



Hunt River

Watershed Description

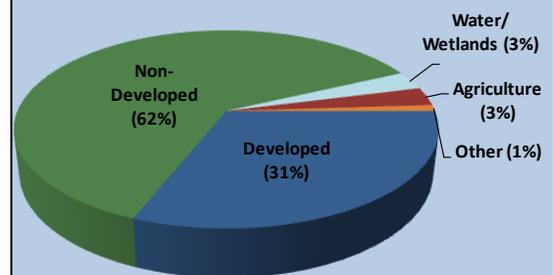
This **TMDL** applies to the Hunt River assessment unit (RI0007028R-03D), a 1-mile long stream segment located in North Kingstown and Warwick, RI (Figure 1). The Town of North Kingstown and the City of Warwick are located on the eastern edge of the state, and are bordered by Narragansett Bay (Geremia, 2009). The Hunt River is located along the northern border of North Kingstown and the southern portion of Warwick. The Hunt River watershed is presented in Figure 2 with land use types indicated.

The Hunt River is formed by multiple tributaries originating in East Greenwich, RI. These tributaries, including Scrabbletown Brook, Frenchtown Brook, and Fry Brook, join to form the Hunt River along the northern border of North Kingstown on the eastern side of Route 4. The river flows east through a mix of forested and developed areas before crossing Route 1. The Hunt River continues northeast and enters Potowomut Pond. The impaired segment of the Hunt River begins at the outlet of the pond. Sandhill Brook, another impaired stream, enters the Hunt River just west of Potowomut Road. The Hunt River then flows north into the southern portion of Warwick, where it widens to form the Potowomut River and empties into Narragansett Bay just south of Greenwich Bay.

The Hunt River watershed covers 22.7 square miles. As shown in the aerial image of Figure 3, non-developed areas occupy a large portion (62%) of the watershed. Developed uses (including residential, commercial, and transportation areas) occupy approximately 31%, agricultural uses occupy 3%, wetlands and other surface waters occupy 3%, and other land uses combine to occupy 1%. Impervious surfaces cover a total of 13.1%.

Assessment Unit Facts (RI0007028R-03D)

- **Town:** North Kingstown, Warwick
- **Impaired Segment Length:** 1 mile
- **Classification:** Class B
- **Direct Watershed:** 22.7 mi² (14,511 acres)
- **Impervious Cover:** 13.1%
- **Watershed Planning Area:** Hunt River (#6)



Watershed Land Uses

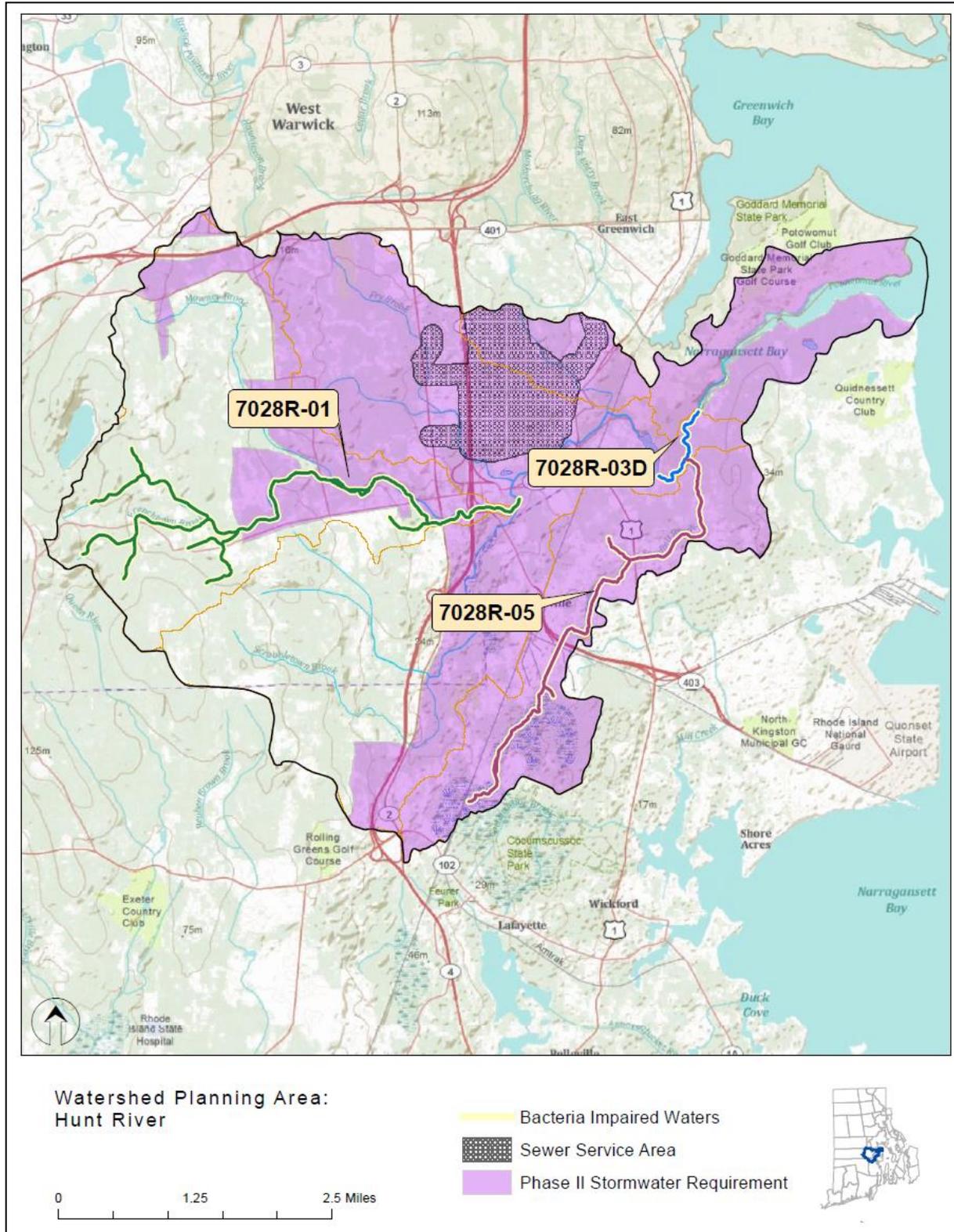


Figure 1: Map of the Hunt River Watershed Planning Area with impaired segments addressed by the Statewide Bacteria TMDL, sewer service areas, and stormwater regulated zones.

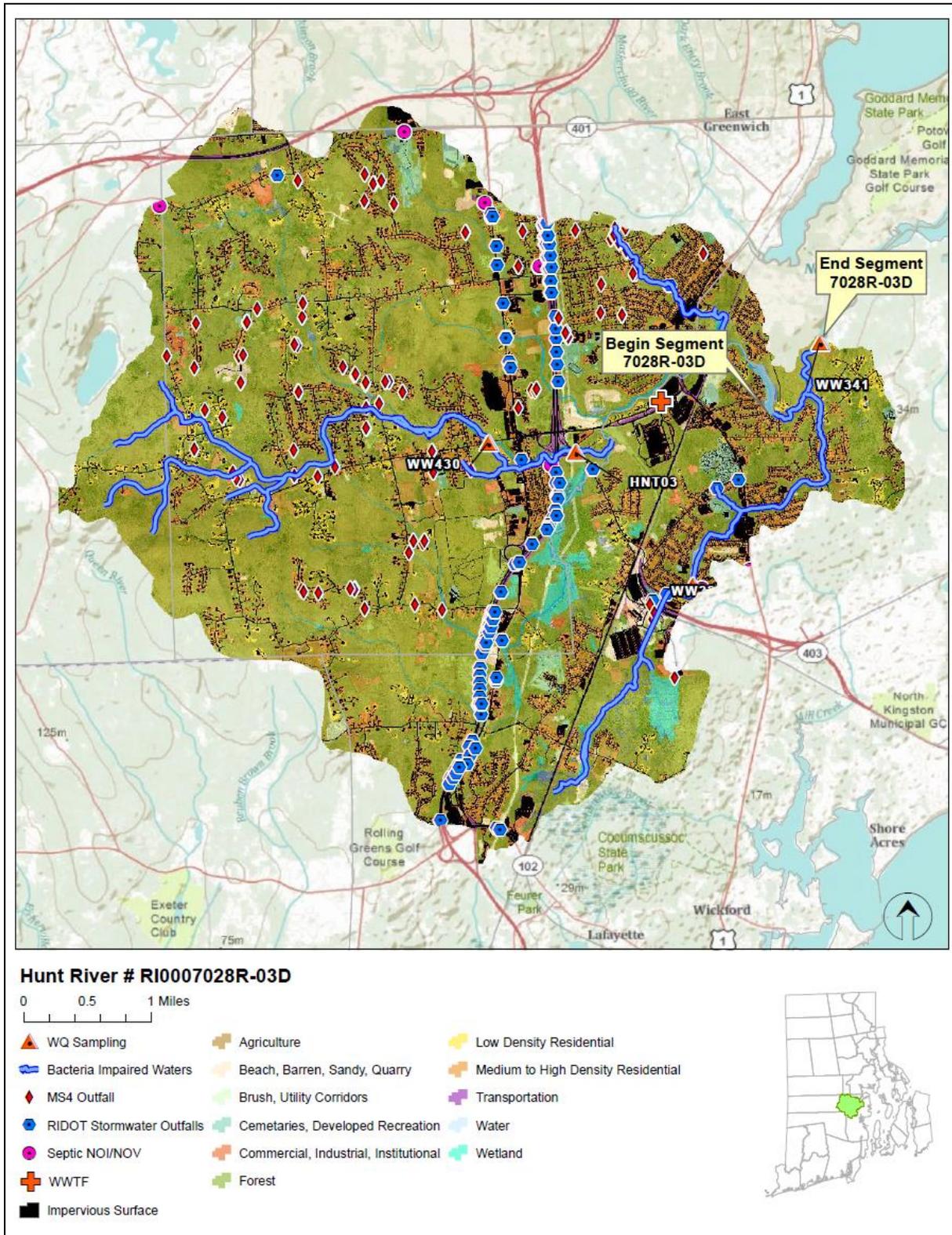


Figure 2: Map of the Hunt River watershed with impaired segments, sampling locations, and land cover indicated.

Why is a TMDL Needed?

Hunt River is a Class B freshwater stream, and its applicable designated uses are primary and secondary contact recreation and fish and wildlife habitat (RIDEM, 2009). From 2007-2008, water samples were collected from one sampling location (WW341) and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with bacteria sampling results from 2007-2008 and associated statistics are presented in Table 1. The geometric mean at station WW341 exceeded Rhode Island's water quality criteria for enterococci.

To aid in identifying possible bacteria sources, the geometric mean was also calculated for wet-weather and dry-weather sample days at station WW341. Both wet and dry geometric mean values exceeded water quality criteria for enterococci with wet weather values higher than dry weather values.

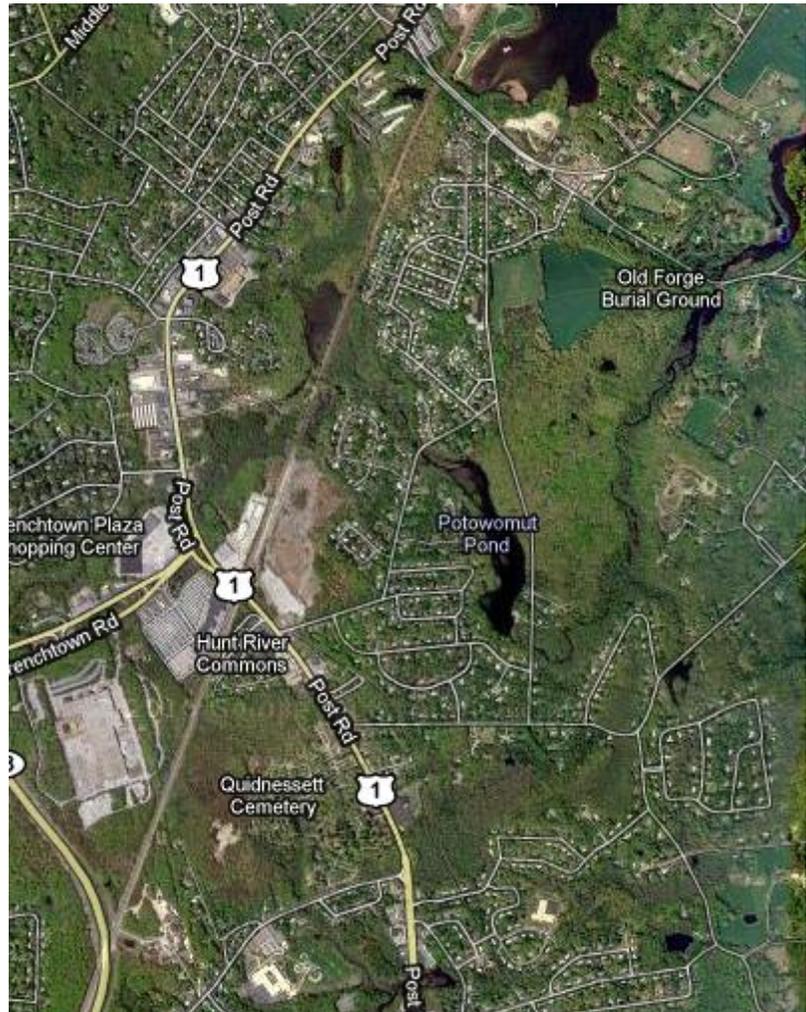


Figure 3: Partial aerial view of the Hunt River watershed (Source: Google Maps)

Due to the elevated bacteria measurements presented in Table 1, this segment of the Hunt River 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 waterbodies to comply with state water quality standards.

Other segments of the Hunt River, including the headwaters and main stem, have been assessed by RIDEM as not meeting water quality standards for fecal coliform. While a TMDL for these segments were completed in 2001, this impaired segment of the Hunt River was not included in the 2001 TMDL.

Potential Bacteria Sources

There are several potential sources of bacteria in the Hunt River watershed including malfunctioning onsite wastewater treatment systems, stormwater runoff from developed areas, and wildlife and domestic animal waste. The 2001 Hunt River Fecal Coliform TMDL identified stormwater runoff, bacteria inputs from Scrabbletown Brook, Fry Brook, Pierce Brook, Frenchtown Brook, and Sandhill Brook, and wildlife and waterfowl as potential sources of bacteria to the upper portions of the Hunt River. These sources may also be contributing to bacterial contamination in this impaired segment of the Hunt River.

Onsite Wastewater Treatment Systems

Approximately 96% of the town of North Kingstown relies on onsite wastewater treatment systems (OWTS) such as cesspools and septic systems. A small section of the town located in the northeast corner in the Quonset Point/Davisville Industrial Park has a small wastewater treatment plant. RIDEM has identified 730 cesspools throughout North Kingstown that are impacted by the cesspool phaseout law described in Section 6.7 of the Core TMDL Document. The Hunt River watershed relies exclusively on OWTS, including the small portion of the watershed in Warwick (Town of North Kingstown, 2000). Failing or inadequate OWTS, including cesspools, have previously been identified as potential sources of bacteria to Hunt River (RIDEM, 2001; Town of North Kingstown, 2000). Failing OWTS can be significant sources of bacteria by allowing raw waste to reach surface waters (RI HEALTH, 2003). Many areas in the Town of North Kingstown also have inherent environmental conditions, such as a high groundwater table, poor soil type, and restricted lot sizes, that require careful siting and diligent maintenance of OWTS (Town of North Kingstown, 2000).

Developed Area Stormwater Runoff

The Hunt River watershed has an impervious cover of 13.1%. 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. As discussed in Section 6.3 of the Core TMDL Document, as a general rule, impaired streams with watersheds having higher than 10% impervious cover are assumed to be caused by stormwater runoff.

In accordance with Phase II requirements, the Rhode Island Department of Transportation (RIDOT), North Kingstown, and Warwick have identified and mapped their stormwater outfalls (VHB, 2004). The municipalities continue to update the maps and to identify additional outfalls. Multiple stormwater outfalls have been identified within the Hunt River watershed (Figure 2). As stormwater is known to

carry a suite of pollutants, including bacteria, stormwater is a likely source of bacterial contamination to the Hunt River.

Waterfowl, Wildlife, and Domestic Animal Waste

The Hunt River watershed is predominately undeveloped, particularly in the western portion of the watershed. Many of these areas are home to multiple species of wildlife and waterfowl. Wetland areas within the watershed are also home to various animals. 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.

The portion of the watershed adjacent to the impaired segment of the Hunt River is characterized by residential development. Waste from domestic animals such as dogs, may also be contributing to bacteria concentrations in the Hunt River.

Existing Local Management and Recommended Next Steps

Drinking water for 94% of North Kingstown's residents comes from ten wells in three groundwater aquifers. Any contamination of groundwater threatens the town's drinking water supply. As such, the town has a successful groundwater protection program that includes zoning, land acquisition, and groundwater education for residents (RI HEALTH, 2003).

Additional bacteria data collection would be beneficial to support identification of sources of potentially harmful bacteria in the Hunt River watershed. These activities could potentially 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 Hunt River watershed rely on OWTS (septic systems or cesspools). The Town of North Kingstown has an approved Onsite Wastewater Management Plan that provides a framework for managing the OWTS (Town of North Kingstown, 2000). As all of the drinking water for the town comes from groundwater, the town is particularly interested in protecting the quality of their

groundwater through measures such as limiting contamination from OWTS. As such, North Kingstown has an active Wastewater Management Committee (formed in 1996), that has worked to develop (1999) and adopt (2005) an ordinance requiring all OWTS in North Kingstown be inspected and pumped if necessary, once every three years (Geremia, 2009; Town of North Kingstown, 2000). The Committee has also established methods for tracking the location, age, and maintenance history of all OWTS in North Kingstown and developed four wastewater management districts to provide more comprehensive protection of surface and groundwater (Geremia, 2009).

The Town of North Kingstown is eligible for Rhode Island's Community Septic System Loan Program (CSSLP), and has obtained 1.6 million dollars in CSSLP money since 2002. The CSSLP program provides low-interest loans to residents to help with maintenance and replacement of OWTS. North Kingstown should also continue to provide funds to residents through the CSSLP.

A small portion of the river is located in the southern section of Warwick. Though much of Warwick relies on a municipal sewer system, the southern portion of the town relies on OWTS. The City of Warwick does not have an Onsite Wastewater Management Plan or a septic system ordinance in place, and is not eligible for CSSLP. As part of the onsite wastewater planning process, Warwick 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).

Stormwater Management

The Town of North Kingstown (RIPDES permit RIR040028), the City of Warwick (RIPDES permit RIR040031), and RIDOT (RIPDES permit RIR040036) are municipal separate storm sewer (MS4) operators in the Hunt River watershed and have prepared the required Phase II Stormwater Management Plans (SWMPP). The entire watershed area is regulated under the Phase II program.

North Kingstown and Warwick's SWMPPs outline goals for the reduction of stormwater runoff to the Hunt River through the implementation of Best Management Practices (BMPs). Many of these goals, 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 are complete or near completion (RIDEM, 2010a).

The Town of North Kingstown adopted an illicit discharge detection and elimination ordinance in 2006 and the City of Warwick adopted a similar ordinance in 2008 (RIDEM, 2010a). These ordinances prohibit illicit discharges to the MS4 and provide an enforcement mechanism. It is recommended that any stormwater outfalls discharging in the vicinity of the sampling locations be monitored to check for illicit discharges. Illicit discharges can be identified through continued dry weather outfall sampling and microbial source tracking.

RIDOT also 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 Management 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.

While these first steps are important to reduce the effects of stormwater runoff to the Hunt River, additional efforts are needed to restore the river's water quality. As mentioned previously, the Hunt River watershed has an impervious cover of 13.1%, a level where stormwater impacts are expected. At this threshold, RIDEM is requiring the MS4 operators to revise their post-construction stormwater ordinances as described in Section 6.3 of the Core TMDL Document. RIDEM also requires the MS4 operators to continue to comply with and adapt the minimum measures to reflect the bacteria impairment in regulated areas. Information regarding plans to revise the post construction ordinance should be documented in a TMDL Implementation Plan (TMDL IP). Unless otherwise noted in this waterbody summary, any other TMDL IP requirements described in Section 6.2 of the Core TMDL Document are not applicable to the MS4 operators for watershed areas having impervious cover between 10 and 15 %. Information regarding how the MS4 operators' minimum measures are addressing the pollutant of concern (i.e. bacteria) should be documented in the MS4 operators' annual report, consistent with Part IV.G.2.d of the RIPDES General Permit (RIDEM, 2010b). Further detail is also included in Sections 6.3 of the Core TMDL Document.

While this TMDL applies to lower segment of the Hunt River, previous TMDL documents have dealt with waterbody segments upstream of this lower Hunt River segment. Implementing the actions from these studies can also improve water quality in this Hunt River segment. Additionally, past studies linked water quality in this lower Hunt River segment to Sandhill Brook, which discharges to this segment. Stormwater requirements for Sandhill Brook are discussed in another appendix to the Core

TMDL Document. North Kingstown, Warwick, and RIDOT should continue to implement the Phase II minimum measures while ensuring that their post-construction ordinances are consistent with Section 6.2 of the core TMDL document.

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, particularly in the southern portion of the watershed. Animal wastes should be disposed of away from any waterway or stormwater system. The municipalities should work with volunteers 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.

The municipalities 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 the Hunt 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 the Hunt River and can harm human health and the environment.

Land Use Protection

Woodland and wetland areas within the Hunt River 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 over half of the land use in the Hunt River watershed, it is important to preserve these undeveloped areas, and institute controls on development in the watershed. The Town of North Kingstown has a longstanding groundwater protection program that includes regional planning and zoning restrictions based on aquifer locations. While this program is designed to protect the town's drinking water supply, it can also protect the water quality of the Hunt River and other surface waters in North Kingstown (RI HEALTH, 2003).

The steps outlined above will support the goal of mitigating bacteria sources and meeting water quality standards in the Hunt River.

Table 1: Hunt River Bacteria Data

Waterbody ID: RI0007028R-03D

Watershed Planning Area: 6 – Hunt 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: 66% (Includes 5% Margin of Safety)

Data: 2007-2008 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Hunt River (2007-2008) with Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
WW341	Hunt River @ Forge Road	10/25/2008	19	Wet	138[†] (66%)*
WW341	Hunt River @ Forge Road	9/20/2008	411	Dry	
WW341	Hunt River @ Forge Road	8/16/2008	299	Dry	
WW341	Hunt River @ Forge Road	7/10/2008	58	Dry	
WW341	Hunt River @ Forge Road	6/7/2008	153	Wet	
WW341	Hunt River @ Forge Road	5/10/2008	323	Wet	
WW341	Hunt River @ Forge Road	10/20/2007	519	Wet	61
WW341	Hunt River @ Forge Road	9/15/2007	110	Wet	
WW341	Hunt River @ Forge Road	8/16/2007	65	Dry	
WW341	Hunt River @ Forge Road	7/21/2007	45	Wet	
WW341	Hunt River @ Forge Road	6/16/2007	101	Dry	
WW341	Hunt River @ Forge Road	5/12/2007	3	Dry	
Shaded cells indicate an exceedance of water quality criteria					
*Includes 5% Margin of Safety					
†Geometric mean used to determine percent reduction					

Wet and Dry Weather Geometric Mean Enterococci Values for Station WW341

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
WW341	Hunt River @ Forge Road	2007-2008	6	6	92	116	72
Shaded cells indicate an exceedance of water quality criteria Weather condition determined from rain gage at TF Green Airport in Warwick, RI							

References

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- RIDEM (2010a). MS4 Compliance Status Report for RI Statewide Bacteria TMDL. Rhode Island Department of Environmental Management.
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- RI HEALTH (2003). North Kingstown 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.
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- VHB (2004). Municipal Stormwater Management Program Plan: North Kingstown, Rhode Island. Vanasse Hangen Brustlin, Inc. (March 2004).