Cutler Brook

Watershed Description

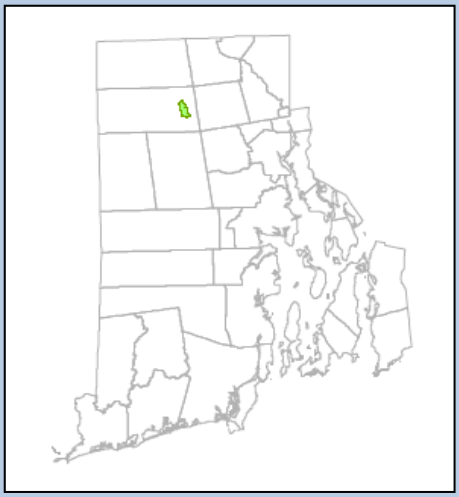
This **TMDL** applies to the Cutler Brook assessment unit (RI0002007R-02), a 3.2-mile long stream located in Glocester, RI (Figure 1). The Town of Glocester is located in the northwestern portion of Rhode Island, bordering Connecticut to the west and the Town of Smithfield, RI, to the east. Cutler Brook is located in the northeastern corner of Glocester. The Cutler Brook watershed is presented in Figure 2 with land use types indicated.

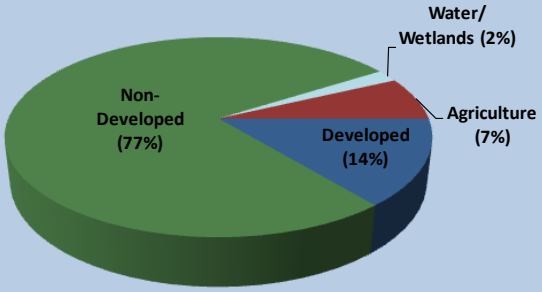
The headwaters of Cutler Brook originate in a wetland area on the eastern side of Cooper Road in Glocester. The brook travels west under Cooper Road, before flowing through a forested wetland area. The brook then travels due south where it passes to the east of agricultural fields and turns southeast. The brook then passes under Route 44 (Putnam Pike) near the intersection with Farnum Road. Cutler Brook continues southeast and is met by a tributary in a small impoundment to the east of the Melody Hill Golf Course. After leaving the impoundment, the brook continues southeast where it passes under Saw Mill Road and flows into the northwestern cove of the Waterman Reservoir near Waterman Lake Drive. The Waterman Reservoir is currently used for recreation and drains to another bacteria-impaired segment, the Stillwater River.

The Cutler Brook watershed covers 1.2 square miles. As shown in the aerial image of Figure 3, non-developed lands occupy a large portion (77%) of the watershed. Developed uses (including residential and commercial uses) cover 14% of the land area. Impervious surfaces cover 5.4% of the land within the watershed. Wetland and surface waters occupy 2%, and 7% of the lands within the watershed are used for agriculture.

Assessment Unit Facts (RI0002007R-02)

- **Town:** Glocester
- **Impaired Segment Length:** 3.2 miles
- **Classification:** Class B
- **Direct Watershed:** 1.2 mi² (797 acres)
- **Impervious Cover:** 5.4%
- **Watershed Planning Area:** Woonasquatucket (#24)





Watershed Land Uses

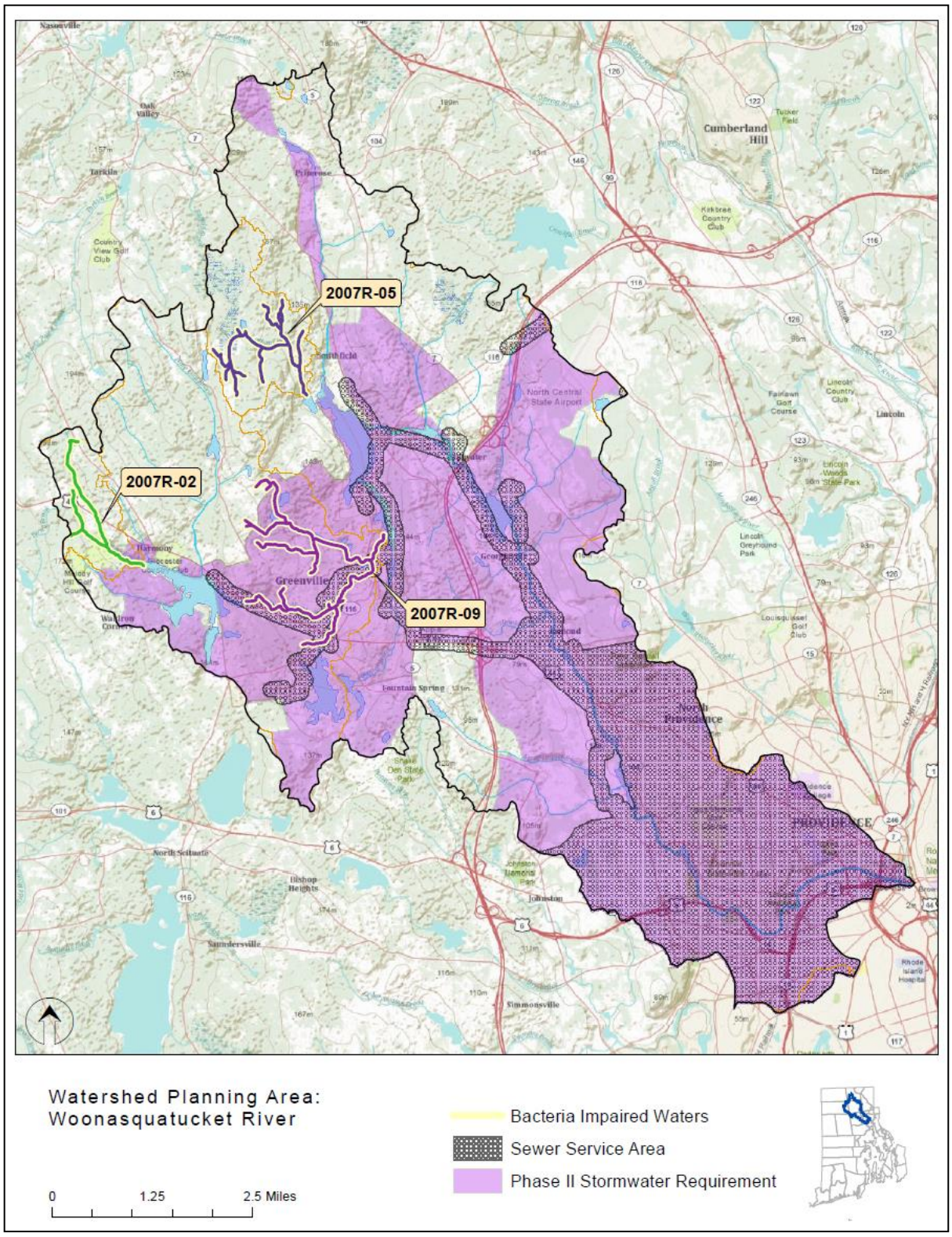


Figure 1: ***Map of the Woonasquatucket River Watershed Planning Area with impaired segments addressed by the Statewide Bacteria TMDL, sewered areas, and stormwater regulated zones.***

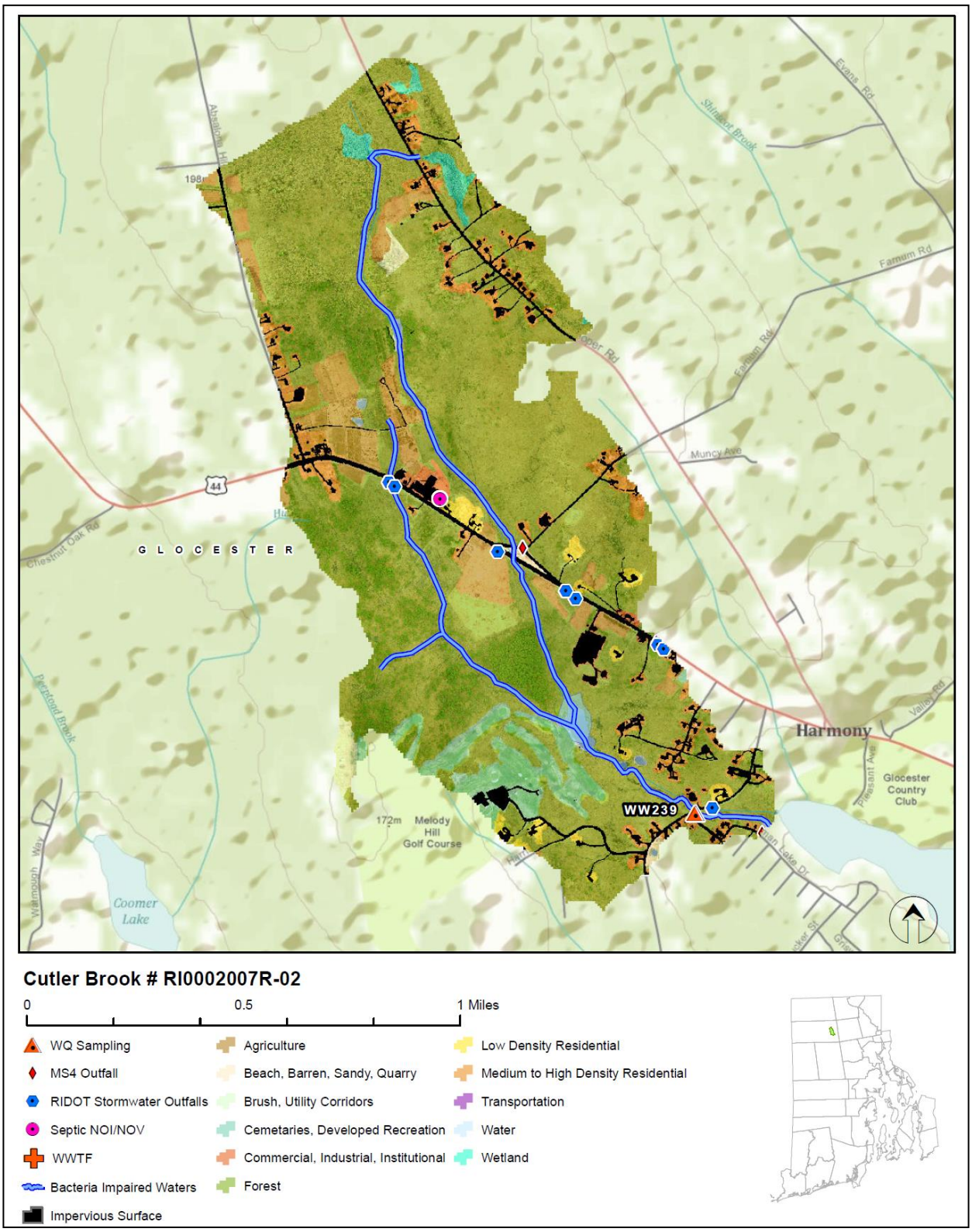


Figure 2: ***Map of the Cutler Brook watershed with impaired segment, sampling location, and land cover indicated.***

Why is a TMDL Needed?

Cutler Brook is a Class B freshwater stream with designated uses of primary and secondary contact recreation, and fish and wildlife habitat (RIDEM, 2009). From 2006-2008, water samples were collected from one sampling station (WW239) and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with bacteria sampling results from 2006-2008 and associated statistics are presented in Table 1. The geometric mean was calculated for Station WW239 and exceeded the water quality criteria for enterococci.

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

To aid in identifying possible bacteria sources, the geometric mean was calculated for wet and dry-weather sample days. The geometric mean value for wet-weather exceeded the water quality criteria for enterococci. Though the dry-weather geometric mean value did not exceed the water quality criteria, recent individual samples taken in dry-weather conditions were high (400 to 800 colonies/100 mL).

Due to the elevated bacteria measurements presented in Table 1, Cutler 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 Cutler Brook watershed including malfunctioning onsite wastewater treatment systems, illicit discharges, wildlife and domestic animal waste, stormwater runoff from developed areas, and agricultural activities.

Onsite Wastewater Treatment Systems

All of the residents within Glocester, including those within the Cutler Brook watershed, rely entirely on onsite wastewater treatment systems (OWTS), such as septic systems and cesspools, for waste disposal. Failing OWTS can be a significant source of bacteria by allowing improperly treated waste to reach surface waters (RI HEALTH, 2003). 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, one OWTS Notice of Violation/Notice of Intent to Violate has been issued by the RIDEM Office of Compliance and Inspection within the Cutler Brook watershed.

Within Glocester, 14% of the soils are classified as poorly to very poorly drained, and 7% of soils are classified as excessively drained (Town of Glocester, 2006). These soil characteristics pose significant risks for septic disposal because high groundwater does not allow for the waste to break down and be disposed of properly. The specific soils dominant in Glocester and the Cutler Brook watershed are Canton-Charlton, Hinckley, Merrimac, Paxton, Ridgebury-Whitman-Leicester, Sutton, and Woodbridge. All of these soil types pose significant problems for septic waste disposal (Edwards and Kelcey, 2004). A study conducted in 2003 found that within the Village of Chepachet, an area of town just outside of the Cutler Brook watershed, 7% of the lots were unsuitable for conventional septic waste disposal (Chepachet Village, 2003). Though Chepachet is outside of the watershed boundaries, the soil types and limitations posed by these soils are also found within the Cutler Brook's watershed, suggesting that failing or malfunctioning OWTS could be a significant source of bacterial contamination to Cutler Brook.

Developed Area Stormwater Runoff

The Cutler 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 developed portions of the watershed may be contributing bacteria to Cutler 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 for Glocesters's Municipal Separate Storm Sewer System (MS4), the town has mapped outfalls to surface water bodies (Town of Glocester, 2006). The Rhode Island Department of Transportation (RIDOT) has also mapped stormwater outfalls within the Cutler Brook watershed. Glocester has one MS4 outfall on Cutler Brook and the RIDOT has multiple stormwater outfalls entering the brook (Figure 2).

Waterfowl, Wildlife, and Domestic Animal Waste

Domestic animals within the Cutler Brook watershed represent a potential source of bacteria to Cutler Brook. Residential developments are located directly adjacent to the stream in several areas. If residents are not properly disposing of pet waste, the bacteria from that waste could enter and contaminate the stream. There are several small impoundments along Cutler Brook, providing ideal habitat for waterfowl (Woonasquatucket, 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.

Agricultural Activities

Agricultural operations are an important economic activity and landscape feature in the state's rural areas. Though agricultural land use only makes up seven percent of the land within the Cutler Brook watershed, much of that agricultural activity, especially the agricultural operation located near RI Route 44, is located adjacent to the stream (Figure 3). Runoff from agricultural areas may carry a variety of pollutants, including bacteria. Manure-based fertilizers can contain harmful amounts of bacteria. If there is not an adequate stream buffer around agricultural lands, polluted runoff from these areas could reach Cutler 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 Cutler 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 of the residents within Glocester (and the Cutler Brook watershed) rely on OWTS. The town has taken a number of proactive steps, including developing an Onsite Wastewater Management Plan to protect the groundwater and surface water in town from problems with onsite wastewater disposal (Edwards and Kelcey, 2004). A 1997 study conducted for the Town of Glocester found that there were concerns with OWTS failing and polluting surface and ground water. The study suggested the town develop a Wastewater Management District (WWMD) to help educate citizens about septic disposal issues, detect failing systems, and enforce ordinances pertaining to testing and maintenance (Fuss & O'Neill, 1997). In 1999, the Town of Glocester created the Glocester Wastewater Management Board to administer the town's Wastewater Management District Ordinance (Town of Glocester, 2011). The ordinance addresses the potential issues OWTS pose to the town's water resources, including Cutler Brook (Glocester WWMD, 2003). Developing such programs gives the town greater authority to proactively address wastewater management issues, providing a more comprehensive protection for surface and groundwater (Edwards and Kelcey, 2004). Routine inspections and recordkeeping of the location and maintenance history of all OWTS in the town allow Glocester to determine where systems are failing and provide an important enforcement tool in the prevention of bacterial contamination. Glocester's Wastewater Management Board should continue to aggressively locate failing systems and educate citizens.

To assist with the replacement of failing OWTS, Glocester is eligible for Rhode Island's Community Septic System Loan Program (CSSLP), which allows towns to provide low-interest loans to residents for the replacement and maintenance of OWTS. Since 2001, the Town of Glocester had received $550,000 through the program.

Stormwater Management

The Town of Glocester (RIDPES permit RIR040038) and RIDOT (RIPDES permit RIR040036) are municipal separate storm sewer system (MS4) operators in the Cutler Brook watershed and have prepared the required Phase II Stormwater Management Plans (SWMPP). Only a small section of the watershed near the mouth of the brook is included in the regulated area.

Glocester's SWMPP outlines goals for the reduction of stormwater runoff to Cutler 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 ordinances, and conducting public education activities (RIDEM, 2010a).

Glocester developed a draft Illicit Discharge Detection and Elimination (IDDE) ordinance in 2009. These specific types of ordinances prohibit illicit discharges to the MS4 and provide an enforcement mechanism. The town also has procedures in-place to detect illicit discharges (Town of Glocester, 2006). Detecting these discharges is a central component of the IDDE program. Illicit discharges can be significant sources of bacterial contamination and Glocester should continue to have thorough measures in place for detection and elimination (Town of Glocester, 2006).

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. Storm Water Pollution Prevention Plans (SWMPP) 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 Cutler Brook based on the watershed's imperviousness, Glocester 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

Glocester's education and outreach programs currently highlight the importance of picking up after dogs and other pets (Town of Glocester, 2006). The town has also incorporated educational materials focused on not feeding waterfowl. Animal wastes should be disposed of away from any waterway or stormwater system. Glocester 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 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 also take several measures to minimize waterfowl-related impacts. They can allow tall, coarse vegetation to grow in areas along the shores of the many small impoundments along the streams course, which 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 Cutler Brook and can be harmful to human health.

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 to develop conservation plans for farming activities within the watershed. NRCS and the RIDEM Division of Agriculture should work with local farms 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

Glocester has a history of preserving the natural character of the town (Glocester, 2001). Glocester should focus its preservation efforts on wetland and woodland areas surrounding the stream. Preserving natural areas is important because woodland and wetland areas within the Cutler Brook watershed absorb and filter pollutants from stormwater and help protect both water quality in the stream and stream channel stability. As these areas represent approximately 77% of the land in the Cutler Brook watershed, it is important to continue to preserve these undeveloped areas, and to 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 the Cutler Brook watershed.

Table 1: Cutler Brook Bacteria Data

***Waterbody ID*:** RI0002007R-02

Watershed Planning Area: 24 – Woonasquatucket

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: **34% (Includes 5% Margin of Safety)**

Data: 2006-2008 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Cutler Brook (2006-2008) with Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
WW239	Waterman Tributary @ Saw Mill (Cutler Brook)	10/25/2008	25	Wet	**76 (34%)***
WW239	Waterman Tributary @ Saw Mill (Cutler Brook)	7/14/2008	816	Dry	
WW239	Waterman Tributary @ Saw Mill (Cutler Brook)	5/14/2008	457	Dry	
WW239	Waterman Tributary @ Saw Mill (Cutler Brook)	10/20/2007	330	Wet	
WW239	Waterman Tributary @ Saw Mill (Cutler Brook)	7/21/2007	317	Wet	
WW239	Waterman Tributary @ Saw Mill (Cutler Brook)	5/14/2007	2	Dry	
WW239	Waterman Tributary @ Saw Mill (Cutler Brook)	10/31/2006	43	Wet	
WW239	Waterman Tributary @ Saw Mill (Cutler Brook)	7/28/2006	201	Wet	
WW239	Waterman Tributary @ Saw Mill (Cutler Brook)	5/22/2006	5	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 WW239

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
WW239	Waterman Tributary @ Saw Mill (Cutler Brook)	2006-2008	5	4	76	117	44

Shaded cells indicate an exceedance of water quality criteria

Weather condition determined from the rain gage at T.F. Green Airport in Warwick, RI

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