TRWA Taunton River Watershed 2018 Monitoring Summary

March *2019*

Estuarine systems like the Taunton River, Mount Hope Bay, and the larger Narragansett Bay are ecological, recreational, and economic power houses! TRWA volunteers conduct monthly monitoring along with periodic picture taking at multiple locations in the watershed to give the river a health check-up and keep the spot light on areas and actions needed for further improvement. EPA, MassDEP and the watershed's 43 municipalities do not have the manpower and on-river presence of TRWA's volunteer river monitors, photographers, and members. The TRWA monitoring and photography volunteers are "The Guardians of the Taunton River"!

I. LARGEST CHALLENGES IN THE WATERSHED

- Excess nitrogen loading to the lower watershed (tidal influenced waters from Taunton downstream) and too high phosphorus in ponds and upper watershed tributary streams cause excess plant and algae growth limiting the diversity of aquatic life that can live there (more diversity = greater ecological, recreational, and economic value of the watershed, estuary, and bay);
- A comprehensive state sponsored 2004 to 2006 study throughout the Taunton River Estuary and Mount Hope Bay documented high algae and depressed dissolved oxygen attributed to high nitrogen loads. TRWA monitoring continues to measure nitrate (a portion of total nitrogen) in the main stem of the river at levels 2 to over 4 times the in-stream target total nitrogen level 0.45 milligrams/liter (mg/l) MassDEP, EPA and RI say is needed to protect the estuary (total nitrogen = **nitrate** + organic nitrogen + ammonia + nitrite; so despite the fact we measure only one component of total nitrogen (nitrate) the levels measured are much too high).
- In 2018, TRWA learned of early results from MassDEP continuous monitoring buoys. **Low dissolved oxygen levels which do not meet water quality criteria were measured by MassDEP during the summer of 2017 for weeks at a time at their continuous monitoring buoys in upper Mount Hope Bay** at the mouths of both the Taunton and Cole Rivers (see TRWA Google map for buoy locations). Low DO was observed following events where chlorophyll-a peaks of 25 to 100 ug/l were observed, which demonstrates that the low DO resulted from algae blooms that were caused by excessive nutrients.
- **Nitrogen induced eutrophication in the estuary threatens the endangered Atlantic sturgeon, Winter Flounder, Sea Run Brook Trout and the ability of the Taunton watershed and Mount Hope Bay to support a balanced indigenous population of fish and aquatic life.**
- Low stream flow periodically limits recreational use (canoeing and fishing) and exacerbates nutrient loading and effluent domination for waters resulting in excessively high nutrient and treated effluent concentrations in streams;
- Unmanaged stormwater impairs stream habitat by scour, organism flushing, and pollution loading spikes when storms occur. Potentially beneficial storm flows run quickly from impervious surfaces to streams being wasted rather than infiltrated through soils for cleaning and groundwater base streamflow replenishment;
- Wildlife habitat and stream buffers are often lost due to poorly designed and regulated development along stream corridors.

Continued nutrient loading and growing treated effluent flows with less stream water dilution because of the periodic summer droughts have resulted in very high measured nitrate levels and low water levels

(click on the Monitoring Program Tab on the TRWA home page http://savethetaunton.org/ and the picture of the sample bottles for data and the algae bloom picture for photos).

II. TRWA 2018 MONITORING RESULTS AND WHAT THEY MEAN

- **Nitrogen** (we measure **Nitrate** (NO3) part of total nitrogen (TN) because it is a low-cost high value test with a low reporting level of 0.05 milligrams/liter (mg/l) (**TN** = organic N + Ammonia + **Nitrate** + Nitrite) [**TN** should be less than 0.45 mg/L for good water quality according to MassDEP, EPA and RIDEM. The Buzzards Bay Project/MA Coastal Zone Management Agency and Cape Cod Commission recommend similar or somewhat lower values. TRWA uses a 0.4 mg/l target for **nitrate** because it is only a portion of TN].
    - In 2018 levels of nitrate and total phosphorus were high despite rain events before our July, Aug., Sept., and Oct. sampling days. The nitrate levels measured were generally half 2017 and 2016 levels but still at least 2 to 3 times the water quality target of 0.4 mg/l.
    - It is obvious that no matter what credible instream target is used for the Taunton River estuary (TN water quality criteria targets for estuaries, bays, and tidal rivers range 0.3 mg/l to 0.5 mg/l in New England, less than 0.3 mg/l in shallow warmer estuaries in the southeast coastal US). The Taunton River estuary is way over-loaded with nitrogen by any criterion or standard!

- **Total Phosphorus**
    - Levels in freshwater rivers and streams (above tidal influence on the main stem (upstream of the route 24 bridge)) and tributaries should have total phosphorus (TP) levels less than 0.10 mg/L (a long-standing EPA suggested instream criterion);
    - Levels in lakes, ponds, impoundments, or streams just upstream of lakes, ponds, and impoundments should have TP levels below 0.05 mg/L;
    - Most WWTPs in the upper watershed already remove TP. TRWA monitoring measured TP levels below the riverine target at most locations. The Town River Bridgewater and Taunton main stem at the Berkley bridge had levels which sometimes exceeded the 0.10 mg/l TP target.
    - Instream targets for phosphorus can be deceptive because during blooms algae and rooted aquatic plants can use up phosphorus so quickly, they depress water column levels to below suggested criteria. TRWA visual observations and photographs indicate that this is likely the case in the Taunton watershed.
    - The new WWTP permits include somewhat lower TP limits. It will be necessary to observe water quality in the future to see if these reductions along with improvements in stormwater management (also a significant TP source) are sufficient;
    - Phosphorus attaches to particulates and gets filtered out by soils making it much less mobile than nitrogen;
    - Stormwater from parking lots and roads containing TP (deposited by auto exhausts and fluid leaks) can be effectively removed by infiltration-based stormwater controls. Infiltration controls of the first flush from frequent small storms are very helpful.

- **Fecal Coliform**
    - Freshwater streams and rivers should have less than 400 colonies/100ml (normal background is 0 to 100 colonies/100ml);

- High levels of coliform bacteria indicate the potential presence of pathogens that might cause illness (usually gastro-intestinal) to swimmers or kayakers;
- The Mill River sampling locations in Taunton had the most consistent high values above the former Massachusetts fecal coliform standard of 400 colonies/100ml. Other locations had only sporadic infrequent high values which might have been caused by wildlife. The number of criteria violations was higher in 2018 than the two previous years most likely due to the rain events prior to our sampling days.
- In 2019 TRWA will be switching from fecal coliform to the new state approved bacteria pollution indicator enterococci.

- **Dissolved Oxygen**
  - TRWA takes surface samples for dissolved oxygen (DO) in the early morning when it is usually lowest. The locations sampled are the moving main stem of the Taunton and with few exceptions (Mill R., Three Mile R., and Thompson Brook) tributaries near their mouths which are their highest flow points (just before they enter the main stem).
  - We generally found dissolved oxygen levels above criteria and consistent with water temperature except for the small sluggish Thompson Brook that eventually drains to Lake Rico in Massasoit State Park.
  - Had we sampled in smaller upstream areas, slack waters, or depositional areas we may have found instances of low dissolved oxygen but the areas we sample with the exception of those mentioned had adequate oxygen. Even though we aren't generally seeing DO problems in the types of areas we monitor we will continue to monitor DO because of the importance of oxygen to aquatic life and to track how DO changes with water temperatures.
  - **As mentioned above MassDEP continuous monitoring buoys measured low dissolved oxygen levels which do not meet water quality criteria during the summer of 2017 for weeks at a time** at their continuous monitoring buoys in upper Mount Hope Bay at the mouths of both the Taunton and Cole Rivers (see TRWA Google map for buoy locations). Low DO was observed following events where chlorophyll-a peaks of 25 to 100 ug/l were observed, which demonstrates that the low DO resulted from algae blooms that were caused by excessive nutrients. This is a problem that was first measured in a comprehensive state sponsored 2004 to 2006 study throughout the Taunton River Estuary and Mount Hope Bay which documented high algae and depressed dissolved oxygen attributed to high nitrogen loads.

- **Total Suspended Solids**
  - A few instream values in the 10 to 30 mg/l were measured in June, July, and August most likely due to our sampling shortly after rain events.

- **pH**
  - pH is analyzed at the Veolia wastewater treatment plant lab from our TSS samples using a calibrated meter. Veolia found pH generally in the 6.0 to 7.0 range with four unusually low values on the Town River at Haywood St.

- **Temperature**
  - The warmest water month was August with measured instream temperatures 22.3° C to almost 24.9 ° C compared to the Class B standard of 28 ° C.

III. WHAT OUR MONITORING SUGGESTS ABOUT THE FUTURE OF THE WATERSHED

The data tells us that with responsible actions many of which are underway we should expect improvement in Taunton River water quality. All of the challenges mentioned in the four bullets under Item I have known solutions.

Nitrogen and Phosphorus

- Excess nitrogen (66% from WWTPs and 34% from stormwater + nonpoint sources) and phosphorus is being addressed in large part by new discharge permits for WWTPs and improved stormwater regulation for new development/redevelopment. Five of the seven most important permits for TN and TP control have been re-issued with all the permits re-issued to date in effect. A table of watershed major permits along with their effective dates and schedules may be found on the TRWA website http://savethetaunton.org/ at the Water Quality Monitoring tab. The two remaining permits that require re-issuance are Somerset (10+ years overdue) and Fall River (13+ years overdue). **[EPA Region 1 needs to step up and re-issue the long overdue Somerset and Fall River permits.]**
- Nitrogen is the active ingredient in lawn and agriculture fertilizers. It dissolves in water and flows easily with groundwater to streams if applied at levels greater than what grass and crops need to grow. Regulation to assure fertilizer application does not exceed the agricultural agronomic requirement, stream buffers, and education are needed to address these nitrogen loads.
- Nitrogen fertilizer is applied by landscaping companies and homeowners often with broadcast rotary spreaders which apply fertilizer not only to lawns but inadvertently to roads, sidewalks and driveways. Local ordinances requiring landscape companies and homeowners to sweep or blow fertilizer off impervious services onto lawns would go a long way toward keeping this nitrogen out our rivers.

Low Stream Flow

- Water removed from the ground by wells or surface water from streams and ponds is not available to replenish stream and river base flow as is stormwater that quickly runs off impervious surfaces rather than infiltrating back into the water table. We can't control the weather or drought cycles but can select water sources carefully, conserve water, and improve stormwater management so more precious rain water infiltrates to groundwater storage rather than quickly running away. State Water Management Act (WMA) permits (10 year permits authorizing water withdrawals) in the Taunton basin are scheduled for reissuance by MassDEP soon. This is an opportunity for water users, MassDEP and the interested public to collaborate on the best approaches for source water choice optimization, conservation, and water consumer education.
- Infiltration of stormwater from new development/redevelopment, and monitoring of stormwater collection systems for wastewater cross contamination is well covered by the recently issued EPA and MassDEP stormwater permit.
- Education and exploitation of opportunities to encourage infiltration of stormwater from existing roads, parking lots, and other impervious areas (not generally required by the new permit) needs to be expanded to bolster our groundwater, stream base flow reserves, and protect crucial tributary stream aquatic life.

Unmanaged Stormwater

- As described above there is a connection between low stream flows and unmanaged stormwater runoff which is not infiltrated back into the ground as it was prior to development.
- There are stormwater impairment issues of erosion, habitat destruction, repeated wash out of aquatic life that is the base of the watershed's food web, and frequent pollution wash off spikes from the many small storms most common in New England.
- Fortunately, recent research indicates that infiltration Best Management Practices (BMP) technology sized even for just small frequent storms is extremely cost effective for capturing the most concentration first flush of pollution from any storm. Small relatively inexpensive controls for existing impervious areas and more extensive controls for new development/redevelopment (required new stormwater permit) will make a substantial contribution to restoring our groundwater reserves and small stream health which is essential to watershed health as a whole.

Poorly Designed and Regulated Development Close to Streams

- Local Conservation Commissions, Planning Boards, MasDEP (in a back-up capacity), concerned citizens, and citizen organizations like TRWA all have a role to be vigilant to save what we love. Of the challenges mentioned abve poor regulation and design of new development is potentially the hardest challenge to deal with and the one that will require constant effort in a watershed with development growing as quickly as ours.

Working together cooperatively on watershed stewardship we can enjoy the ecological, recreational and economic benefits of a healthy Taunton River Watershed!