2019 Water Quality Report
Milton, MA

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neponset river
WATERSHED ASSOCIATION

Introduction:

The Neponset River Watershed Association (NepRWA) has been collecting water quality data in Milton and throughout the Neponset River watershed since 1996. Samples are collected by volunteers through the Citizen Water Monitoring Network (CWMN) and by NepRWA staff through the Hot Spot program.

There are ten permanent CWMN stations within and bordering the Town of Milton; three on Pine Tree Brook, three on Unquity Brook and four on the Neponset River. CWMN stations are sampled once per month between May and October. Waterbodies in Milton are tested for *E.coli*, total phosphorus, pH, dissolved oxygen, temperature, and flow rate. Select sites may also be tested for ortho-phosphate, total nitrogen, ammonia, and chlorophyll a. Hot spots are tested for *E.coli*, ammonia, and surfactants. The parameters discussed in this report are limited to those that are tested at every site.

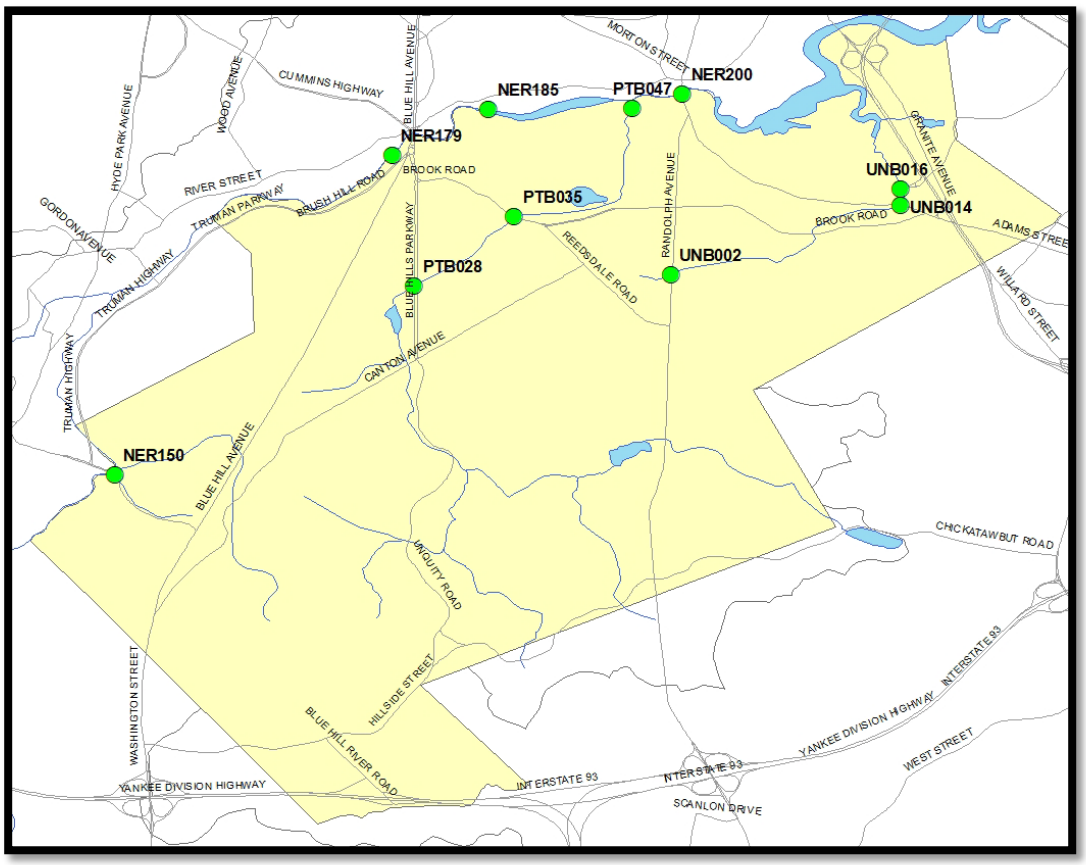

Figure 1: Map of CWMN Sites in Milton

Data gathered by the CWMN volunteers are used to track the health of the Neponset River and its tributaries, and to locate pollution hot spots for follow-up sampling. Hot Spot sampling in Milton has occurred in Unquity Brook and Pine Tree Brook. In each case, the goal of the Hot Spot sampling was to locate potential sources of sewage contamination.
This report is intended to provide a summary and interpretation of the results from CWMN 2019 and subsequent Hot Spot sampling. The raw water quality data are available upon request.

Milton Water Quality Analysis

E.coli

E.coli bacteria are used to assess a waterbody's suitability for human contact during recreational activities. They are often used as indicators of the presence of other, more dangerous, pathogens associated with human and animal waste. In Massachusetts there are two criteria for what is considered an acceptable level of *E.coli* within a Class B waterbody. For primary recreation, also referred to as the swimming standard, no single sample shall exceed 235 Colony Forming Units (CFU) per 100 ml, and/or the geometric mean of at least 5 samples taken within the same season shall not exceed 126 CFU/100ml. For secondary recreation, also referred to as the boating standard, the geometric mean of at least 5 samples taken within the same season shall not exceed 630 CFU/100ml.

Neponset River

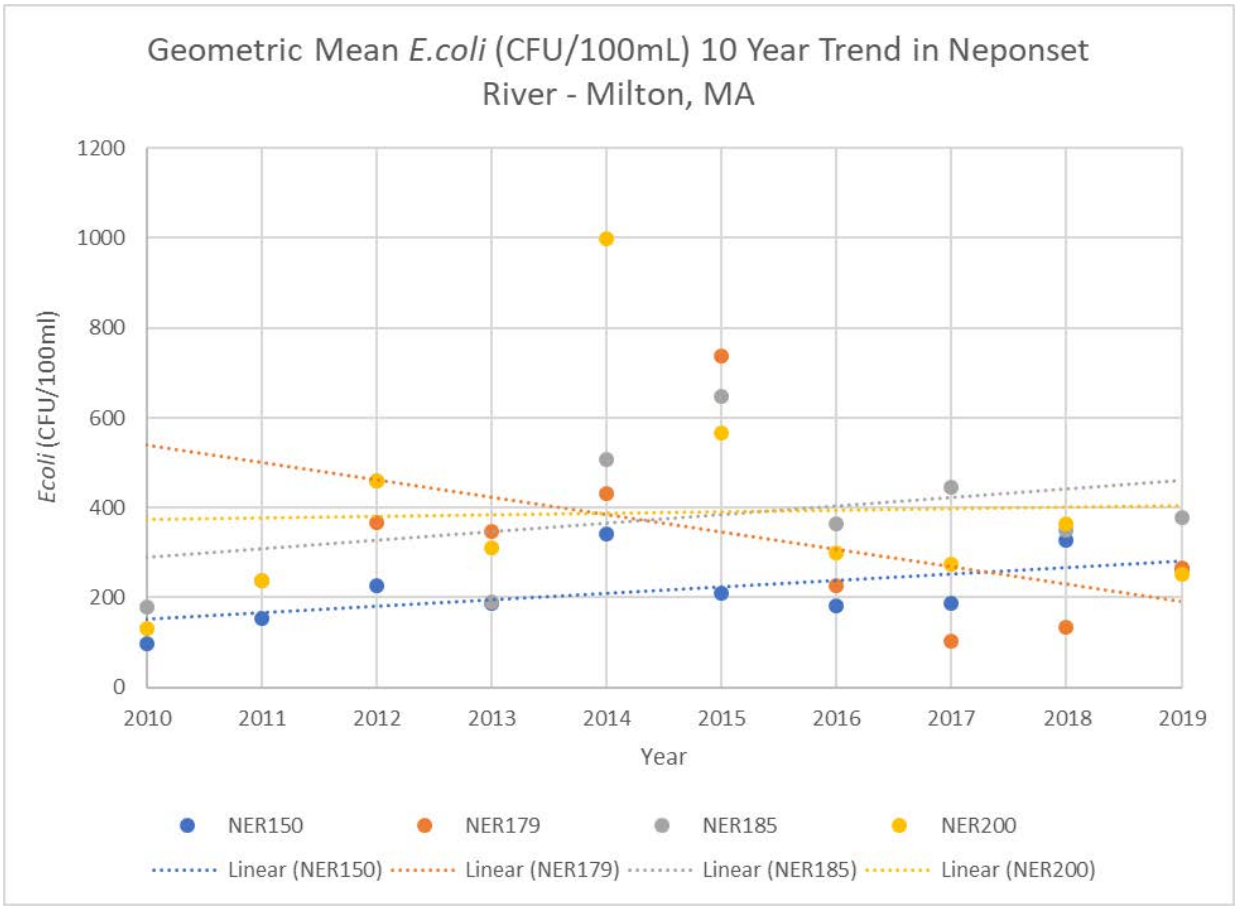

Figure 2: Geometric mean of *E.coli* concentrations in the Neponset River over the past 10 years in Milton, MA

According to Table 1 (below), *E.coli* values in the Neponset River were better than average at NER179 and NER200, average at NER185, and slightly worse than average at NER150. Figure 2 suggests that over the past decade *E.coli* concentrations have slightly increased or remained the same at three of the four sites on the Neponset River. The only site that has shown improvements in the Neponset River is NER179 (Kennedy Playground). NepRWA began sampling NER179 in 2012, and *E.coli* concentrations have improved significantly over that time period. Figure 2 also suggests that *E.coli* levels spiked in 2014 and 2015 at several sites but has returned to lower levels in recent years. The cause of the spike is still unknown.

The Neponset River in Milton has generally been safe for boating for at least the last decade. Boating is the most common form of recreation in this section of the river. All of the Milton sites on the Neponset met the boating standard in 9 of the last 10 years. Unfortunately, none of the Neponset River sites in Milton have met the swimming standard since 2017, so there is still room for improvement.

Pine Tree Brook

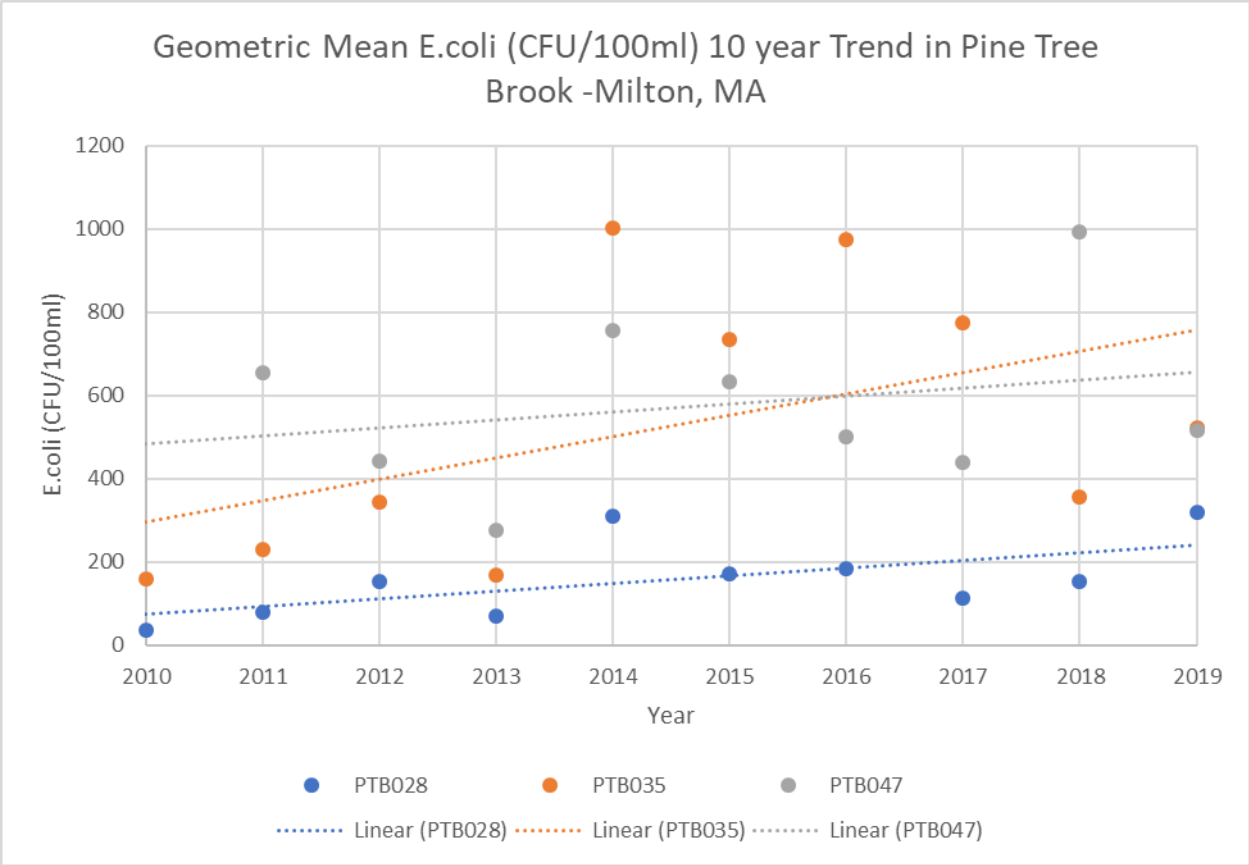

Figure 3: Geometric mean of *E.coli* concentrations in Pine Tree Brook over the past 10 years in Milton, MA

All three sites on Pine Tree Brook met the boatable standard for *E.coli* in 2019. However, figure 3 suggests that *E.coli* concentrations in Pine Tree Brook have been increasing over the past decade. The most pronounced increase was seen at PTB035 (Brook Rd). The increasing trend

at PTB035 appears to be driven by abnormally high *E.coli* concentrations between 2014-2017. According to Table 1 (below), concentrations at PTB035 were lower than average in 2019. In fact, *E.coli* concentrations at PTB035 have improved over the past two years, however, these concentrations were still 3x times higher than the swimmable limit. So, there is still plenty of room for improvement.

PTB028 (Blue Hills Parkway) had its highest *E.coli* levels in a decade. In fact *E.coli* concentrations at this site were more than twice the 9 year average, according to Table 1. While PTB028 had the best water quality of all three sites, the increase in *E.coli* in 2019 is a concern. One explanation for the higher than average *E.coli* levels in 2019 was the disproportionate number of wet weather sampling days in 2019. Table 2, shows a large disparity between dry weather *E.coli* concentrations and wet weather concentrations. In 2019 only one out of five samples were collected during dry weather.

E.coli concentrations at PTB047 (Central Ave) were much improved over last year. According to Table 1, PTB047 had an average year for *E.coli* concentrations in 2019. Unfortunately, that average is over 4 times the swimmable limit.

Unquity Brook

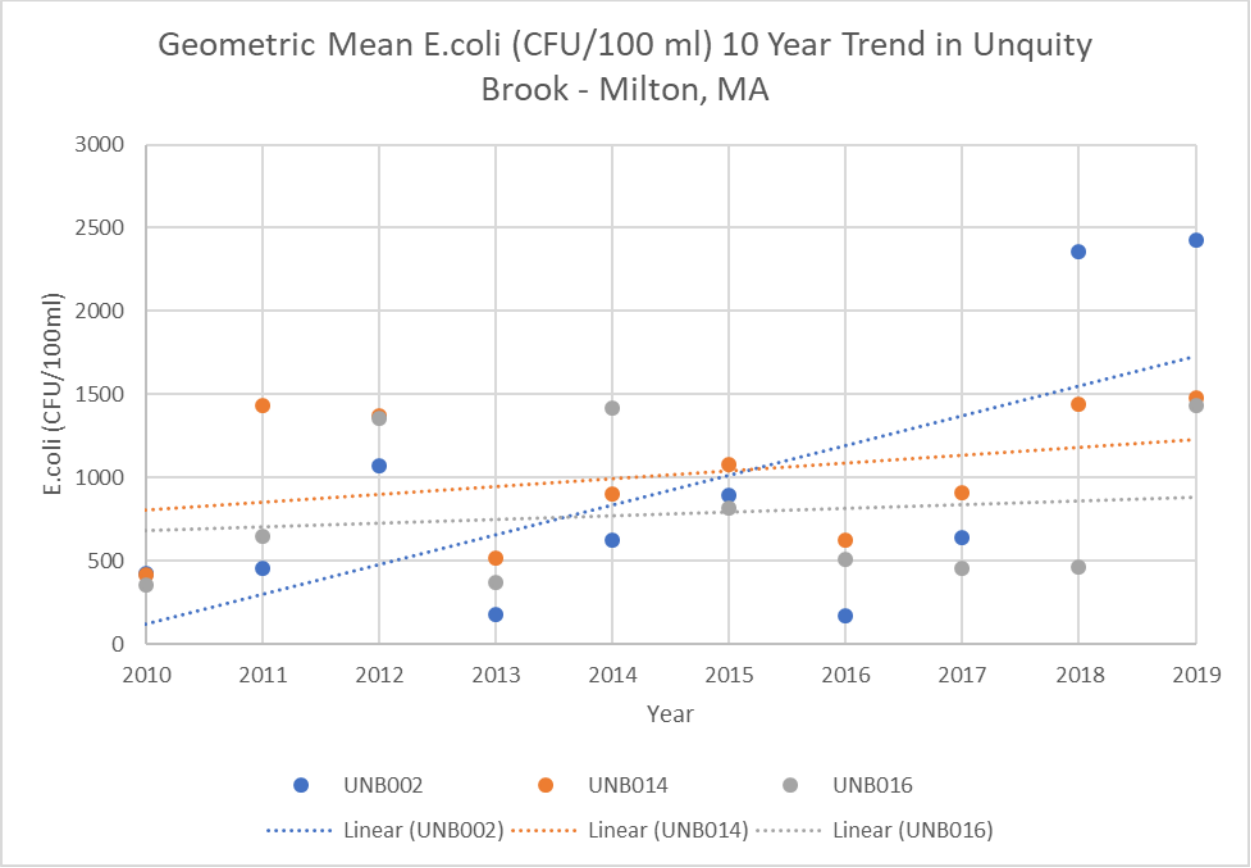

Figure 4: Geometric mean of *E.coli* concentrations in Unquity Brook over the past 10 years in Milton, MA (Note: Y axis scale is greater than figures 2 and 3)

None of the sites on Unquity Brook met the swimming or boating standards in 2019. E.coli concentrations at UNB002 and UNB014 were alarmingly high for the second year in a row, and UNB016 had its highest E.coli concentrations of the decade in 2019. Illicit discharges have been identified on Uniquity Brook in the past, and a new stormwater BMP was installed at the Milton Police Station in 2019. Unfortunately, there appears to be more unaddressed issues that need to be resolved at Uniquity Brook.

Table 1: *E.coli* concentrations in 2019 compared to previous 9-year average

Site ID	Average Geometric Mean of *E.coli* (CFU/100mL) 2010-2018	Geometric mean of *E.coli* concentrations (CFU/100mL) 2019
NER150	212	264
NER179	335	265
NER185	376	377
NER200	405	253
PTB028	141	318
PTB035	527	523
PTB047	587	515
UNB002	759	2423
UNB014	967	1481
UNB016	711	1438

One major source of *E.coli* contamination is stormwater runoff. Table 2 suggests that some of the sites on the Neponset River and upper Pine Tree Brook are heavily impacted by stormwater runoff. Other sites on Unquity Brook and Pine Tree Brook, surprisingly, had lower E.coli concentrations during wet weather than during dry weather. Those sites on Unquity Brook and Pine Tree Brook, had high *E.coli* concentrations regardless of the weather suggesting that those areas are impacted by more than just stormwater pollution.

Table 2: *E.coli* concentrations in 2019 during wet and dry weather

Weather	Number of Samples 2019	Geometric Mean *E.coli* Conc. (cfu/100ml)
NER150		
Dry	2	175
Wet	4	324
NER179		
Dry	1	132
Wet	3	334
NER185		
Dry	2	224
Wet	4	489
NER200		

Weather	Number of Samples 2019	Geometric Mean *E.coli* Conc. (cfu/100ml)
PTB035		
Dry	2	603
Wet	4	487
PTB047		
Dry	2	651
Wet	4	440
UNB002		
Dry	2	1190
Wet	4	3457
UNB014		

Dry	2	125		Dry	2	2649
Wet	4	360		Wet	4	1108
PTB028				**UNB016**		
Dry	1	31		Dry	2	1097
Wet	4	569		Wet	4	1647

Improper disposal of pet waste in the street, lawns, and catch basins is the most common source of *E.coli*. However, some is also the result of naturally occurring wildlife waste. Non-structural BMPs that educate citizens about proper pet waste disposal, and regular cleaning of catch basins should help reduce *E.coli* loads. Infiltration BMPs are also highly effective in reducing *E.coli* loading before it reaches a waterbody and building those types of BMPs should be a prioritized when possible.

Hot Spot Results

In 2016, three suspected illicit discharges along Unquity brook were discovered by NepRWA staff via Hot Spot monitoring. The discovered sites were behind the police station, a private sewer discharging under Brook Rd, and the culvert discharging from under Reedsdale Rd. The Milton police station received major stormwater upgrades in 2019, which will hopefully translate into water quality improvements at UNB002.

Hot Spot monitoring of Pine Tree Brook has not uncovered any conclusive illicit discharges. However, the results support the notion that there are high instream *E.coli* levels in Pine Tree Brook most of the time. Continued efforts in this area will hopefully uncover the source of the *E.coli* bacteria.

There are four CWMN stations along the Neponset River that abut the Town of Milton. It is unlikely that Milton is the sole contributor of *E.coli* in these areas. There are several known illicit discharges in Hyde Park and Mattapan that are likely contributing to high levels of *E.coli* during dry weather in this part of the river. Further monitoring of the Milton outfalls in this section of the river would be needed to confirm this.

Phosphorus

Phosphorus is often the limiting nutrient in freshwater aquatic ecosystems, meaning that the level of available phosphorus in any given waterbody is directly linked to that waterbody's ability to produce plant biomass. This is important because too much phosphorus leads to too much biomass, especially algae, which can utilize free phosphorus suspended in the water column. This process is called eutrophication. Eutrophication can result in crashes of dissolved oxygen; a critical resource required by most aquatic animals, unsightly and strong smelling algal blooms, destruction of important subaquatic plant communities through reduced light penetration, and harmful cyanobacteria blooms that can be lethally toxic to humans and pets.

The state of Massachusetts does not provide numerical phosphorus standards for classification of water quality impairments. Instead MassDEP uses a narrative standard that includes the EPA gold book standard as well as dissolved oxygen problems and recorded presence of algal

blooms. For the purpose of this report, only the EPA gold book standard of .05mg/l for streams and .025 mg/l for ponds is used to assess the presence of a phosphorus problem.

Phosphorus loading can come from several sources including stormwater runoff, particularly runoff loaded with sediment or from over-fertilized lawns. Fallen leaves, especially those fallen on impervious surfaces, concentrated in gutters, illegally dumped in riparian zones, or collected in catch basins, can also contribute to phosphorus loading in stormwater. Finally, improperly maintained septic systems, illicit discharges, and internal loading through the release of phosphorus from sediments and dead aquatic plant material are also common sources of phosphorus loading that are not related to stormwater runoff.

Table 3: Phosphorus concentrations during wet, dry, and combined weather conditions in 2019

Site ID	Dry Weather (mg/L)	Wet Weather (mg/L)	Combined (mg/L)
NER150	.05506	.05522	.05517
NER179	.07596	.05287	.05859
NER185	.06740	.07373	.07162
NER200	.05235	.06141	.05839
PTB028	.09244	.05657	.06374
PTB035	.11895	.0704	.08664
PTB047	.05842	.04537	.05059
UNB002	.12483	.15091	.14222
UNB014	.05168	.07281	.06576
UNB016	.05789	.07219	.06742

Every site in Milton had average phosphorus concentrations that were greater than the EPA Gold Book standard in 2019. The Neponset River appeared to fare best, while Unquity Brook had the worst phosphorus-related water quality. UNB002 averaged almost three times the threshold. Phosphorus appears to be a major water quality issue in Milton.

The data in Table 3 show that stormwater runoff is affecting some of Milton's waterbodies more than others. Unquity Brook appears to be particularly impacted by phosphorus rich stormwater discharges compared to Pine Tree Brook and the Neponset River. All sites on Pine Tree Brook had lower phosphorus concentrations during wet weather. This suggests that there may be internal sources of phosphorus in the sediment that are contributing to the issue. It also suggests that the many stormwater BMPs that the Town of Milton has built to protect Pine Tree Brook from phosphorus pollution may be showing an impact.

It's clear from the data that total phosphorus is a problem in Milton's waterways. Structural and non-structural BMPs could help to reduce the concentrations of Phosphorus found locally. Education of citizens about the proper disposal of yard waste, proper lawn fertilization, and keeping gutters clean will help address this issue. Other non-structural BMPs such as street vacuuming, and regular catch basin cleaning will also help. Sewage often contains high concentrations of phosphorus, so eliminating known illicit discharges should help address the problem. Finally, more structural BMP's that collect and filter out phosphorus before it reaches a water body could continue to make positive impacts on water quality, especially those proposed in the heavily impacted Unquity Brook sub-watershed.

pH

pH is a measure of how acidic or basic something is. The pH of a waterbody is an important factor of habitat quality for aquatic life. Water that is too acidic or too basic can be toxic. pH is often influenced by bedrock characteristics, groundwater seepage, acid rain, or heavy loading of tannin rich leaves/needles. These do not appear to be issues affecting pH in Milton. The state of Massachusetts determined that the healthy range of pH for waterbodies in the state is 6.5-8.3.

Table 3: Summary of pH values in 2019

Site ID	Max pH	Min pH	Average pH
NER150	7.71	6.51	7.12
NER179	7.84	6.97	7.31
NER185	7.65	6.88	7.21
NER200	7.05	7.59	7.31
PTB028	7.57	6.8	7.25
PTB035	7.84	6.94	7.32
PTB047	7.6	6.71	7.10
UNB002	7.53	6.63	7.07
UNB014	7.4	6.82	7.08
UNB016	7.29	6.87	7.10

The data in Table 4 suggest that pH is consistently within a healthy range in Milton. At no point in 2019 did pH values leave the healthy range. pH should not be a major concern for the town.

Dissolved Oxygen:

Adequate levels of dissolved oxygen (DO) are necessary to support many aquatic insects, fish and mollusks. These animals utilize dissolved oxygen to breathe. Dissolved Oxygen is influenced by water volume, water temperature, and atmospheric mixing through rapids or wind. The state of Massachusetts has determined that dissolved oxygen levels below 5 mg/L are considered stressful to aquatic organisms. The table below shows the DO data collected by CWMN volunteers.

Table 4: Summary of Dissolved Oxygen Conditions in 2019

Site ID	Max DO (mg/L)	Min DO (mg/L)	Average DO (mg/L)
NER150	6.55	3.62	5.60
NER179	11.6	6.70	8.8
NER185	9.8	6.5	7.98
NER200	9.9	7	8.62

PTB028	8.8	4.7	6.50
PTB035	8.9	5.3	6.72
PTB047	10.5	7	8.4
UNB002	8.3	2.9	5.27
UNB014	7.07	10.2	8.31
UNB016	7.7	11	9.03

In general, dissolved oxygen is healthy in Milton. Dissolved oxygen remained healthy for the entire 2019 sampling season, except for a few samples in NER150, PTB035, and UNB002. Each of those streams only had one month that was below the healthy threshold for dissolved oxygen.

Conclusion

Based on the data collected, the main water quality issues faced by the Town of Milton are *E.coli* contamination and phosphorus. Dissolved oxygen and pH are typically within healthy ranges aside from a few exceptions. Many of these issues can be simultaneously addressed through the implementation of stormwater BMPs, repairing illicit discharges, and through public education campaigns aimed at improving stormwater-related behavior.

While Milton's water quality issues pose a serious challenge for the town, they are not insurmountable. Having a dedicated stormwater utility in place reduces budgetary uncertainty and will allow Milton to plan further ahead than they previously could. With thoughtful planning and proper investment Milton should be able to restore water quality to Unquity brook, Pine Tree Brook, and the Neponset River.