

# 2018 Water Quality Report Canton, MA

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**neponset river**  
WATERSHED ASSOCIATION

## **Introduction:**

The Neponset River Watershed Association (NepRWA) has been collecting water quality data in Canton and throughout the Neponset River watershed for 23 years. Samples are collected by volunteers through the Citizen Water Monitoring Network (CWMN) and by NepRWA staff through the Hotspot program.

There are eight permanent CWMN stations within and bordering the town of Canton; two on Pequit Brook, one on Pecunit Brook, one on Ponkapoag brook, one on Beaver Meadow Brook, one on Massapoag Brook, one on the East Branch of the Neponset, and one on the Neponset River. CWMN stations are sampled once per month between May and October. Waterbodies in Canton are tested for *E.coli*, total phosphorus, pH, dissolved oxygen, and temperature. Select sites may also be tested for ortho-phosphate, total nitrogen, ammonia, and chlorophyll a. Hotspots are tested for *E.coli*, ammonia, and surfactants. The parameters discussed are limited to those that are tested at every site.

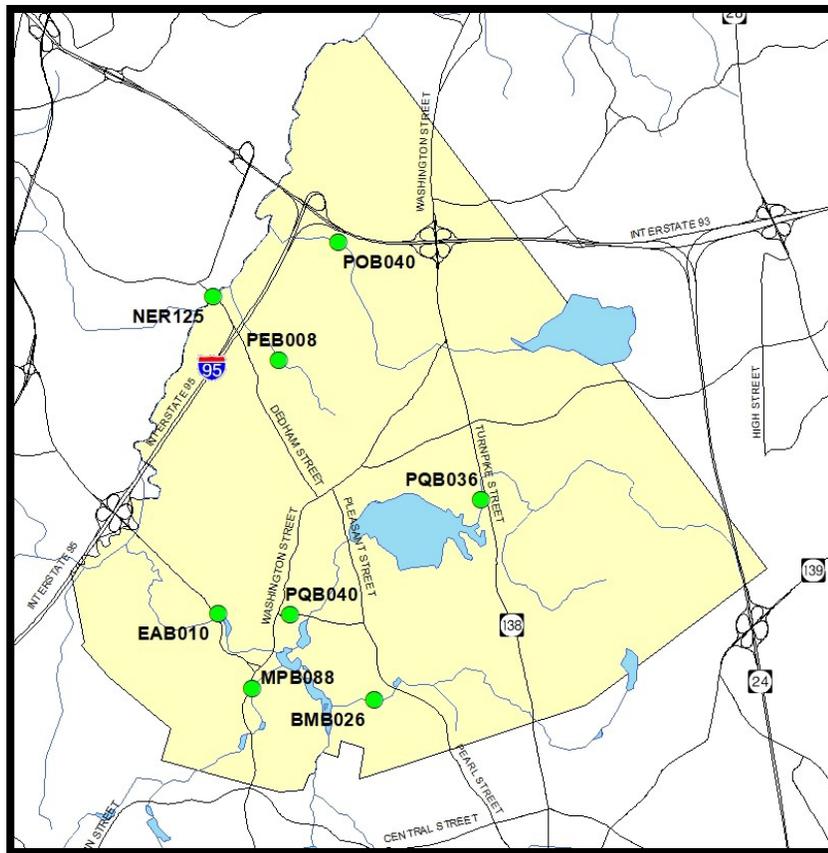


Figure 1: CWMN sampling sites within Canton, MA

Data gathered by CWMN volunteers are used to track the health of the Neponset River and its tributaries, and to locate pollution hotspots for follow-up sampling. Hotspot sampling in Canton has occurred in Pequit, Pecunit, and Ponkapoag Brooks. In each case, the goal of the Hotspot sampling was to locate potential sources of sewage contamination and/or gather more information about low dissolved oxygen issues.

This report is intended to provide a summary and interpretation of the results from CWMN 2018 and subsequent Hotspot sampling. The raw water quality data are available upon request

## Canton 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 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, the geometric mean of at least 5 samples taken within the same season shall not exceed 630 CFU/100ml.

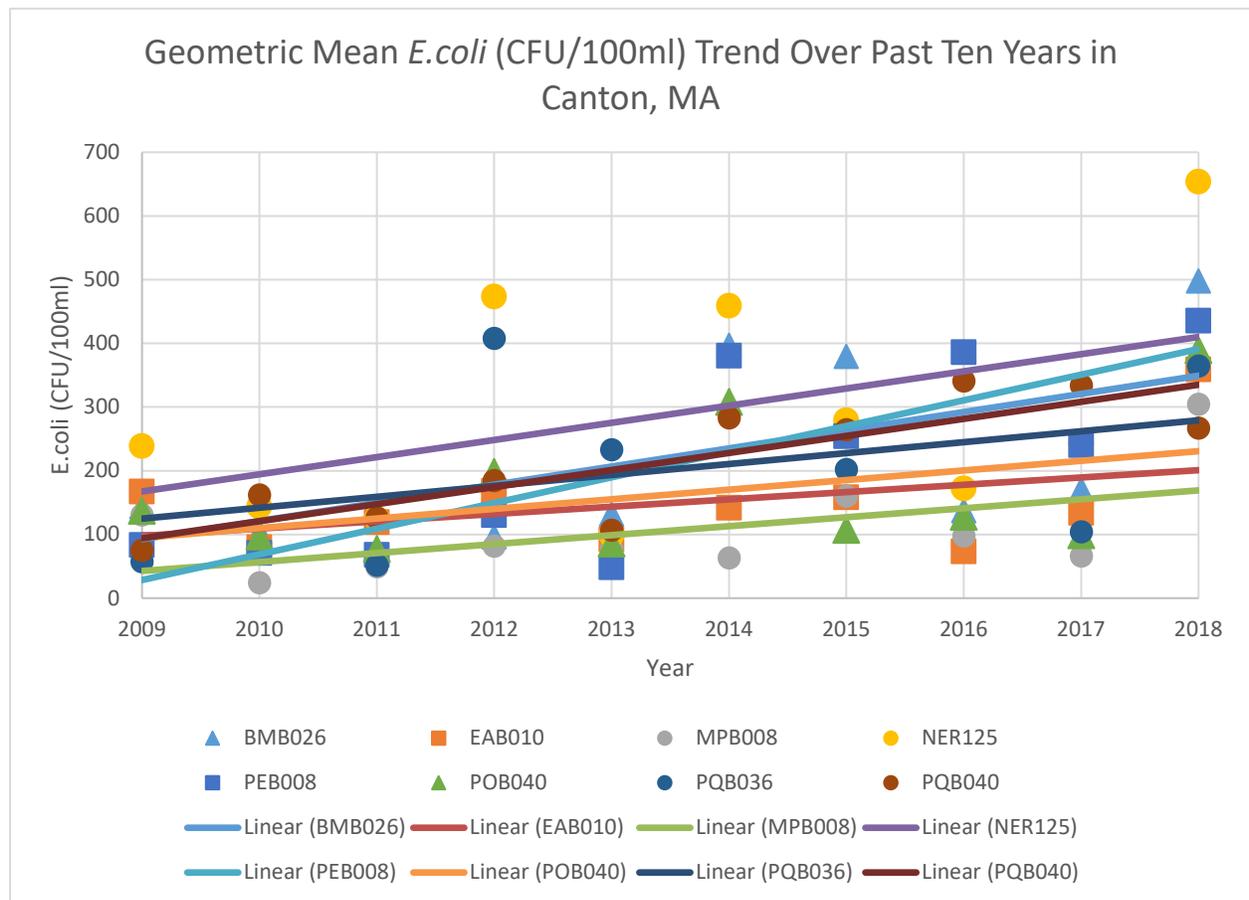


Figure 2: This Chart depicts the ten year trend of *E.coli* Geometric means of at least five samples in Canton, Massachusetts.

Figure 2 suggests that *E.coli* concentrations have been increasing at all sites in Canton over the past 10 years. Most of the Canton sites had their highest *E.coli* values of the past decade in 2018. None of the sites met the geometric mean criteria for primary contact recreation last

year. However, all of the sites except for NER125 met the secondary recreation criteria. It is unclear what caused the *E.coli* concentrations to be so much higher than average in 2018.

**Table 1: Geometric mean of *E.coli* concentrations (MPN/100mL) for at least five samples 2018 vs previous 10 year average**

Site ID	Average Geometric Mean of <i>E.coli</i> (CFU/100mL) 2008-2017	Geometric mean of <i>E.coli</i> concentrations (CFU/100mL) 2018
BMB026	181	498
EAB010	131	359
MPB008	83	305
NER125	256	654
PEB008	187	436
POB040	138	390
PQB036	158	365
PQB040	220	267

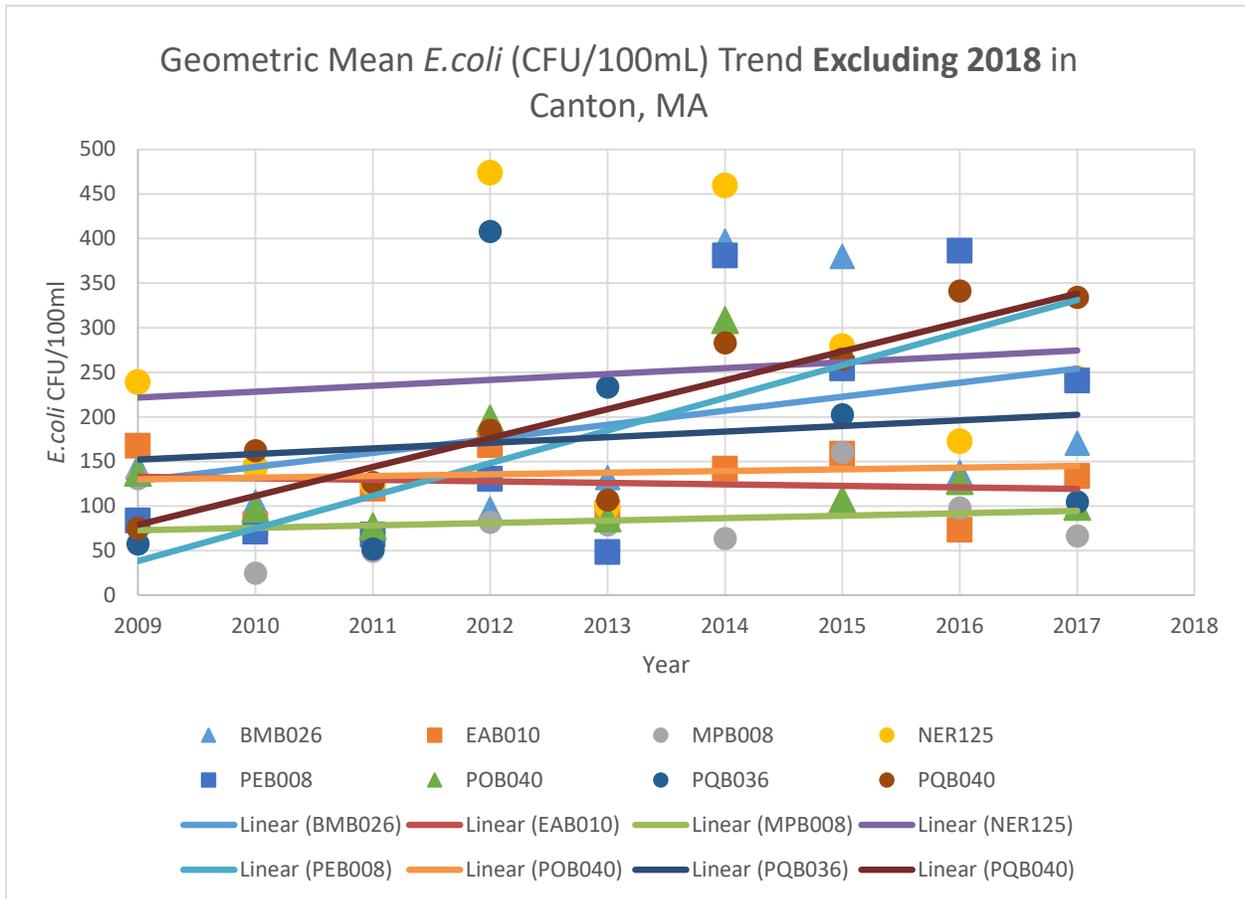
One possible explanation for the high *E.coli* values in 2018 is that, by chance, there were more wet weather sampling days in 2018 than average. Table 2 below shows a strong positive correlation between *E.coli* concentrations and wet weather. However, it is worth noting that even during dry weather, half of the sites in 2018 had *E.coli* concentrations that were higher than the 10 year average (see Table1).

Illicit discharges of sewage is a possible source of *E.coli* contamination during dry weather. However, hot spot monitoring efforts in Canton did not uncover any illicit discharges. It is critical that we continue to watch these trends closely in order to determine if 2018 was an anomaly or the beginning of an upward trend.

**Table 2: *E.coli* concentrations (CFU/100ml) during wet vs dry weather for *E.coli* in Canton, MA for 2018**

Site	Total Number of Samples 2018	Geometric Mean <i>E.coli</i> Conc. (cfu/100ml)	Site	Total Number of Samples 2018	Geometric Mean <i>E.coli</i> Conc. (cfu/100ml)
BMB026			PEB008		
Dry	3	234	Dry	3	215
Wet	3	1059	Wet	3	882
EAB010			POB040		
Dry	3	96	Dry	3	159
Wet	3	1337	Wet	3	953
MPB008			PQB036		
Dry	3	113	Dry	3	124
Wet	2	1359	Wet	3	1073
NER125			PQB040		
Dry	3	182	Dry	3	107
Wet	2	4467	Wet	2	1055

Improper disposal of pet waste in the street, lawns, and catch basins is the most common source of *E. coli*. 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 prioritized when possible.



**Figure 3: This Chart depicts the ten year trend of *E. coli* Geometric means of at least five samples in Canton, Massachusetts. Excluding 2018**

When the 2018 results are excluded, it appears that most of the sites in Canton are remaining relatively constant for *E. coli*. Three sites Beaver Meadow Brook at Devoll Field, Pecunit Brook at Elm St, and Pequit Brook at Sherman St appear to have increasing *E. coli* values. Extensive Hot Spot monitoring along Pecunit and Beaver Meadow brooks did not uncover any illicit discharges. Hot Spot monitoring has been scheduled to occur in Pequit brook near the Sherman St site in order to locate a potential cause of the *E. coli* increase. Devoll Field is slated to have stormwater BMPs installed in the summer of 2019. Hopefully they will help to reduce *E. coli* levels at that site.

## 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 support vegetation. This is important because too much phosphorus can lead to too much vegetation; especially algae which utilize phosphorus suspended in the water column. This process is called eutrophication. Eutrophication can result in crashes of dissolved oxygen (a critical resource required by all 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, we only used the EPA gold book standard to assess the presence of a phosphorus problem since we don't record algae data and phosphorus typically affects dissolved oxygen levels in ponds which we don't sample regularly in Canton. The gold book standards states that Total Phosphorus levels should not exceed 0.025mg/l in ponds and 0.05 mg/l in streams.

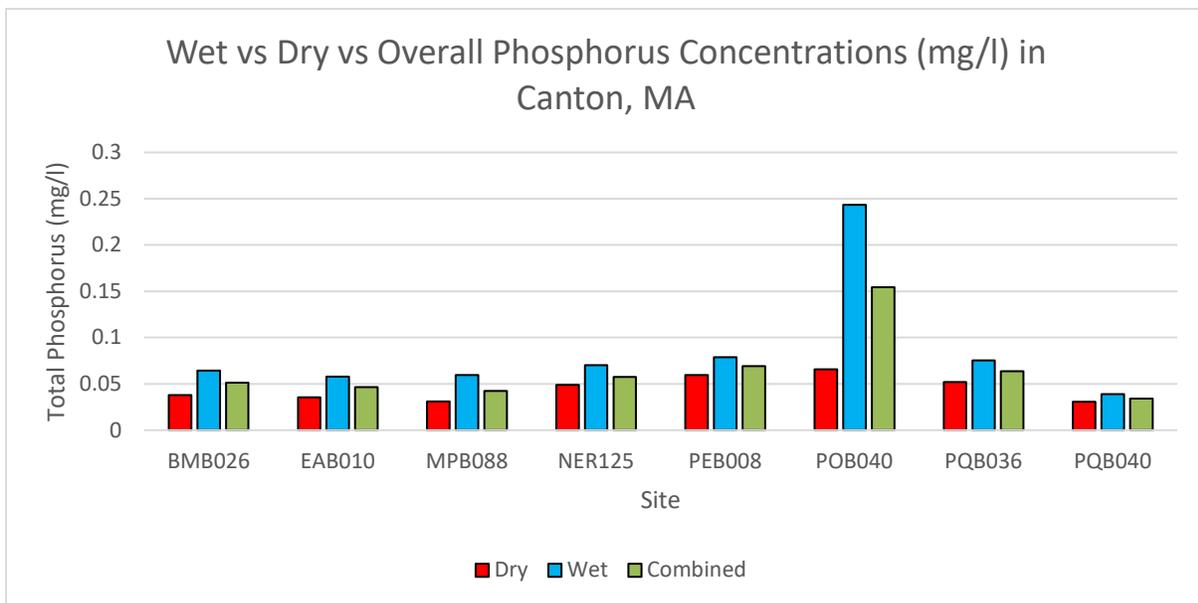


Figure 4: Average Total Phosphorus concentrations (mg/l) during wet, dry, and combined weather in 2018

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. There are other common sources of phosphorus loading that are not associated with stormwater runoff, including: improperly maintained septic systems, illicit discharges, and internal loading through the release of phosphorus from sediments and dead aquatic plant material.

It's clear from the data that phosphorus is a problem in some of Canton's waterways. The data in Figure 4 also show that stormwater runoff is affecting some of Canton's waterbodies more than others. Pecunit Brook, Pequit Brook, and Ponkapoag Brook have major phosphorus issues. The two of the worst brooks in terms of phosphorus, Pecunit and Ponkapoag, flow through several golf courses before reaching the sampling site. In some cases the golf course grounds keepers have mowed directly down to the stream bank, arguably a violation of the state's Wetlands Protection Act. Restoring the riparian buffers on the golf courses could help to reduce phosphorus pollution in those streams.

Structural and non-structural BMPs could also help to reduce the concentrations of Phosphorus found locally. Educating residents and business owners about the proper disposal of yard waste, proper use of fertilizers, 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. Finally, structural BMP's that collect and filter out phosphorus before it reaches a water body will have a large positive impact on water quality.

## 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 since water that is too acidic or too basic can be toxic. The pH of a waterbody also influences the behavior of nutrients, determining whether they will be made unavailable by bonding to free carbon in sediments or made available by being released from such bonds. The state of Massachusetts determined that the healthy range of pH for waterbodies in the state is 6.5-8.3.

**Table 4: Average pH values during dry, wet, and combined weather in 2018**

Site ID	Dry Weather pH	Wet Weather pH	Combined pH
BMB026	6.75	6.97	6.86
EAB010	6.92	7.26	7.09
MPB088	7.7	8.28	7.99
NER125	6.91	6.91	6.91
PEB008	6.95	6.80	6.88
POB040	6.69	6.83	6.76
PQB036	6.48	6.58	6.53
PQB040	6.53	7.17	6.85

The data in table 4 suggest that pH is consistently within a healthy range in Canton with the exception of the upper site on Pequit Brook. This site regularly dries up in the summer and becomes slow and stagnant. pH is often influenced by bedrock characteristics, groundwater seepage, acid rain, or heavy loading of tannin rich leaves/needles. One or more of these factors in conjunction with the stagnation of the water may be driving the pH issues seen in upper Pequit Brook.

## 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. The state of Massachusetts 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 in 2018

Table 5: Compliance rates for dissolved oxygen in Canton, MA

Site ID	Dry Weather (mg/l)	Wet Weather (mg/l)	Combined Weather (mg/l)
BMB026	7.1	6.4	6.7
EAB010	8.9	9.0	8.9
MPB088	8.3	7.7	8.0
NER125	4.7	4.8	4.7
PEB008	7.1	6.0	6.6
POB040	5.7	4.2	4.9
PQB036	1.8	2.3	2.1
PQB040	6.7	6.4	6.5

In general dissolved oxygen is healthy in Canton with the exception of the upper site on Pequit Brook. Dissolved Oxygen is influenced by water volume, water temperature, and the amount of atmospheric mixing through rapids or wind that is allowed to occur. The site PQB036 regularly becomes a series of shallow disconnected stagnant pools during the dry summer months. This is likely the cause of the poor dissolved oxygen in this section of the brook.

Warmer water has less capacity to hold dissolved oxygen than colder water, and impoundments are known to create heating effects that remain further downstream. Other factors that affect water temperature are lack of canopy and shading, water depth and volume, season, and ground water seepage.

## **Conclusion**

Based on the data we have collected, the main water quality issues faced by the town of Canton 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, discovering and repairing illicit discharges, and through public education campaigns aimed at improving stormwater and fertilizer related behavior.

While Canton's water quality issues pose a serious challenge for the town, they are not insurmountable. The town is already making major strides towards retrofitting its properties with stormwater BMPs. With continued thoughtful planning and proper investment Canton should be able to restore water quality in all of its Brooks and the Neponset River.