



# Simmons Brook

## Watershed Description

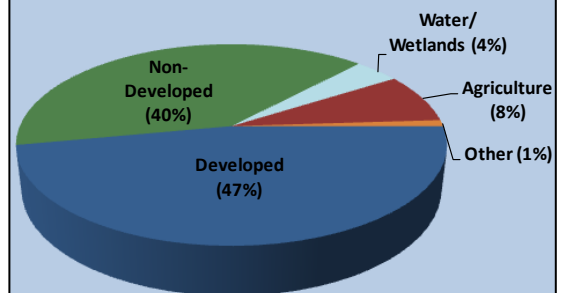
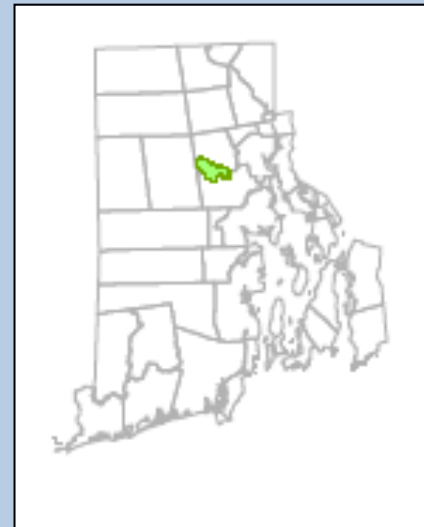
This **TMDL** applies to the Simmons Brook assessment unit (RI0006018R-04), a 2.8-mile long stream-segment located in Johnston and Cranston, RI (Figure 1). The Town of Johnston is located in the central portion of the state and is bordered to the east by Providence, to the west by Scituate, to the north by Smithfield, and to the south by Cranston. Simmons Brook is located in the western portion of town. The Simmons Brook watershed is presented in Figure 2 with land use types indicated.

Simmons Brook begins at the outlet of the Simmons Lower Reservoir near the intersection of Route 14 and Interstate 295. The brook flows northeast through a residential neighborhood and crosses Simonsville Avenue. Simmons Brook then continues east parallel to Route 14 through a mix of forested and residential areas, and is met by a small tributary. This impaired segment of Simmons Brook ends in a densely-populated residential area just before the intersection of Routes 5 and 14.

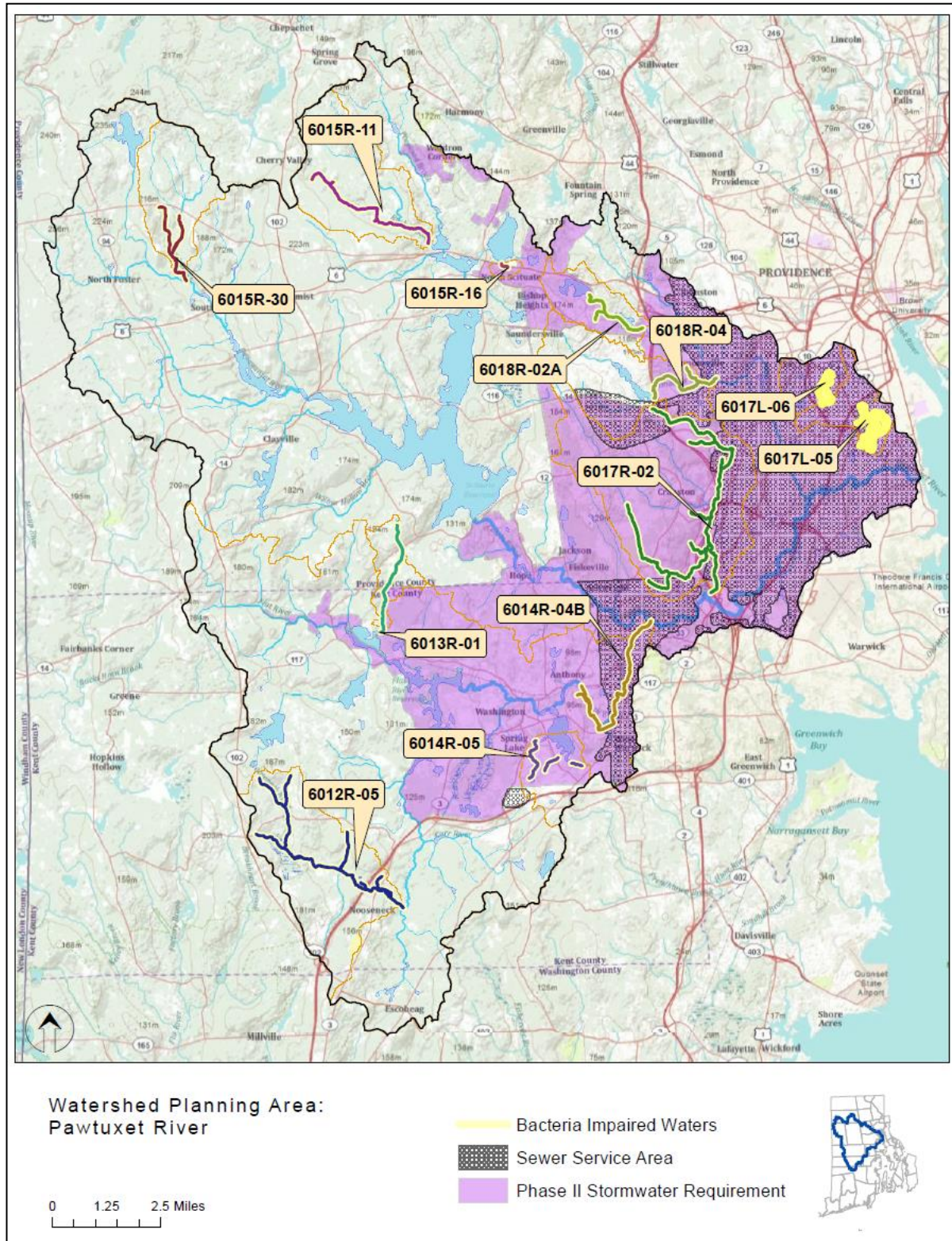
The Simmons Brook watershed covers 5.9 square miles. Developed uses (including residential and commercial uses) occupy approximately 47% and include the Central Landfill (Figure 3). The landfill lies in the upper portion of the watershed just upstream from the Simmons Upper Reservoir. Impervious surfaces cover a total of 17.1%. Non-developed and agricultural land uses are concentrated in the northwestern portion of the watershed and occupy 40% and 8% of the watershed, respectively. Wetlands and other surface waters, including the Simmons Upper and Lower Reservoirs occupy 4%, and other land uses cover 1%.

## Assessment Unit Facts *(RI0006018R-04)*

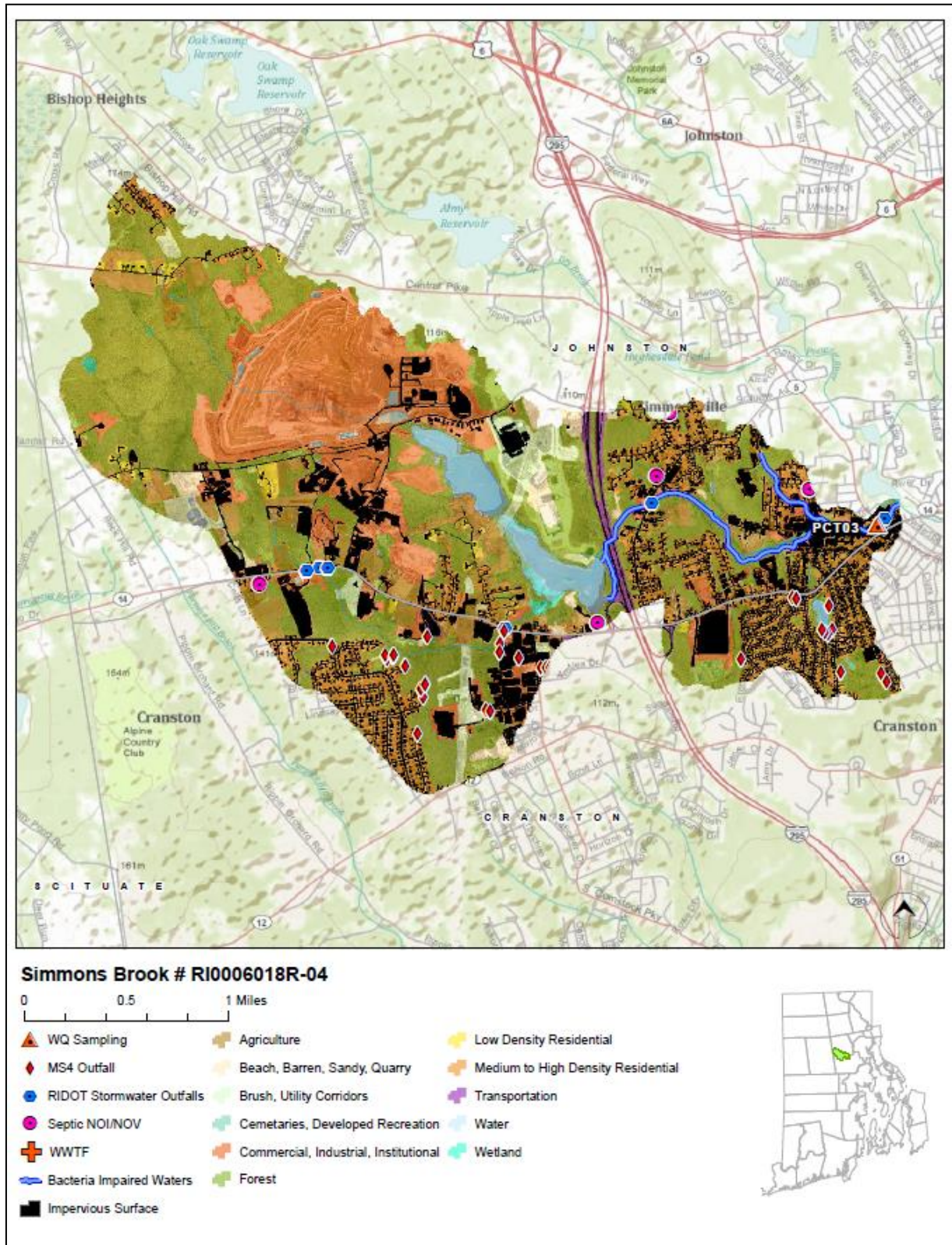
- **Town:** Johnston and Cranston
- **Impaired Segment Length:** 2.8 miles
- **Classification:** Class B
- **Direct Watershed:** 5.9 mi<sup>2</sup> (3789 acres)
- **Impervious Cover:** 17.1%
- **Watershed Planning Area:** Pawtuxet (#12)



**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 the Simmons Brook watershed with impaired segment, sampling location, and land cover indicated.**

### Why is a TMDL Needed?

Simmons Brook is a Class B fresh water 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 (PCT03) 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 PCT03 and exceeded the water quality criteria for enterococci.

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 wet-weather values higher than the dry-weather values.



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

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

Simmons Brook has previously been assessed by RIDEM as not meeting water quality standards for biodiversity. No TMDLs have been completed to address this impairment.

### Potential Bacteria Sources

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

#### Developed Area Stormwater Runoff

Almost half of the Simmons Brook watershed is developed, particularly in the eastern and southern portions of the watershed. This development includes the Central Landfill, a large landfill just northeast of the Simmons Upper Reservoir. The watershed has an impervious cover of 17.1%. 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 Simmons Brook. As discussed in Section 6.3 of the Core TMDL Document, as a general rule, impaired streams with watersheds that are more than 15% impervious cover are expected to be impacted by stormwater.

The Rhode Island Department of Transportation (RIDOT), the Town of Johnston, and the Town of Cranston have identified and mapped stormwater outfalls in the Simmons Brook watershed. As shown in Figure 2, multiple outfalls were found throughout the watershed. Stormwater is known to carry a suite of pollutants, including bacteria, and may be a source of bacterial contamination to Simmons Brook.

#### Onsite Wastewater Treatment Systems

Though the section of Johnston and Cranston to the east of Interstate 295 is serviced by a municipal sewer system (Pare, 2010), most of the residents living to the west of Interstate 295, including many of those in the Simmons 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 waste to reach surface waters (RI HEALTH, 2003).

Most soils in the Town of Johnston, including these 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, four OWTS Notices of Violation/Notices of Intent to Violate have been issued by the RIDEM Office of Compliance

and Inspection in the Simmons Brook watershed in the residential neighborhoods in the southern portion of the watershed.

### Sewer Leaks

A small portion of the watershed relies on the municipal sewer system. Any leaks to the sewer lines in this area may also be contributing bacteria to Simmons Brook.

### Waterfowl, Wildlife, and Domestic Animal Waste

Large open surface water areas, including the Simmons Upper and Lower 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 in the eastern and southern portions of the watershed. Waste from domestic animals, such as dogs, in these residential neighborhoods, may also be contributing to bacteria concentration in Simmons 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 Simmons Brook watershed. These activities could potentially 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.

### Stormwater Management

The Town of Johnston (RIPDES permit RIR040008), the City of Cranston (RIPDES permit RIR040012), and RIDOT (RIPDES permit RIR040036) are municipal separate storm sewer (MS4) operators in the Simmons Brook watershed and have prepared the required Phase II Stormwater Management Plans (SWMPP). The regulated area in Johnston includes only the area surrounding Simmons Brook. The entire watershed area that is located in Cranston is regulated under the Phase II program.

Cranston and Johnston's SWMPPs outline goals for the reduction of stormwater runoff to Simmons 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).

Johnston and Cranston have ordinances 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 Simmons 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. 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.

While these first steps are important to reduce the effects of stormwater runoff to Simmons Brook, additional efforts are needed to restore the river's water quality. As mentioned previously, the Simmons Brook watershed has an impervious cover of 17.1%, a level where stormwater impacts are expected. At this threshold, RIDEM is requiring the MS4 operators to revise their post-construction stormwater ordinances as described in Section 6.3 of the Core TMDL Document. Cranston, Johnston, and RIDOT should also evaluate whether the six minimum measures alone are sufficient to meet the bacteria reduction targets. Per Part IV.D of the General Permit, the MS4 operators should ensure that their minimum measures are consistent with the recommendation of Section 6.2 of the Core TMDL Document. Changes to the SWMPPs should be documented in a TMDL Implementation Plan (TMDL IP) and should comply with relevant provisions of Part IV.D of the RIPDES Stormwater General Permit (RIDEM, 2010b), which are summarized in Section 6.2 (Numbers 1 through 5) of the Core TMDL Document.

The Town of Johnston, City of Cranston, and RIDOT should also continue to implement the goals of their Phase II SWMPP including dry-weather sampling, extensive street and catch basin cleaning, and public education activities. It is also recommended that the Town of Johnston continue to monitor the Simmons Upper Reservoir for bacterial contamination that may originate in the Central Landfill. Simmons Brook is hydrologically connected to the Simmons Reservoir system and may be receiving bacteria from the landfill.

#### Onsite Wastewater Management

Most residents of the Simmons 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 to establish 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 Interstate 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 Simmons Brook watershed (Pare, 2010).

#### 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 Simmons 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 Simmons 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 Simmons Brook watershed absorb and filter pollutants from stormwater runoff, and help protect both water quality in the stream and stream channel stability. As these areas represent less than half of the land use in the Simmons 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 Simmons Brook.

**Table 1: Simmons Brook Bacteria Data**

**Waterbody ID:** RI0006018R-04

**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:** 91% (Includes 5% Margin of Safety)

**Data:** 2007-2008 from RIDEM

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

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
PCT03	Simmons Brook at Atwood Ave, Rte 5	8/21/2008	228	Wet	<b>386 (91%)*</b>
PCT03	Simmons Brook at Atwood Ave, Rte 5	7/16/2008	649	Dry	
PCT03	Simmons Brook at Atwood Ave, Rte 5	7/1/2008	365	Dry	
PCT03	Simmons Brook at Atwood Ave, Rte 5	5/14/2008	326	Wet	
PCT03	Simmons Brook at Atwood Ave, Rte 5	10/22/2007	488	Wet	

Shaded cells indicate an exceedance of water quality criteria

\*Includes 5% Margin of Safety

**Wet and Dry Weather Geometric Mean Enterococci Values for Station PCT03**

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
PCT03	Simmons Brook at Atwood Ave, Rte 5	2007-2008	3	2	339	469	289

Shaded cells indicate an exceedance of water quality criteria

Weather condition determined from rain gage at the T.F. Green Airport in Warwick, 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](http://www.epa.gov/owm/septic/pubs/septic_2002_osdm_all.pdf).