



January 24, 2019

Mr. William Marcussen
Town of Tuftonboro
P.O. Box 98 240 Middle Road (Route 109A)
Center Tuftonboro, NH 03816

Re: Nineteen Mile Brook Watershed Baseline Environmental Assessment
Normandeau Project No. 24254.000

Dear Mr. Marcussen:

Normandeau Associates, Inc. (Normandeau; NAI) is pleased to provide this report to the Town of Tuftonboro summarizing our comprehensive file review and environmental evaluation of the Wolfeboro Rapid Infiltration Basin Facility (RIB). We have reviewed all of the readily available materials on file with the New Hampshire Department of Environmental Services (NHDES) and have provided you a summary of the most relevant data on the overall state of water quality in Nineteen Mile Brook, any documented changes over time in the brook, and any apparent effects on surface water quality from the operation of the RIB discharge. Nineteen Mile Brook is a high quality stream and a valuable natural resource to the region and we thank you for the opportunity to perform this preliminary study. It is our recommendation that further environmental studies be completed and that existing and available data continue to be reviewed to ensure the integrity of Nineteen Mile Brook as explained in our Recommendations section of this report.

Background

In 2008 Normandeau Associates, Inc. completed a baseline environmental study of the Nineteen Mile Brook watershed on behalf of the Tuftonboro Conservation Commission (TCC). The study was completed to evaluate the potential environmental impacts associated with a recently permitted (not yet constructed) subsurface rapid infiltration discharge of up to 600,000 gallons per day of treated municipal wastewater (potentially expandable to 2 million gallons per day) in the neighboring Town of Wolfeboro, NH. This discharge is located near the Wolfeboro/Tuftonboro town line and is within the watersheds of Nineteen Mile Brook, Whitten Pond and Lake Winnepesaukee. The TCC commissioned the study due to significant concerns regarding the potential impact of the discharge on general stream, pond and lake water quality, macroinvertebrates, fisheries, wetlands, public health and lake and stream ecology.

The 2008 NAI study provided an assessment of aquatic habitat, surface water quality, benthic macroinvertebrate communities, wildlife and fish populations, and rare, threatened, and endangered species within a seven mile section of Nineteen Mile Brook, including Whitten Pond. Our study resulted in the following findings:

"Baseline studies for water quality, aquatic and wetland wildlife and aquatic habitat and associated fish and macroinvertebrates all indicate that Nineteen Mile Brook from about ¼ mile above the Tuftonboro/Wolfeboro town line is a high quality small stream, typical of New Hampshire streams largely unaffected by cultural development. During the 2008 summer sampling program, water quality was found to be good to excellent in all locations and during each sampling event, based on field and laboratory measurements of selected water quality parameters. There was no significant evidence of water quality

degradation, upstream to downstream, except for slight increases in conductivity during all sampling events. These increases may reflect the slightly greater amount of development present in the lower portion of the study area, but no upstream/downstream relationship was evident in chemical analyses from the laboratory tests. Regardless, one must conclude that water quality is excellent throughout the study area by any traditional method of assessment.

With respect to wildlife, Nineteen Mile Brook and its adjacent riparian zone currently provides good to high quality habitat for a range of wildlife species, including reptiles and amphibians. Spatial variations in species observed appear to be related to natural variations in habitat quality throughout the study area as a result of the physical morphology of the stream bed and surrounding upland, and the variations in vegetation. These variations are primarily influenced by beaver activity in many locations at the current time. All species of wildlife observed in the study area were common species that were expected to be present and more or less abundant. No listed threatened or endangered species were found and none that are known to exist in Tuftonboro are expected to be present due to a lack of appropriate habitat. The lower reaches of Nineteen Mile Brook and floodplain appear to be especially suitable for the wood turtle which is considered vulnerable by the State of NH.

Aquatic habitat was determined to be excellent for supporting fish and benthic macroinvertebrates, based on the results of surveys in 4 sample locations. The benthic macroinvertebrate community was classified moderately impaired, slightly impaired, and non-impaired at Stations 4, 3, and 2, respectively, but this impairment appears to be entirely natural, resulting from differences in habitat characteristics, such as substrate composition and current velocity. Fish data indicated a good quality, coldwater community at all sampling locations."

The Wolfeboro Rapid Infiltration Basin groundwater discharge project was made operational in 2009 after the conclusion of our baseline environmental studies in Nineteen Mile Brook in 2008. The RIB discharge site experienced performance issues shortly after the system began operating in 2009 with increased flows from pre-existing seep areas above Nineteen Mile Brook which resulted in discrete channelization in previous areas of sheetflow, erosion from the hillslope and sediment deposition in the adjacent wetland areas above Nineteen Mile Brook. In 2009 a slope failure was documented in the seep areas as well as the development of a sink hole and downslope sand migration into wetland areas. In response to the performance issues, discharge rates were reduced below design and permit limits from 600,000 gallons per day (GPD) to 300,000 to 500,000 GPD in an attempt to reduce the groundwater flow rates emerging from the seep areas. Further sediment erosion and deposition in Nineteen Mile Brook associated with the site was documented in 2010 and sediment deposition controls were installed at weirs in the seep areas in response. Flows were further reduced from the RIBs to 200,000 to 400,000 GPD in 2010 and 200,000 to 300,000 GPD in 2011. A piping system was added to the groundwater breakout areas on the hillslopes to convey water away from the seep areas and wetlands directly to the sand traps above Nineteen Mile Brook. An Administrative Order by Consent was issued by NHDES in 2015 citing the groundwater breakouts and resulting erosion and deposition as violations of the Wolfeboro RIB discharge permit. Further engineering controls are being evaluated by Wolfeboro and their consultants in coordination with NHDES to restore the function of the RIB discharge system while protecting the impacted water resources in the area of the project.

On October 15, 2018 Steve Wingate of TCC requested NAI to provide a study plan to repeat the 2008 studies completed by NAI on Nineteen Mile Brook. The goal of the studies would be to determine any environmental changes in the watershed since construction and activation of the Wolfeboro rapid infiltration discharge and provide a new baseline environmental study. Normandeau developed a proposed scope of services that is generally consistent with the 2008 study with assessments of aquatic habitat, benthic macroinvertebrates, fish, aquatic and wetland wildlife, rare, threatened and endangered species, and surface

water quality. We also proposed to review the Wolfeboro rapid infiltration discharge permit file, including any water quality data collected and reported as a permit condition, to evaluate water quality including any trends or other changes since activation of the rapid infiltration discharge. We presented our proposal to the Tuftonboro Board of Selectmen on Tuesday, November 6, 2018 during a selectmen's meeting. After reviewing the proposal, the Board of Selectmen, Mr. Steve Wingate, and Normandeau agreed the best approach would be to complete a full file review for the Wolfeboro rapid infiltration discharge permit and then use the results of the file review to revise our proposed study plan to target areas of need for additional field studies. Normandeau completed a file review in December 2018 and January 2019 that included collecting and reviewing the publicly available information (via NHDES Onestop Data Portal) in the Wolfeboro Groundwater Discharge Permit file. The amount of information available in the groundwater permit file is extensive and we found it necessary to focus our efforts and limited budget on only the file materials determined to be most relevant to the objective of this study – i.e. determining the state of water quality in Nineteen Mile Brook following nine years of operation of the Wolfeboro rapid infiltration discharge. This report discusses the general findings of the permit file review, including specific supporting data of the most critical information, and also highlights the needs for additional information missing from the site history based on our understanding of the observed or potential project impacts on water quality.

Methods

Normandeau performed a file review for the Wolfeboro Rapid Infiltration Basin Facility (Whitten Site) Groundwater Discharge Site #200707014 by obtaining and reviewing the Groundwater Discharge Permits issued for the Site in 2007, 2012, and 2017 and the associated file materials (applications, reports, memos, data submittals, etc.) for the Site as accessed from the NHDES Onestop website. Our objective was to evaluate the state of surface water quality in Nineteen Mile Brook and its tributaries in the vicinity of the RIB Site since our initial baseline study in 2008 and operation of the RIB discharge commenced in 2009. Much of the Project file was dedicated to the engineering aspects of the Project including geotechnical information, discharge flow rates, groundwater quality and elevations, and groundwater discharge zones and responses to the unexpected groundwater breakouts and associated problems. The engineering and groundwater aspects of the Project were beyond the scope of our study which was focused on surface water quality. Surface water sampling was collected extensively as part of the project including routine monitoring required as a permit condition as well as additional monitoring collected for Project performance evaluation and in an effort to ensure surface water impacts were minimized. Much of the surface water data record was available from the NHDES Onestop web site, although some gaps exist in the record, i.e. in 2010 when there were reporting errors and in 2013 and 2014 when non-permit surface water data is not available from Onestop.

Surface water data including water chemistry and physical parameters, biological data, and stream habitat data were reviewed and when deemed relevant entered into a project spreadsheet database. We then reviewed the surface water quality data relative to water quality standards and guidance criteria, as applicable. We also created time series figures from the water chemistry data to evaluate the change in surface water quality over time at the Site and reviewed the water chemistry data relative to position in the watershed to determine whether there were spatial patterns in surface water quality at the site. Habitat data collected as part of the Rapid Bioassessment Protocols were scored and assessed for the years available (2013, 2015) and compared to RBP data from our 2008 study. Macroinvertebrate data were collected in 2013, 2014, and 2015 as a permit requirement and the original taxa counts presented were informally evaluated using the Hilsenhoff Biotic Index to determine the overall tolerance of the macroinvertebrate community sampled in Nineteen Mile Brook.

Results

Site Description – The main stem of Nineteen Mile Brook flows through the Site south of the hill top/slope on which the RIB discharge is located and flows westerly into Whitten Pond and eventually into Lake Winnepesaukee. An unnamed tributary to Nineteen Mile Brook flows south around the east side of the hill top/slope on which the RIB discharge is located and joins Nineteen Mile Brook approximately a quarter mile upstream of Whitten Pond. On the southwest slope of the hill on which the RIB discharge is located there are two areas of groundwater seeps with hillslope wetlands (Western Groundwater Discharge Area and Central Groundwater Discharge Area) that discharge from culverts beneath the Site access road as small surface water tributaries to Nineteen Mile Brook. Engineering reports show that the majority of RIB discharge water passes through these seep areas and then enters Nineteen Mile Brook as surface water through two minor tributaries (referred to as WGDA Tributary and CGWDA Tributary in this report). Surface water sampling stations were established along the main stem of Nineteen Mile Brook and the Unnamed Tributary, as well as in the Groundwater Discharge Areas. The table below lists the sampling stations that were reviewed for this report and their position in the watershed. Figure 1, from Meeting Minutes for a NHDES meeting on October 2, 2015, shows the Site and sampling station locations.

Table 1. Surface water sampling stations on Nineteen Mile Brook and tributaries

Station ID	Easting	Northing	Surface Water Body
19MB-01	1100230	412039	Main Stem Nineteen Mile Brook
19MB-02	1098627	412735	Main Stem Nineteen Mile Brook
19MB-04	1096086	413100	Main Stem Nineteen Mile Brook
19MB-06	1099847	412663	Unnamed Tributary
19MB-07	1098580	412856	Western Groundwater Discharge Area
19MB-08	1099044	413022	Western Groundwater Discharge Area
19MB-09	1099010	412441	Central Groundwater Discharge Area
19MB-10	1099193	412778	Central Groundwater Discharge Area
19MB-11	1099441	412694	Access road east of Central Groundwater Discharge Area
19MB-12	1099921	412866	Unnamed Tributary
19MB-13	1100020	412970	Unnamed Tributary
19MB-14	1100128	413033	Unnamed Tributary
19MB-15	1100225	413337	Unnamed Tributary
19MB-16	1100068	413482	Unnamed Tributary
19MB-17	1099852	413581	Unnamed Tributary
19MB-18	1099729	412147	Unnamed Tributary
19MB-19	1099651	412143	Main Stem Nineteen Mile Brook
19MB-20	1099014	412355	Main Stem Nineteen Mile Brook
19MB-21	1098437	412866	Main Stem Nineteen Mile Brook

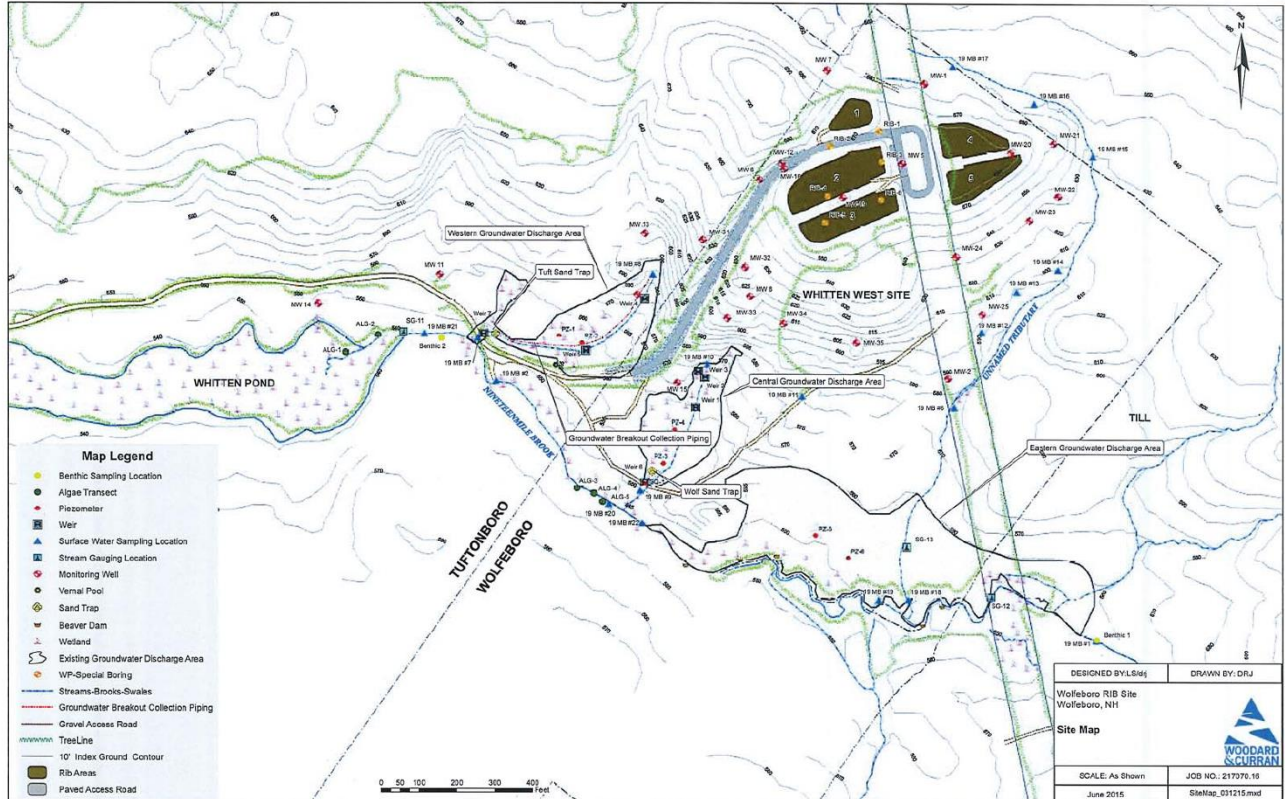


Figure 1. Site Map

Surface water chemistry – The Wolfeboro RIB Site project file had water chemistry data for the period July 2007 through August 2017 at the time of our research. Stations 19MB-1 (an upstream reference station), 19MB-4 (downstream of the Project influence at the Rte 109 crossing), and 19MB-21 (downstream of the Project influence above Whitten Pond) have the most comprehensive surface water quality records for the Project and have sampling requirements under the current and previous permits. Other water quality monitoring stations in the Western Groundwater Discharge Area (19MB-7, 19MB-8) and the Central Groundwater Discharge Area (19MB-9, 19MB-10) have extensive records as well and are monitored routinely. Other stations in the Project area have more sporadic records and were included in our analysis as much as possible. Multiple water chemistry parameters were monitored at each of the stations, including nutrients, which are the primary pollutants of concern from wastewater treatment facility discharges. Our review of data focused primarily on nutrients including total phosphorus and nitrate, although other parameters including chloride were also reviewed for patterns, trends, and water quality exceedances.

Total phosphorus, which is typically the limiting nutrient in freshwaters, was monitored extensively at the Project site and was the surface water quality parameter we were most focused on. In New Hampshire, state surface water quality standards are identified in Env WQ-1700. There are no numerical water quality standards for phosphorus in NH; however, Env-Wq 1703.14 states that “Class B waters shall contain no phosphorus or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring” and also states that “There shall be no new or increased discharge containing phosphorus or nitrogen to tributaries of lakes or ponds that would contribute to cultural eutrophication or growth of weeds or algae in such lakes and ponds.” EPA has provided guidelines for nutrient criteria in the absence of state water quality standards based on aggregate ecoregions throughout the US. For Aggregate Ecoregion VIII, which includes northern New England and Nineteen Mile Brook, the recommended phosphorus limit is 0.010 mg/L for rivers and streams. While this guideline is not an enforceable limit, it does provide guidance for assessing the state of rivers and streams. In the available water quality data for Nineteen Mile Brook, there are routine exceedances of the 0.010 mg/L TP threshold throughout the watershed and throughout the period of record from 2007 – 2017. Figures 2 - 4 below show TP as time series from 2007 through 2015 (Figures 2 & 3) and from 2007 – 2017 (Figure 4). These figures show that total phosphorus is variable throughout the Site and that higher levels of TP are documented in the control reach (Station 19MB-1) outside the influence of the discharge and also at multiple stations in the timeframe pre-dating the operation of the discharge, which suggests naturally existing TP levels exceed the EPA guideline. The time series plots in Figures 2 – 4 also show an overall decreasing trend in TP levels throughout the watershed. Total phosphorus values in the watershed do not show strong evidence of spatial patterns of distribution, although there were some minor patterns evident. In general, the highest levels of TP were on average slightly higher in the Central and Western Groundwater Discharge Area at Stations 19MB-08 and 19MB-10 compared to stations along the main stem of Nineteen Mile Brook. This suggests some evidence of minor TP effects from the RIB discharge in the Groundwater Discharge Areas, although the averages are only marginally higher and should not be considered significant.

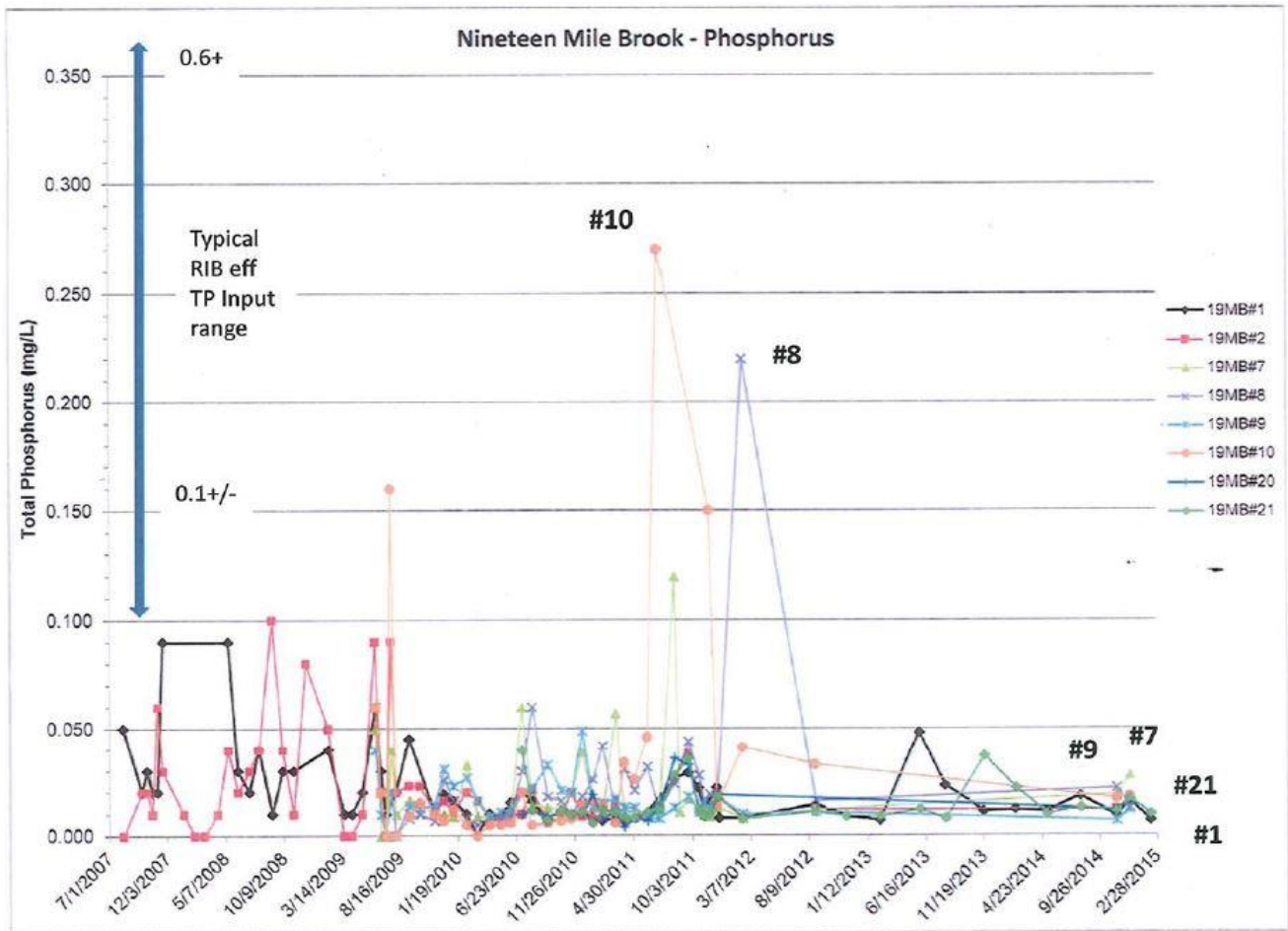


Figure 2. Total phosphorus at all stations except 19MB-4 for 2007 – 2015 (from Wolfeboro memo, 2015)

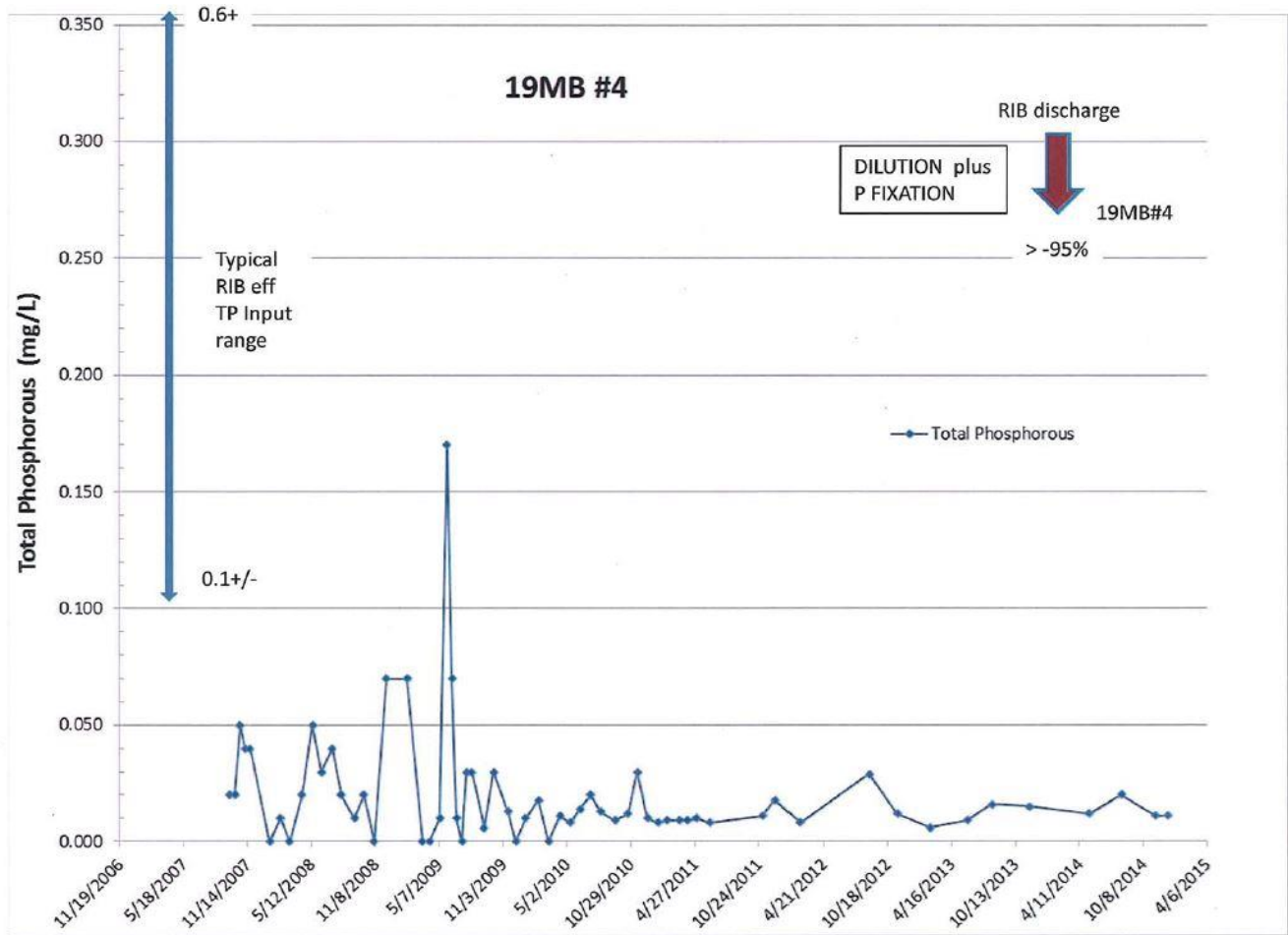


Figure 3. Total phosphorus at station 19MB-4 for 2007 – 2015 (from Wolfeboro memo, 2015)

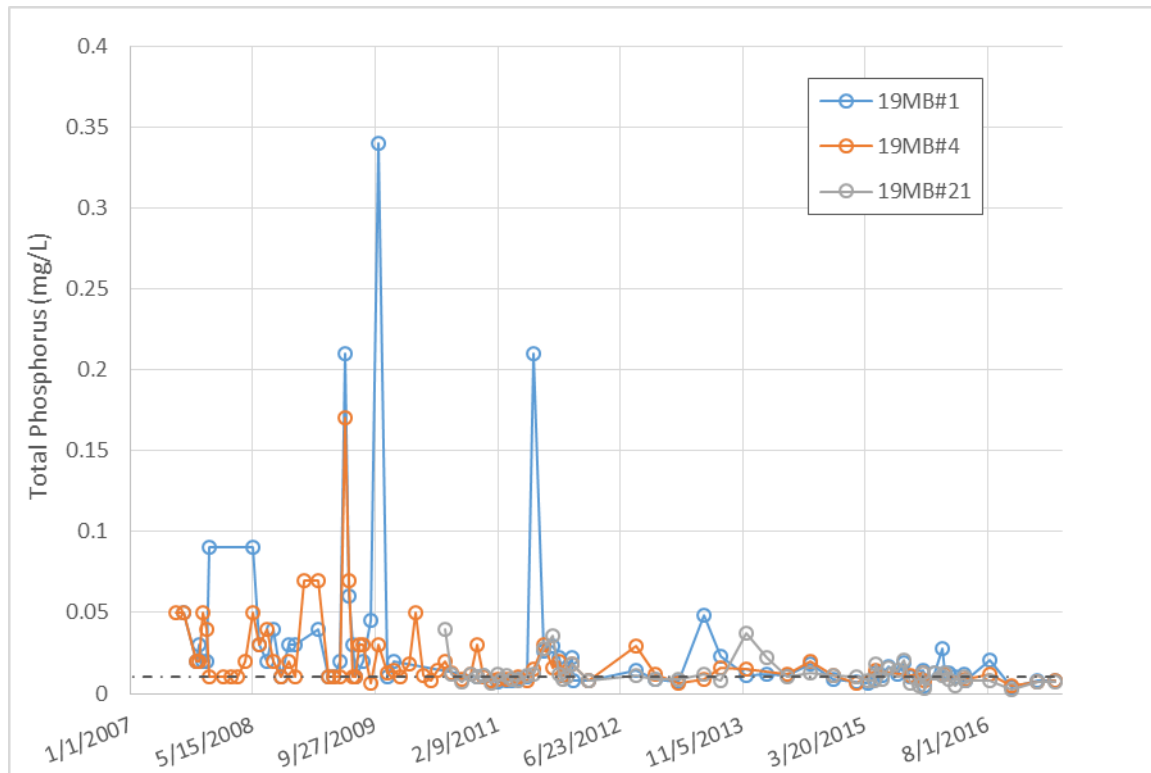


Figure 4. Total Phosphorus at stations 19MB-1, 19MB-4, and 19MB-21 for 2007 - 2017

There are also extensive nitrogen data for the period of record throughout the Nineteen Mile Brook watershed, primarily as nitrate, the most common form of nitrogen in surface waters. Like phosphorus, there are no numerical surface water standards for total nitrogen or nitrate in New Hampshire. Env-Wq 1703.14 states that “Class B waters shall contain no phosphorus or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring” and also states that “There shall be no new or increased discharge containing phosphorus or nitrogen to tributaries of lakes or ponds that would contribute to cultural eutrophication or growth of weeds or algae in such lakes and ponds.” The EPA guideline for total nitrogen for Aggregate Ecoregion VIII, which includes northern New England and Nineteen Mile Brook, is 0.38 mg/L for rivers and streams. In the available water quality data for Nineteen Mile Brook, nitrate values are highly variable, with values at stations along the main stem of Nineteen Mile Brook generally below the 0.38 mg/L total nitrogen threshold, while nitrate values in the Western and Central Groundwater Discharge Areas tended to be much higher – typically in the 0.5 – 2.5 mg/L range. Figures 5 - 7 below show nitrate as time series from 2007 through 2015 (Figures 5 & 6) and from 2007 – 2017 (Figure 7). These figures show that nitrate levels have generally increased in the watershed since 2007 and particularly since the RIB discharge commenced in 2009. As indicated, there are strong spatial patterns of distribution of nitrate in the Nineteen Mile Brook watershed. The main stem on Nineteen Mile Brook indicates the highest nitrate levels near Station 19MB-21, below the groundwater discharge areas, and the lowest nitrate levels at Station 19MB-01, the background station above the influence of the RIB discharge. The most consistently high levels of nitrate were measured in samples from the uppermost stations in the Western and Central Groundwater Discharge Areas (19MB-08 and 19MB-10, respectively). The median nitrate value for all samples from Station 19MB-08 was 1.1 mg/L, while at Station 19MB-10 it was 1.8 mg/L. These values are over an order of magnitude greater than the

median nitrate value at Station 19MB-01 (background station) of 0.07 mg/L. Clearly, nitrate levels in Nineteen Mile Brook increased with commencement of operations of the RIB discharge and increased most significantly in the surface water tributaries receiving groundwater discharges in the Western and Central Groundwater Discharge Areas.

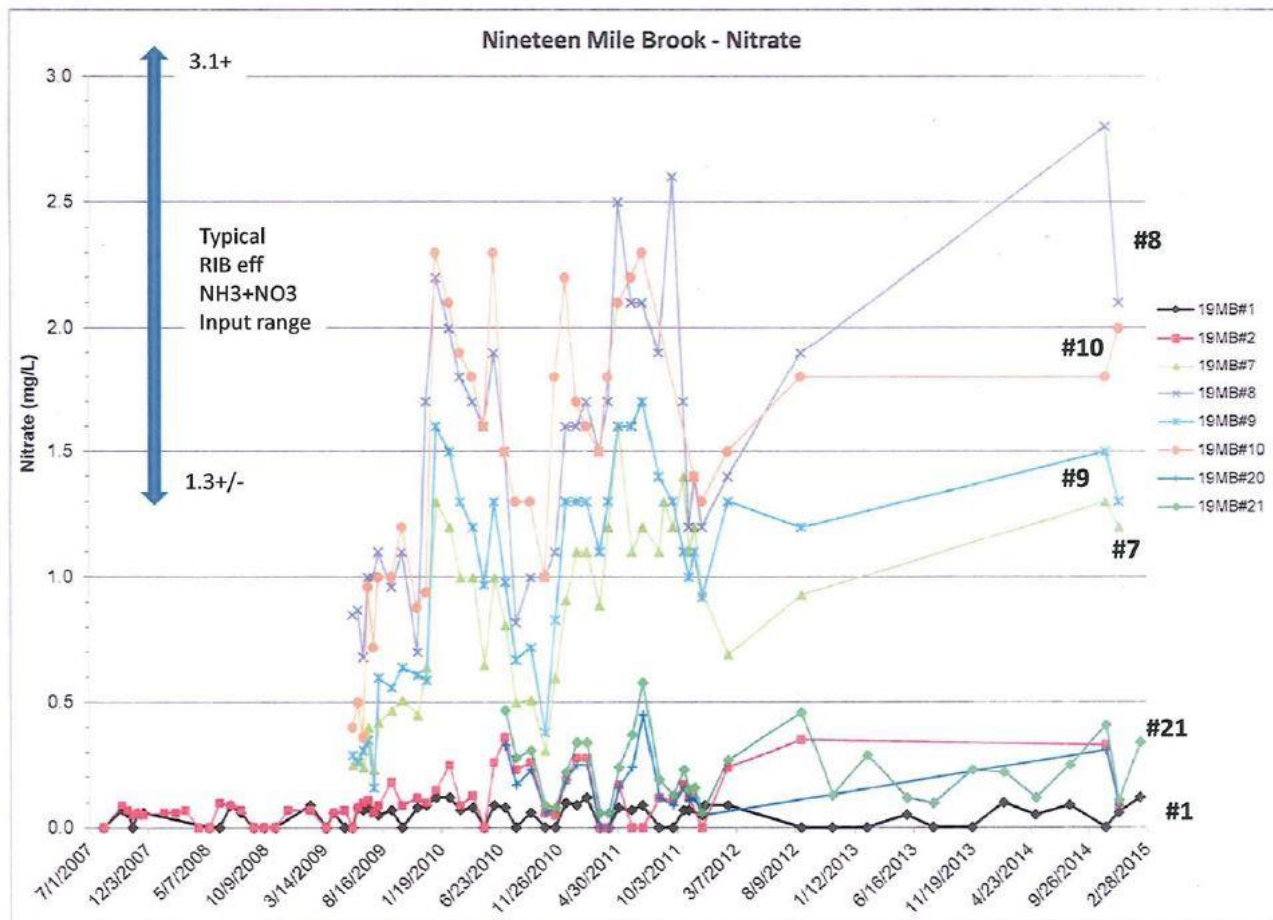


Figure 5. Nitrate at all stations except 19MB-4 for 2007 – 2015 (from Wolfeboro memo, 2015)

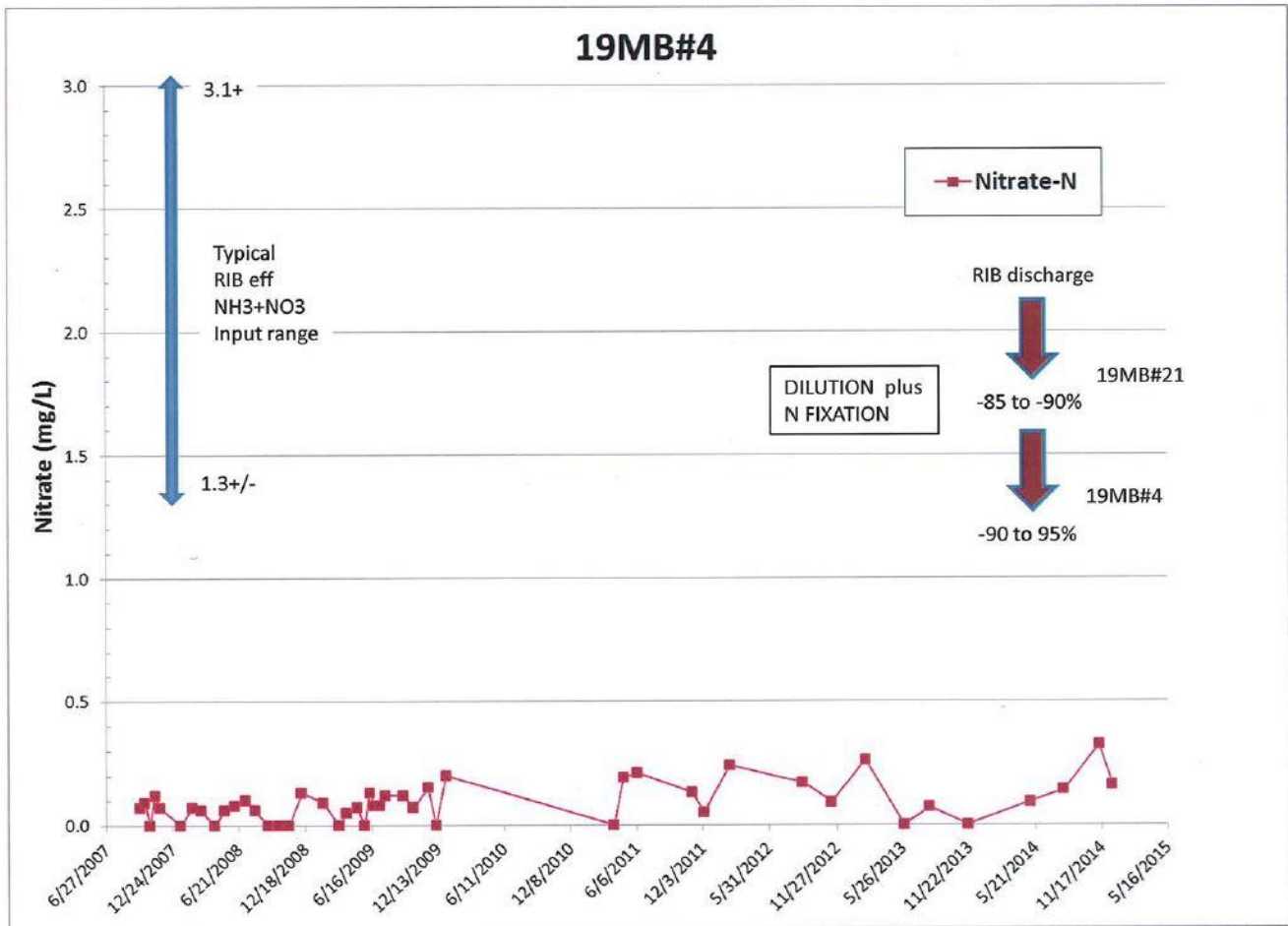


Figure 6. Nitrate at station 19MB-4 for 2007 – 2015 (from Wolfeboro memo, 2015)

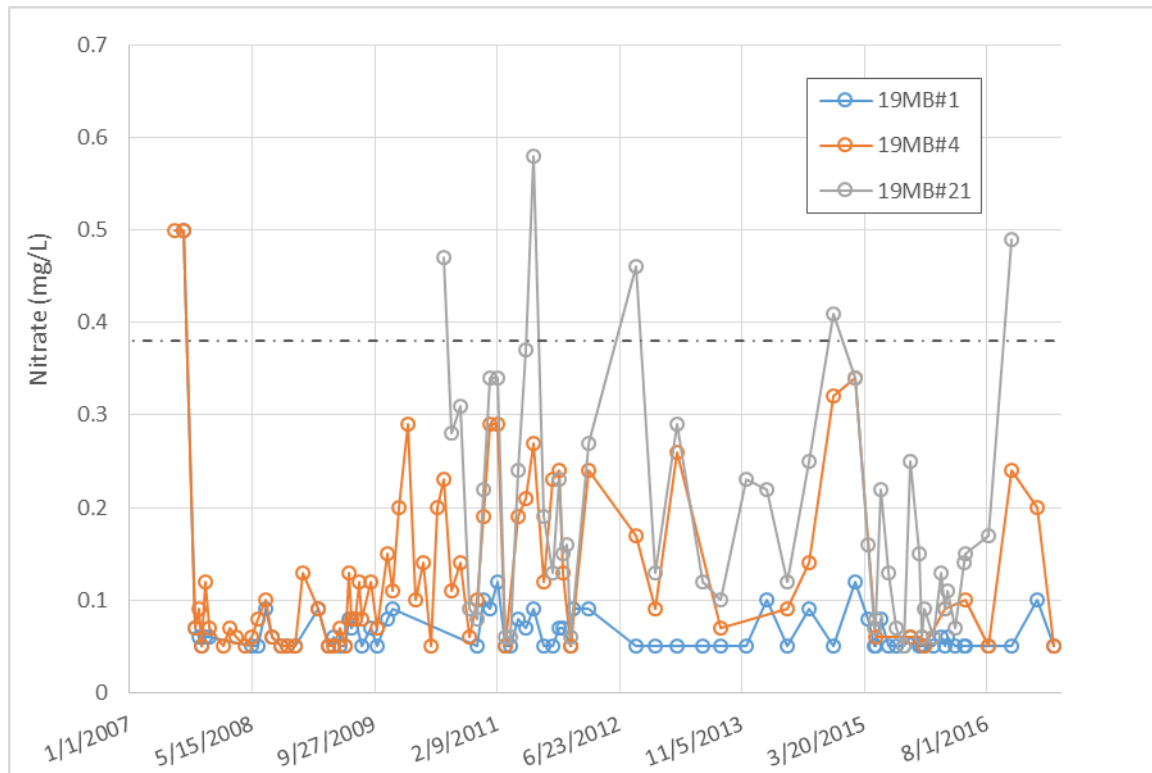


Figure 7. Nitrate at stations 19MB-1, 19MB-4, and 19MB-21 for 2007 - 2017

Chloride is another parameter of concern for wastewater discharges to surface waters, including indirect discharges via groundwater infiltration, due to the conservative nature of chloride (i.e. there is generally no natural attenuation of chlorides in surface water or groundwater). Extensive chloride data was collected as part of the Project's permit compliance monitoring and chloride time series data are presented in Figures 8 and 9. It is evident from the surface water chloride data that natural chloride levels are low in Nineteen Mile Brook with consistent measurements around 5 mg/L chloride at the background station 19MB-01, upstream of the discharge. Since commencement of operation of the RIB discharge in 2009, chloride levels downstream of the discharge areas have increased considerably above background levels. Monitoring stations on the main stem of Nineteen Mile Brook have had chloride detected at 2-10 times the concentration of background samples and monitoring stations in the Western and Central Groundwater Discharge Areas have had chloride detected at 10-30 times the concentration of background samples. In New Hampshire, state surface water quality standards are identified in Env WQ-1700. Chloride has an acute freshwater standard of 860 mg/L and a chronic freshwater standard of 230 mg/L, for the protection of aquatic life. There was no evidence of an exceedance of either standard based on the readily available chloride data reviewed as part of this study.

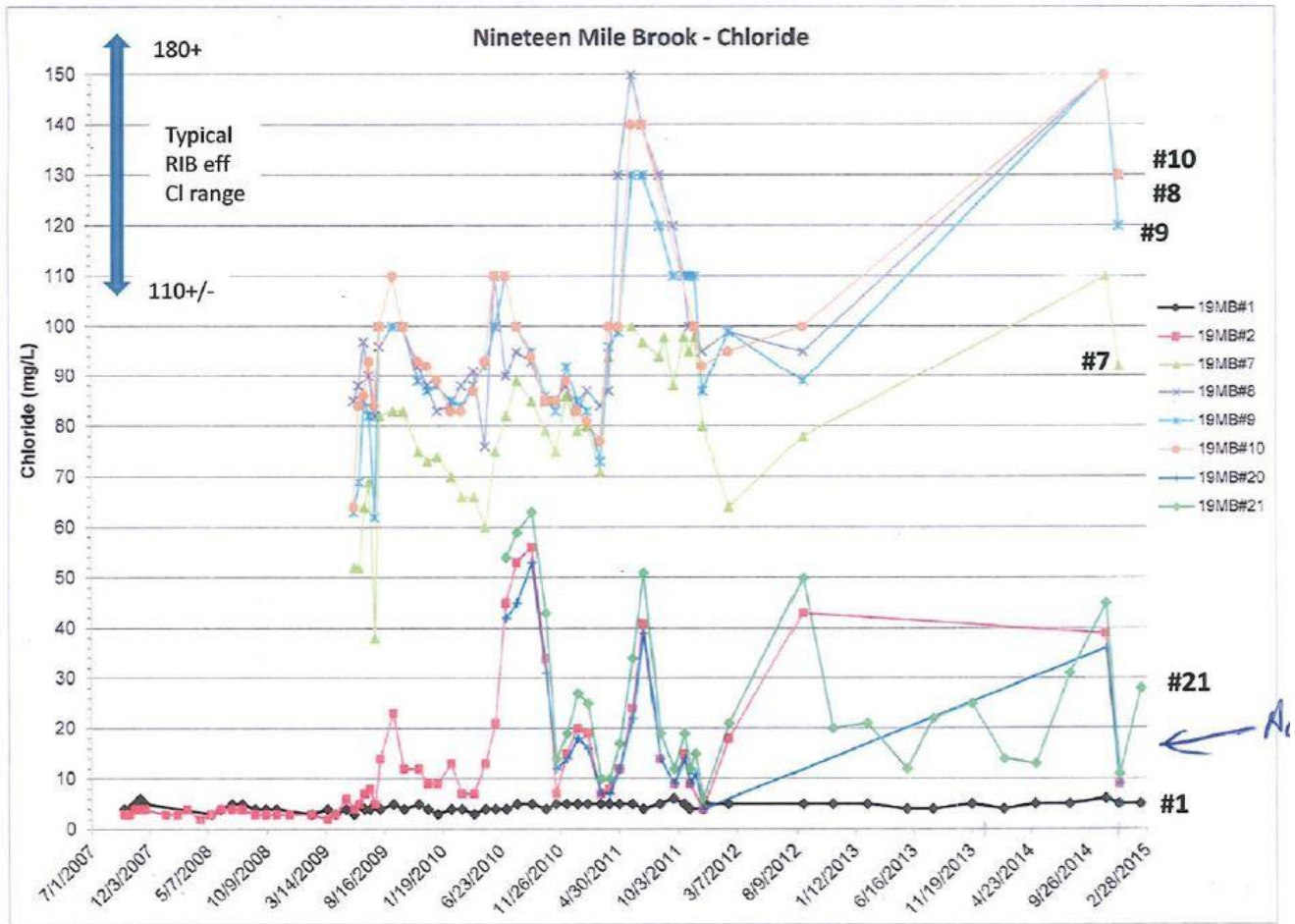


Figure 8. Chloride at all stations except 19MB-4 for 2007 – 2015 (from Wolfeboro memo, 2015)

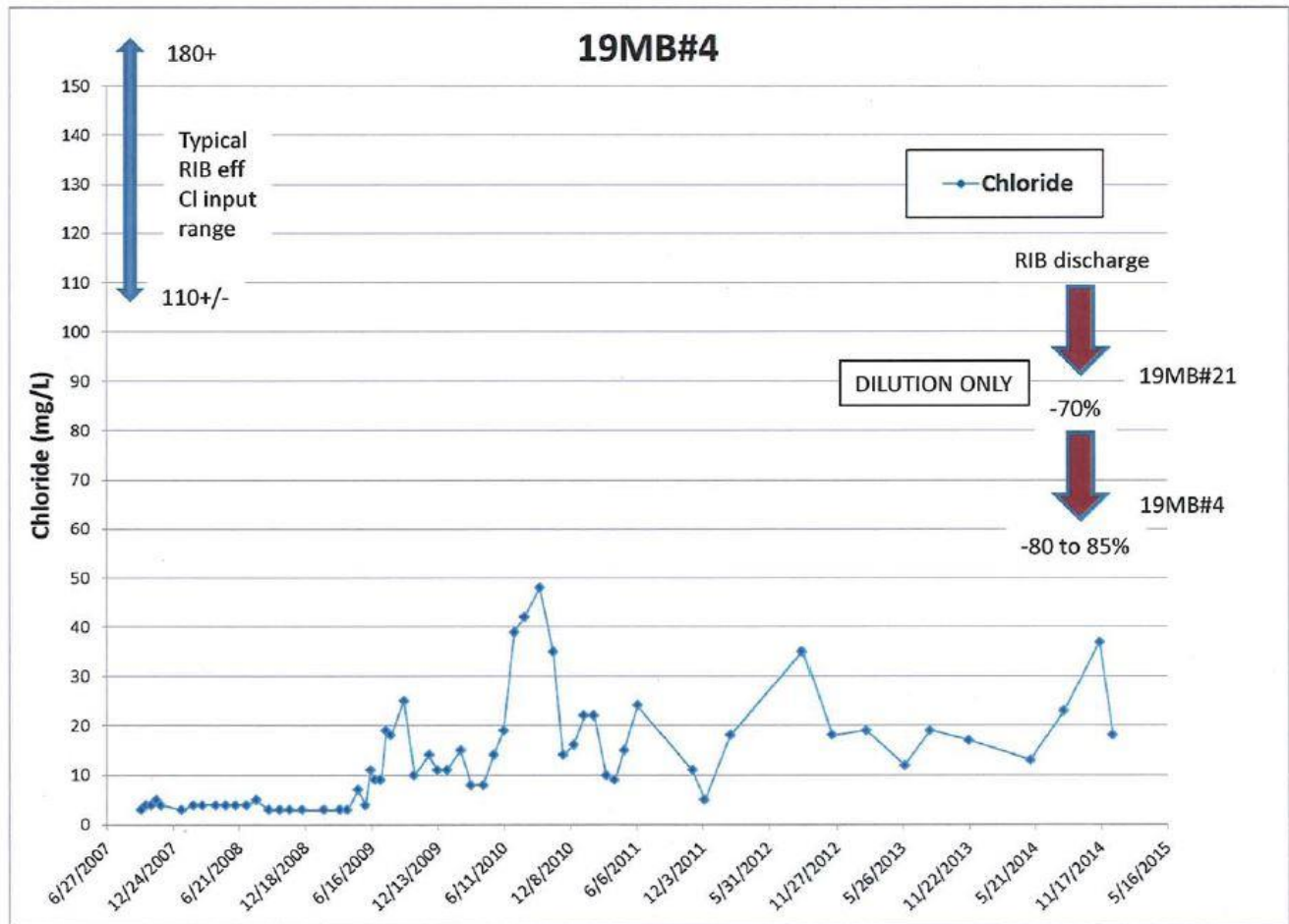


Figure 9. Chloride at station 19MB-4 for 2007 – 2015 (from Wolfeboro memo, 2015)

RBP Habitat Assessment – Aquatic and riparian habitat in Nineteen Mile Brook has been evaluated in our 2008 baseline study and again in 2013 and 2015 per the Project Groundwater Discharge Permit requirement using US EPA’s Rapid Bioassessment Protocols (RBP, Barbour et al. 1999). Ten metrics are evaluated on a numerical scale of 0 to 20 (highest quality) for each sampling reach. The ratings are then totaled and compared to a reference (upstream) condition to provide a final habitat ranking; scores increase as habitat quality increases. Total habitat scores range from 0 to 200; therefore, in general, scores 150 to 200 indicate excellent habitat quality, scores 100 to 149 indicate good habitat quality, scores 50 to 99 indicate fair habitat quality, and scores 0 to 49 indicate poor habitat quality. Changes in aquatic and riparian habitat could result in changes in water quality and documenting changes over time is important for evaluating the overall ecological integrity of a stream. The table below presents a summary of the available RBP habitat assessment data. As can be seen in the table, the stations where RBP habitat assessments have taken place on Nineteen Mile Brook generally indicate “Excellent” habitat value, with the exception being Station 19MB-21A, which, in 2013, was ranked as having “Good” habitat.

Table 2. RBP Habitat scores by year and location

	2008				2013		2015	
	Downstream Station - near mouth of Nineteen Mile Brook	Downstream Station - downstream of Whitten Pond	Downstream Station - upstream of Whitten Pond	Reference Station - Near 19MB-01	Downstream Station	Reference Station	Downstream Station	Reference Station
Station	1	2	3	4	21A	19MB1	21A	19MB1
Total RBP Score	158	154	151	159	136	155	155	175
Habitat Value	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Excellent	Excellent

Benthic Macroinvertebrates – In our 2008 Nineteen Mile Brook baseline study, we evaluated the in-stream macroinvertebrate community to assist with determining the overall state of water quality in the brook. Macroinvertebrates are variably sensitive to water quality and the abundance of various taxa can effectively indicate high quality streams versus impaired streams and can be useful in tracking changes in water quality over time. In the 2008 study we sampled macroinvertebrates at four locations on the main stem of Nineteen Mile Brook – Station 1 was near the mouth of the brook, Station 2 was below Whitten Pond, Station 3 was above Whitten Pond, and Station 4 was upstream of the proposed discharge areas. We used a kick-net method of sampling the benthic community which is a different method from later benthic sampling under the 2012 and 2017 Groundwater Discharge Permits which used a deployed artificial substrate sampler (“rock basket”). The differences in sampling methods don’t allow for statistically rigorous direct comparison. However we can qualitatively review the results from both methods and generally evaluate indications of impairment from the available data. The macroinvertebrate data from the 2008 Baseline Study indicated moderate impairment at Station 1, slight impairment at Station 2, and no impairment at Station 3, all relative to reference Station 4, which had an overall good water quality rating. NHDES evaluated the 2013 and 2014 macroinvertebrate data submitted as part of the Groundwater Discharge Permit requirements and determined an Index of Biotic Integrity, which is the summation of a number of macroinvertebrate statistical metrics. For the 2013 macroinvertebrate data, the upstream reference station 19MB-01 had an IBI score of 66.55 which “passed” the threshold of 65.44, while the downstream station 19MB-21 had an IBI score of 53.63 which “failed” to meet the threshold score of 65.49. In 2014, both 19MB-01 and 19MB-21 failed to meet the threshold IBI scores, with scores at 62.49 and 60.88, respectively. These results may indicate impairment, although we were unable to formally develop all of the indices to provide a more comprehensive evaluation within the scope of this project. An informal (not statistically rigorous) evaluation of one metric, the Hilsenhoff Biotic Index, indicate fair to excellent HBI values as determined from the 2013, 2014, and 2015 macroinvertebrate data. Multiple indices also indicate a pattern of slightly higher water quality in the reference station as compared to the downstream station affected by the RIB discharge, although, again, this is an informal and preliminary evaluation.

Recommendations

Nineteen Mile Brook is a high quality coldwater habitat stream that, since 2009, indirectly receives nearly all of the Wolfeboro Rapid Infiltration Basin Facility wastewater discharge through groundwater infiltration adjacent to the brook. Given the site history associated with the RIB discharge, including performance issues significant enough to warrant an Administrative Order by Consent from NHDES citing a

violation of the RIB Facility Groundwater Discharge Permit and, based on the available data presented in this report, which show evidence of surface water quality impacts likely resulting from the RIB discharge (primarily chloride and nitrate), we feel that continued environmental monitoring and environmental data evaluation is prudent and justified. Normandeau previously presented to Tuftonboro, on October 26, 2018, a proposal for baseline environmental monitoring on Nineteen Mile Brook that included several studies for completion in 2019. Included in those studies were surface water quality (chemistry), aquatic habitat assessment, macroinvertebrates, fish, wildlife, and rare, threatened, and endangered species evaluation. Following this file review, we generally concur with those recommendations, although we feel that adding continuous specific conductance monitoring, as a surrogate for chloride, may be valuable. We also conclude that a wildlife study may be unnecessary at this point and that the other proposed studies remain higher priority. The results of this file review have also helped to identify further analyses that should be performed on existing and newly collected data including a review of surface water quality antidegradation requirements in NH and implications for water chemistry in Nineteen Mile Brook as well as a rigorous statistical analysis of macroinvertebrate data. Normandeau will review and revise our proposal for additional environmental studies on Nineteen Mile Brook, based on the findings highlighted in this report, and submit a revised proposal to the Town of Tuftonboro for review.