



Dry Brook

Watershed Description

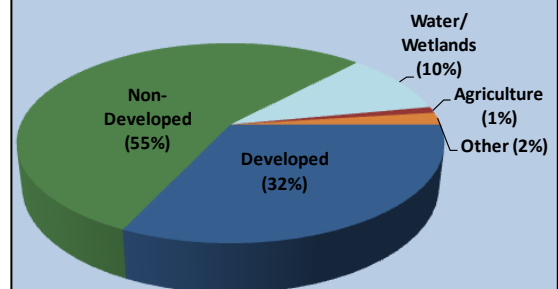
This **TMDL** applies to the Dry Brook assessment unit (RI0006018R-02A), a 1.6-mile long stream-segment located in Johnston, RI (Figure 1). The Town of Johnston is located in the central portion of the state and is bordered to the east by Providence, to the west by Scituate, to the north by Smithfield, and to the south by Cranston. Dry Brook is located in the western portion of town. The Dry Brook watershed is presented in Figure 2 with land use types indicated.

Dry Brook begins at the outlet of the Oak Swamp Reservoir. The brook flows southeast through a residential neighborhood and crosses Reservoir Avenue. Dry Brook continues southeast, through a predominately forested area, and flows into the Almy Reservoir. Dry Brook leaves the Almy Reservoir at the southeast corner near Central Avenue, crosses Interstate 295 (I-295) and eventually empties into the Pocasset River. The impaired segment of Dry Brook ends just upstream of a small wastewater treatment facility (capacity of 100 people) located at the Briarcliff Nursing Home, just west of I-295.

The Dry Brook watershed covers 2.7 square miles. Non-developed areas occupy a large portion (55%) of the watershed. Developed uses (including residential and commercial uses) occupy approximately 32%. Impervious surfaces cover a total of 11.3%, and are concentrated in the northern portion of the watershed around the Oak Swamp Reservoir. As shown in Figure 3, wetlands and other surface waters, including the Oak Swamp and Almy reservoirs, occupy 10%. Agricultural land uses occupy 1%, and other land uses occupy 2%.

Assessment Unit Facts **(RI0006018R-02A)**

- **Town:** Johnston
- **Impaired Segment Length:** 1.6 miles
- **Classification:** Class B
- **Direct Watershed:** 2.7 mi² (1681 acres)
- **Impervious Cover:** 11.3%
- **Watershed Planning Area:** Pawtuxet (#12)



Watershed Land Uses

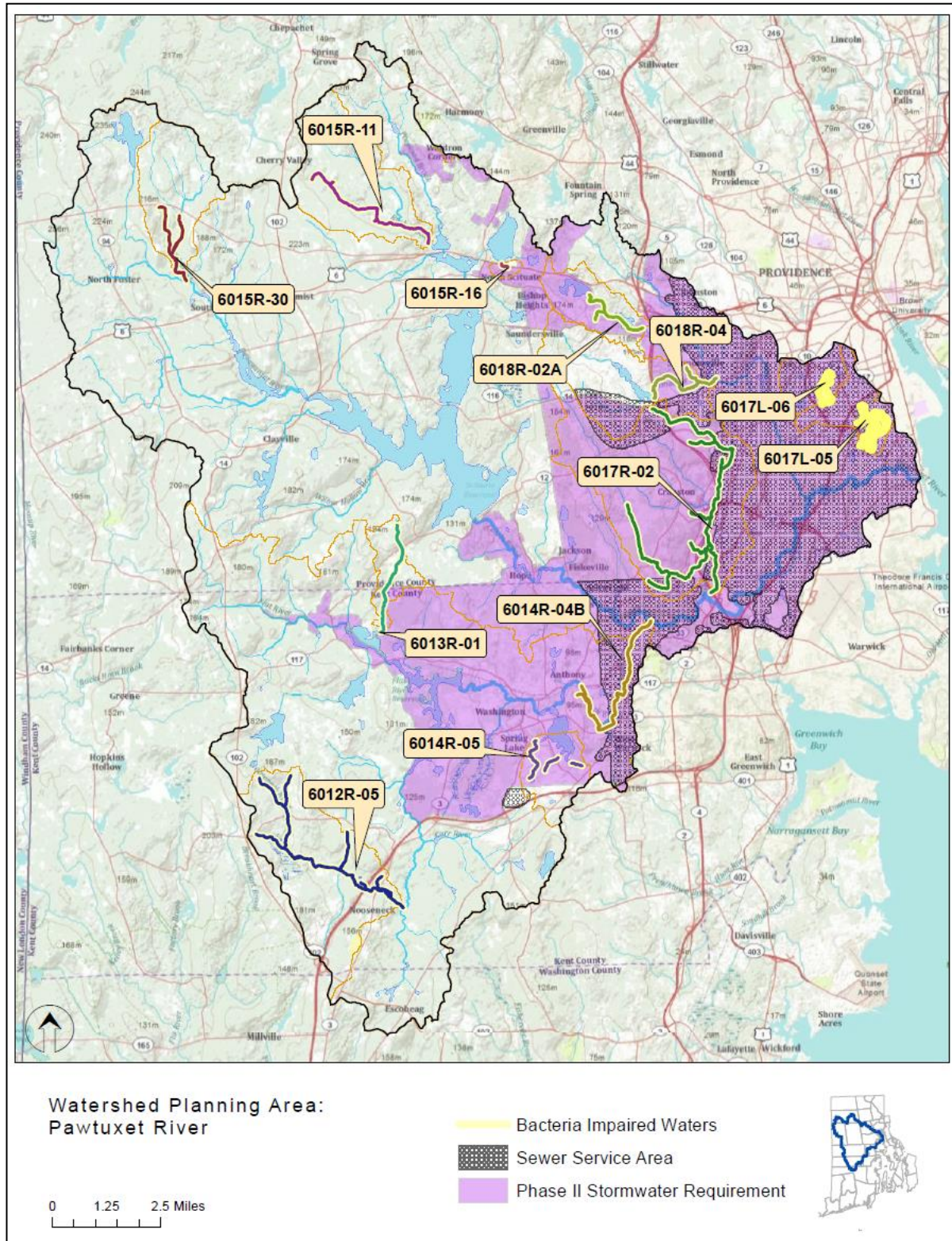


Figure 1: Map of the Pawtuxet Watershed Planning Area with impaired segments addressed by the Statewide Bacteria TMDL, sewer service areas, and stormwater regulated zones.

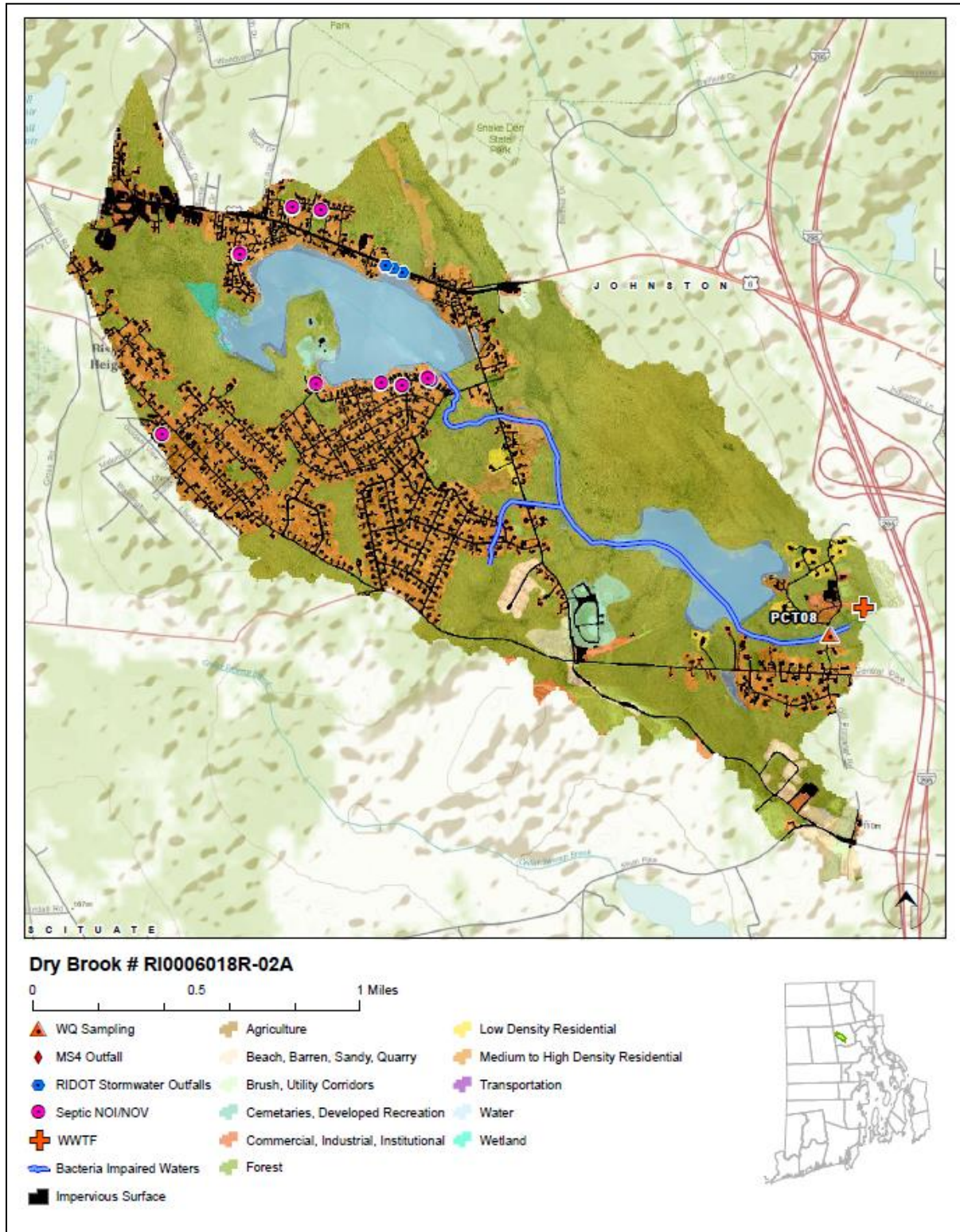


Figure 2: Map of the Dry Brook watershed with impaired segment, sampling location, and land cover indicated.

Why is a TMDL Needed?

Dry Brook is a Class B freshwater stream, and its applicable designated uses are primary and secondary contact recreation, and fish and wildlife habitat (RIDEM, 2009). From 2007-2008, water samples were collected from one sampling location (PCT08) and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with bacteria sampling results from 2007-2008 and associated statistics are presented in Table 1. The geometric mean was calculated for station PCT08 and exceeded the water quality criteria for enterococci.



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

To aid in identifying possible bacteria sources, the geometric mean was also calculated for each station for wet weather and dry weather sample days, where appropriate. Both wet and dry geometric mean values exceeded the water quality criteria for enterococci, with the dry-weather values higher than the wet-weather values.

Due to the elevated bacteria measurements presented in Table 1, Dry Brook does not meet Rhode Island's bacteria water quality standards, is identified as impaired, and was 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.

Potential Bacteria Sources

There are several potential sources of bacteria in the Dry Brook watershed including stormwater runoff from developed areas, illicit discharges, malfunctioning onsite wastewater treatment systems, and waterfowl, wildlife, and domestic animal waste.

Onsite Wastewater Treatment Systems

While the portion of Johnston to the east of I-295 is serviced by a municipal sewer system (Pare, 2010), most of the residents living to the west of I-295, including those in the Dry Brook watershed, rely 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).

Most soils in the Town of Johnston, including the unsewered portions, have soils with moderate to severe OWTS limitations (Berger, 2001). Failing or inadequate OWTS, including cesspools, have previously been identified in the Town of Johnston. In 2001, 45 OWTS in the town were identified as failing and 212 systems were identified as needing repairs. Many of these systems were located in the residential areas around the Oak Swamp Reservoir (Pare, 2010). As shown in Figure 2, eight OWTS Notices of Violation/Notices of Intent to Violate have been issued by the RIDEM Office of Compliance and Inspection in the Dry Brook watershed in the residential neighborhoods surrounding the Oak Swamp Reservoir.

Developed Area Stormwater Runoff

Though most of the Dry Brook watershed is undeveloped, the area around the Oak Swamp Reservoir has multiple residential neighborhoods. The watershed has an impervious cover of 11.3%. 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. Runoff from impervious areas in developed portions of the watershed is likely contributing bacteria to Dry Brook. As discussed in Section 6.3 of the Core TMDL Document, as a general rule, impaired streams with watersheds with 10-15% impervious cover are expected to be impacted by stormwater.

The Rhode Island Department of Transportation (RIDOT) has identified and mapped all or almost all of their stormwater outfalls in the Dry Brook watershed. As shown in Figure 2, three outfalls were found along Route 6. Stormwater is known to carry a suite of pollutants, including bacteria and may be a source of bacterial contamination to Dry Brook.

Waterfowl, Wildlife, and Domestic Animal Waste

The Dry Brook watershed is predominately undeveloped, particularly in the southern portion of the watershed. Large open surface water areas, including the Oak Swamp and Almy reservoirs are home to various 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.

Residential development is concentrated around the Oak Swamp Reservoir. Waste from domestic animals, such as dogs, in these residential neighborhoods, may also be contributing to bacteria concentrations in Dry Brook.

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 Dry Brook watershed. These activities could include sampling at several different locations and under different weather conditions (e.g., wet and dry). Field reconnaissance surveys focused on stream buffers, stormwater runoff, and other source identification may also be beneficial.

Based on existing ordinances and previous investigations, the following steps are recommended to support water quality goals.

Onsite Wastewater Management

Most residents of the Dry Brook watershed rely on OWTS (septic systems or cesspools). Multiple failures of OWTS have been identified in the Town of Johnston and as such, the town has an approved Onsite Wastewater Management Plan that provides a framework for managing the OWTS. The town passed an ordinance in 1999 establishing a Wastewater Management District, including a Wastewater Management Board. The board has the authority to conduct and/or require OWTS inspections. However, the current ordinance does not include a routine pump-out program (Berger, 2001).

RIDEM recommends that all communities create an inventory of onsite systems through mandatory inspections. Inspections help 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 Johnston is eligible for Rhode Island's Community Septic System Loan Program (CSSLP). Johnston has obtained 500,000 dollars in CSSLP money since 2003. This program assists citizens with the replacement of older and failing systems through low-interest loans.

It is also recommended that the Town of Johnston continue to evaluate the feasibility of expanding the municipal sewer system west of I-295. In 2010, an updated wastewater facility plan for the Town of Johnston outlines this expansion of the existing sewer system to include some areas within the Dry Brook watershed (Pare, 2010).

Stormwater Management

The Town of Johnston (RIPDES permit RIR040008) and RIDOT (RIPDES permit RIR040036) are municipal separate storm sewer (MS4) operators in the Dry Brook watershed and have prepared the required Phase II Stormwater Management Plans (SWMPP). The regulated area in Johnston includes only the area along Dry Brook and I-295. The remainder of the watershed, including the area along Route 6, is outside of the regulated area.

Johnston's SWMPP outlines goals for the reduction of stormwater runoff to Dry 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).

The Town of Johnston has an ordinance in place to address illicit discharges (RIDEM, 2010a). This type of ordinance prohibits illicit discharges to the MS4 and provides an enforcement mechanism. The town should continue to select priority areas to identify and eliminate illicit discharges in the Dry Brook watershed. 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 Dry Brook, additional efforts are needed to restore the river's water quality. As mentioned previously, the Dry Brook watershed has an impervious cover of 11.3%, a level where stormwater impacts are expected. RIDEM requires the MS4 operators to continue to comply with and adapt their minimum measures to reflect the bacteria impairment in regulated areas. Johnston and RIDOT should also ensure that their post-construction ordinances are consistent with Section 6.2 of the Core TMDL Document. In addition, RIDOT should continue to implement its minimum measures to include its three identified outfalls along the part of Hartford Avenue just west of I-295. Although this area is not in the Phase II coverage area, RIDOT applies its stormwater program statewide.

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.

The Town of Johnston should continue to implement the goals of its Phase II SWMPP including dry-weather sampling, extensive street and catch basin cleaning, and public education activities. RIDOT should also continue to implement the goals of its Phase II SWMPP.

Waterfowl, Wildlife, and Domestic Animal Waste

Education and outreach programs 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. Johnston should work with volunteers to map locations where animal waste is a significant and a chronic problem. This work should be incorporated into the town's Phase II plans and should result in an evaluation of 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 Dry 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 Dry Brook and can harm human health and the environment. Johnston should ensure that mention of this regulation is included in its SWMPP.

Land Use Protection

Woodland and wetland areas within the Dry Brook watershed, particularly in the southern portion of the watershed near the Almy Reservoir, absorb and filter pollutants from stormwater runoff, and help protect both water quality in the stream and stream channel stability. As these areas represent over half of the land use in the Dry Brook watershed, it is important to preserve these undeveloped areas, and institute controls on development in the watershed.

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

Table 1: Dry Brook Bacteria Data

Waterbody ID: RI0006018R-02A

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: 54% (Includes 5% Margin of Safety)

Data: 2007-2008 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Dry Brook (2007 - 2008) with Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
PCT08	Dry Brook at Central Ave near 295	8/19/2008	116	Wet	106 (54%)*
PCT08	Dry Brook at Central Ave near 295	7/16/2008	488	Dry	
PCT08	Dry Brook at Central Ave near 295	7/1/2008	196	Dry	
PCT08	Dry Brook at Central Ave near 295	6/3/2008	33	Wet	
PCT08	Dry Brook at Central Ave near 295	10/31/2007	37	Wet	
Shaded cells indicate an exceedance of water quality criteria					
* Includes a 5% Margin of Safety					

Wet and Dry Weather Geometric Mean Enterococci Values for Station PCT08

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
PCT08	Dry Brook at Central Ave near 295	2007-2008	3	2	73	84	151
Shaded cells indicate an exceedance of water quality criteria							
Weather condition determined from rain gage at URI in Kingston, RI							

References

- Berger (2001). ISDS Wastewater Management Plan for the Town of Johnston, RI. The Louis Berger Group. February 26, 2001.
- Pare (2010). Wastewater Facility Plan for NBC-Owned Interceptors and Town Sewers in Johnston, RI. Pare Corporation. May 21, 2010.
- 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 (2010a). MS4 Compliance Status Report for RI Statewide Bacteria TMDL. Rhode Island Department of Environmental Management.
- RIDEM (2010b). Total Maximum Daily Load Analysis for the Pawcatuck River and Little Narragansett Bay Waters (Bacteria Impairments). Rhode Island Department of Environmental Management.
- RI HEALTH (2003). Aquidneck Island Drinking Water Assessment Results, Source Water Protection Assessment conducted by the University of Rhode Island for the Rhode Island Department of Health, Office of Drinking Water Supply.
- USEPA (2002). Onsite Wastewater Treatment Systems Manual – Office of Water, Office of Research and Development – EPA/625/R-00/008. Online:
www.epa.gov/owm/septic/pubs/septic_2002_osdm_all.pdf.