



# Dutemple Brook

## Watershed Description

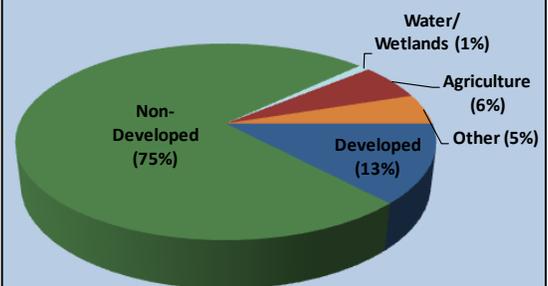
This **TMDL** applies to the Dutemple Brook assessment unit (RI0008039R-30), a 1.8-mile long stream located in Exeter, RI (Figure 1). The Town of Exeter is located in the southern portion of the state and Dutemple Brook is located in the northern section of town. The Dutemple Brook watershed is presented in Figure 2 with land use types indicated.

Dutemple Brook begins in a forested area just north of Widow Sweets Road in Exeter. The brook flows southeast under Widow Sweets Road, through a residential neighborhood and continues through an area of mixed land use including agriculture, residential, and forested. Dutemple Brook then flows under Route 102 through a non-developed area, crosses Hallville Road, and empties into Fisherville Brook.

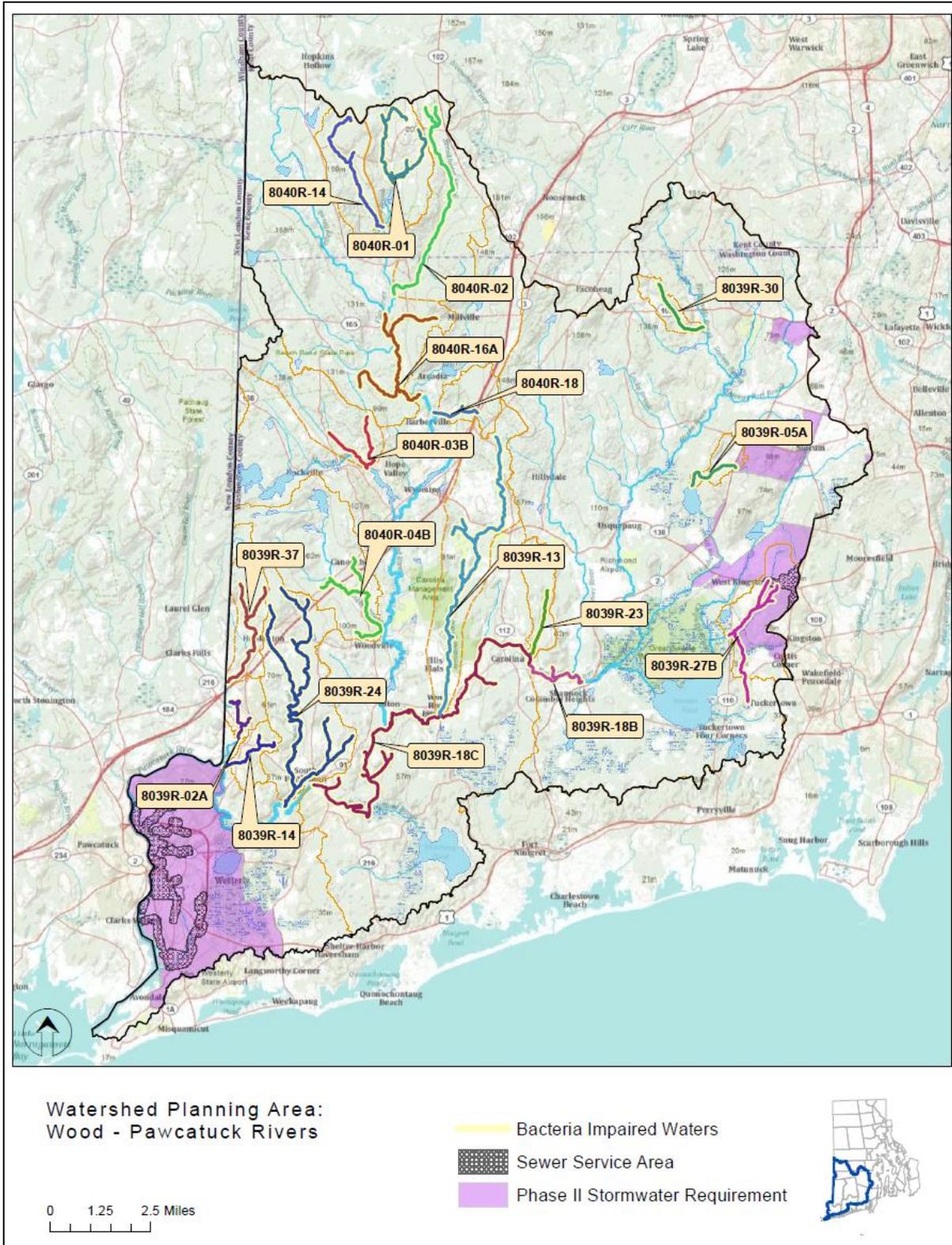
The Dutemple Brook watershed covers 0.94 square miles. Non-developed areas occupy a large portion (75%) of the watershed. Developed uses (including residential and commercial uses) occupy approximately 13%. Agricultural and uses cover 6%, and are concentrated around Route 102. Other land uses including vacant land occupy 5% of the watershed, and open water and wetlands occupy 1%.

## **Assessment Unit Facts** **(RI0008039R-30)**

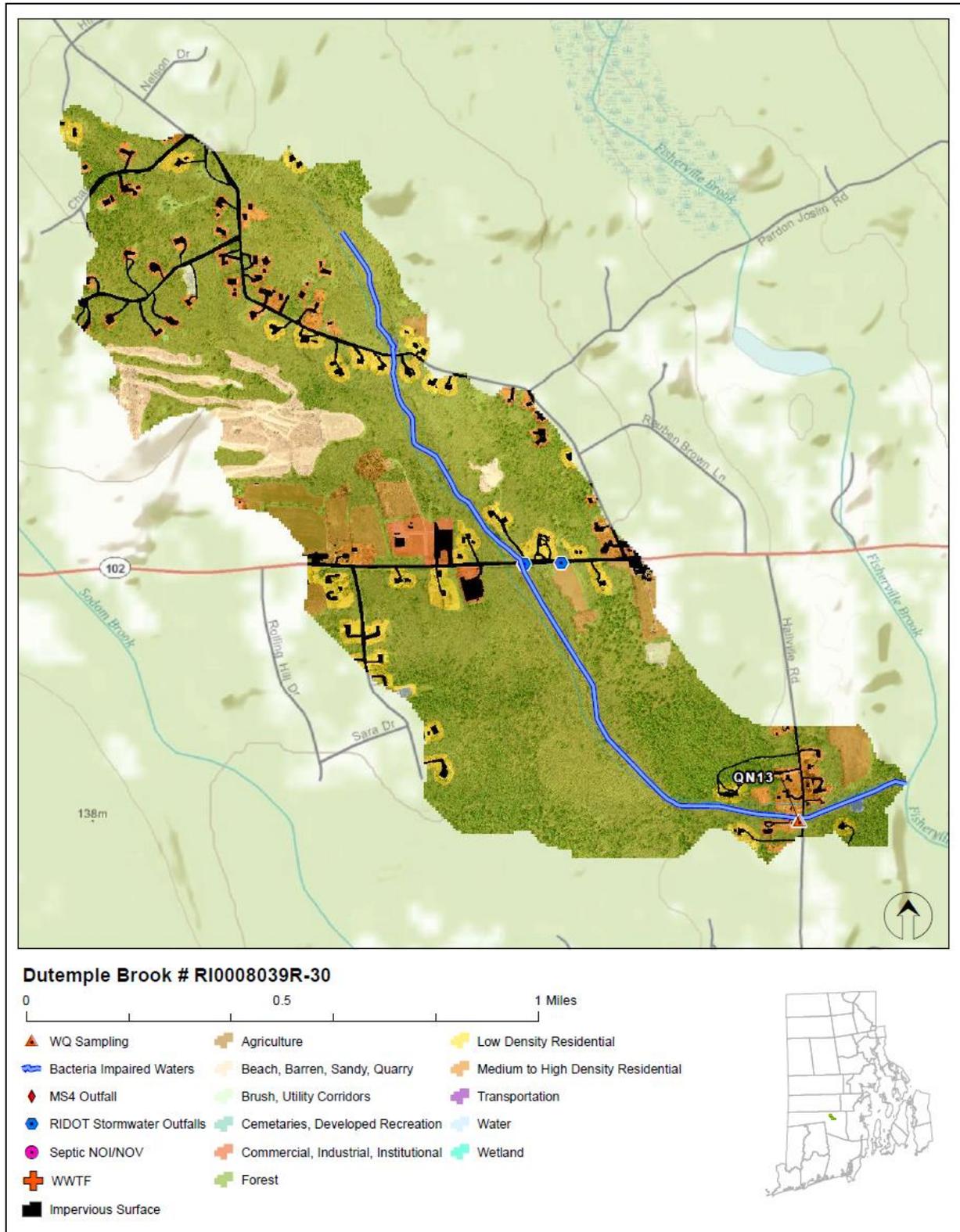
- **Town:** Exeter
- **Impaired Segment Length:** 1.8 miles
- **Classification:** Class A
- **Direct Watershed:** 0.94 mi<sup>2</sup> (602 acres)
- **Impervious Cover:** 5.4%
- **Watershed Planning Area:** Wood – Pawcatuck (#23)



**Watershed Land Uses**



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



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

### Why is a TMDL Needed?

Dutemple Brook is a Class A fresh water stream, and its applicable designated uses are primary and secondary contact recreation (RIDEM, 2009). From 2006-2007, water samples were collected from one sampling location (QN13) and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with bacteria sampling results from 2006-2007 and associated statistics are presented in Table 1. The geometric mean was calculated for station QN13 and exceeded the water quality criteria for enterococci. All samples were taken in dry-weather. Possible dry weather sources are described in the sections below. Potential sources include improperly operating onsite wastewater treatment systems (OWTS), wastes from agriculture activities, as well as wastes from waterfowl, wildlife, and domestic pets.



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

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

### Potential Bacteria Sources

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

#### Onsite Wastewater Treatment Systems

All residents in the Dutemple Brook watershed rely on onsite wastewater treatment systems (OWTS) such as cesspools and septic systems. Most of the soils in Exeter have moderate to severe septic system limitations (RIDEM, 2004). 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 Dutemple Brook watershed.

#### Agricultural Activities

Agricultural operations are an important economic activity and landscape feature in the state's rural areas. Agricultural land use occupies 6% of the land area in the Dutemple Brook watershed. However, much of this land is adjacent to Dutemple Brook, particularly near Route 102. Agricultural runoff may contain multiple pollutants, including bacteria, and may be contributing bacteria to Dutemple Brook.

#### Waterfowl, Wildlife, and Domestic Animal Waste

The Dutemple Brook watershed is predominately undeveloped, particularly in the southern portion of the watershed. 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 Dutemple Brook.

#### Developed Area Stormwater Runoff

Though only a small portion of the Dutemple Brook watershed is developed, most of the development is concentrated near the headwaters of the brook. The Dutemple Brook watershed has an impervious cover

of 5.4%. 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 Dutemple 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.

As part of Phase II requirements, the Rhode Island Department of Transportation (RIDOT) has identified and mapped its stormwater outfalls throughout the state. As shown in Figure 2, two outfalls are found in the Dutemple Brook watershed, and are concentrated along Route 102.

### 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 Dutemple 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.

#### Onsite Wastewater Management

All residents of the Dutemple Brook watershed rely on OWTS (septic systems or cesspools). The Town of Exeter has a draft Onsite Wastewater Management Plan that provides a framework for managing the OWTS. As part of an onsite wastewater management planning process, Exeter 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 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 Exeter 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 Exeter develop a program to assist citizens with the replacement of older and failing systems.

### 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 Route 102, 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.

### 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. Exeter 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. 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 Dutemple 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 Dutemple Brook and can harm human health and the environment.

### Stormwater Management

RIDOT (RIPDES permit RIR040036) is a municipal separate storm sewer (MS4) operator in the Dutemple Brook watershed and has prepared a Phase II Stormwater Management Plan (SWMPP). Though the Town of Exeter (RIPDES permit RIR040017) is regulated by the Phase II program, the Dutemple Brook watershed is outside of the Phase II regulated area.

The Town of Exeter does not currently have an ordinance to address illicit discharges (Fuss and O'Neill, 2007). 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 Dutemple Brook based on the watershed's imperviousness, RIDOT and Exeter 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 Dutemple Brook watershed, particularly in the southern portion of the 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 a large portion of the land use in the Dutemple 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 Dutemple Brook.

**Table 1: Dutemple Brook Bacteria Data**

**Waterbody ID:** RI0008039R-30

**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:** 13% (Include 5% Margin of Safety)

**Data:** 2006-2007 from RIDEM

**Single Sample Enterococci (colonies/100 mL) Results for Dutemple Brook (2006-2007) with Geometric Mean Statistics**

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
QN13	Hallville Road (mailbox 111)	8/9/2007	170	Dry	<b>59 (13%)*</b>
QN13	Hallville Road (mailbox 111)	7/9/2007	93	Dry	
QN13	Hallville Road (mailbox 111)	6/26/2007	43	Dry	
QN13	Hallville Road (mailbox 111)	6/12/2007	6	Dry	
QN13	Hallville Road (mailbox 111)	10/9/2006	170	Dry	
Shaded cells indicate an exceedance of water quality criteria *Includes 5% Margin of Safety					

**Wet and Dry Weather Geometric Mean Enterococci Values for Station QN13**

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
QN13	Hallville Road (mailbox 111)	2006-2007	0	5	59	NA	59
Shaded cells indicate an exceedance of water quality criteria Weather condition determined from rain gage at URI in Kingston, RI							

### References

- RIDEM (2004). Total Phosphorus TMDL for Dutemple Brook, Yawgoo and Barber Ponds. Rhode Island Department of Environmental Services.
- 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.
- Town of Exeter (2004). Phase II Stormwater Management Program Plan. March 2004.
- 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).