



Phillips Brook

Watershed Description

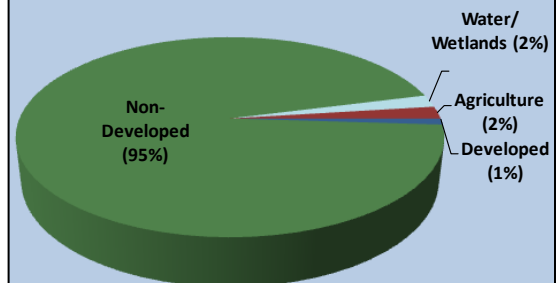
This **TMDL** applies to the Phillips Brook assessment unit (RI0008040R-14), a 4-mile long stream located in West Greenwich, RI (Figure 1). The Town of West Greenwich is located in the western portion of the state and Phillips Brook is located in the western section of town. The Phillips Brook watershed is presented in Figure 2 with land use types indicated.

Phillips Brook begins just south of a small agricultural operation in a forested area west of the Wickaboxet Wildlife Management Area near Wickaboxet Rock Road in West Greenwich, RI. The brook flows into a small unnamed pond, and continues south at the outlet of the pond. The brook then crosses through the low-density residential area along Plain Meeting House Road and is met by a small tributary that originates in a wetland area just north of the road. Phillips Brook continues south through a forested area and enters Phillips Pond near Sprague Road. The brook follows Sprague Road, enters the northern portion of the Arcadia Management Area, and joins with Acid Factory Brook to form the Flat River.

The Phillips Brook watershed covers 3.2 square miles. Non-developed areas occupy a large portion (95%) of the watershed and include portions of the Wickaboxet Wildlife Management Area and the Arcadia Management Area. Agricultural uses occupy 2% of the watershed. Surface water and wetlands occupy 2% and includes Phillips Pond. Developed uses occupy 1% of the watershed, and are concentrated along Plain Meeting House Road in the center of the watershed.

Assessment Unit Facts **(RI0008040R-14)**

- **Town:** West Greenwich
- **Impaired Segment Length:** 4 miles
- **Classification:** Class A
- **Direct Watershed:** 3.2 mi² (2050 acres)
- **Impervious Cover:** 0.8%
- **Watershed Planning Area:** Wood – Pawcatuck (#23)



Watershed Land Uses

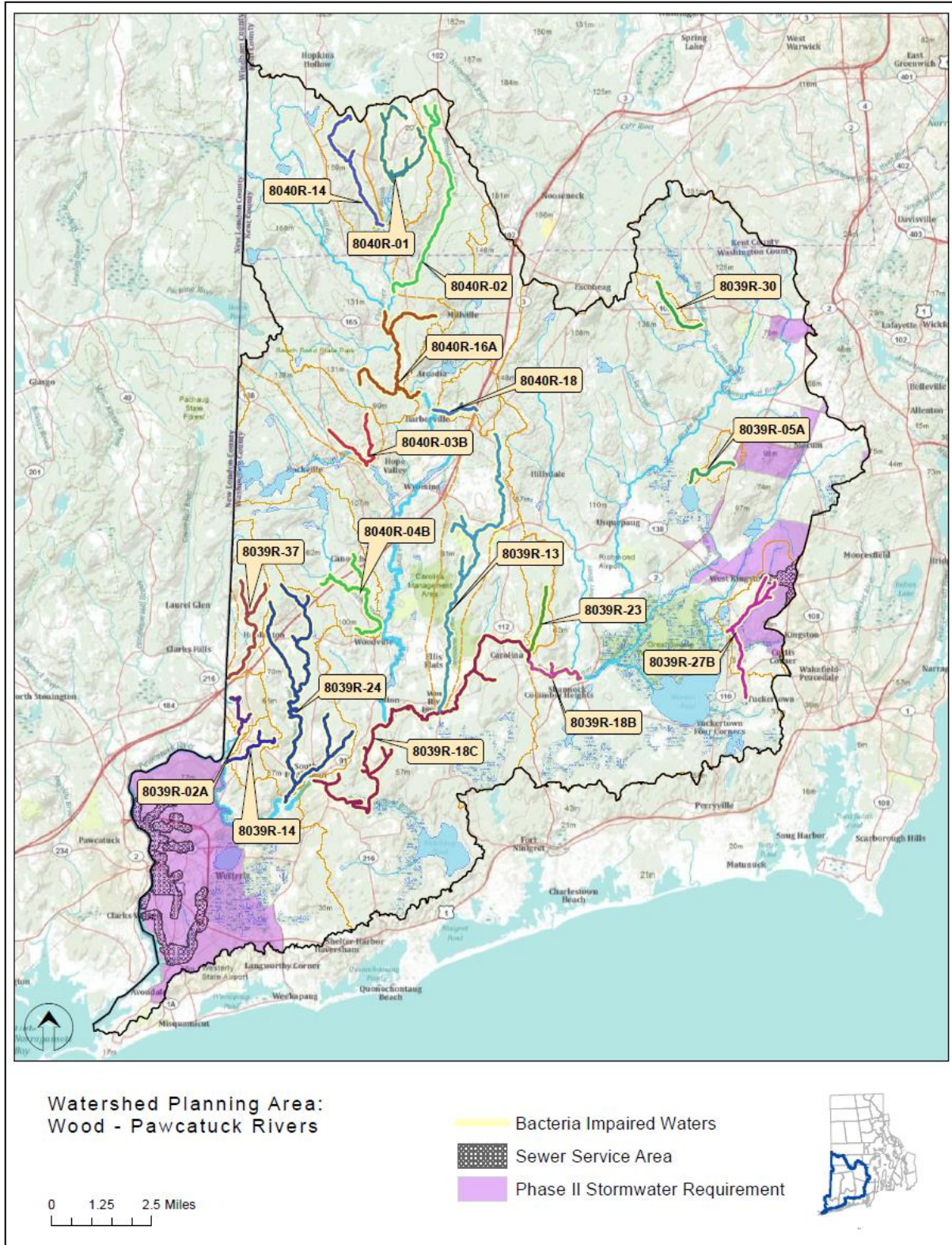


Figure 1: Map of the Wood-Pawcatuck Watershed Planning Area with impaired segments addressed by the Statewide Bacteria TMDL, sewer service areas, and stormwater regulated zones.

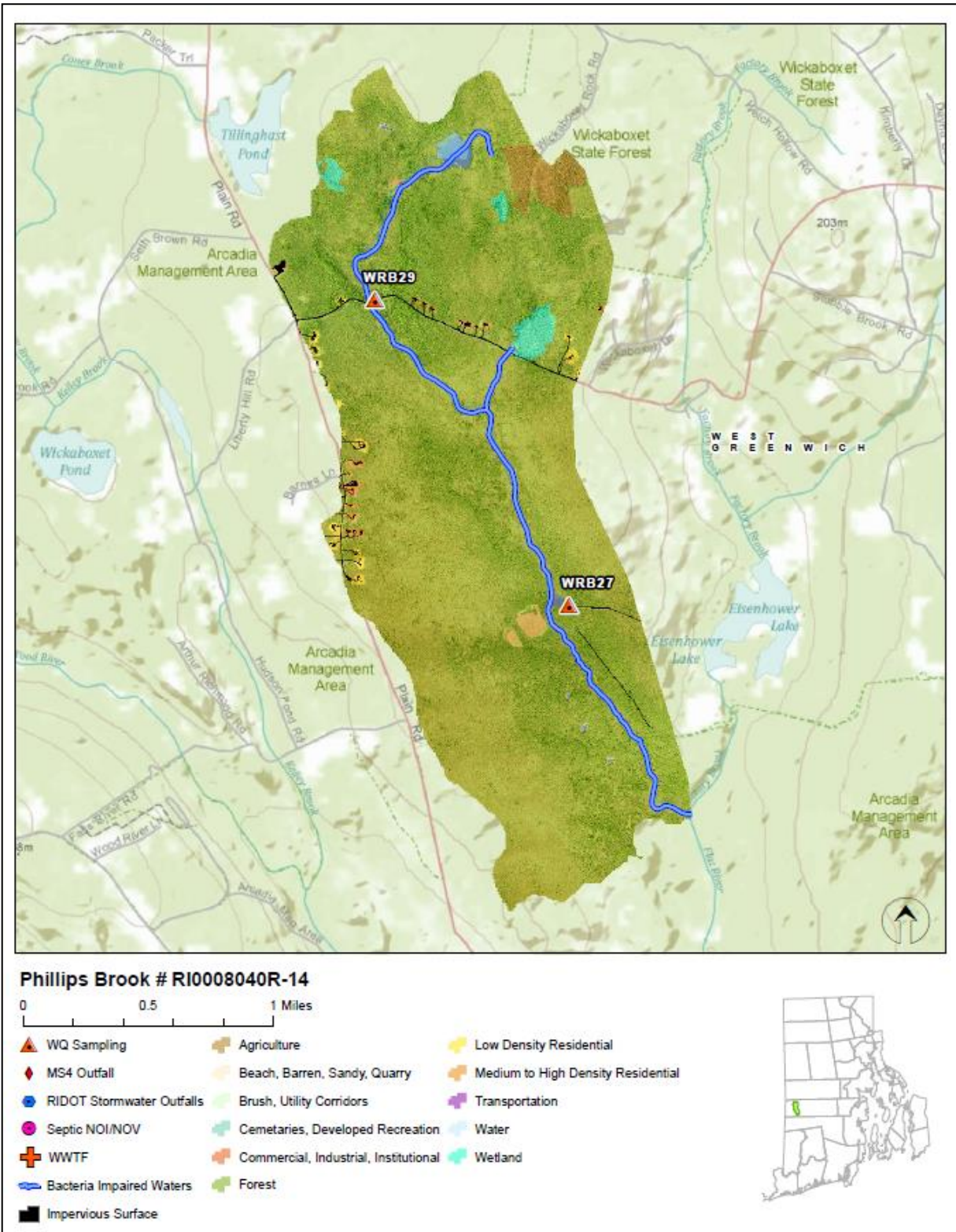


Figure 2: Map of the Phillips Brook watershed with impaired segment, sampling locations, and land cover indicated.

Why is a TMDL Needed?

Phillips Brook is a Class A fresh water stream, and its applicable designated uses are primary and secondary contact recreation and fish and wildlife habitat (RIDEM, 2009). From 2004-2005, water samples were collected from two sampling locations (WRB27 and WRB29) and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with bacteria sampling results from 2004-2005 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 Station WRB27. This station is located near Phillips Pond. All samples were taken in dry weather.

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

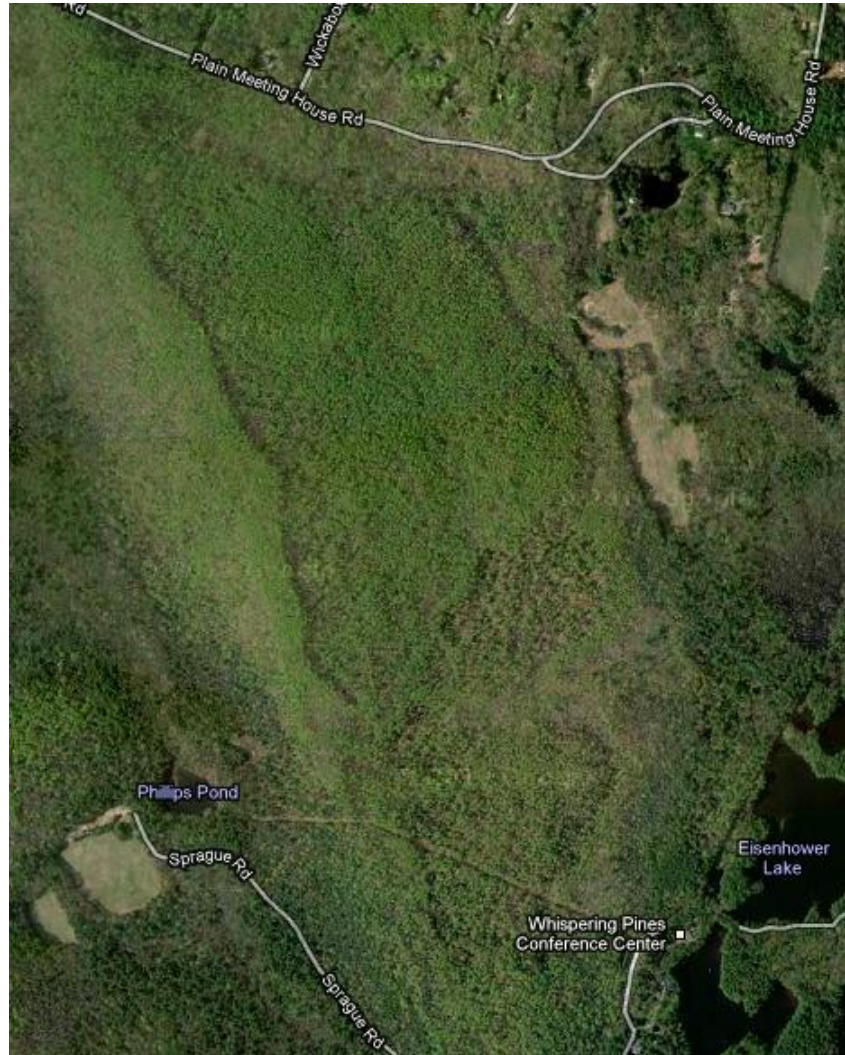


Figure 3: Partial aerial view of the Phillips Brook watershed. (Source: Google Maps)

Potential Bacteria Sources

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

Onsite Wastewater Treatment Systems

All residents in the Phillips Brook watershed rely on onsite wastewater treatment systems (OWTS) such as cesspools and septic systems. 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 Phillips Brook watershed.

Waterfowl, Wildlife, and Domestic Animal Waste

The Phillips Brook watershed is predominately undeveloped and includes a portion of the Wickaboxet Wildlife Management Area and the Arcadia Management Area. These forested areas are also 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.

Though only a small portion of the watershed is characterized by residential development, much of this development is located near the headwaters and central portion of the brook. Waste from domestic animals such as dogs, may also be contributing to bacteria concentrations in Phillips Brook.

Agricultural Activities

Agricultural operations are an important economic activity and landscape feature in the state's rural areas. Agricultural land use occupies 2% of the land area in the Phillips Brook watershed. However, the headwaters of Phillips Brook originate just south of an agricultural operation near Wickaboxet Rock Road. Agricultural runoff may contain multiple pollutants, including bacteria, and may be contributing bacteria to Phillips Brook.

Developed Area Stormwater Runoff

The Phillips Brook watershed has an impervious cover of 0.8%. 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 Phillips 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 Phillips 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.

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

Onsite Wastewater Management

All residents of the Phillips Brook watershed rely on OWTS. As part of an onsite wastewater management planning process, West Greenwich should develop an Onsite Wastewater Management Plan and 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 West Greenwich is 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 West Greenwich develop a program to assist citizens with the replacement of older and failing systems.

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. West Greenwich should work with volunteers to map locations where animal waste

is a significant and chronic problem. 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 particularly near Phillips Pond. The Brook's shores are largely vegetated. However, if the shore has been cleared, residents can allow tall, coarse vegetation to grow in areas along the shores of Phillips 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 Phillips Brook and can harm human health and the environment.

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 conservation plans for their farming activities within the watershed. NRCS and the RIDEM Division of Agriculture should continue to work with agricultural operation in the watershed, particularly near Wickaboxet Rock Road in the northern portion of 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.

Stormwater Management

The Rhode Island Department of Transportation (RIDOT) (RIPDES permit RIR040036) is a municipal separate storm sewer (MS4) operator in the Phillips Brook watershed and has prepared a Phase II Stormwater Management Plan (SWMPP) for state-owned roads. Though the Town of West Greenwich (RIPDES permit RIR040029) is regulated by the Phase II program, the Phillips Brook watershed is outside of the Phase II regulated area.

In 2009, the Town of West Greenwich adopted an ordinance to address illicit discharges. This type of ordinance prohibits illicit discharges to the storm drain system 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'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 Phillips Brook based on the watershed's imperviousness, RIDOT and West Greenwich 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

Woodland and wetland areas within the Phillips Brook watershed, particularly in the Wickaboxet Wildlife Management Area and the Arcadia Management Area, absorb and filter pollutants from stormwater runoff, and help protect both water quality in the stream and stream channel stability (Berger, 2003). As these areas represent a large portion of the land use in the Phillips 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 Phillips Brook.

Table 1: Phillips Brook Bacteria Data

Waterbody ID: RI0008040R-14

Watershed Planning Area: 23 – Wood-Pawcatuck

Characteristics: Freshwater, Class A, 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: 29% (Includes 5% Margin of Safety)

Data: 2004-2005 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Phillips Brook (2004-2005) with Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
WRB29	Phillips Brook-Plains Meeting House Rd	7/7/2005	120	Dry	51
WRB29	Phillips Brook-Plains Meeting House Rd	5/5/2005	1	Dry	
WRB29	Phillips Brook-Plains Meeting House Rd	8/20/2004	1100	Dry	
WRB27	Phillips Brook-on Dirt Road through Alton Jones Campus map required	7/7/2005	2400	Dry	71 [†] (29%)*
WRB27	Phillips Brook-on Dirt Road through Alton Jones Campus map required	5/5/2005	1	Dry	
WRB27	Phillips Brook-on Dirt Road through Alton Jones Campus map required	8/20/2004	150	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
WRB29	Phillips Brook-Plains Meeting House Rd	2004-2005	0	3	51	NA	51
WRB27	Phillips Brook-on Dirt Road through Alton Jones Campus map required	2004-2005	0	3	71	NA	71

Shaded cells indicate an exceedance of water quality criteria

Weather condition determined from URI rain gage in Kingston, RI

References

- Berger, Louis (2003). Phase II Storm Water Management Plan for the Town of West Greenwich, RI. October 2003.
- 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.