

2019 Water Quality Report Canton, MA

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5/20/2020



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WATERSHED ASSOCIATION

Introduction:

The Neponset River Watershed Association (NepRWA) has been collecting water quality data in Canton 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 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 itself. 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.

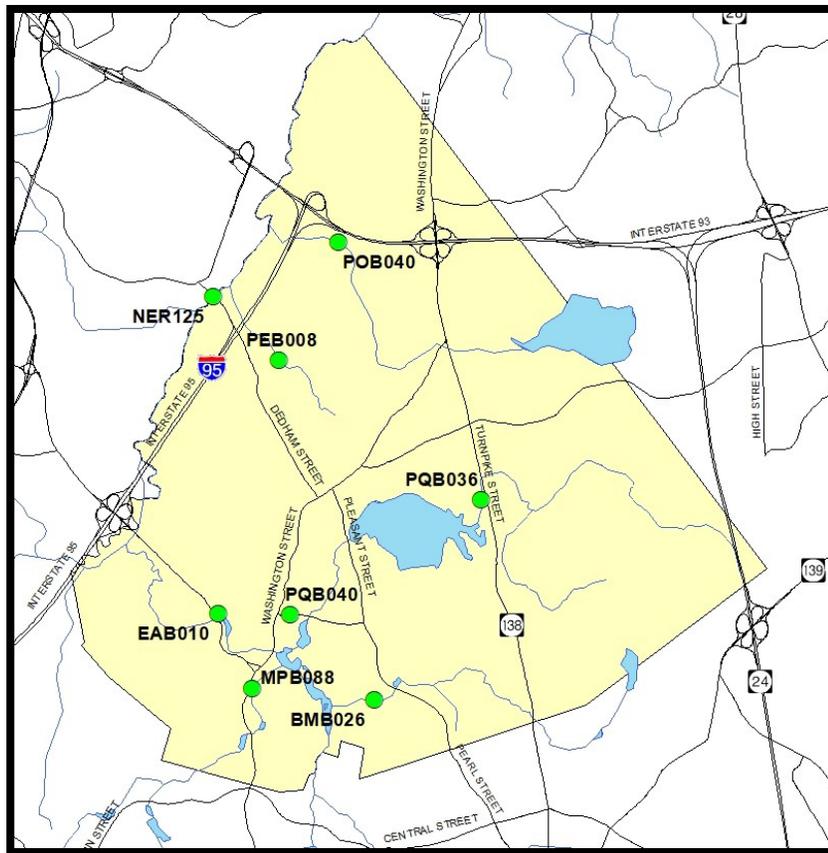


Figure 1: CWMN sampling sites within Canton, MA

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. This report is intended to provide a summary and interpretation of the results from CWMN 2019 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, like those found in Canton. For primary contact recreation (swimming) 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 contact recreation (boating), the geometric mean of at least 5 samples taken within the same season shall not exceed 630 CFU/100ml.

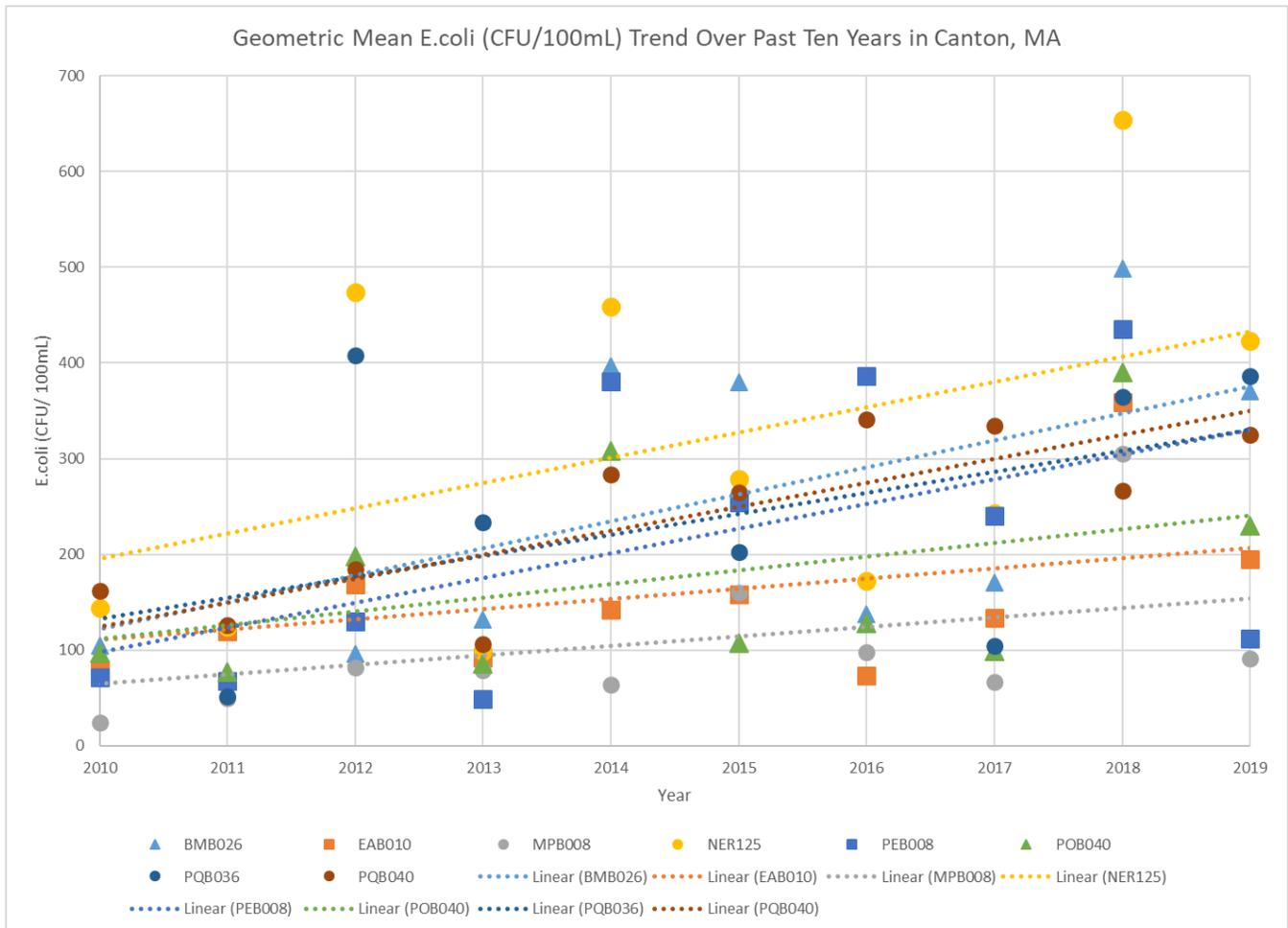


Figure 2: This Chart depicts the ten-year trend of *E. coli* Geometric means of at least five samples in Canton, Massachusetts.

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. However, *E. coli* levels were generally lower than those levels in 2019. All sites, except PQB036 and PQB040 had lower *E. coli* concentrations in 2019 compared to 2018. Massapoag

Brook and Pecunit Brook met the primary contact standard in 2019, and all of the sites met the boatable standard. Unfortunately, despite the geometric mean of *E. coli* concentrations being lower than in 2018, Table 1 shows that most sites in Canton had higher than average *E. coli* concentrations.

Table 1: Geometric mean of *E. coli* concentrations (MPN/100mL) for at least five samples 2019 vs previous 12-year average

Site ID	Average Geometric Mean of <i>E. coli</i> (CFU/100mL) 2007-2018	Geometric mean of <i>E. coli</i> concentrations (CFU/100mL) 2019
BMB026	198	370
EAB010	154	195
MPB008	97	92
NER125	279	423
PEB008	199	112
POB040	155	230
PQB036	183	386
PQB040	222	325

One possible explanation for the high *E. coli* values in 2019 is that there were more wet weather sampling days in 2019 than average. Table 2 below shows a positive correlation between *E. coli* concentrations and wet weather. Thus it is expected that the geometric mean of the *E. coli* would be higher in a year with more wet weather. With that said, it is worth noting that even during dry weather, nearly half of the sites in 2019 had *E. coli* concentrations that were higher than the 10 year average. This suggests that stormwater runoff isn't the only factor affecting *E. coli* concentrations in Canton.

Table 2: *E. coli* concentrations (CFU/100ml) during wet vs dry weather for *E. coli* in Canton, MA for 2019

Site	Total Number of Samples 2019	Geometric Mean <i>E. coli</i> Conc. (cfu/100ml)	Site	Total Number of Samples 2019	Geometric Mean <i>E. coli</i> Conc. (cfu/100ml)
BMB026			PEB008		
Dry	1	282	Dry	2	117
Wet	4	1059	Wet	4	110
EAB010			POB040		
Dry	2	91	Dry	3	115
Wet	4	285	Wet	3	324
MPB008			PQB036		
Dry	1	86	Dry	3	338
Wet	3	94	Wet	3	413
NER125			PQB040		
Dry	2	259	Dry	3	325
Wet	4	542	Wet	2	325

Illicit discharges of sewage are one possible source of *E.coli* contamination during dry weather. However, hot spot monitoring efforts in Canton did not uncover any illicit discharges in 2019. Improper disposal of pet waste in the street, lawns, and catch basins is the most common source of *E.coli* in the landscape. There are also naturally occurring sources of *E.coli* such as wildlife waste. When it rains *E.coli* from these sources gets washed into nearby waterways via the storm sewer system. 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 highly effective in reducing *E.coli* loading before it reaches a waterbody, and building those types of BMPs should be prioritized when possible. Devoll Field and the Dean S Luce School were recently retrofitted with infiltrating stormwater BMPs. Hopefully they will help to reduce *E.coli* levels at those sites, especially during wet weather.

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, the EPA gold book standard was used 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 goldbook standards state that Total Phosphorus levels should not exceed 0.025mg/l in ponds and 0.05 mg/l in streams.

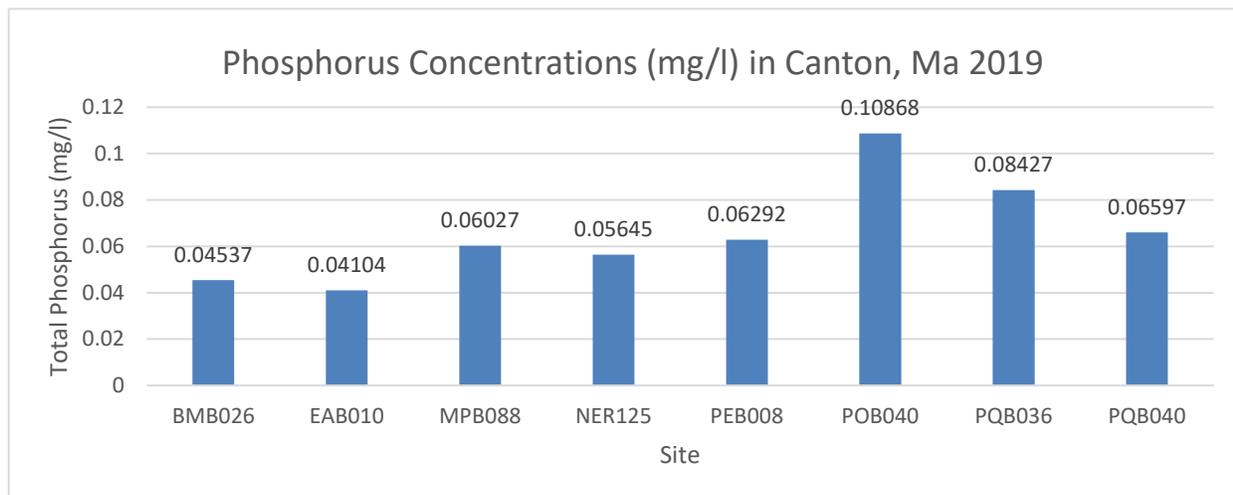


Table 3: Average Total Phosphorus concentrations (mg/l) in 2019

It is clear from the data that phosphorus was a problem in some of Canton’s waterways in 2019. Massapoag, Pecunit, Pequit, and Ponkapoag Brook all had phosphorus issues in 2019. Two of the worst brooks in terms of phosphorus, Pecunit and Ponkapoag, flow through several golf courses upstream of our sampling site. In some cases, the golf course grounds keepers have mowed directly down to the stream bank, which is 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.

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 decomposing plant material.

Structural and non-structural BMPs could 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 available for plant uptake. pH is often influenced by bedrock characteristics, groundwater seepage, acid rain, or heavy loading of tannin rich leaves/needles. The state of Massachusetts determined that the healthy range of pH for waterbodies in the state is 6.5-8.3.

Table 4: Summary of pH values 2019

Site ID	Max pH	Min pH	Average pH
BMB026	7.39	6.67	7.07
EAB010	7.42	6.97	7.21
MPB088	7.58	7.07	7.28
NER125	7.70	6.90	7.16
PEB008	7.23	6.79	7.07
POB040	7.21	6.65	6.92
PQB036	7.07	6.61	6.84
PQB040	7.99	6.65	7.26

The data in table 4 suggest that pH was consistently within a healthy range in Canton in 2019. pH was not a water quality concern in 2019, and conditions in Pequit brook were improved over 2018.

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 2019.

Table 5: Summary of Dissolved Oxygen concentrations (mg/l) in Canton, MA 2019

Site ID	Max DO (mg/l)	Min DO (mg/l)	Average DO (mg/l)
BMB026	8.7	4.9	6.8
EAB010	10.1	7.2	8.8
MPB088	9.6	6.5	8
NER125	6	3.64	5
PEB008	9.3	4.9	6.6
POB040	8.9	3.7	5.7
PQB036	5.49	1	2.2
PQB040	9.2	4.8	6.9

Dissolved oxygen was above the healthy threshold at most sites for most of the time in 2019. The Upper Pequit Brook site continues to have low dissolved oxygen issues. Most of the sampling season was below the 5mg/l threshold. Ponkapoag Brook, and the Neponset River had dissolved oxygen issues for parts of the summer, particularly July-September, when temperatures are the highest, and flow is the lowest. Ponkapoag brook's low dissolved oxygen levels are cause for concern because that brook is a designated coldwater fishery, and coldwater species are especially sensitive to declines in dissolved oxygen.

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 collected data, the main water quality issues faced by the town of Canton are *E.coli* contamination and excess phosphorus. Dissolved oxygen is also a concern at several sites. In particular, efforts should be made to improve dissolved oxygen in Ponkapoag Brook to protect the fragile but regionally important coldwater fishery. pH was consistently within healthy ranges and should not be a major water quality concern of the town.

Many of these water quality 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.