



Belleville Upper Pond Inlet

Watershed Description

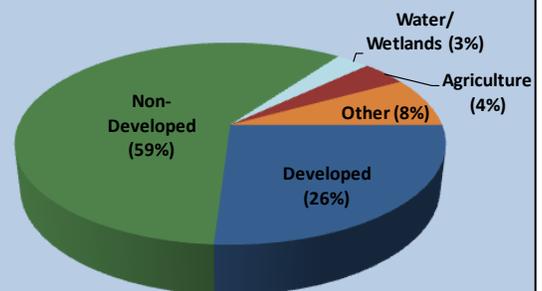
This **TMDL** applies to the Belleville Upper Pond Inlet assessment unit (RI0007027R-02), a 3-mile long stream located in North Kingstown, RI (Figure 1). The Town of North Kingstown is located in Washington County and is bordered by Narragansett Bay to the east. The town has a population of approximately 26,000, and is located 20 miles south of Providence (Geremia, 2009). Belleville Upper Pond Inlet is located in the center of town. The watershed is presented in Figure 2 with land use types indicated.

The headwaters of Belleville Upper Pond Inlet are near Hatchery Road just northeast of Dry Bridge Sand and Gravel. The Lafayette Trout Hatchery is located near the headwaters and pumps groundwater for flow-through hatchery operations. Hatchery waters are then discharged into Hatchery Brook (also known as Goose Nest Brook), which comprises the majority of flow to the Belleville Upper Pond Inlet. From its headwaters, the Belleville Upper Pond Inlet flows northeast through a mix of forested and wetland areas before crossing Route 4, where it flows southeast and discharges to the upper basin of Belleville Ponds. The Belleville Ponds are comprised of a main upper basin and a much smaller lower basin. The basins form a single waterbody, but narrow to a 40-foot bottleneck at the confluence (RIDEM, 2010a).

The Belleville Upper Pond Inlet watershed covers 3.1 square miles. As shown in the aerial image of Figure 3, non-developed areas occupy a large portion (59%) of the watershed. Developed uses (including residential, commercial, and transportation uses) occupy approximately 26%, wetlands and other surface waters occupy 3%, and other land uses, including barren land and quarries, combine to occupy 8%.

Assessment Unit Facts (RI0007027R-02)

- **Town:** North Kingstown
- **Impaired Segment Length:** 3 miles
- **Classification:** Class B
- **Direct Watershed:** 3.1 mi² (1968 acres)
- **Impervious Cover:** 10%
- **Watershed Planning Area:** West Passage (#22)



Watershed Land Uses

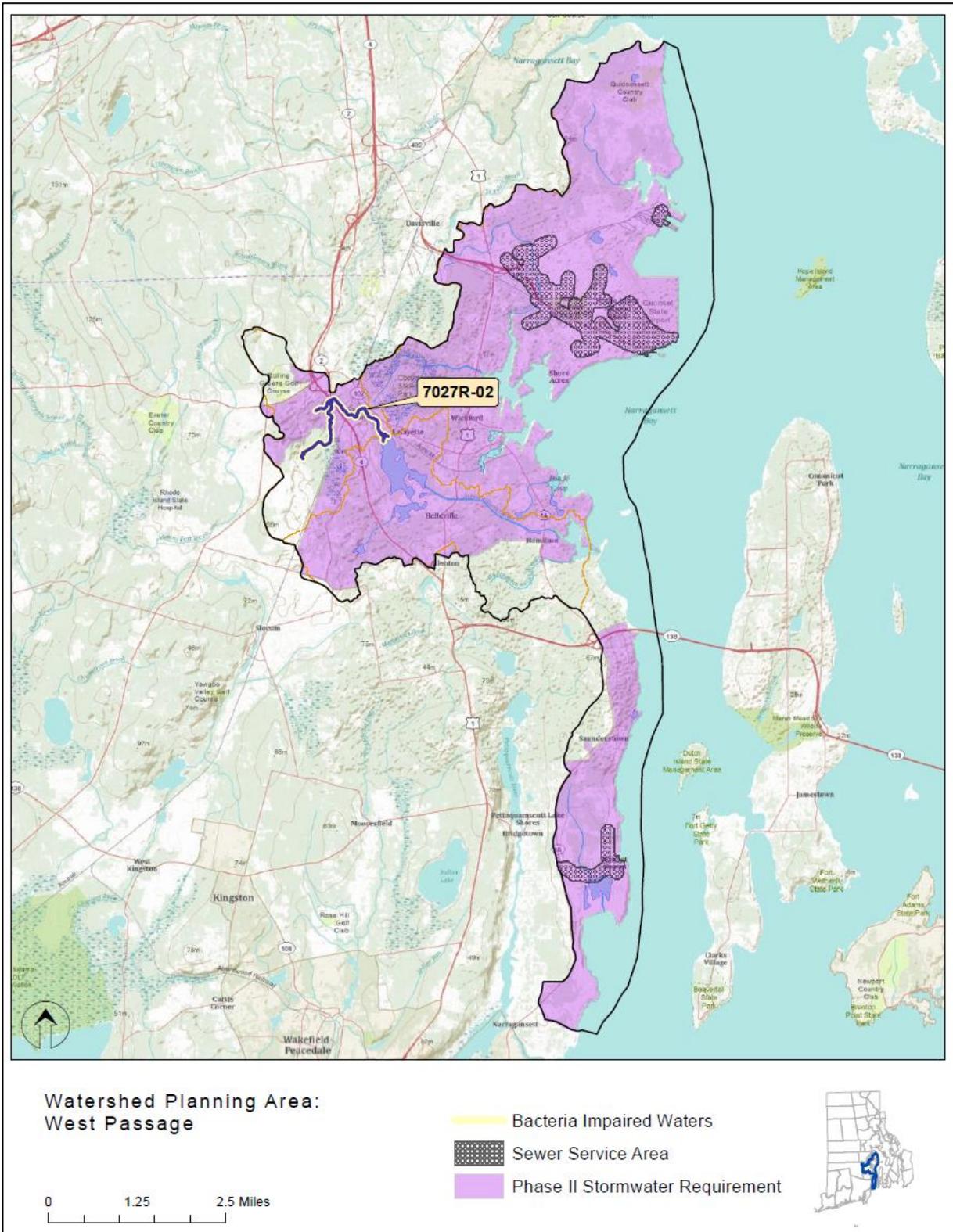


Figure 1: Map of the West Passage Watershed Planning Area with the impaired segment addressed by the Statewide Bacteria TMDL, sewered areas, and stormwater regulated zones.

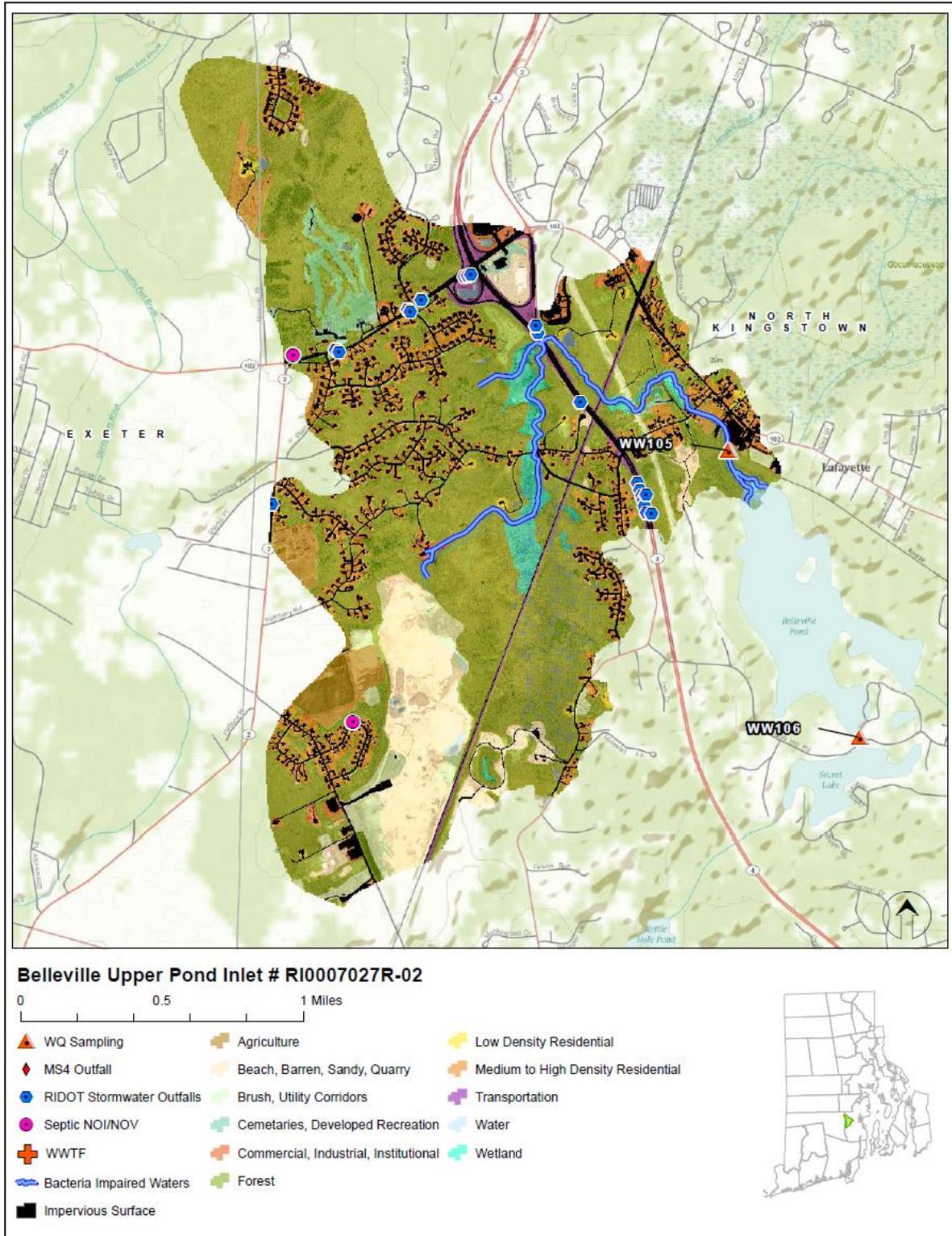


Figure 2: Map of the Belleville Upper Pond Inlet watershed with the impaired segment, sampling locations, and land cover indicated.

Why is a TMDL Needed?

Belleville Upper Pond Inlet 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 2006-2008, water samples were collected from two sampling locations (WW105 and WW106) 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. At station WW105, the geometric mean exceeded Rhode Island's water quality criteria for enterococci in 2007 and 2008. The geometric mean at station WW106 was consistently below Rhode Island's water quality standards for enterococci.

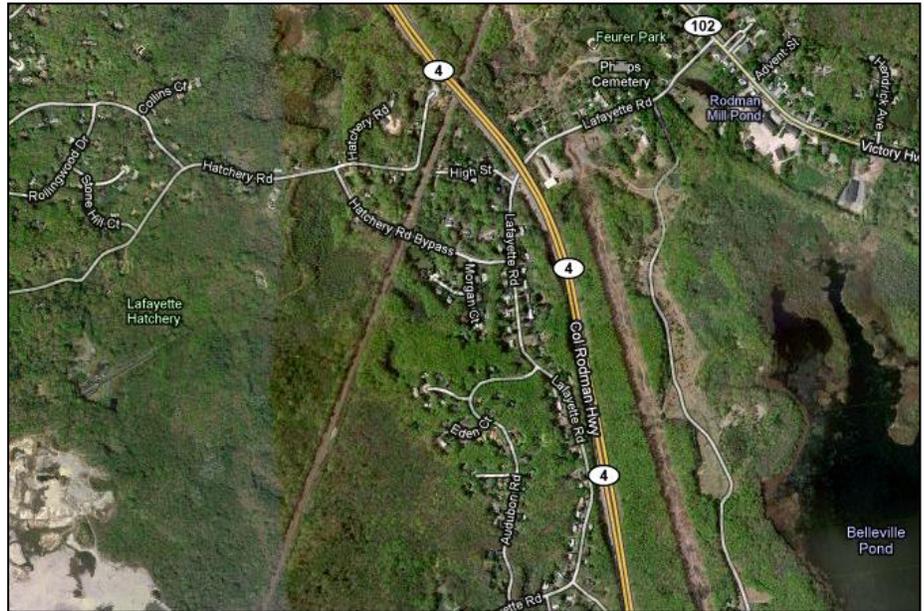


Figure 3: Partial aerial view of the Belleville Upper Pond Inlet watershed. (Source: Google Maps)

To aid in identifying possible bacteria sources, the geometric mean was also calculated for each station for wet-weather and dry-weather sample days, where appropriate. Only the wet-weather geometric mean value for station WW105 exceeded the water quality criteria for enterococci, suggesting bacterial contamination near this station may be attributed to wet-weather sources such as stormwater runoff.

Due to the elevated bacteria measurements presented in Table 1, Belleville Upper Pond Inlet 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. The goal is for all waterbodies to comply with state water quality standards.

Belleville Upper Pond Inlet has also been assessed by RIDEM as not meeting water quality standards for total phosphorus. The inlet was included in the 2010 Total Maximum Daily Load to address the Phosphorus Impairment to Belleville Ponds and Belleville Upper Pond Inlet (RIDEM, 2010a).

Potential Bacteria Sources

There are several potential sources of bacteria in the Belleville Upper Pond Inlet watershed including stormwater runoff from developed areas, malfunctioning septic systems, and wildlife and domestic animal waste.

Lafayette Trout Hatchery

The Lafayette Trout Hatchery, a state facility, is the only non-stormwater point source within the Belleville Upper Pond Inlet watershed. The facility pumps groundwater for flow-through hatchery operations. Hatchery waters are then discharged into Hatchery Brook (a/k/a Goose Nest Brook), which forms the Belleville Upper Pond Inlet. The mean daily flow from the facility, during the period of September 2006 to June 2009, was 1.82 MGD. This hatchery discharge flow comprises the vast majority of flow to the headwaters of the Belleville Upper Pond Inlet. The Belleville Upper Pond Inlet discharges into the upper basin of Belleville Ponds approximately 3 km downstream of the Lafayette Trout Hatchery. The RIDEM RIPDES (Rhode Island Pollutant Discharge Elimination System) program has issued a permit regulating the hatchery's effluent (RIPDES permit RI0110035). The hatchery's RIPDES permit requires that the hatchery discharge be sampled for total phosphorus and several other pollutants (RIDEM, 2010a). Since the activities conducted at the hatchery (e.g., the farming of trout to stock Rhode Island ponds and rivers) are not reasonably believed to contribute enterococci bacteria to its discharge, the hatchery does not have bacteria sampling requirements and will not be further considered as a source at this time.

Developed Area Stormwater Runoff

The Belleville Upper Pond Inlet watershed has an impervious cover of 10.2%. 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. 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 affected by urban stormwater runoff.

The Town of North Kingstown has identified and mapped 452 stormwater outfalls and their receiving waterbodies (VHB, 2004). The town is continuing to update the map and identify other outfalls. As shown in Figure 2, the Rhode Island Department of Transportation (RIDOT) has also identified multiple stormwater outfalls in the watershed. Three areas of concentrated surface flow associated with highway and residential runoff have also been identified on Hatchery Road at the Belleville Upper Pond Inlet Bridge (RIDEM, 2010a).

Waterfowl, Wildlife, and Domestic Animal Waste

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 Belleville Upper Pond Inlet watershed is predominately non-developed. A large wetland area adjacent to Route 4 is home to multiple species of wildlife and waterfowl that may contribute bacteria through their waste directly to the river. Canada geese have been observed congregating at a small impoundment to the east of Lafayette Road. Grassed areas on both sides of the impoundment offer easy access to the water at this location (RIDEM, 2010a). The western portion of the watershed is characterized by residential development. Waste from domestic animals such as dogs, may also be contributing to bacteria concentrations in Belleville Upper Pond Inlet.

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 northeast corner of the Town, located near the Quonset Point/Davisville Industrial Park, is sewered and discharges to a wastewater treatment facility operated by the Quonset Development Corporation that discharges the treated wastewater directly to Narragansett Bay. RIDEM has identified 730 cesspools throughout North Kingstown that are impacted by the cesspool phaseout law. The cesspool phase-out law is described in Section 6.7 of the Core TMDL Document. The Belleville Upper Pond Inlet watershed relies exclusively on OWTS (Town of North Kingstown, 2000). Failing OWTS can be significant sources of bacteria by allowing improperly treated waste to reach surface waters (RI HEALTH, 2003). Many areas in the town of North Kingstown 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).

Failing or inadequate OWTS have previously been identified as potential sources of bacteria to the Belleville Pond system (Town of North Kingstown, 2000). Two Notices of Violation/Notices of Intent to Violate have been issued by the RIDEM Office of Compliance and Inspection in the Belleville Upper Pond Inlet watershed (Figure 2).

Existing Local Management and Recommended Next Steps

Drinking water for 94% of the residents in North Kingstown comes from ten groundwater wells in three groundwater aquifers. Residents in the Belleville Upper Pond Inlet watershed rely on water from the Annaquatucket Aquifer. Any contamination of groundwater threatens the town's public drinking water

supply. As such, the town has a successful groundwater protection program that includes groundwater zoning, land acquisition, and groundwater education for residents (RI HEALTH, 2003).

Additional bacteria data collection may be beneficial to support identification of sources of potentially harmful bacteria in the Belleville Upper Pond Inlet 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.

Stormwater Management

The Town of North Kingstown (RIPDES permit RIR040028) and RIDOT (RIPDES permit RIR040036) are MS4 operators in the Belleville Upper Pond Inlet watershed, and both have prepared Phase II Stormwater Management Plans (SWMPP). The majority of the watershed, including the area surrounding the Belleville Upper Pond Inlet, is regulated under the Phase II program. North Kingstown's SWMPP outlines goals for the reduction of stormwater runoff to the Belleville Upper Pond Inlet 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 ordinances, and conducting public education activities (RIDEM, 2010b).

In 2006, the Town of North Kingstown adopted an illicit discharge detection and elimination ordinance (RIDEM, 2010b). This ordinance prohibits illicit discharges to the MS4 and provides an enforcement mechanism. It is recommended that any stormwater outfalls discharging in the near the WW105 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 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. Storm Water Pollution Prevention Plans (SWPPP) 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 Belleville Upper Pond Inlet, future efforts are needed to restore the river's water quality. As mentioned previously, the Belleville Upper Pond Inlet watershed has an impervious cover of 10.2%, a level where stormwater impacts are expected. At this threshold, RIDEM is requiring MS4 operators to revise their post-construction 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 impairments in the regulated areas. Changes to SWMPPs should be documented in a TMDL Implementation Plan (TMDL IP) and should comply with the relevant provisions Part IV.D of the RIPDES Stormwater General Permit (RIDEM, 2010b), which are summarized in Section 6.2 (Numbers 1-5) of the TMDL Core Document. Further detail is also included in Sections 6.3 of the core document.

In addition, the Belleville Pond Total Phosphorus TMDL found that structural BMPs are necessary to improve water quality. RIDEM identified five priority outfalls in Table 4.1 of the Total Phosphorus TMDL document. The outfall at Beacon Drive appears to be owned by the Town of North Kingstown, while the remaining outfalls, located at the intersection of Routes 2 and 102, appear to be owned by RIDOT. The BMPs should be designed to target bacterial pollution reduction as well as phosphorus reductions. Where system interconnections between two MS4s occur, regardless of ownership of the priority outfall, each MS4 (North Kingstown and RIDOT) is responsible for stormwater discharges emanating from their stormwater collection system. One TMDL IP may be submitted to address both bacteria and phosphorus TMDL requirements.

The Town of North Kingstown should continue to implement the goals of its Phase II Stormwater Management Plan (2004) 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 Stormwater Plan.

Waterfowl, Wildlife, and Domestic Animal Waste

Stormwater Phase II requirements include an educational program to inform the public about the impact of stormwater. North Kingstown's 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. North Kingstown should work with volunteers from the town to map locations where animal waste is a significant and a 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 take several measures to minimize waterfowl-related impacts. The River'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 Belleville Upper Pond Inlet 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 Belleville Upper Pond Inlet and can harm human health and the environment.

Onsite Wastewater Management

All residents of the Belleville Upper Pond Inlet 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 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. 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 continue its exemplary approach of tracking the maintenance history of all OWTS, and enforcing its inspection and pump-out ordinance. The town should also continue to provide funds to residents through CSSLP.

Land Use Protection

Woodland and wetland areas within the Belleville Upper Pond Inlet watershed, such as the large wetland area near Route 4, 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 Belleville Upper Pond Inlet 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 Belleville Upper Pond Inlet 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 Belleville Upper Pond Inlet.

Table 1: Belleville Upper Pond Inlet Bacteria Data

Waterbody ID: RI0007027R-02

Watershed Planning Area: 22 – West Passage

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: 53% (Includes 5% Margin of Safety)

Data: 2006-2008 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Belleville Upper Pond Inlet (2006-2008) with Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
WW105	Belleville Upper Pond Inlet at RR Xing	10/23/2008	8	Dry	96
WW105	Belleville Upper Pond Inlet at RR Xing	9/19/2008	127	Dry	
WW105	Belleville Upper Pond Inlet at RR Xing	8/14/2008	52	Wet	
WW105	Belleville Upper Pond Inlet at RR Xing	7/10/2008	602	Dry	
WW105	Belleville Upper Pond Inlet at RR Xing	6/5/2008	201	Wet	
WW105	Belleville Upper Pond Inlet at RR Xing	5/10/2008	130	Wet	
WW105	Belleville Upper Pond Inlet at RR Xing	10/18/2007	15	Dry	104 [†] (53%)*
WW105	Belleville Upper Pond Inlet at RR Xing	9/13/2007	355	Wet	
WW105	Belleville Upper Pond Inlet at RR Xing	8/18/2007	99	Dry	
WW105	Belleville Upper Pond Inlet at RR Xing	7/19/2007	1300	Wet	
WW105	Belleville Upper Pond Inlet at RR Xing	5/10/2007	18	Dry	
WW105	Belleville Upper Pond Inlet at RR Xing	10/27/2006	6	Dry	48
WW105	Belleville Upper Pond Inlet at RR Xing	9/29/2006	2420	Wet	
WW105	Belleville Upper Pond Inlet at RR Xing	8/25/2006	17	Wet	
WW105	Belleville Upper Pond Inlet at RR Xing	7/27/2006	55	Dry	
WW105	Belleville Upper Pond Inlet at RR Xing	5/17/2006	19	Wet	
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	10/23/2008	1	Dry	9
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	9/19/2008	17	Dry	
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	8/14/2008	5	Wet	
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	7/10/2008	46	Dry	
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	6/5/2008	15	Wet	
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	5/10/2008	10	Wet	

Single Sample Enterococci (colonies/100 mL) Results for Belleville Upper Pond Inlet (2006-2008) with Geometric Mean Statistics (continued)

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	10/18/2007	5	Dry	9
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	9/13/2007	8	Wet	
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	8/18/2007	16	Dry	
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	7/19/2007	37	Wet	
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	5/10/2007	3	Dry	
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	10/27/2006	9	Dry	15
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	9/29/2006	42	Wet	
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	8/25/2006	4	Wet	
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	7/27/2006	8	Dry	
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	5/17/2006	57	Wet	
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 each Station

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
WW105	Belleville Upper Pond Inlet at RR Xing	2006-2008	8	8	79	162	39
WW106	Bville Lwr Pnd Out at Sluiceway/UPI	2006-2008	8	8	11	15	8
Shaded cells indicate an exceedance of water quality criteria							
Weather condition determined from rain gage at URI in Kingston, RI							

References

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