



Boyd Brook

Watershed Description

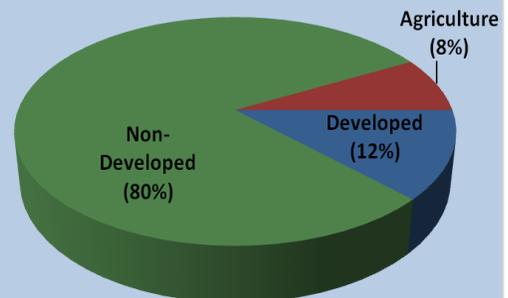
This **TMDL** applies to the Boyd Brook assessment unit (RI0006013R-01), a 2.7-mile long stream located in Scituate and Coventry, RI (Figure 1). The towns of Scituate and Coventry are located in the central part of the state. The impaired segment is located southwest of the Scituate Reservoir in the southern section of Scituate and the northern section of Coventry. The Boyd Brook watershed is presented in Figure 2 with land use types indicated.

Boyd Brook begins just east of a residential development near the intersection of Franklin Road and Route 12 in Scituate. The brook flows south, crosses Matteson Road, and passes through an agricultural area. The brook continues south, through a forested area, crosses Hope Furnace Road, and enters the Town of Coventry. Boyd Brook then crosses Town Farm Road and empties into the Coventry Reservoir. This reservoir is hydrologically connected to the larger Flat River Reservoir.

The Boyd Brook watershed covers 1.6 square miles and is largely non-developed, as shown in Figures 2 and 3. Non-developed land accounts for 80% of watershed area. Developed areas occupy 12% of the land area, and consist mostly of medium-density residential neighborhoods. Most of the development is located near the headwaters of the brook and around Hope Furnace Road. Agricultural uses occupy 8% of the land area and are concentrated in the central portion of the watershed between Matteson and Burnt Hill Roads.

Assessment Unit Facts *(RI0006013R-01)*

- **Town:** Scituate and Coventry
- **Impaired Segment Length:** 2.7 miles
- **Classification:** Class B
- **Direct Watershed:** 1.6 mi² (1,013 acres)
- **Impervious Cover:** 4.5%
- **Watershed Planning Area:** Pawtuxet (#12)



Watershed Land Uses

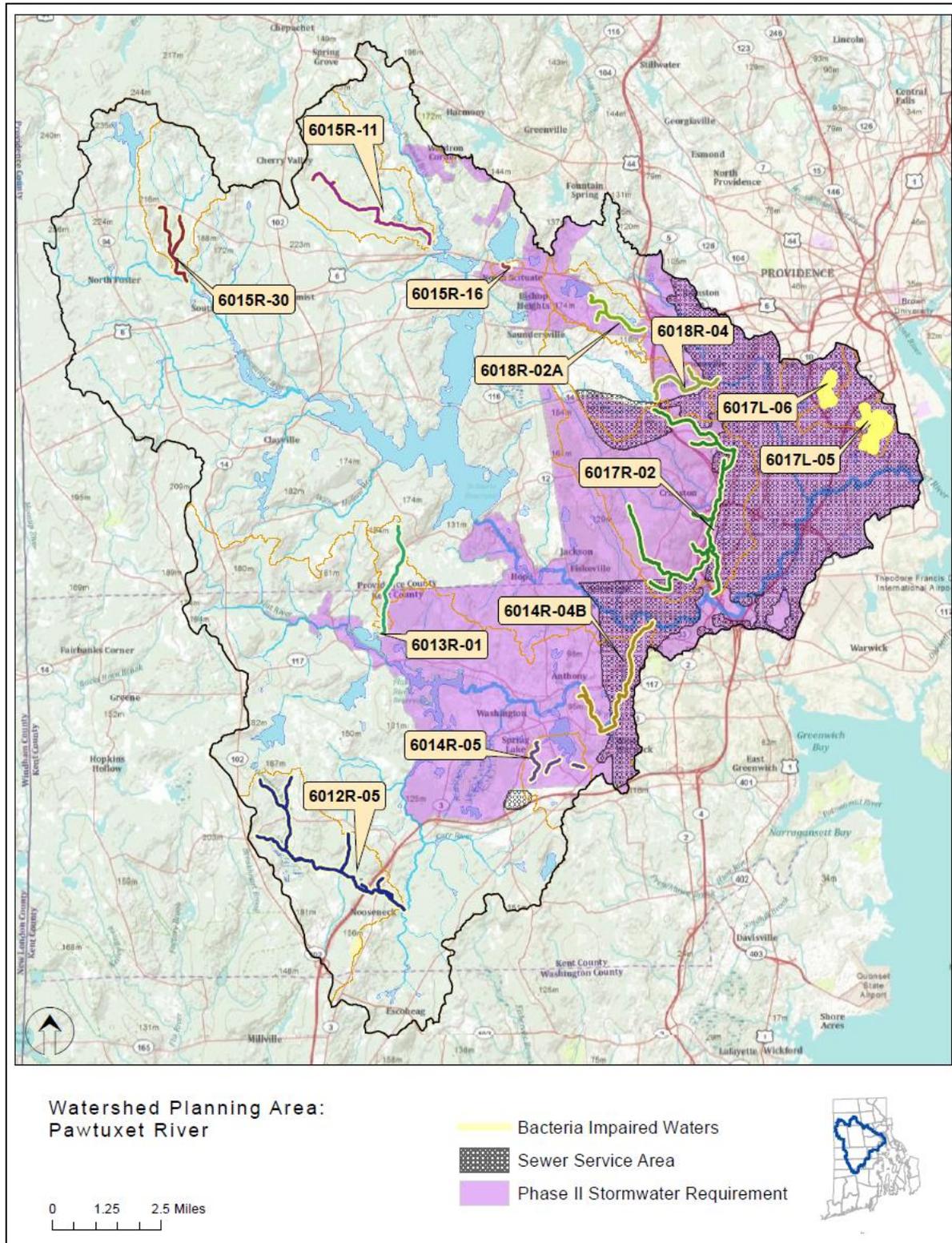


Figure 1: Map of the Pawtuxet Watershed Planning Area with impaired segments addressed by the Statewide Bacteria TMDL, sewered areas, and stormwater regulated zones.

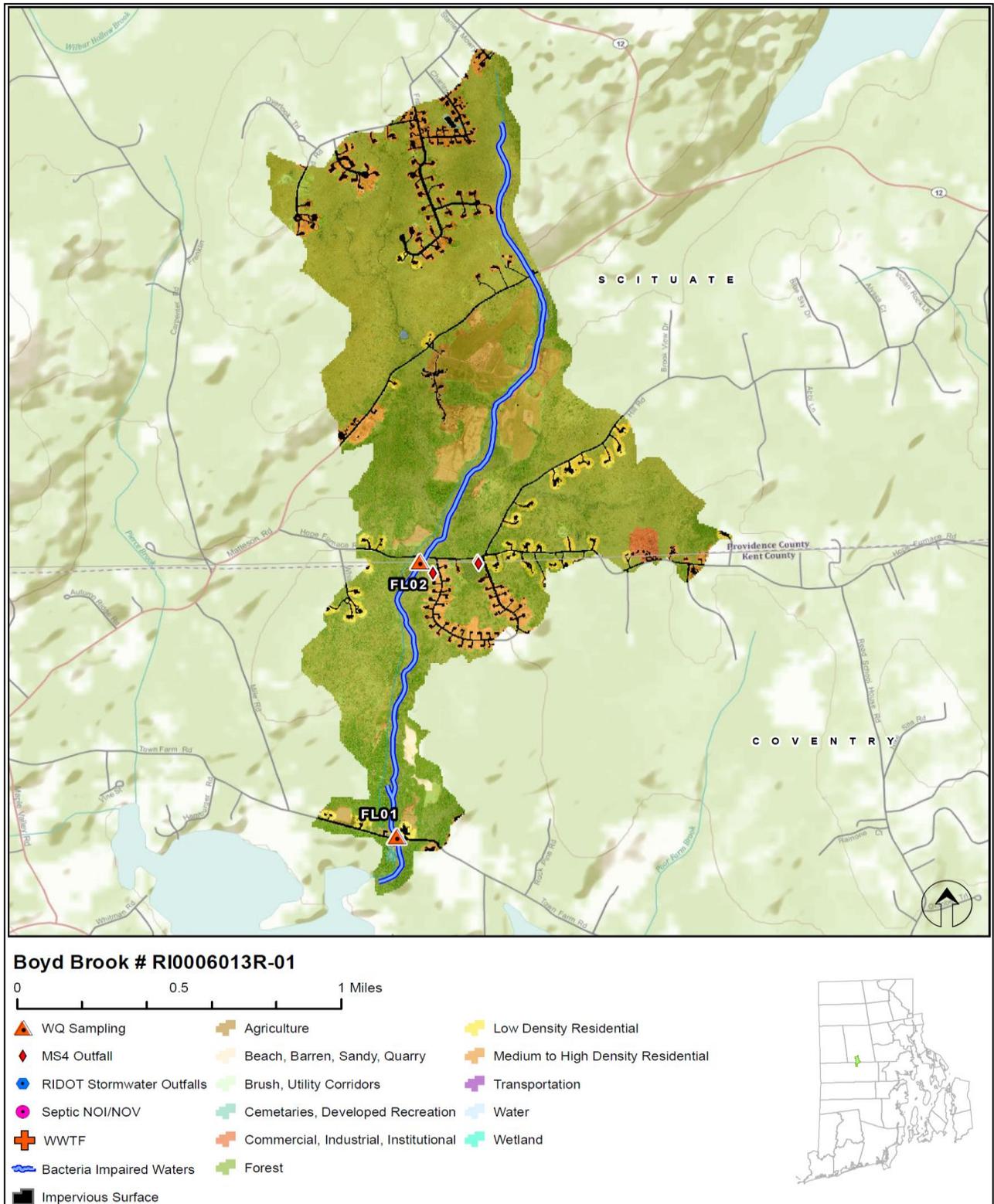


Figure 2: Map of Boyd Brook watershed with impaired segment, sampling locations, and land cover indicated.

Why is a TMDL Needed?

Boyd Brook is a Class B fresh water stream with designated uses of primary and secondary contact recreation and fish and wildlife habitat (RIDEM, 2009b). From 2006-2007, water samples were collected from two sampling locations (FL01 and FL02) 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 both stations and exceeded the water quality criteria for enterococci at the upstream station, FL02.

To aid in identifying possible bacteria sources, the geometric mean was calculated for each station for wet and dry-weather conditions, where appropriate. The dry-weather geometric mean value exceeded the water quality criteria for enterococci at station FL02. The wet-weather geometric mean value could not be calculated for either station as there were too few data.

Due to the elevated bacteria measurements presented in Table 1, the Boyd Brook 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.

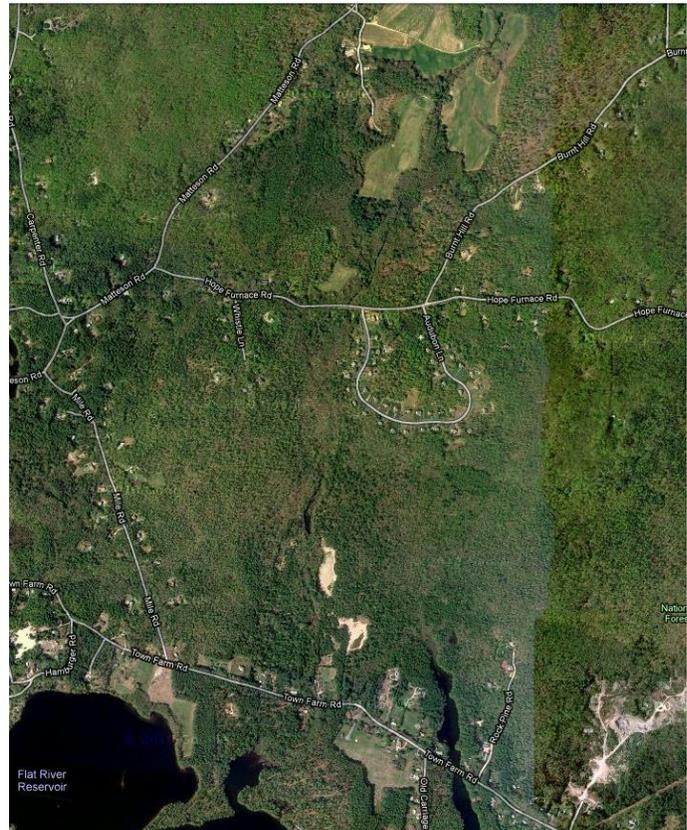


Figure 3: Partial aerial view of the Boyd Brook watershed. (Source: Google Maps)

Potential Bacteria Sources

Previous investigations have concluded that there are several potential sources of harmful bacteria in the Boyd Brook watershed including stormwater runoff from developed areas, illicit discharges, failing onsite wastewater treatment systems, agricultural activities, and wildlife and domestic animal waste (Weston & Sampson, 2003; Town of Scituate, 1994). Each type of potential bacteria source is described briefly below.

Onsite Wastewater Treatment Systems

The Boyd Brook 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). If systems are improperly sized, malfunctioning, or in soils poorly suited for septic waste disposal, microorganisms such as bacteria, can easily enter surface water (USEPA, 2002). As shown in Figure 2, no OWTS Notice of Violation/Notice of Intent to Violate (NOV/NOIs) have been issued by the RIDEM Office of Compliance and Inspection in the Boyd Brook watershed.

Agricultural Activities

Agricultural operations are an important economic activity and landscape feature in the state's rural areas. Agricultural land use occupies only 8% of the land area in the Boyd Brook watershed. However, most of the agricultural activities in the watershed, including hay fields, pasture, and low-intensity cropland, is located directly adjacent to Boyd Brook, near Hope Furnace Road (Figure 2). Agricultural runoff, may contain multiple pollutants, including bacteria, and may be contributing to the high concentrations of bacteria in Boyd Brook.

Wildlife and Domestic Animal Waste

Most of the Boyd Brook watershed is non-developed. 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.

Residential development is concentrated in the northern and central portions of the watershed. Waste from domestic animals, such as dogs, in these residential neighborhoods, may also be contributing to bacteria concentrations in Boyd Brook.

Developed Area Stormwater Runoff

Though only a small portion of the Boyd Brook watershed is developed, impervious surfaces cover approximately 4.5%, particularly in the residential areas along Hope Furnace Road and in the northern portion 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. While runoff from impervious areas in developed portions of the watershed may be contributing bacteria to Boyd Brook, as discussed in Section 6.3 of the Core TMDL Document, as a general rule, impaired streams with watersheds having less than 10% impervious cover are assumed to be caused by sources other than urbanized stormwater runoff.

Existing Local Management and Recommended Next Steps

Both Scituate and Coventry have developed and implemented programs to protect water quality from bacterial contamination. Future mitigative activities are necessary to ensure the long-term protection of Boyd Brook. Additional bacteria data collection would be beneficial to support identification of sources of potentially harmful bacteria in the Boyd Brook watershed. These activities could include sampling at several different locations and under different weather conditions (e.g., wet and dry). Field reconnaissance surveys focusing on stream buffers, stormwater runoff, and other source identification may also be beneficial.

Both Scituate and Coventry have Comprehensive Plans that provide technical resources for protection of the Boyd Brook watershed. A brief description of existing local programs and recommended next steps from Coventry's Stormwater Phase II report, Wastewater Facilities Plan, and both Scituate and Coventry's Onsite Wastewater Management Plans are provided below. Stakeholders should review these documents directly for more detailed information.

Onsite Wastewater Management

All residents in the Boyd Brook watershed rely on OWTS (Figure 1). Both Scituate and Coventry have Onsite Wastewater Management Plans that provide a framework for managing the OWTS. However, neither town has adopted an OWTS ordinance requiring all OWTS to be inspected and pumped routinely. As part of an onsite wastewater planning process, Scituate and Coventry should adopt this type of ordinance 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 Coventry is eligible for Rhode Island's Community Septic System Loan Program (CSSLP) and has obtained \$300,000 in CSSLP money since 2008. The CSSLP program provides low-interest loans to residents to help with maintenance and replacement of OWTS. Though the Town of Scituate is not currently eligible for CSSLP, it is recommended that the town develop a program to assist citizens with the replacement of older and failing systems.

Agricultural Activities

If not already in place, agricultural producers should work with the RIDEM Division of Agriculture, and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) to develop a conservation plan for farming activities, particularly for the large operation on Matteson Road. NRCS and the RIDEM Division of Agriculture should continue to work with agricultural operations in the watershed to ensure that there are sufficient stream buffers, that fencing exists to restrict access of livestock and horses to streams and wetlands, and that animal waste handling, disposal, and other appropriate BMPs in place.

Wildlife and Domestic Animal Waste

The Towns of Scituate and Coventry should develop education and outreach programs to 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. The towns should also evaluate strategies to reduce the impact of animal waste on water quality. 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 Boyd Brook 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 Boyd Brook and can harm human health and the environment.

Stormwater Management

The Town of Coventry (RIPDES Permit RIR040006) and RIDOT (RIPDES permit RIR040036) are municipal separate storm sewer system (MS4) operators in the Boyd Brook watershed and have prepared the required Phase II Stormwater Management Plans (SWMPPS). The Town of Scituate is also regulated under the Phase II program (RIPDES permit RIR040027). However, the Boyd Brook watershed is outside of the regulated area (Fuss and O'Neill, 2007).

Most of the southern portion of the Boyd Brook watershed is included in the regulated area in Coventry. Coventry's SWMPP outlines goals for the reduction of stormwater runoff to Boyd Brook 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 Town of Coventry adopted an illicit discharge detection and elimination ordinance (IDDE) (RIDEM, 2010a). The Town of Scituate has not adopted an IDDE ordinance. 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 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. SWMPPs 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.

As it is assumed that stormwater runoff is not the major contributor of bacteria to Boyd Brook based on the watershed's imperviousness, Coventry and RIDOT will have no changes to their Phase II permit requirements and no TMDL Implementation Plan (TMDL IP) will be required at this time.

Land Use Protection

The majority of the Boyd Brook watershed is undeveloped. Woodland areas within the Boyd Brook watershed, particularly in the central portion of the watershed, absorb and filter pollutants from stormwater and agricultural runoff, 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 Boyd Brook watershed.

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

Table 1: Boyd Brook Bacteria Data

Waterbody ID: RI0006013R-01

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: 48% (Includes 5% Margin of Safety)

Data: 2006-2007 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Boyd Brook (2008-2009) with Geometric Mean Statistics

| Station Name | Station Location | Date | Result | Wet/Dry | Geometric Mean |
|--------------|----------------------------------|-----------|--------|---------|----------------------------------|
| FL02 | Hope Furnace Road | 8/9/2007 | 980 | Dry | 95[†] (48%)* |
| FL02 | Hope Furnace Road | 7/9/2007 | 180 | Dry | |
| FL02 | Hope Furnace Road | 6/26/2007 | 86 | Dry | |
| FL02 | Hope Furnace Road | 6/12/2007 | 71 | Wet | |
| FL02 | Hope Furnace Road | 10/9/2006 | 7 | Dry | |
| FL01 | 69 Town Farm Rd (off of Rte 117) | 8/9/2007 | 180 | Dry | 35 |
| FL01 | 69 Town Farm Rd (off of Rte 117) | 7/9/2007 | 42 | Dry | |
| FL01 | 69 Town Farm Rd (off of Rte 117) | 6/26/2007 | 23 | Dry | |
| FL01 | 69 Town Farm Rd (off of Rte 117) | 6/12/2007 | 78 | Wet | |
| FL01 | 69 Town Farm Rd (off of Rte 117) | 10/9/2006 | 4 | Dry | |

Shaded cells indicate an exceedance of water quality criteria

*Includes 5% Margin of Safety

[†]Geometric mean used to determine percent reduction

Wet and Dry Weather Geometric Mean Enterococci Values for all Stations

| Station Name | Station Location | Years Sampled | Number of Samples | | Geometric Mean | | |
|--|-------------------------------|---------------|-------------------|-----|----------------|-----|-----|
| | | | Wet | Dry | All | Wet | Dry |
| FL02 | Hope Furnace Road | 2006-2007 | 1 | 4 | 95 | NA | 102 |
| FL01 | 69 Town Farm Rd (off Rte 117) | 2006-2007 | 1 | 4 | 35 | NA | 29 |
| Shaded cells indicate an exceedance of water quality criteria Weather conditions determined from the rain gage at the T.F. Green Airport in Warwick, RI | | | | | | | |

References

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- RIDEM (2008). State of Rhode Island and Providence Plantations 2008 303(d) List – List of Impaired Water Bodies. Rhode Island Department of Environmental Management.
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