



Branch River (Segment 1B)

Watershed Description

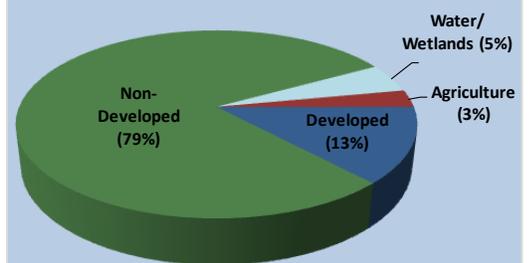
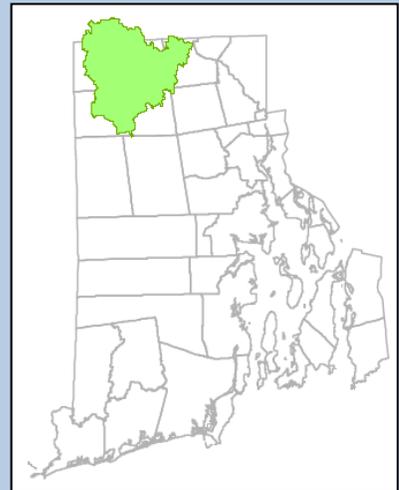
This **TMDL** applies to the Branch River assessment unit (RI0001002R-01B), a 4.1-mile long stream segment located in North Smithfield, RI (Figure 1). The Town of North Smithfield is located in the northern portion of the state along the border with Massachusetts. This impaired segment of the Branch River is located in the western portion of the town. The Branch River watershed is presented in Figures 2 and 3 with land use types indicated.

The Branch River has two impaired segments. The Branch River (Segment 1A) originates in Burrillville, RI at the confluence of two other bacteria-impaired rivers (Chepachet and Clear Rivers) and ends at the Slatersville Reservoir. This TMDL addresses the Branch River (Segment 1B), which begins at the Slatersville Reservoir near the intersection of Main Street and Route 102. The river flows past the Holliston Sand Company into the Upper Slatersville Reservoir and crosses Route 5. The river continues northeast, through moderate residential and commercial development. The Branch River is then joined by two tributaries that drain the Forestdale Industrial Area. The Branch River then travels along the eastern edge of the Blackstone Gorge area and empties into the Blackstone River.

This segment of the Branch River watershed covers 92.8 square miles in the Towns of North Smithfield, Smithfield, Burrillville, Glocester, and Scituate. The watershed is largely non-developed (79%), as shown in Figures 2 and 3. Large open water features in the watershed are the Slatersville Reservoir, the Upper Slatersville Reservoir, Forestdale Pond, and Trout Brook Pond. Land uses around these bodies of water are developed and include Holliston Sand, Brookside Equestrian Center, Banneker Industries, and the North Smithfield downtown area. Conserved land includes Blackstone Gorge and small town parks, such as Pacheco Park.

Assessment Unit Facts (RI0001002R-01B)

- **Town:** North Smithfield
- **Impaired Segment Length:** 4.1 miles
- **Classification:** Class B
- **Direct Watershed:** 92.8 mi² (59,420 acres)
- **Impervious Cover:** 5.6%
- **Watershed Planning Area:** Branch-Blackstone (#8)



Watershed Land Uses

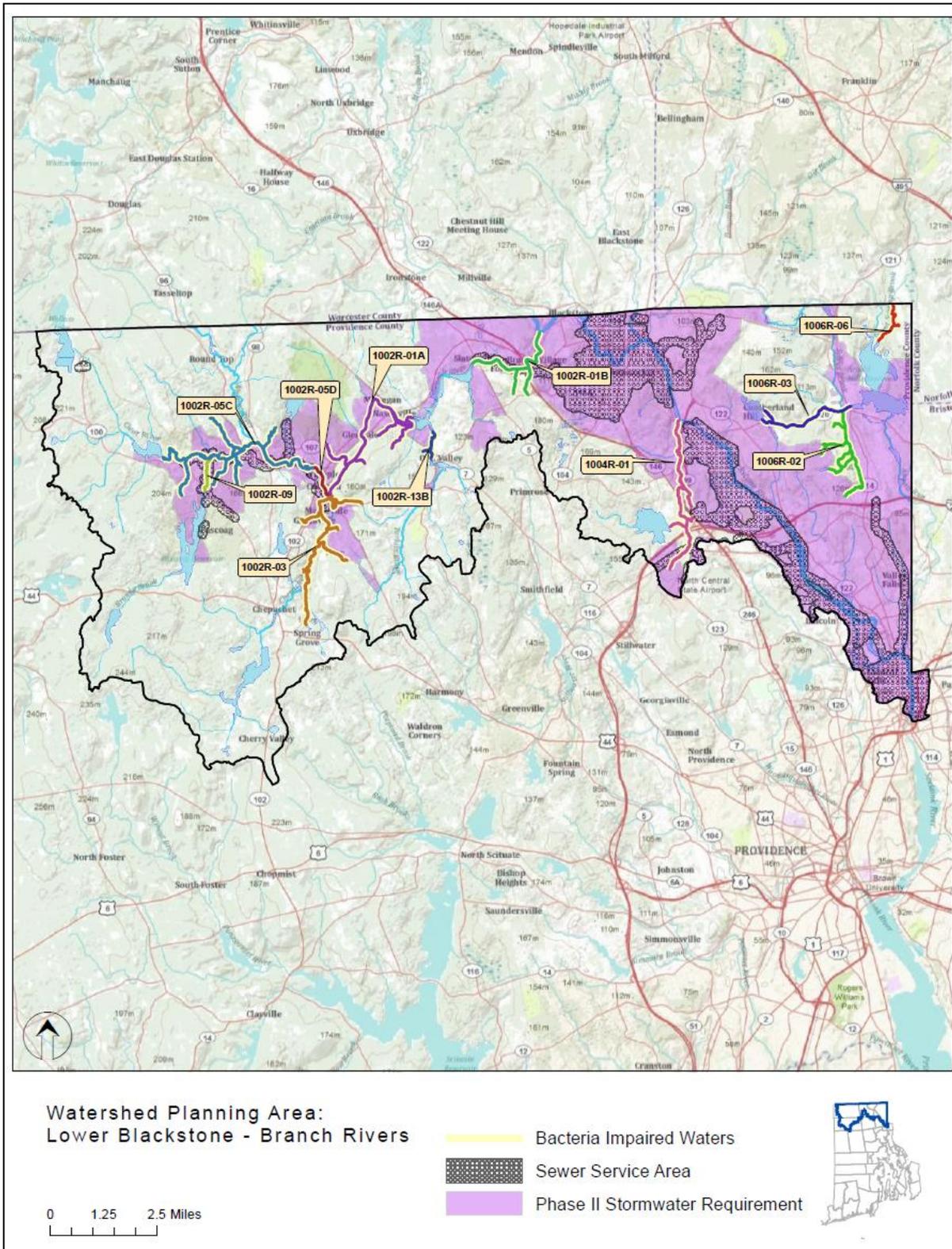


Figure 1: Map of the Lower Blackstone-Branch River Watershed Planning Area with impaired segments addressed by the Statewide Bacteria TMDL, sewer service areas, and stormwater regulated zones.

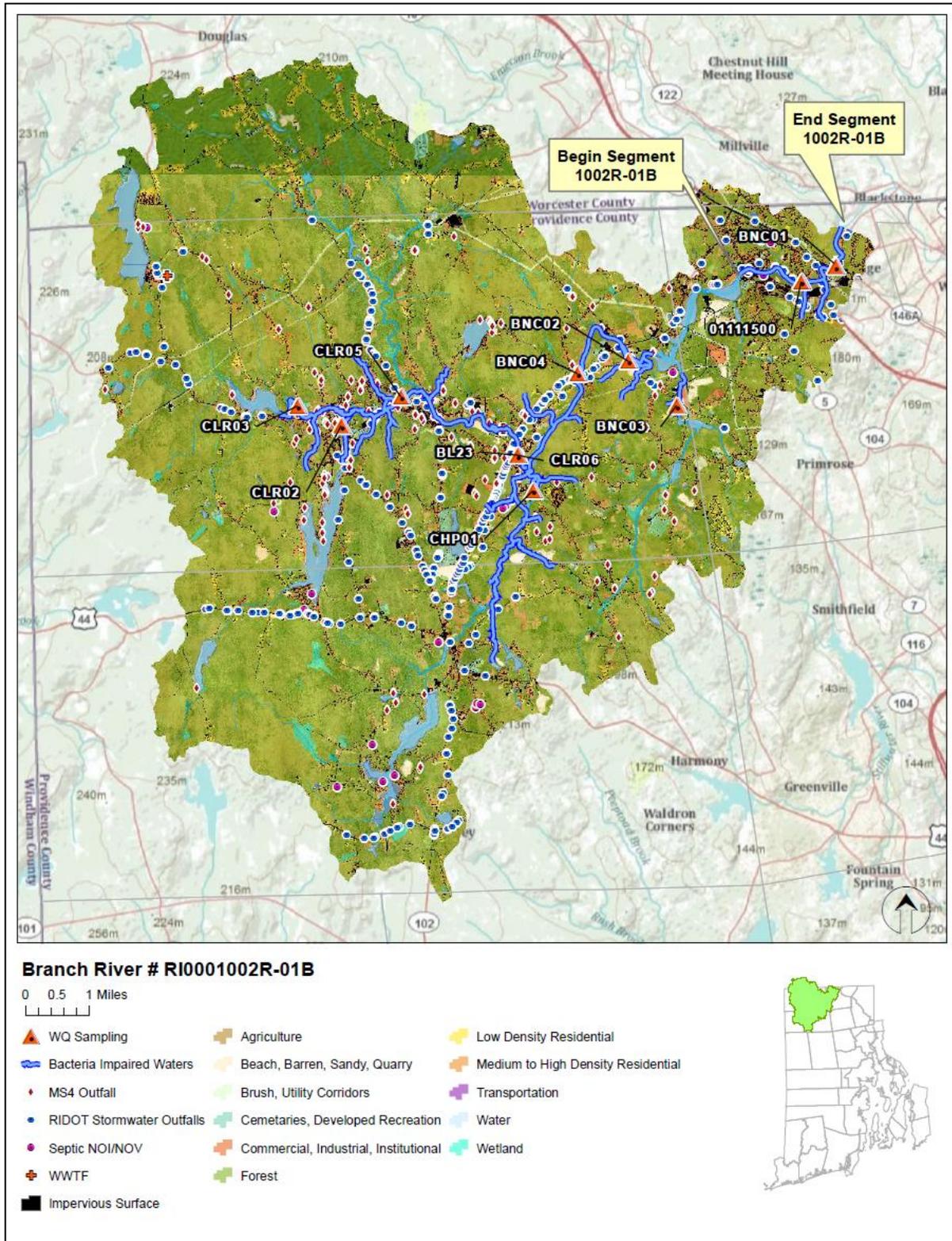


Figure 2: Map of Branch River (Segment 1B) watershed with impaired segments, sampling locations, and land cover indicated.

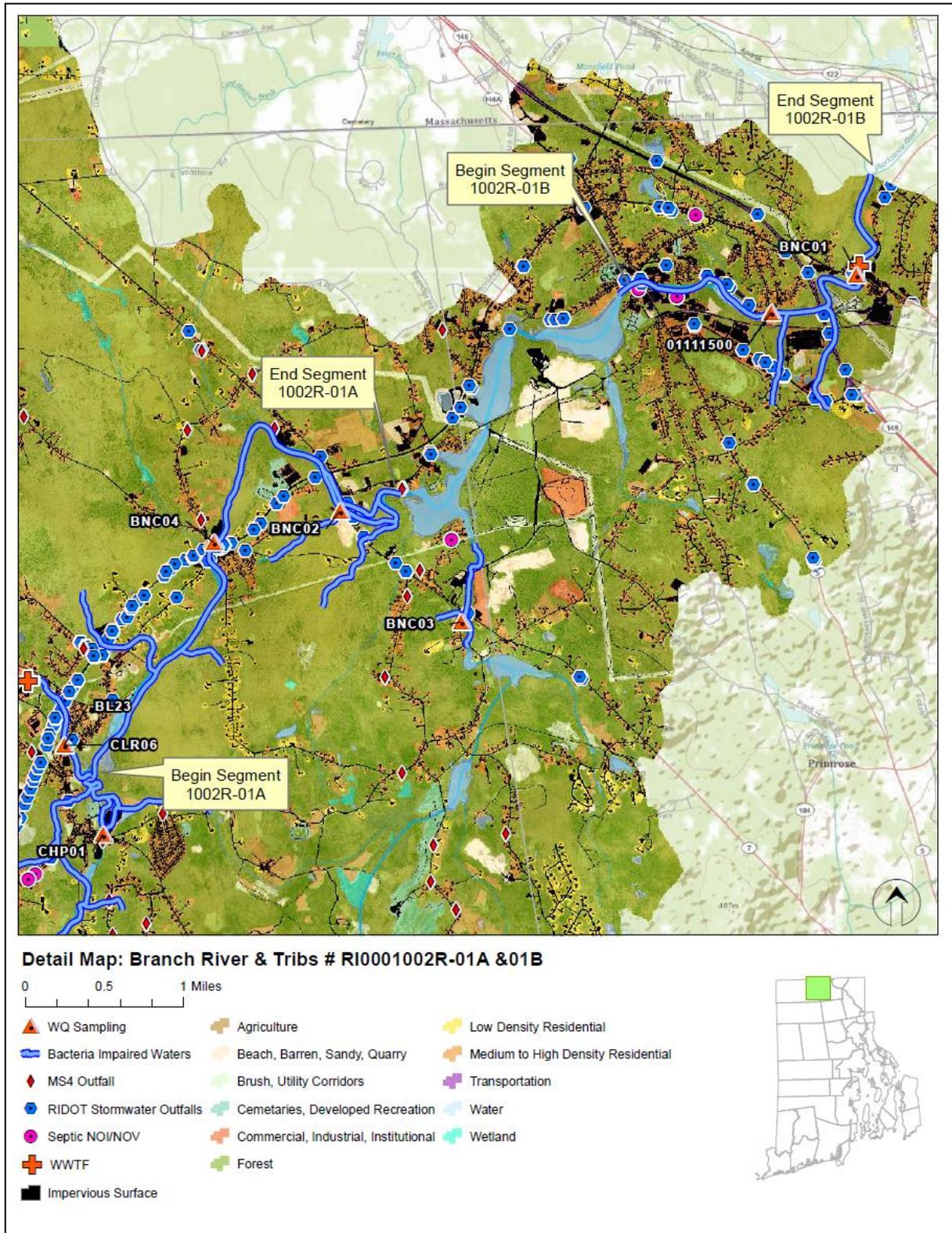


Figure 3: Zoomed map of Branch River (Segment 1B) watershed with impaired segments, sampling locations, and land cover indicated.

Why is a TMDL Needed?

The Branch River (Segment 1B) is a Class B freshwater stream with designated uses of primary and secondary contact recreation and fish and wildlife habitat (RIDEM, 2009). During 2007-2009, water samples were collected from two sampling locations (01111500 and BNC01) and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with bacteria sampling results from the 2007-2009 study and associated statistics, are presented in Table 1. The geometric mean exceeded the water quality criteria for enterococci at both stations.



Figure 4: Partial aerial view of the Branch River (Segment 1B) watershed (Source: Google Maps)

To aid in identifying possible bacteria sources, the geometric mean was also calculated for wet and dry-weather sampling days for station 01111500. All samples at station BNC01 were taken in dry-weather conditions. The wet and dry-weather geometric mean values exceeded the water quality criteria for enterococci at station 01111500, with the wet-weather values higher than the dry-weather values.

Due to the elevated bacteria measurements presented in Table 1, the Branch River (Segment 1B) 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 water bodies to comply with state water quality standards.

The Branch River (Segment 1B) has also been assessed by RIDEM as not meeting water quality standards for biodiversity and metals (copper and lead). To date, no TMDLs have been completed to address these impairments.

Potential Bacteria Sources

Previous investigations have concluded that there are several potential sources of bacteria in the Branch River watershed including stormwater runoff from developed areas, failing onsite wastewater treatment systems, illicit discharges, agricultural activities, and wildlife and domestic animal waste (Geremia, 2007). Each type of potential bacteria sources is described briefly below.

Onsite Wastewater Treatment Systems

Most residents in the Branch River 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 (Geremia, 2007). The soils in much of the Branch River watershed are not well suited for OWTS due to wetness, flooding potential, slow percolation, and soil type (Town of Burrillville, 2005). If OWTS 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 Figures 2 and 3, three OWTS Notices of Violation/Notices of Intent to Violate have been issued by the RIDEM Office of Compliance and Inspection in the Branch River watershed below Slatersville Reservoir (Figures 2 and 3).

Sewer Leaks

Another potential source of bacterial contamination to the Branch River is leaks in the municipal sewer system. A portion of the Branch River watershed is serviced by a municipal sewer system, particularly around major roadways, as shown in Figure 1. If there were to be any leaks within this sewer system, the waste from the sewer, containing high levels of bacteria, could enter the river. Spills and leaks from municipal sewer systems can cause human health issues from high bacteria levels, and can cause significant ecological damage (Mallin *et. al.*, 2007).

Developed Area Stormwater Runoff

Though the majority of the Branch River watershed is non-developed, impervious surfaces cover approximately 5.6% of the watershed, particularly in close proximity to the Branch River. 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 these portions of the watershed may be contributing bacteria to the Branch River, 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.

Agricultural Activities

Agricultural operations are an important economic activity and landscape feature in many areas of the state. Agricultural land use occupies only 3% of the land area of the Branch River watershed. Agricultural activities in the watershed are limited to small crop areas and animal pastures, including the Brookside Equestrian Center. Agricultural runoff, particularly from farms with animals such as horses, may contain pollutants, including bacteria, and may be contributing to the high concentrations of bacteria in the Branch River.

Waterfowl, Wildlife, and Domestic Animal Waste

Non-developed land accounts for 61% of the watershed area. The Branch River flows through the Blackstone Gorge, which is 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 also potential sources of bacteria to the Branch River. Low-density residential developments are common in the northern portion of the watershed and public parks are common along the river. If residents are not properly disposing of pet waste, the bacteria from that waste could enter and contaminate the stream.

Existing Local Management and Recommended Next Steps

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

The town's existing Comprehensive Plan provides a strong technical basis for beginning to reduce a suite of pollutants, including bacteria. A brief description of existing local programs and recommended next steps from the town's Stormwater Phase II report, Wastewater Facilities Plan, and other documents are provided below. Stakeholders should review these documents directly for more detailed information.

Onsite Management and Other Illicit Discharges

While a small portion of the Branch River watershed is sewered, most residents in the Branch River watershed rely on OWTS (Figure 1). Currently, the Town of North Smithfield has a draft Onsite Wastewater Management Plan. As part of an onsite wastewater planning process, North Smithfield 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).

Though the Town of North Smithfield is not currently eligible for the Community Septic System Loan Program (CSSLP), it is recommended that the town develop a program to assist citizens with the replacement of older and failing systems. CSSLP provides low-interest loans to residents to help with maintenance and replacement of OWTS.

Stormwater Management

The Town of North Smithfield (RIPDES Permit RIR040013) and RIDOT (RIPDES permit RIR040036) are municipal separate storm sewer system (MS4) operators in the Branch River watershed and have prepared Phase II Stormwater Management Plans (SWMPPs).

Most of the Branch River watershed is included in the regulated area in North Smithfield. North Smithfield's SWMPP outlines goals for the reduction of stormwater runoff 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, and implementing an annual street sweeping program. North Smithfield has not adopted construction erosion and sediment control and post-construction stormwater control ordinances (RIDEM, 2010a).

The Town of North Smithfield has not adopted an IDDE ordinance. This type of ordinance prohibits illicit discharges to the MS4 and provides an enforcement mechanism. The Town should continue to locate priority areas to identify and eliminate illicit discharges in the Branch River watershed. 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. Stormwater 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.

As it is assumed that stormwater runoff is not the major contributor of bacteria to this impaired segment of the Branch River based on the watershed's imperviousness, North Smithfield 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.

Waterfowl, Wildlife, and Domestic Animal Waste

North Smithfield's 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. North Smithfield should work with volunteers to map locations where animal waste is a significant and 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.

The town 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 Branch River 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 Branch River and can harm human health and the environment. North Smithfield should ensure that mention of this regulation is included in their SWMPPs.

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 near the banks of the Branch River and for the Brookside Equestrian Center. 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.

Land Use Protection

Woodland and wetland areas within the Branch River watershed, including Blackstone Gorge, absorb and filter pollutants from stormwater runoff, and help protect both water quality in the stream and stream channel stability. As these areas represent approximately 79% of the land use in the entire Branch River watershed, it is important to preserve these undeveloped areas, and institute controls on development in Branch River watershed.

The steps outlined above will support the goal of mitigating bacteria sources and meeting water quality standards in the Branch River (Segment 1B).

Table 1: Branch River (Segment 1B) Bacteria Data

Waterbody ID: RI0001002R-01B

Watershed Planning Area: 8 – Branch-Blackstone River

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: 68% (Includes 5% Margin of Safety)

Data: 2007-2009 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Branch River (Segment 1B) (2007-2009) with Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
01111500	Branch River at Forestdale, RI	3/24/2009	1	Dry	59
01111500	Branch River at Forestdale, RI	2/24/2009	7	Wet	
01111500	Branch River at Forestdale, RI	1/27/2009	4	Dry	
01111500	Branch River at Forestdale, RI	12/16/2008	300	Dry	
01111500	Branch River at Forestdale, RI	12/2/2008	64	Wet	
01111500	Branch River at Forestdale, RI	10/21/2008	141	Dry	
01111500	Branch River at Forestdale, RI	9/16/2008	240	Wet	
01111500	Branch River at Forestdale, RI	8/19/2008	1700	Dry	
01111500	Branch River at Forestdale, RI	7/22/2008	4600	Dry	
01111500	Branch River at Forestdale, RI	6/17/2008	1500	Wet	
01111500	Branch River at Forestdale, RI	5/20/2008	250	Dry	
01111500	Branch River at Forestdale, RI	4/22/2008	1	Dry	
01111500	Branch River at Forestdale, RI	2/26/2008	1	Dry	
01111500	Branch River at Forestdale, RI	2/4/2008	123	Dry	

**Single Sample Enterococci (colonies/100 mL) Results for Branch River (Segment 1B) (2007-2009)
 with Geometric Mean Statistics (continued)**

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
01111500	Branch River at Forestdale, RI	12/18/2007	177	Wet	146[†] (68%)*
01111500	Branch River at Forestdale, RI	11/27/2007	18	Wet	
01111500	Branch River at Forestdale, RI	10/23/2007	325	Dry	
01111500	Branch River at Forestdale, RI	9/25/2007	4100	Dry	
01111500	Branch River at Forestdale, RI	8/28/2007	340	Dry	
01111500	Branch River at Forestdale, RI	7/10/2007	3800	Dry	
01111500	Branch River at Forestdale, RI	6/5/2007	415	Wet	
01111500	Branch River at Forestdale, RI	5/7/2007	100	Dry	
01111500	Branch River at Forestdale, RI	4/16/2007	240	Wet	
01111500	Branch River at Forestdale, RI	3/19/2007	12	Wet	
01111500	Branch River at Forestdale, RI	2/12/2007	1	Dry	
BNC01	Branch River at 146A crossing in Forestdale (North Smithfield)	8/26/2009	157	Dry	64
BNC01	Branch River at 146A crossing in Forestdale (North Smithfield)	7/20/2009	102	Dry	
BNC01	Branch River at 146A crossing in Forestdale (North Smithfield)	7/15/2009	31	Dry	
BNC01	Branch River at 146A crossing in Forestdale (North Smithfield)	5/20/2009	68	Dry	
BNC01	Branch River at 146A crossing in Forestdale (North Smithfield)	9/17/2008	33	Dry	
Shaded cells indicate an exceedance of water quality criteria					
*Includes 5% Margin of Safety					
†Geometric mean used to calculate the 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
01111500	Branch River at Forestdale, RI	2007-2009	9	16	88	95	85
BNC01	Branch River at 146A crossing in Forestdale (North Smithfield)	2008-2009	0	5	64	NA	64

Shaded cells indicate an exceedance of water quality criteria

Weather conditions determined from the Weather Underground rain gage in Lincoln, RI

References

- Geremia (2007). Wastewater Management Facilities Plan. Town of North Smithfield, Rhode Island. Submitted by James J. Geremia & Associates, Inc, Providence, RI. October 2007.
- Mallin, et. al. (2007). Mallin, M.A., L.B. Cahoon, B.R. Toothman, D.C. Parsons, M.R. McIver, M.L. Ortwine and R.N. Harrington. 2007. Impacts of a raw sewage spill on water and sediment quality in an urban estuary. Mar. Pollution Bull. 54:81-88
- 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. 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 Quality.
- Town of North Smithfield (2001). Town of North Smithfield Comprehensive Plan. Prepared by the North Smithfield Planning Board. Updated 2006.
- Town of Burrillville (2005). Town of Burrillville Comprehensive Plan, 5-Year Update. Online: www.burrillville-ri.gov/Public_Documents/BurrillvilleRI_Planning/comp_toc.
- 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.
- VHB (2004). Municipal Stormwater Management Plan. Submitted by Vanasse Hangen Brustlin, Inc, Providence, RI. March 2004.