



East Sneech Brook

Watershed Description

This **TMDL** applies to the East Sneech Brook assessment unit (RI0001006R-03), a 2.8-mile stream segment located in Cumberland, RI (Figure 1). The Town of Cumberland is located in the northeastern corner of Rhode Island. East Sneech Brook is located in north-central Cumberland, with the northern portion of the watershed extending into Massachusetts. The East Sneech Brook watershed is presented in Figure 2 with land use types indicated.

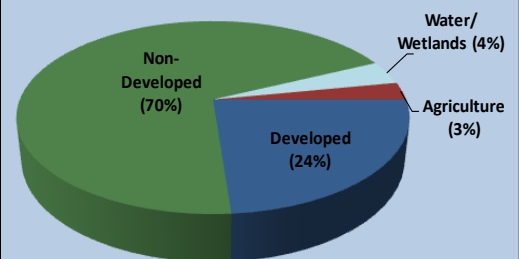
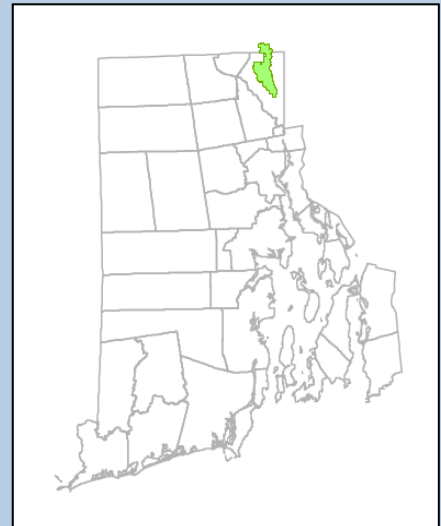
East Sneech Brook forms at the southeastern outlet of Sneecech Pond. The impaired segment of East Sneecech Brook begins in a wetland area just south of Nate Whipple Highway (RI Route 120) a half mile east of its intersection with Mendon Road in Cumberland. The brook flows parallel to Nate Whipple Highway, turns northeast, and passes under the road near Cumberland North Middle School. Shortly after, East Sneecech Brook turns southeast and runs along Schofield Farm, before passing back under Nate Whipple Highway. East Sneecech Brook is joined by two tributaries before flowing into the Pawtucket (Arnold Mills) Reservoir on the eastern side of Diamond Hill Road.

There are several conservation areas within the East Sneecech Brook watershed. Diamond Hill State Park is a densely forested area that makes up a large section of the northwestern portion of the watershed. Since 1996, the Cumberland Land Trust has acquired several properties along East Sneecech Brook (Cumberland Land Trust, 2011).

As shown in the aerial image of Figure 3, non-developed lands occupy a large portion (70%) of the watershed. Developed areas cover approximately 24% of the land area. Wetland and surface waters occupy 4%, and agricultural use accounts for 3% of the watershed area.

Assessment Unit Facts (RI0001006R-03)

- **Town:** Cumberland
- **Impaired Segment Length:** 2.8 miles
- **Classification:** Class AA
- **Direct Watershed:** 7.8 mi² (5,000 acres)
- **Impervious Cover:** 9.2%
- **Watershed Planning Area:** Branch - Blackstone (#8)



Watershed Land Uses

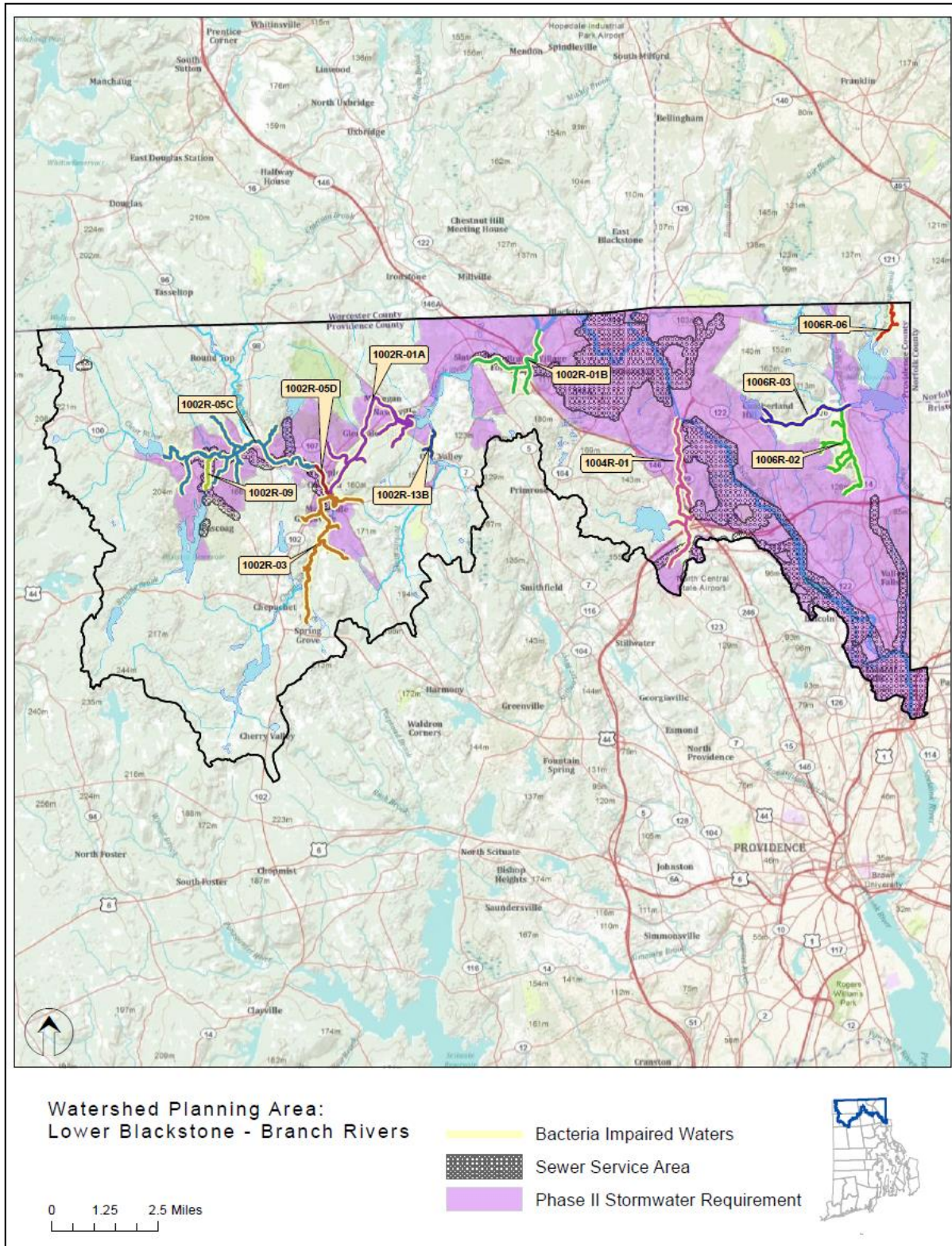


Figure 1: Map of the Branch-Blackstone Watershed Planning Area with impaired segments addressed by the Statewide Bacteria TMDL, sewered areas, and stormwater regulated zones.

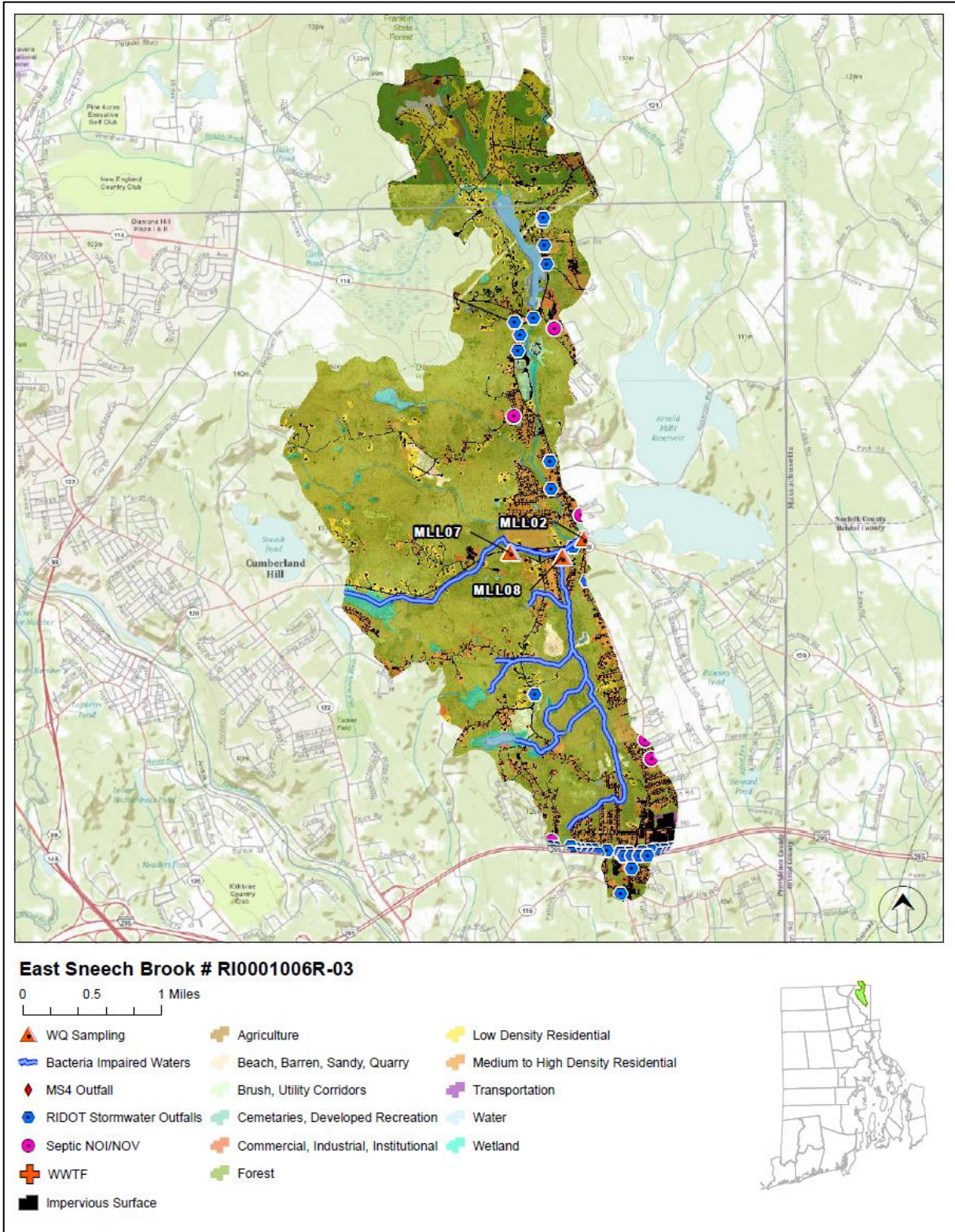


Figure 2: Map of the East Sneech Brook watershed with impaired segments, sampling locations, and land cover indicated.

Why is a TMDL Needed?

East Sneeck Brook is a Class AA fresh water stream and is a tributary within Pawtucket Water Supply Board's public drinking water supply system. However, as it is not a terminal reservoir, its applicable designated uses are primary and secondary contact recreation (RIDEM, 2009). Due to its location within a drinking water supply and its designation as a critical habitat for rare and endangered species, East Sneeck Brook has been designated by RIDEM as a Special Resource Protection Water (SRPW), providing it with special protections under RIDEM's Antidegradation Provisions. SRPWs are high quality surface waters that have been identified as having significant ecological or recreational uses and/or are public water supplies.



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

During 2008-2009, water samples were collected at two sampling locations (MLL02 and MLL07) and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with 2008-2009 sampling results and associated statistics are presented in Table 1. The geometric mean was calculated for stations MLL02 and MLL07 and exceeded the water quality criteria for enterococci.

To aid in identifying possible bacteria sources, the wet and dry-weather geometric means were calculated for both stations. Both the wet and dry-weather geometric mean values exceeded the water quality criteria for enterococci, with dry-weather values higher at station MLL07 and wet-weather values higher at station MLL02.

Due to the elevated bacteria measurements presented in Table 1, East Sneeck Brook does not meet Rhode Island's bacteria water quality standards, was 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 water bodies to comply with state water quality standards.

Potential Bacteria Sources

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

Onsite Wastewater Treatment Systems

The residents within the East Sneece Brook watershed rely almost entirely on onsite wastewater treatment systems (OWTS), such as septic systems and cesspools. While nearly half of Cumberland is serviced by a municipal wastewater system (Town of Cumberland, 2004), the majority of the East Sneece Brook watershed is undeveloped and does not have access to the sewer system (Figure 1). Failing OWTS can be significant sources of bacteria by allowing improperly treated waste to reach surface waters (RI HEALTH, 2003). If septic systems are improperly sized, malfunctioning, or located in soils poorly suited for septic waste disposal, bacteria can easily be transported to adjacent surface waters (USEPA, 2002). The soils in much of the East Sneece Brook watershed are not well suited for OWTS due to shallow groundwater aquifers, flooding potential, slow percolation, and steep slopes. These soils include Adrian Muck, Canton, and Paxton soil types. Over 30 percent of the town's total land area has soils poorly suited for septic waste disposal (Town of Cumberland, 2003). As shown in Figure 2, six OWTS Notices of Violation/Notices of Intent to Violate have been issued by the RIDEM Office of Compliance and Inspection in the East Sneece Brook watershed.

Illicit Discharges

The Town of Cumberland has completed several studies on the feasibility of extending the municipal wastewater system to new areas. The area around the headwaters of East Sneece Brook's impaired segment was found to be a priority area for extending municipal sewer access (Anderson-Nicols & Co., 1982). As part of these studies, the need to develop and implement town programs aimed at detecting illicit discharges to the towns storm drains have been prioritized (Town of Cumberland, 2004; Town of Cumberland, 2003). As shown in Figure 2, multiple stormwater outfalls are found in the East Sneece Brook watershed. Illicit discharges can occur when municipal sewer pipes carrying human waste are connected directly to storm drain pipes or are leaking into storm drain pipes.

Wildlife and Domestic Animal Waste

Domestic animals within the East Sneece Brook watershed are also a potential source of bacteria. Residential developments are located directly adjacent to the stream in several areas. If residents are not properly disposing of pet waste, the bacteria associated with that waste can enter and contaminate the stream.

Large sections of the East Sneeck Brook watershed are protected and provide a sanctuary to a variety of wildlife including squirrel, deer, and waterfowl. Many of these conservation areas surround the stream concentrating wildlife around East Sneeck Brook and its tributaries (Cumberland Land Trust, 2011). 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.

Developed Area Stormwater Runoff

The East Sneeck Brook watershed has an impervious cover of 9.2%. 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 East Sneeck 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

Additional bacteria data collection would be beneficial to support identification of sources of potentially harmful bacteria in the East Sneeck 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 would also be beneficial. Based on existing ordinances and previous investigations, the following steps are recommended to support water quality goals.

Onsite Wastewater Management

The majority of residents within the East Sneeck Brook watershed rely on OWTS. Currently, the Town of Cumberland does not have an Onsite Wastewater Management Plan or an OWTS ordinance. As part of an onsite wastewater management planning process, Cumberland 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 Cumberland is currently not eligible for the Community Septic System Loan Program (CSSLP). The CSSLP program provides low-interest loans to residents to help with maintenance and replacement of OWTS. It is recommended that Cumberland develop a program to assist citizens with the replacement of older and failing systems.

Wildlife and Domestic Animal Waste

Cumberland's education and outreach programs should highlight the importance of picking up after dogs and other pets and not feeding waterfowl, particularly around the conserved lands within the watershed. Animal wastes should be disposed of away from any waterway or stormwater system. Cumberland should work with volunteers from the town to map locations where animal waste is a significant and chronic problem. This work should be incorporated into the municipalities' 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 digester systems in high-use areas, enacting ordinances requiring clean-up, and targeting educational and outreach programs in problem areas.

Towns and residents can also take several measures to minimize waterfowl-related impacts. They can allow tall, coarse vegetation to grow in areas along the shores of the numerous small ponds along East Sneeck Brook's tributaries. These ponds, as well as much of the wetland areas within the watershed 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 East Sneeck Brook and can harm human health and the environment.

Stormwater Management

The Town of Cumberland (RIPDES permit RIR040035) and the Rhode Island Department of Transportation (RIDOT) (RIPDES permit RIR040036) are municipal separate storm sewer (MS4) operators in the East Sneeck Brook watershed and have prepared Phase II Stormwater Management Plans (SWMPP). The area near the headwaters and the mouth of the brook are the only portions of East Sneeck Brook that are included in the Phase II regulated area.

Cumberland's SWMPP outlines goals for the reduction of stormwater runoff to East Sneeck 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).

Currently, Cumberland does not have an illicit discharge detection and elimination ordinance. These types of ordinances prohibit illicit discharges to the MS4 and provide an enforcement mechanism. The town should pursue development and implementation of an illicit discharge detection and elimination ordinance. In Cumberland's Comprehensive Plan, Action NR.1.3.3. proposes to establish a Wastewater Management District (WWMD) within the Cumberland and Pawtucket Reservoir Watersheds, which includes East Sneeck Brook (Town of Cumberland, 2004). Having an active WWMD would help to establish and enforce any future illicit discharge detection and elimination ordinance. In the past, the Cumberland Department of Public Works has identified illicit discharges through routine catch basin cleaning. In these cases, Cumberland has notified RIDEM for enforcement (Town of Cumberland, 2003). These discharges can be a significant source of bacterial contamination and Cumberland should have thorough measures in place for detection. Illicit discharges can be more clearly identified through continued dry-weather stormwater 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 East Sneeck Brook based on the watershed's imperviousness, RIDOT and Cumberland will have no changes to their Phase II permit requirements and no TMDL Implementation Plan (TMDL IP) will be required at this time. The Town of Cumberland should continue to implement the goals of its Phase II SWMPP including dry weather sampling, extensive street and catch basin cleaning programs, and public education activities. RIDOT should also continue to implement the goals of its Phase II SWMPP.

Land Use Protection

Currently, the East Sneeck Brook watershed is approximately 72% undeveloped, however only a small portion of this area is protected as open space. As source waters to Pawtucket's water supply system preserving the watershed's natural areas is particularly important. The East Sneeck Brook watershed

currently has several conservation areas consisting of important woodland and wetland areas. Several of the wetland areas within the watershed are home to the rare Atlantic White Cedar (Cumberland Land Trust, 2011). Also, within the Town of Cumberland's Comprehensive Plan, specific policies were proposed to preserve the unique natural areas through land acquisition, conservation easements, transfer of development rights, and other creative methods to limit development (Town of Cumberland, 2004).

Preserving these natural areas is important because woodland and wetland areas within the East Sneeck Brook watershed absorb and filter pollutants from stormwater, and help protect both water quality in the stream and stream channel stability. It is important to continue the preservation of 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 East Sneeck Brook.

Table 1: East Sneeck Brook Bacteria Data

Waterbody ID: RI0001006R-03

Watershed Planning Area: 8 – Branch - Blackstone

Characteristics: Freshwater, Class AA, Tributary within a Public Drinking Supply, Primary and Secondary Contact Recreation, SRPW

Impairment: Enterococci (colonies/100mL)

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

Percent Reduction to meet TMDL: 60% (Includes 5% Margin of Safety)

Data: 2008-2009 from RIDEM

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

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
MLL07	East Sneeck, Nate Whipple Hwy (120), north of the west-end of Sneeck Pond Rd; dwnstrm confluence with Ash Swamp	8/18/2009	206	Dry	119
MLL07	East Sneeck, Nate Whipple Hwy (120), north of the west-end of Sneeck Pond Rd; dwnstrm confluence with Ash Swamp	8/5/2009	161	Wet	
MLL07	East Sneeck, Nate Whipple Hwy (120), north of the west-end of Sneeck Pond Rd; dwnstrm confluence with Ash Swamp	7/7/2009	299	Wet	
MLL07	East Sneeck, Nate Whipple Hwy (120), north of the west-end of Sneeck Pond Rd; dwnstrm confluence with Ash Swamp	5/13/2009	29	Dry	
MLL07	East Sneeck, Nate Whipple Hwy (120), north of the west-end of Sneeck Pond Rd; dwnstrm confluence with Ash Swamp	9/22/2008	86	Dry	

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

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
MLL02	East Sneeck Brook on 114 Diamond Hill Road; inlet to Arnold Mills Reservoir	8/18/2009	140	Dry	121[†] (60%)*
MLL02	East Sneeck Brook on 114 Diamond Hill Road; inlet to Arnold Mills Reservoir	8/5/2009	225	Wet	
MLL02	East Sneeck Brook on 114 Diamond Hill Road; inlet to Arnold Mills Reservoir	7/7/2009	93	Wet	
MLL02	East Sneeck Brook on 114 Diamond Hill Road; inlet to Arnold Mills Reservoir	5/13/2009	96	Dry	
MLL02	East Sneeck Brook on 114 Diamond Hill Road; inlet to Arnold Mills Reservoir	9/22/2008	91	Dry	
Shaded cells indicate an exceedance of water quality criteria *Includes 5% Margin of Safety † Geometric mean used to calculate 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
MLL07	East Sneeck, Nate Whipple Hwy (120), north of the west-end of Sneeck Pond Rd; dwnstrm confluence with Ash Swamp	2008-2009	2	3	119	80	219
MLL02	East Sneeck Brook on 114 Diamond Hill Road; inlet to Arnold Mills Reservoir	2008-2009	2	3	121	145	107
Shaded cells indicate an exceedance of water quality criteria Weather condition determined from Weather Underground rain gage in Lincoln, RI							

References

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