# Water Quality Committee BOD Report 02/21/2022

**NEW INFORMATION**

**Strategy**

According to Kim Tower, we will receive the Water Quality Plan draft the beginning of April. The current plan is for the Board of Directors and the Water Quality Committee to meet and discuss the plan (additions, corrections, questions, etc.), resolve any issues with Kim, David and Ed Eichner, then present the plan to our constituency for their input.

Based on my reading of the Savery Pond Plan, it is likely that alum addition will be recommended. My research indicates that the cost would be about $200,000. Alum applications can have adverse effects on flora and fauna and the reduction of phosphorus does not last forever (a couple of years).

It makes sense for HPWA to learn as much as possible about alum, alternatives to alum and experiences of other watershed facing the same non-point source pollution caused algae and cyanobacteria blooms. Accordingly, the following general topics will be investigated before the Water Quality Plan is received: 1) phosphorus removal techniques other than alum, 2) runoff, 3) funding sources, 4) other watershed experiences, 5) specifics of alum treatment, and 6) any other suggestions that anyone might have.

Our first such meeting was held with Stephen Silva, Volunteer Monitoring and Water Quality Coordinator for the Taunton River Watershed Alliance (TRWA). The minutes of that meeting are immediately below. Important information was shared and Stephen promised to provide us with new contacts in the relevant areas.

# Herring Ponds Watershed Association Water Quality Committee Meeting 02/10/22

Guest: Stephen Silva Taunton River Watershed Alliance

Attendees: Don Williams, Geri Williams, Brian Harrington, Jack Kedian, Paul Denoncourt, Beth Sobiloff, Hampton Watkins (Six Ponds Association President), Stephen Silva

**Background:**

Don Williams had met Stephen Silva at a recent Watershed Action Alliance meeting, and he agreed to attend a Zoom meeting of the Herring Ponds Watershed Association Water Quality Committee to answer questions about water quality and water testing. Don thought it might be useful for the WQC to be able to ask questions of an expert prior to receiving the Water Quality Plan study draft anticipated in early April. Hampton was invited as a WAA member and a water quality collaborator with HPWA.

**Stephen Silva:**

Stephen's career spanned 40 years with the EPA. He has a master's degree in Environmental Engineering from Northeastern University. The last 7 years of that time, he was the regional EPA chief of Water Quality. For the prior 23 years, he managed other water programs, including permits, estuaries, compliance and EPA's Maine state program. In his retirement, he is serving as the volunteer monitoring and water quality coordinator for the Taunton River Watershed Alliance (TRWA), an area

from Fall River to Brockton encompassing 562 square miles including over a dozen tributary streams. The Taunton River main stem is 40 miles long and comprises both fresh and salt water for the first 17 miles due to its gradient. It is dominated by wastewater treatment effluent during summer drought conditions. TRWA negotiated with the area sewer operator, Veolia Taunton, to analyze 24 samples per month for quality (20 sites plus 4 QA samples) as part of their sewer contract.

**TRWA Description:**

Stephen explained that TRWA is concerned about both nitrogen pollution in the Taunton River estuary and phosphorus contamination in fresh waters; they have both SB (salt-containing) and B (fresh) water waterways. He explained that the five most upriver sewage treatment plants were required to begin work on facilities to remove nitrogen and phosphorus starting in 2014 when their Clean Water Act (CWA) permits were being renewed and will complete upgrades in 2022. As a result, TRWA hopes these sewage treatment plants will return treated water with acceptably low nitrogen and phosphorus levels by the end of summer 2022. TRWA measures enterococci (HPWA tracks E. coli) because enterococci are approved for both salt (brackish) and fresh waters.

**Discussion:**

**Are any commercially available septic add-on systems for phosphorus removal existed?**

Steve stated that although this was not his area of expertise, sewer treatment plants have no trouble removing phosphorus (most by chemical addition, some by filtration or a combination of both). Phosphorus tends to adhere to fine particulate matter making filtration through soil an effective removal mechanism both for wastewater (septic tank effluent) and stormwater runoff. Use of the appropriate amount of filtering material for the proper distance are the most important criteria for successful removal of phosphorus. Generally, phosphorus can be removed by filtration of the solids it has adhered to or precipitation. For Title V septic systems, the degree of phosphorus removal success is directly dependent on the distance between the septic leach field and the ground water level or surface water. Nitrogen is dissolved in water and flows easily through septic systems and ground water to surface waters. It must be treated in a specially designed subsurface disposal system. Steve volunteered to find us some links to EPA's stormwater program and the University of New Hampshire Stormwater Center. He will also try to find someone for us to talk with about phosphorus removal from the EPA stormwater program and from the Lakes Program at EPA. He also hoped to be able to put us into contact with non-point source program grants.

**How does the pollution cause algae and cyanobacteria blooms?**

The pollutant in our freshwater systems is phosphorus. Sources of phosphorus are fertilizer, septic systems, runoff and sediment (particularly from our area's cranberry industry). Phosphorus fuels the growth of both algae and cyanobacteria. These plants eventually die and fall to the bottom of the pond, requiring the pond's dissolved oxygen to decompose them. The decrease in dissolved oxygen encourages more phosphorus to enter the water body, starting another bloom cycle. The EPA did a phosphorus stormwater abatement study of the Charles River that should be available on EPA's website. The Charles River Watershed Alliance has a lot of information on their website.

**Are any treatments available to reduce phosphorus levels in large ponds?**

The standard recommendation is alum addition. This can have harmful effects on flora and fauna and must be repeated at a cost of $500/acre.

**What other treatments are available?**

Steve promised to provide contacts with Charles River Watershed Association, EPA Region I and the University of New Hampshire Stormwater Center. Septic upgrades will work well but are expensive; the average homeowner will require financial assistance. The State Revolving Fund (SRF) provides low-cost loans to municipalities. In the 70's and 80's Grants to Community were available that provided the 75% federal and 15% state contributions to the cost of municipal upgrades. These grants are no longer given out but there may be Covid, or Infrastructure money provided by the Federal Government. Our consultant should know more about the alternative treatments for phosphorus pollution and for pollution prevention.

**Can stormwater be a major contributor of phosphorus?**

Stormwater is tricky. There are two factors involved, both concentration of phosphorus and the volume of phosphorus-containing water entering the waterway. After the first flush of nutrient, the amount tails off. This suggests that lots of small management practices, when combined, may be effective in reducing pollutants. EPA did studies of optimization using many smaller best management practices to infiltrate stormwater for phosphorus removal.

**Can barriers and trenches be used to remove phosphorus?**

Again, Steve's expertise is in other areas but given enough length and enough barrier, phosphorus could be removed. He also suggested that we look at the cranberry industry for more information. Hampton said that Alex Hackman is a Massachusetts source for this information.

**What are alternatives to sewering large areas to reduce waterway pollution?**

One suggested alternative is small, group package treatment "plants." Don is in NC and will ask a contact in Nags Head about their experience with these "plants." The Cape Cod Commission may have information on sewering small areas for groundwater disposal.

In addition I included answers to specific questions that I sent to Steve before the meeting:

***What are the alternatives for dealing with phosphorus pollution?***
Phosphorus pollution is typically addressed using source control. Phosphorus (unlike nitrate which is in a dissolved form which travels readily through groundwater) tends to adhere to particulate matter. For this reason, Best Management Practices (BMPs) that infiltrate stormwater and properly operating (Title 5) subsurface wastewater systems do a good job removing phosphorus because the stormwater or wastewater flows through soil before reaching groundwater, streams or lakes.

To deal with phosphorus pollution you want to eliminate or reduce direct stormwater discharges that don't go through infiltration for as large a group of storms as possible (stormwater has P in it). Make sure onsite wastewater treatment systems, especially those near waterbodies are functioning properly (no breakout of sewage to storm drains or streams), minimize erosion from dirt roads and around streams/lakes, maintain natural buffers around waters, and while most fertilizers have eliminated P some starter fertilizers still have it. Minimize use of fertilizers and if homeowners or landscapers put fertilizers on roads and sidewalks make them clean it up (blow it onto the lawn).

Farm animals and horses along with agriculture golf courses can also be sources of P to consider.

***Is there any value in monitoring groundwater pollution? We are not currently doing so.***
Generally, no because P doesn't move readily through ground water.

***Should we be filtering Total Phosphorus and nitrate samples?***
No. You would filter to determine dissolved TP and nitrate but not sure why you would want to limit yourself to just that.

***We are monitoring E. coli; what are the rationales for switching to enterococci?***
E. coli is good for freshwater bacteria monitoring. Enterococci can be used in both saltwater and freshwater. The Taunton River is 40 miles long with the first 20 miles tidal (first 17 miles brackish). We use enterococci because it is acceptable according to MassDEP's water quality standards (see table pages 19 and 20 or 179) for our lower river brackish water areas as well as the upper watershed freshwater areas. We used to monitor for total coliform but switched to one of the newer approved criteria (either E. coli or enterococci).

***We generally ask Envirotech (our tester) to add the sulfuric acid to the TP samples when they are brought in. Is this OK?***
I don't know. Our lab adds it to the empty bottles they supply us. You would have to contact the MassDEP Worcester office Robert Smith who runs their QA program robert.f.smith@state.ma.us

***Are MA regs the same for rivers and ponds?***
No. For example, usually you cannot have a wastewater treatment plant (WWTP) discharge to a pond but you can to a river. You may find a WWTP discharge to a river upstream of an impoundment on a river that creates a pond in some cases. You can look up the water quality standards applicable to any waterbody on the MassDEP's website.

***What is the difference between Class B and Class SB waterways?***
Class B is freshwater, and Class SB is saltwater. They have somewhat different use classification definitions and water quality criteria (narrative and numeric requirements to protect that class of water and its uses).

***What do you learn from the chlorophyll measurements?***
Chlorophyll measurements are useful to provide a measure of the amount of algae in a water. We don't measure it but the MassDEP does at their two continuous monitoring buoys in Mount Hope Bay. In the last major study of our watershed sponsored by MassDEP they reported both nitrogen and chlorophyll levels.

***What do you learn from the specific conductivity measurements?***
You can convert specific conductivity to salinity using a chart. We don't do this anymore because it is not critical to our purpose of showing the degree of nitrogen and bacteria pollution that needs to be addressed in the watershed. There are meters that measure this as well.

***How do nitrate and total nitrogen measurements differ?***
Total nitrogen (TN) = nitrate **(NO3)** + organic nitrogen + ammonia (NH3) + nitrite (NO2). As you can see nitrate is one component of TN but is easy and cheaper to measure than TN. Most of the nitrogen we

are concerned about is in the nitrate form. The EPA set a TN site specific criteria for our estuary at TN 0.45 mg/l. We are often above that just measuring nitrate and will be until all the WWTPs upgrade to remove nitrogen. If we consistently see compliance on nitrate, we may spend the extra to have a few samples measured for TN.

Last I checked prices NO3 $12 + NO2 $12 + TKN (organic N plus NH3) $20 so total TN cost $44/sample vs nitrate $12/sample. The $32/sample difference adds up fast when you do 24 samples per month.

***What should we expect as suggestions for remediating phosphorus pollution in the Water Quality Plan report?***
I can't say because each situation is unique and site specific. The source control measures in the answer to question 1 would probably be included only with more specificity based on your actual situation on the ground in your watershed.

***Are you aware of any septic add-ons to remove phosphorus***? ***There are add-ons that are being commercially applied on the Cape to remove nitrogen?***
No a proper septic system that assures the treated wastewater from the septic tank flows to a leaching field above the groundwater level so the waste gets soil filtration would likely be enough. Nitrogen polluting the saltwater embayments on the Cape is different since it flows through the leaching field and is transported with the groundwater. To deal with this you need a special septic system that nitrifies and denitrifies to remove the nitrogen. Similarly, stormwater controls are more complex if you want to remove nitrogen.

***What are the reasons for sampling in the early morning?***
The theory is that if you are interested in monitoring dissolved oxygen (DO), it is lowest in the morning because algae are not generating oxygen like they do with sunlight later in the day. We are not concerned about DO in the surface flowing stream samples our volunteers collect in the upper watershed. We are concerned about the DO in the deep waters of Mount Hope Bay where the MassDEP sollects continuous measurements.

For us, sampling in the morning is needed for the samplers to get the samples to our partners at the Veolia Taunton WWTP in time so they can be picked up by their contract lab for nitrate, TP and enterococci analysis.