TRWA Taunton River Watershed 2016 Monitoring Summary

January *2016*

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 caused 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);
- Low stream flow limited recreational use (canoeing and fishing) and exacerbated nutrient loading and effluent domination for waters resulting in excessively high nutrient and treated effluent concentrations in streams;
- Unmanaged stormwater impaired stream habitat by scour, organism flushing, and pollution loading spikes when storms occurred. Potentially beneficial storm flows ran 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 were 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 persistent drought 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 2016 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. TRWA uses a 0.4 mg/l target for **nitrate** because it is only a portion of TN].
    - In 2016 during the most critical summer months of June to September TRWA measured **Nitrate** levels in the Taunton River main stem from 2 to 14 times the target level, levels in the Town River 2 to 32 times target, levels in the Matfield River 5 times target, and levels in the Three Mile River 4 to 20 times target.
    - It is obvious that no matter what credible instream target is used for the Taunton River estuary (TN water quality criteria targets for estuaries and bays 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!

- **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 only the Town River Bridgewater and Taunton main stem at the Berkley bridge had levels which often 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 location at Washington St. in Taunton and Chuckamucksett Brook in Berkley had the most consistent values above the former Massachusetts fecal coliform standard of 400 colonies/100ml. These locations should be investigated for potential wastewater leakage. Other locations had only sporadic infrequent high values which might have been caused by wildlife.
    - With the exceptions mentioned above the sampling results looked good for water contact.

- **Dissolved Oxygen**
    - TRWA 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 Town River at Haywood St in Bridgewater in August and September and the small 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.

- **Total Suspended Solids**
  - Instream values above 20 mg/l can be a concern representing potential erosion by poor construction practices. Most values were below this threshold except Chuckamucksett Brook in Berkley which had two unusually high measurements.

- **pH**
  - TRWA field testing for pH with test strips is generally only suitable to find outlier values worthy of further investigation with a calibrated meter. TRWA field pH results March to August tended to be a little low (5.0 to 6.5) but not inconsistent with the watershed's swampy bog geology.
  - In September and October the Veolia wastewater treatment plant lab analyzed the pH of our TSS samples using a calibrated meter. Veolia found pH generally in the 5.6 to 7.4 range with three unusually low values in October at Chuckamucksett Brook, Taunton River at Cherry St., and the Town River at Haywood St. We don't have enough calibrated pH data to interpret these three low results.

- **Temperature**
  - The warmest water month was August with measured instream temperatures 22^{o} C to almost 25 ^{o} C compared to the Class B standard of 28 ^{o} C. As described in the dissolved oxygen (DO) discussion we are not likely measuring in the highest temperature or lowest DO waters but none-the-less it is good that we did not see a temperature criteria violation during the warm dry summer.

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 six most important permits for TN and TP control have been re- issued with all but the 2 most recently re-issued permits in effect. Attempts to appeal TN limits or delay the effective date have failed before both the EPA Environmental Appeals Board, and the Federal First Circuit Court of Appeals which recently denied Taunton's request for a stay.
- 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 in 2017. 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 both existing state regulations and 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 will 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 by current regulations) 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 four challenges mentioned in item I this is potentially the hardest and the one that will require constant effort.

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