



Tiogue Tributaries

Watershed Description

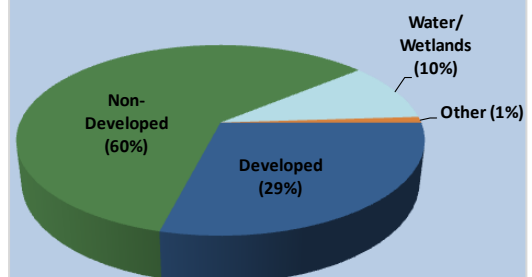
This **TMDL** applies to the Tiogue Tributaries assessment unit (RI0006014R-05), three streams that total 1.4 miles in length located in Coventry, RI (Figure 1). The Town of Coventry is located in the central part of the state. The impaired segments are found in the southeastern corner of Coventry in a residential area. The Tiogue Tributaries watershed is presented in Figure 2 with land use types indicated.

The Tiogue Tributaries watershed is made up of three unnamed streams draining to Tiogue Lake. The western tributary is the longest and originates in a forested area east of Centre of New England Boulevard. The tributary flows north through a barren area and crosses King Street. The stream then crosses Johnson Boulevard and forms a small unnamed pond before it crosses under York Drive and empties into Tiogue Lake near Arnold Road. The center tributary flows from a small pond behind the Wal-Mart Supercenter. It flows north through a forested area and crosses Jade Road. The tributary then forms a small unnamed pond before it flows through a high-density residential neighborhood. The central tributary then crosses Reno Court and Arnold Road and empties into Tiogue Lake near Briar Point. The eastern tributary begins in a forested area south of the intersection of Tiffany Road and Old North Road. It flows west and empties into Tiogue Lake near South Glen.

The Tiogue Tributaries watershed covers 2.4 square miles and extends into West Greenwich, RI. Non-developed land occupies 60% of the watershed area. Developed areas occupy 29% and consist mostly of high-density residential neighborhoods. Open water and wetland areas, including half of Tiogue Lake, make up 10% of watershed area. Other land uses in the watershed include land cleared for development.

Assessment Unit Facts (RI0006014R-05)

- **Town:** Coventry
- **Impaired Segments Length:** 1.4 miles
- **Classification:** Class B
- **Direct Watershed:** 2.4 mi² (1,516 acres)
- **Impervious Cover:** 14.5%
- **Watershed Planning Area:** Pawtuxet (#12)



Watershed Land Uses

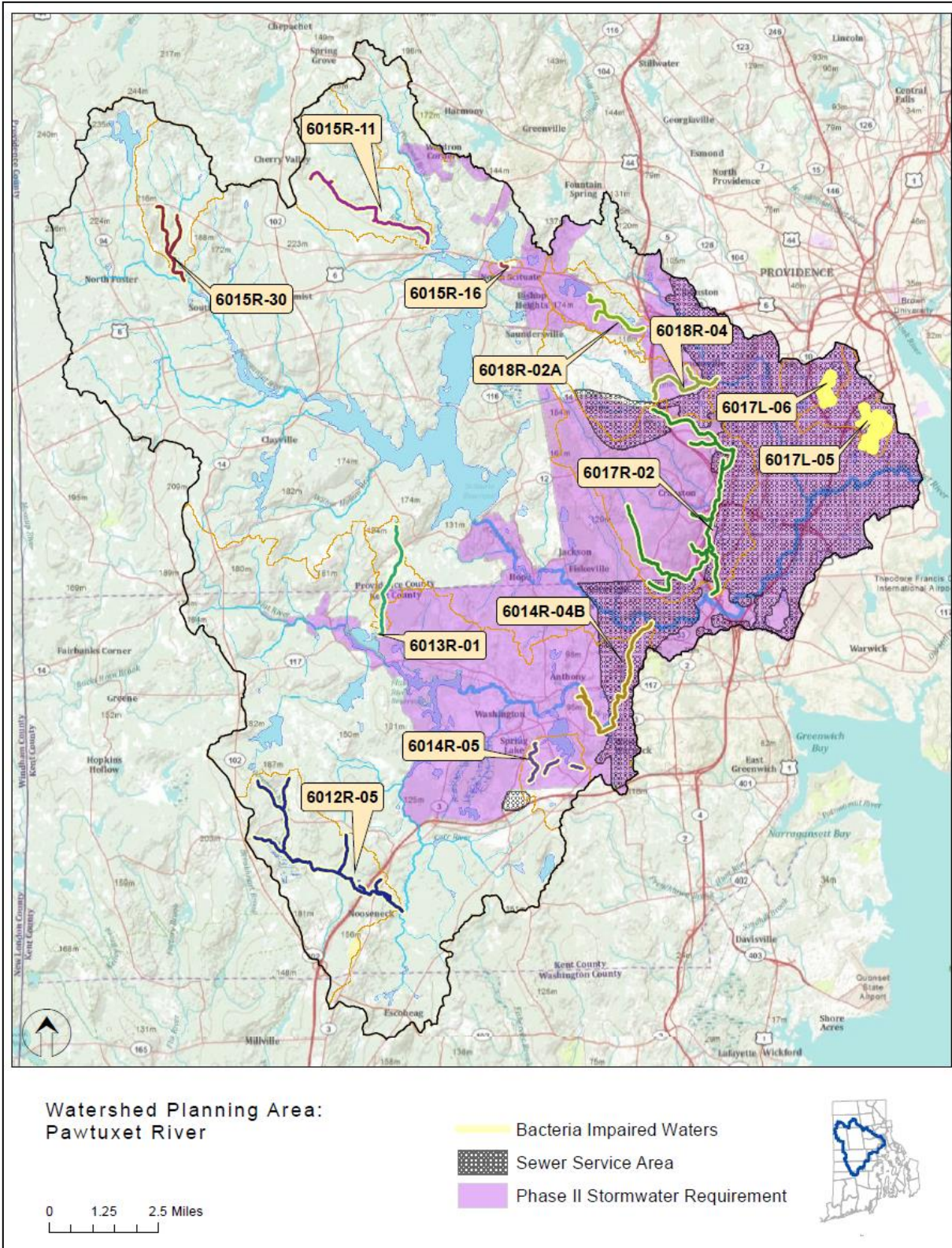


Figure 1: Map of the Pawtuxet Watershed Planning Area with impaired segments addressed by the Statewide Bacteria TMDL, sewer service areas, and stormwater regulated zones.

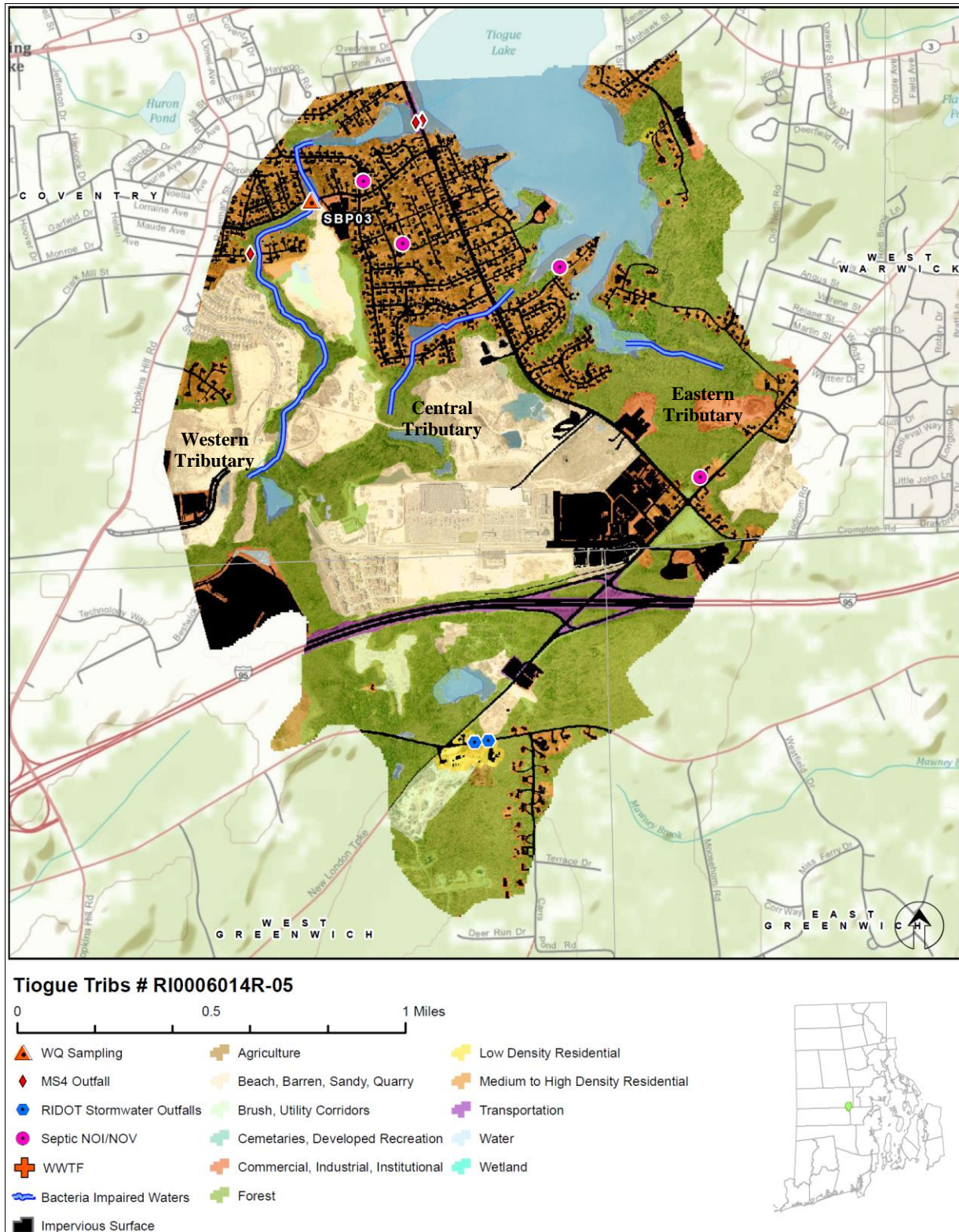


Figure 2: Map of the Tiogue Tributaries watershed with impaired segments, sampling location, and land cover indicated.

Why is a TMDL Needed?

The Tiogue Tributaries are Class B freshwater streams with designated uses of primary and secondary contact recreation and fish and wildlife habitat (RIDEM, 2009). From 2006-2007, water samples were collected from one sampling location (SBP03) on the western tributary and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with bacteria sampling results from the 2006-2007 study and associated statistics are presented in Table 1. The geometric mean was calculated for Station SBP03 and exceeded the water quality criteria for enterococci.

To aid in identifying possible bacteria sources, the geometric mean was calculated for wet and dry-weather sample days, where appropriate. The dry-weather geometric mean value at station SBP03 exceeded the water quality criteria for enterococci.

Due to the elevated bacteria measurements presented in Table 1, the Tiogue Tributaries assessment unit does not meet Rhode Island's water quality standards. The segment was identified as impaired and placed on the 303(d) list (RIDEM, 2008). The Clean Water Act requires that all 303(d) listed waters undergo a TMDL assessment that describes the impairments and identifies the measures needed to restore water quality. The goal is for all waterbodies to comply with state water quality standards.

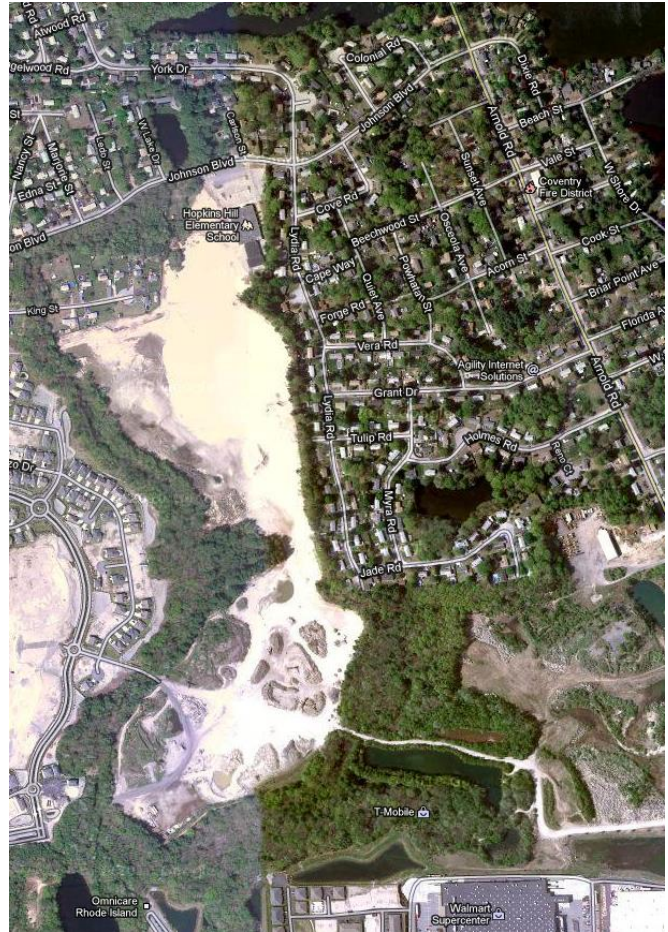


Figure 3: Partial aerial view of the Tiogue Tributaries watershed. (Source: Google Maps)

Potential Bacteria Sources

Previous investigations have concluded that there are several potential sources of harmful bacteria in the Tiogue Tributaries watershed including stormwater runoff from developed areas, failing onsite wastewater treatment systems, and wildlife and domestic animal waste (Weston & Sampson, 2003). Each type of potential bacteria source is described briefly below.

Developed Area Stormwater Runoff

Though the majority of the Tiogue Tributaries watershed is non-developed, impervious surfaces cover approximately 14.3%, particularly in the residential areas on the shores of Tiogue Lake and commercial areas around the New London Turnpike in the center of the watershed. Impervious cover is defined as land surface areas, such as roofs and roads, that force water to run off land surfaces, rather than infiltrating into the soil. Impervious cover provides a useful metric for the potential for adverse stormwater impacts. As discussed in Section 6.3 of the Core TMDL Document, as a general rule, impaired streams with watersheds having higher than 10% impervious cover are assumed to be affected by stormwater runoff.

In accordance with Phase II requirements, Coventry and West Greenwich have identified and mapped outfalls to surface water bodies within their regulated areas. The Rhode Island Department of Transportation (RIDOT) has also mapped stormwater outfalls within the Tiogue Tributaries watershed. As shown in Figure 2, two RIDOT outfalls were found along Division Road in West Greenwich. Three MS4 outfalls in Coventry were identified on the western tributary. As stormwater is known to carry a suite of pollutants, including bacteria, stormwater may be a potential source of bacterial contamination to the Tiogue Tributaries.

Onsite Wastewater Treatment Systems

The Tiogue Tributaries watershed relies entirely on onsite wastewater treatment systems (OWTS) such as septic systems and cesspools. Failing OWTS can be significant sources of bacteria by allowing improperly treated waste to reach surface waters (RI HEALTH, 2003). A 1992 survey of residents in eastern Coventry found that at least 24% of residents had malfunctioning OWTS (Weston & Sampson, 1995). As shown in Figure 2, four OWTS Notices of Violation/Notices of Intent to Violate (NOI/NOV) have been sent to property owners in the Tiogue Tributaries watershed. Two are located in the high-density residential area near the western tributary, one is located on the shore of Tiogue Lake at the outlet of the central tributary, and the last NOI/NOV is located near the intersection of the New London Turnpike and Arnold Road.

Waterfowl, Wildlife, and Domestic Animal Waste

Non-developed land accounts for 60% of the watershed area. Forests and open water areas are home to multiple species of wildlife and waterfowl. Wildlife, including waterfowl, may be a significant bacteria source to surface waters. With the construction of roads and drainage systems, these wastes may no longer be retained on the landscape, but instead may be conveyed via stormwater to the nearest surface water. As such these physical land alterations can exacerbate the impact of these natural sources on water quality.

Domestic animals are another potential source of bacteria to the Tiogue Tributaries. High-density residential developments are found in the northern portions of the watershed along the lake shore. If residents are not properly disposing of pet waste, the bacteria from that waste could enter and contaminate the tributaries either directly or through stormwater.

Existing Local Management and Recommended Next Steps

Additional bacteria data collection would be beneficial to support identification of sources of potentially harmful bacteria in the Tiogue Tributaries watershed. These activities could include sampling at several different locations and under different weather conditions (e.g., wet and dry). Field reconnaissance surveys that focus on stream buffers, stormwater runoff, and other source identification may also be beneficial, especially with ongoing development in the watershed.

A brief description of existing local programs and recommended next steps from existing local plans are provided below. Stakeholders should review these documents directly for more detailed information.

Stormwater Management

The Town of Coventry (RIPDES permit RIR040006) and RIDOT (RIPDES permit RIR040036) are municipal separate storm sewer (MS4) operators in the Tiogue Tributaries watershed and have prepared Phase II Stormwater Management Plans (SWMPP). West Greenwich is also regulated under the Phase II program (RIPDES permit RIR040029), though the small portion of the watershed in West Greenwich is located outside of the regulated area.

Coventry's SWMPP outlines goals for the reduction of stormwater runoff to the Tiogue Tributaries through the implementation of Best Management Practices (BMPs). Many of these BMPs are now in place, including mapping all stormwater outfalls, instituting annual inspections and cleaning of the town's catch basins, implementing an annual street sweeping program, adopting construction erosion and sediment control and post-construction stormwater control ordinances, and conducting public education activities (RIDEM, 2010a).

In 2009, the Towns of Coventry and West Greenwich adopted illicit discharge detection and elimination (IDDE) ordinances (RIDEM, 2010). This type of ordinance prohibits illicit discharges to the MS4 and provides an enforcement mechanism. It is recommended that any stormwater outfalls discharging in the vicinity of the sampling location be monitored to check for illicit discharges. Illicit discharges can be identified through continued dry weather outfall sampling and microbial source tracking.

RIDOT also has completed a SWMPP for state-owned roads in the watershed. RIDOT's SWMPP and its 2011 Compliance Update outline its goals for compliance with the General Permit statewide. It should be noted that RIDOT has chosen to enact the General Permit statewide, not just for the urbanized and densely populated areas that are required by the permit. RIDOT has finished mapping its outfalls throughout the state and is working to better document and expand its catch basin inspection and maintenance programs along with its BMP maintenance program. Stormwater Management Pollution Prevention Plans (SWPPPs) are being utilized for RIDOT construction projects. RIDOT also funds the University of Rhode Island Cooperative Extension's Stormwater Phase II Public Outreach and Education Project, which provides participating MS4s with education and outreach programs that can be used to address TMDL public education recommendations.

While these first steps are important to reduce the effects of stormwater runoff to the Tiogue Tributaries, additional efforts are needed to restore the river's water quality. As mentioned previously, the Tiogue Tributaries watershed has an impervious cover of 14.3%, a level where stormwater impacts are expected. At this threshold, RIDEM is requiring the Coventry and RIDOT to revise their post-construction stormwater ordinances as described in Section 6.3 of the Core TMDL Document. RIDEM also requires the MS4 operators to continue to comply with and adapt the minimum measures to reflect the bacteria impairments in regulated areas. Information regarding plans to revise the post construction ordinance should be documented in a TMDL Implementation Plan (TMDL IP). Unless otherwise noted in this waterbody summary, any other TMDL IP requirements described in Section 6.2 of the Core TMDL Document are not applicable to the MS4 operators for watershed areas having impervious cover between 10 and 15%. Information regarding how the MS4 operators' minimum measures are addressing the pollutant of concern (i.e. bacteria) should be documented in the MS4 operators' annual report, consistent with Part IV.G.2.d of the RIPDES General Permit (RIDEM, 2010b). Further detail is also included in Sections 6.3 of the Core TMDL Document.

Onsite Wastewater Management

All residents in the Tiogue Tributaries watershed rely on OWTS (Figure 1). Coventry has an Onsite Wastewater Management Plan that provides a framework for managing the OWTS. West Greenwich does not have a Wastewater Management Plan and neither town has adopted an OWTS ordinance requiring all OWTS to be inspected and pumped routinely. No sewer expansion is planned for this area

(Weston and Sampson, 2003). As part of the onsite wastewater planning process, Coventry and West Greenwich should adopt ordinances to establish enforceable mechanisms to ensure that existing OWTS are properly operated and maintained. RIDEM recommends that all communities create an inventory of onsite systems through mandatory inspections. Inspections encourage proper maintenance and identify failed and sub-standard systems. Policies that govern the eventual replacement of sub-standard OWTS within a reasonable time frame should be adopted. The Rhode Island Wastewater Information System (RIWIS) can help develop an initial inventory of OWTS and can track voluntary inspection and pumping programs (RIDEM, 2010b).

The Town of Coventry is eligible for Rhode Island's Community Septic System Loan Program (CSSLP) and has obtained \$300,000 in CSSLP money since 2008. The program assists citizens with the replacement of older and failing systems. Though West Greenwich is not currently eligible for CSSLP, it is recommended that the town develop a program to assist residents with OWTS repairs and replacement.

Waterfowl, Wildlife, and Domestic Animal Waste

Education and outreach programs in Coventry and West Greenwich should highlight the importance of picking up after dogs and other pets and not feeding waterfowl. Animal wastes should be disposed of away from any waterway or stormwater system. The towns should work with volunteers to map locations where animal waste is a significant and chronic problem. This may include installing signage, providing pet waste receptacles or pet waste digester systems in high-use areas, enacting ordinances requiring clean-up of pet waste, and targeting educational and outreach programs in problem areas.

Towns and residents can take several measures to minimize waterfowl-related impacts. They can allow tall, coarse vegetation to grow in areas along the shores of the Tiogue Tributaries that are frequented by waterfowl. Waterfowl, especially grazers like geese, prefer easy access to the water. Maintaining an uncut vegetated buffer along the shore will make the habitat less desirable to geese and encourage migration. With few exceptions, Part XIV, Section 14.13, of Rhode Island's Hunting Regulations prohibits feeding wild waterfowl at any time in the state of Rhode Island. Educational programs should emphasize that feeding waterfowl, such as ducks, geese, and swans, may contribute to water quality impairments in the Tiogue Tributaries and can harm human health and the environment.

Land Use Protection

The majority of the Tiogue Tributaries watershed is undeveloped. Woodland areas within the Tiogue Tributaries watershed, particularly near Tiogue Lake, absorb and filter pollutants from stormwater and help protect both water quality in the stream and stream channel stability. It is important to preserve these undeveloped areas and institute controls on development in Tiogue Tributaries watershed.

The steps outlined above will support the goal of mitigating bacteria sources and meeting water quality standards in the Tiogue Tributaries.

Table 1: Tiogue Tributaries Bacteria Data

Waterbody ID: RI0006014R-05

Watershed Planning Area: 12 – Pawtuxet

Characteristics: Freshwater, Class B, Primary and Secondary Contact Recreation, Fish and Wildlife Habitat

Impairment: Enterococci (colonies/100mL)

Water Quality Criteria for Enterococci: Geometric Mean: 54 colonies/100 mL

Percent Reduction to meet TMDL: 50% (Includes 5% Margin of Safety)

Data: 2006-2007 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Tiogue Tributaries (2006-2007) with Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
SBP03	Johnson St @ end of West Lake Drive	8/9/2007	230	Dry	99 (50%)*
SBP03	Johnson St @ end of West Lake Drive	7/9/2007	460	Dry	
SBP03	Johnson St @ end of West Lake Drive	6/26/2007	460	Dry	
SBP03	Johnson St @ end of West Lake Drive	6/12/2007	200	Wet	
SBP03	Johnson St @ end of West Lake Drive	10/9/2006	1	Dry	
Shaded cells indicate an exceedance of water quality					
*Includes 5% Margin of Safety					

Wet and Dry Weather Geometric Mean Enterococci Values for Station SBP03

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
SBP03	Johnson St @ end of West Lake Drive	2006-2007	1	4	99	NA	84
Shaded cells indicate an exceedance of water quality criteria							
Weather condition determined from the rain gage at T.F. Green Airport in Warwick, RI							

References

- RIDEM (2008). State of Rhode Island and Providence Plantations 2008 303(d) List – List of Impaired Water Bodies. Rhode Island Department of Environmental Management.
- RIDEM (2009). State of Rhode Island and Providence Plantations Water Quality Regulations. Amended December, 2009. Rhode Island Department of Environmental Management.
- RIDEM (2010). MS4 Compliance Status Report for RI Statewide Bacteria TMDL: Town of Coventry. Rhode Island Department of Environmental Management.
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- Weston & Sampson (2003). Onsite Wastewater Management Plan: Town of Coventry, Rhode Island. Submitted by Weston & Sampson Engineers, Inc, Warwick, RI. October 2003.