | **Water Clarity** | **Susp. Phyto.** | **Periphyton** | **Macro.** | **Odor** | **Trash** | **Discharge Pipes** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1307-0037 | 13-BRCH-2.3 | 0 | 1 | 2 | 0 | 0 | 0 | 0 |
| 1307-0037 | 13-BRCH-2.7 | 0 | 0 | 0 | 0 | 0 | 3 | 1 |
| 1307-0037 | 13-BRCH\_T3-0.2 | 0 | 0 | 0 | NA | 0 | 2 | 0 |
| 1307-0037 | 13-BRCH\_T4-0.9 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| 1307-0037 | 13-BRCH\_T4-1.4 | 1 | 0 | 1 | 0 | 0 | 3 | 0 |

Table . Most frequently ranked factor influencing observer desire to participate in 1° and 2° contact recreation. Factors influencing desire to recreate were ranked and a primary factor influencing the desire to participate in 1° and 2° contact recreation was chosen during each site visit. Column values represent the factor selected most frequently at each site.

| **PWL** | **Sites** | **Primary** | **Secondary** |
| --- | --- | --- | --- |
| 1307-0037 | 13-BRCH-2.3 | None | None, Proximity to development buildings |
| 13-BRCH-2.3 | Proximity to Development Buildings | None, Proximity to development buildings |
| 13-BRCH-2.7 | None | None, Proximity to development roads |
| 13-BRCH-2.7 | Trash | None, Proximity to development roads |
| 13-BRCH\_T3-0.2 | None | None, Proximity to development roads |
| 13-BRCH\_T3-0.2 | Proximity to Development Roads | None, Proximity to development roads |
| 13-BRCH\_T4-0.9 | None | None |
| 13-BRCH\_T4-0.9 | Proximity to Development Buildings | None |
| 13-BRCH\_T4-1.4 | Trash | None |

# Section II: Site Specific Data

Section II provides a tabular summary of all accepted results from each sampling location. Descriptive tables for each site include applicable established WQS (6 NYCRR Part 703), a summary of general chemistry and in-situ results, WQS excursion information, and BAP scores. Water chemistry results are summarized by analyte concentration after meeting QA/QC standards. WQS excursion information identifies excursions of the applicable WQS. BAP score information includes mean BAP score, standard deviation, standard error, and number of replicates.

### 13-BRCH\_T4-1.4 | Waterbody Class: B(TS) | WI/PWL ID: 1307-0037

Table : Applicable Standards: 13-BRCH\_T4-1.4

| **Class** | **Parameter** | **Fraction** | **Units** | **Standard Narrative** |
| --- | --- | --- | --- | --- |
| B(TS) | Dissolved Oxygen | dissolved | mg/L | Shall not be less than 7.0 mg/L from other than natural conditions. |
| B(TS) | pH | total | pH units | Shall not be less than 6.5 nor more than 8.5. |

Table : In-Situ Measurements: 13-BRCH\_T4-1.4

| **Site** | **Parameter** | **Units** | **Fraction** | **Record Count** | **Mean** | **Median** | **Max** | **Min** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 13-BRCH\_T4-1.4 | Dissolved Oxygen | mg/L | dissolved | 1 | 11.3 | 11.3 | 11.3 | 11.3 |
| 13-BRCH\_T4-1.4 | Dissolved Oxygen Saturation | % |  | 1 | 108 | 108 | 108 | 108 |
| 13-BRCH\_T4-1.4 | pH | pH units | total | 1 | 7.77 | 7.77 | 7.77 | 7.77 |
| 13-BRCH\_T4-1.4 | Salinity | ppt |  | 1 | 0.24 | 0.24 | 0.24 | 0.24 |
| 13-BRCH\_T4-1.4 | Specific Conductance | uS/cm |  | 1 | 490 | 490 | 490 | 490 |
| 13-BRCH\_T4-1.4 | Temperature | °C |  | 1 | 10 | 10 | 10 | 10 |

*Water Quality Standard Excursions*

There were no water quality standard excursions at this site during the sampling period.

### 13-BRCH\_T4-0.9 | Waterbody Class: B(TS) | WI/PWL ID: 1307-0037

Table : Applicable Standards: 13-BRCH\_T4-0.9

| **Class** | **Parameter** | **Fraction** | **Units** | **Standard Narrative** |
| --- | --- | --- | --- | --- |
| B(TS) | Dissolved Oxygen | dissolved | mg/L | Shall not be less than 7.0 mg/L from other than natural conditions. |
| B(TS) | pH | total | pH units | Shall not be less than 6.5 nor more than 8.5. |
| B(TS) | Ammonia | total | µg/L | Standard is based on pH and temperature |

Table : Chemistry Measurements: 13-BRCH\_T4-0.9

| **Parameter** | **Units** | **Fraction** | **Record Count** | **Result** |
| --- | --- | --- | --- | --- |
| Alkalinity, Total (As Caco3) | mg/L | total | 1 | 28.4 |
| Aluminum | µg/L | total | 1 | 24.7 |
| Ammonia | µg/L | total | 1 | 1.5 |
| Arsenic | µg/L | total | 1 | 0.16 |
| Cadmium | µg/L | total | 1 | 0.19 |
| Calcium | µg/L | total | 1 | 11700 |
| Chloride | mg/L | total | 1 | 26.6 |
| Copper | µg/L | total | 1 | 0.33 |
| Hardness | mg/L | total | 1 | 38.1 |
| Iron | µg/L | total | 1 | 38.2 |
| Lead | µg/L | total | 1 | 0.285 |
| Magnesium | µg/L | total | 1 | 2200 |
| Nickel | µg/L | total | 1 | 0.29 |
| Nitrate | mg/L | total | 1 | 0.193 |
| Nitrite | mg/L | total | 1 | 0.004 |
| Nitrite (As N) | mg/L | total | 1 | 0.193 |
| Nitrogen, Kjeldahl, Total | mg/L | total | 1 | 0.05 |
| Nitrogen, Total | mg/L | total | 1 | 0.2 |
| Phosphorus | mg/L | total | 1 | 0.019 |
| Silver | µg/L | total | 1 | 0.075 |
| Turbidity | NTU | total | 1 | 0.93 |
| Zinc | µg/L | total | 1 | 1.25 |

Table : In-Situ Measurements: 13-BRCH\_T4-0.9

| **Site** | **Parameter** | **Units** | **Fraction** | **Record Count** | **Mean** | **Median** | **Max** | **Min** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 13-BRCH\_T4-0.9 | Chlorophyll A (Probe) | µg/L |  | 1 | 0.66 | 0.66 | 0.66 | 0.66 |
| 13-BRCH\_T4-0.9 | Chlorophyll A (Probe) | RFU |  | 1 | 0.19 | 0.19 | 0.19 | 0.19 |
| 13-BRCH\_T4-0.9 | Dissolved Oxygen | mg/L | dissolved | 2 | 10.225 | 10.225 | 11.5 | 8.95 |
| 13-BRCH\_T4-0.9 | Dissolved Oxygen Saturation | % |  | 2 | 98.8 | 98.8 | 107 | 90.6 |
| 13-BRCH\_T4-0.9 | pH | pH units | total | 2 | 7.31 | 7.31 | 7.37 | 7.25 |
| 13-BRCH\_T4-0.9 | Phycocyanin (Probe) | µg/L |  | 1 | 0 | 0 | 0 | 0 |
| 13-BRCH\_T4-0.9 | Phycocyanin (Probe) | RFU |  | 1 | 0 | 0 | 0 | 0 |
| 13-BRCH\_T4-0.9 | Salinity | ppt |  | 2 | 0.105 | 0.105 | 0.13 | 0.08 |
| 13-BRCH\_T4-0.9 | Specific Conductance | uS/cm |  | 2 | 213 | 213 | 261 | 165 |
| 13-BRCH\_T4-0.9 | Temperature | °C |  | 2 | 13 | 13 | 16 | 10 |

*Water Quality Standard Excursions*

There were no water quality standard excursions at this site during the sampling period.

Table : Biological Assessment Score (BAP) Summary: 13-BRCH\_T4-0.9

| **DATE** | **BAP** | **Standard Deviation** | **Standard Error** | **Replicate** |
| --- | --- | --- | --- | --- |
| 2019-08-01 | 7.3 | 0.35 | 0.18 | 4 |

### 13-BRCH-2.7 | Waterbody Class: B(TS) | WI/PWL ID: 1307-0037

Table : Applicable Standards: 13-BRCH-2.7

| **Class** | **Parameter** | **Fraction** | **Units** | **Standard Narrative** |
| --- | --- | --- | --- | --- |
| B(TS) | Dissolved Oxygen | dissolved | mg/L | Shall not be less than 7.0 mg/L from other than natural conditions. |
| B(TS) | pH | total | pH units | Shall not be less than 6.5 nor more than 8.5. |
| B(TS) | Ammonia | total | µg/L | Standard is based on pH and temperature |

Table : Chemistry Measurements: 13-BRCH-2.7

| **Parameter** | **Units** | **Fraction** | **Record Count** | **Result** |
| --- | --- | --- | --- | --- |
| Alkalinity, Total (As Caco3) | mg/L | total | 1 | 24.4 |
| Aluminum | µg/L | total | 1 | 11 |
| Ammonia | µg/L | total | 1 | 1.5 |
| Arsenic | µg/L | total | 1 | 0.52 |
| Cadmium | µg/L | total | 1 | 0.19 |
| Calcium | µg/L | total | 1 | 10500 |
| Chloride | mg/L | total | 1 | 28.5 |
| Chlorophyll A | µg/L | total | 1 | 0.378 |
| Copper | µg/L | total | 1 | 0.68 |
| Hardness | mg/L | total | 1 | 34.8 |
| Iron | µg/L | total | 1 | 16.6 |
| Lead | µg/L | total | 1 | 0.285 |
| Magnesium | µg/L | total | 1 | 2070 |
| Nickel | µg/L | total | 1 | 0.13 |
| Nitrate | mg/L | total | 1 | 0.249 |
| Nitrite | mg/L | total | 1 | 0.004 |
| Nitrite (As N) | mg/L | total | 1 | 0.249 |
| Nitrogen, Kjeldahl, Total | mg/L | total | 1 | 0.05 |
| Nitrogen, Total | mg/L | total | 1 | 0.34 |
| Phosphorus | mg/L | total | 1 | 0.015 |
| Silver | µg/L | total | 1 | 0.075 |
| Turbidity | NTU | total | 1 | 0.49 |
| Zinc | µg/L | total | 1 | 1.25 |

Table : In-Situ Measurements: 13-BRCH-2.7

| **Site** | **Parameter** | **Units** | **Fraction** | **Record Count** | **Mean** | **Median** | **Max** | **Min** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 13-BRCH-2.7 | Chlorophyll A (Probe) | µg/L |  | 1 | 0.16 | 0.16 | 0.16 | 0.16 |
| 13-BRCH-2.7 | Chlorophyll A (Probe) | RFU |  | 1 | 0.06 | 0.06 | 0.06 | 0.06 |
| 13-BRCH-2.7 | Dissolved Oxygen | mg/L | dissolved | 2 | 10.28 | 10.28 | 11.2 | 9.36 |
| 13-BRCH-2.7 | Dissolved Oxygen Saturation | % |  | 2 | 100.55 | 100.55 | 106 | 95.1 |
| 13-BRCH-2.7 | pH | pH units | total | 2 | 7.39 | 7.39 | 7.56 | 7.22 |
| 13-BRCH-2.7 | Phycocyanin (Probe) | µg/L |  | 1 | 0 | 0 | 0 | 0 |
| 13-BRCH-2.7 | Phycocyanin (Probe) | RFU |  | 1 | 0 | 0 | 0 | 0 |
| 13-BRCH-2.7 | Salinity | ppt |  | 2 | 0.08 | 0.08 | 0.08 | 0.08 |
| 13-BRCH-2.7 | Specific Conductance | uS/cm |  | 2 | 170 | 170 | 175 | 165 |
| 13-BRCH-2.7 | Temperature | °C |  | 2 | 13.5 | 13.5 | 16 | 11 |

*Water Quality Standard Excursions*

There were no water quality standard excursions at this site during the sampling period.

Table : Biological Assessment Score (BAP) Summary: 13-BRCH-2.7

| **DATE** | **BAP** | **Standard Deviation** | **Standard Error** | **Replicate** |
| --- | --- | --- | --- | --- |
| 2019-07-31 | 8 | 0.3 | 0.15 | 4 |

### 13-BRCH\_T3-0.2 | Waterbody Class: B(TS) | WI/PWL ID: 1307-0037

Table : Applicable Standards: 13-BRCH\_T3-0.2

| **Class** | **Parameter** | **Fraction** | **Units** | **Standard Narrative** |
| --- | --- | --- | --- | --- |
| B(TS) | Dissolved Oxygen | dissolved | mg/L | Shall not be less than 7.0 mg/L from other than natural conditions. |
| B(TS) | pH | total | pH units | Shall not be less than 6.5 nor more than 8.5. |
| B(TS) | Ammonia | total | µg/L | Standard is based on pH and temperature |

Table : Chemistry Measurements: 13-BRCH\_T3-0.2

| **Parameter** | **Units** | **Fraction** | **Record Count** | **Result** |
| --- | --- | --- | --- | --- |
| Alkalinity, Total (As Caco3) | mg/L | total | 1 | 8.4 |
| Aluminum | µg/L | total | 1 | 29.4 |
| Ammonia | µg/L | total | 1 | 1.5 |
| Arsenic | µg/L | total | 1 | 0.16 |
| Cadmium | µg/L | total | 1 | 0.19 |
| Calcium | µg/L | total | 1 | 3460 |
| Chloride | mg/L | total | 1 | 0.25 |
| Chlorophyll A | µg/L | total | 1 | 0.964 |
| Copper | µg/L | total | 1 | 0.33 |
| Hardness | mg/L | total | 1 | 12.5 |
| Iron | µg/L | total | 1 | 38.7 |
| Lead | µg/L | total | 1 | 0.285 |
| Magnesium | µg/L | total | 1 | 944 |
| Nickel | µg/L | total | 1 | 0.13 |
| Nitrate | mg/L | total | 1 | 0.433 |
| Nitrite | mg/L | total | 1 | 0.004 |
| Nitrite (As N) | mg/L | total | 1 | 0.433 |
| Nitrogen, Kjeldahl, Total | mg/L | total | 1 | 0.05 |
| Nitrogen, Total | mg/L | total | 1 | 0.49 |
| Phosphorus | mg/L | total | 1 | 0.02 |
| Silver | µg/L | total | 1 | 0.075 |
| Turbidity | NTU | total | 1 | 3.38 |
| Zinc | µg/L | total | 1 | 1.25 |

Table : In-Situ Measurements: 13-BRCH\_T3-0.2

| **Site** | **Parameter** | **Units** | **Fraction** | **Record Count** | **Mean** | **Median** | **Max** | **Min** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 13-BRCH\_T3-0.2 | Chlorophyll A (Probe) | µg/L |  | 1 | 0.05 | 0.05 | 0.05 | 0.05 |
| 13-BRCH\_T3-0.2 | Chlorophyll A (Probe) | RFU |  | 1 | 0 | 0 | 0 | 0 |
| 13-BRCH\_T3-0.2 | Dissolved Oxygen | mg/L | dissolved | 2 | 10.67 | 10.67 | 11.7 | 9.64 |
| 13-BRCH\_T3-0.2 | Dissolved Oxygen Saturation | % |  | 2 | 98.45 | 98.45 | 106 | 90.9 |
| 13-BRCH\_T3-0.2 | pH | pH units | total | 2 | 7.205 | 7.205 | 7.44 | 6.97 |
| 13-BRCH\_T3-0.2 | Phycocyanin (Probe) | µg/L |  | 1 | 0 | 0 | 0 | 0 |
| 13-BRCH\_T3-0.2 | Phycocyanin (Probe) | RFU |  | 1 | 0 | 0 | 0 | 0 |
| 13-BRCH\_T3-0.2 | Salinity | ppt |  | 2 | 0.025 | 0.025 | 0.04 | 0.01 |
| 13-BRCH\_T3-0.2 | Specific Conductance | uS/cm |  | 2 | 59 | 59 | 86 | 32 |
| 13-BRCH\_T3-0.2 | Temperature | °C |  | 2 | 11 | 11 | 13 | 9 |

*Water Quality Standard Excursions*

There were no water quality standard excursions at this site during the sampling period.

Table : Biological Assessment Score (BAP) Summary: 13-BRCH\_T3-0.2

| **DATE** | **BAP** | **Standard Deviation** | **Standard Error** | **Replicate** |
| --- | --- | --- | --- | --- |
| 2019-08-02 | 7.6 | 0.58 | 0.29 | 4 |

### 13-BRCH-2.3 | Waterbody Class: B(TS) | WI/PWL ID: 1307-0037

Table : Applicable Standards: 13-BRCH-2.3

| **Class** | **Parameter** | **Fraction** | **Units** | **Standard Narrative** |
| --- | --- | --- | --- | --- |
| B(TS) | Dissolved Oxygen | dissolved | mg/L | Shall not be less than 7.0 mg/L from other than natural conditions. |
| B(TS) | pH | total | pH units | Shall not be less than 6.5 nor more than 8.5. |
| B(TS) | Ammonia | total | µg/L | Standard is based on pH and temperature |

Table : Chemistry Measurements: 13-BRCH-2.3

| **Parameter** | **Units** | **Fraction** | **Record Count** | **Result** |
| --- | --- | --- | --- | --- |
| Alkalinity, Total (As Caco3) | mg/L | total | 1 | 27.6 |
| Aluminum | µg/L | total | 1 | 12.4 |
| Ammonia | µg/L | total | 1 | 13 |
| Arsenic | µg/L | total | 1 | 0.48 |
| Cadmium | µg/L | total | 1 | 0.19 |
| Calcium | µg/L | total | 1 | 11200 |
| Chloride | mg/L | total | 1 | 26 |
| Chlorophyll A | µg/L | total | 1 | 0.663 |
| Copper | µg/L | total | 1 | 0.33 |
| Hardness | mg/L | total | 1 | 36.2 |
| Iron | µg/L | total | 1 | 24.9 |
| Lead | µg/L | total | 1 | 0.285 |
| Magnesium | µg/L | total | 1 | 2030 |
| Nickel | µg/L | total | 1 | 0.13 |
| Nitrate | mg/L | total | 1 | 0.18 |
| Nitrite | mg/L | total | 1 | 0.004 |
| Nitrite (As N) | mg/L | total | 1 | 0.18 |
| Nitrogen, Kjeldahl, Total | mg/L | total | 1 | 0.05 |
| Nitrogen, Total | mg/L | total | 1 | 0.24 |
| Phosphorus | mg/L | total | 1 | 0.013 |
| Silver | µg/L | total | 1 | 0.075 |
| Turbidity | NTU | total | 1 | 0.47 |
| Zinc | µg/L | total | 1 | 1.25 |

Table : In-Situ Measurements: 13-BRCH-2.3

| **Site** | **Parameter** | **Units** | **Fraction** | **Record Count** | **Mean** | **Median** | **Max** | **Min** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 13-BRCH-2.3 | Chlorophyll A (Probe) | µg/L |  | 1 | 0.03 | 0.03 | 0.03 | 0.03 |
| 13-BRCH-2.3 | Chlorophyll A (Probe) | RFU |  | 1 | 0 | 0 | 0 | 0 |
| 13-BRCH-2.3 | Dissolved Oxygen | mg/L | dissolved | 2 | 10.29 | 10.29 | 11.3 | 9.28 |
| 13-BRCH-2.3 | Dissolved Oxygen Saturation | % |  | 2 | 104.35 | 104.35 | 111 | 97.7 |
| 13-BRCH-2.3 | pH | pH units | total | 2 | 7.655 | 7.655 | 7.78 | 7.53 |
| 13-BRCH-2.3 | Phycocyanin (Probe) | µg/L |  | 1 | 0 | 0 | 0 | 0 |
| 13-BRCH-2.3 | Phycocyanin (Probe) | RFU |  | 1 | 0 | 0 | 0 | 0 |
| 13-BRCH-2.3 | Salinity | ppt |  | 2 | 0.08 | 0.08 | 0.08 | 0.08 |
| 13-BRCH-2.3 | Specific Conductance | uS/cm |  | 2 | 170 | 170 | 174 | 166 |
| 13-BRCH-2.3 | Temperature | °C |  | 2 | 15 | 15 | 18 | 12 |

*Water Quality Standard Excursions*

There were no water quality standard excursions at this site during the sampling period.

Table : Biological Assessment Score (BAP) Summary: 13-BRCH-2.3

| **DATE** | **BAP** | **Standard Deviation** | **Standard Error** | **Replicate** |
| --- | --- | --- | --- | --- |
| 2019-07-30 | 7.5 | 0.45 | 0.22 | 4 |

# Section III: Literature Cited

# Section IV: Appendices

### Appendix I. QA/QC Results

The following tables represent all data excluded from the study, or samples that were taken during the study period but flagged for exclusion from reporting by the QA/QC methods described in SOP#110-21.

Table . Water chemistry analytes flagged as R (rejected) and not included in the analysis for the report.

| **Site** | **Date** | **Parameter** | **Units** | **Fraction** | **Result** | **Validated** | **Validator** | **Explanation** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 13-BRCH\_T4-0.9 | 2019-07-30 | Chlorophyll A | µg/L | total | 0.082 | 2020-05-11 | R | Equipment Blank error |

1. Best use assessment confirmation is based on 1) whether data are core or supplemental indicators, 2) how many years of data are available, and 3) how many samples were collected. (CALM, 2021) [↑](#footnote-ref-25)
2. Compilation of the state’s Integrated Report and updates to WI/PWL ID factsheets occur during even (2022, 2024) years. Best use assessments and factsheets may not immediately reflect data generated in this report. [↑](#footnote-ref-27)