



# Jamestown Brook

## Watershed Description

This **TMDL** applies to the Jamestown Brook assessment unit (RI0007036R-01), a 1.4-mile long stream located in Jamestown, RI (Figure 1). The Town of Jamestown is located on Conanicut Island in Narragansett Bay. As shown in Figure 1, Jamestown Brook is situated near the center of the Island.

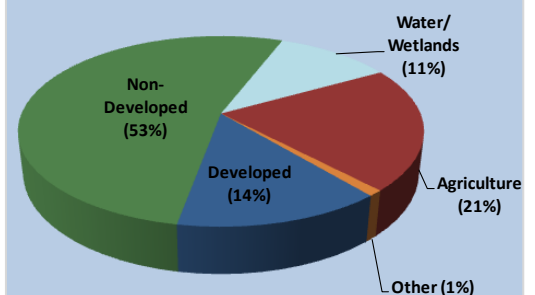
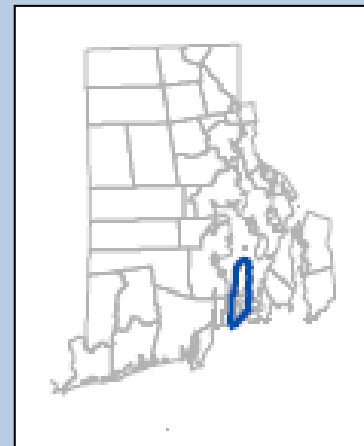
The Jamestown Brook watershed is presented in Figure 2 with land use types indicated. The watershed occupies 1.1 square miles and approximately 11% of the Town of Jamestown. The brook originates at the Jamestown Reservoir (aka North Pond) Reservoir and flows southwesterly, through Watson Pond (aka South Pond) Reservoir and on to Narragansett Bay. Land uses in the watershed are 53% forest, 21% agriculture, 14% developed (residential, commercial, and transportation), 11% water and wetlands, and 1% other.

The Jamestown Brook watershed reservoirs are source waters for Jamestown's drinking water supply. As an island ecosystem, Jamestown depends on a limited fresh water supply and must carefully protect its drinking water supply (RI HEALTH, 2003). RIDEM has identified the reservoirs as Special Resource Protection Waters (SRPW), providing them with special protections under RIDEM's Antidegradation Provisions (Fuss & O'Neill, 2004). SRPWs are high quality surface waters that have been identified as having significant ecological or recreational uses and/or are public water supplies.

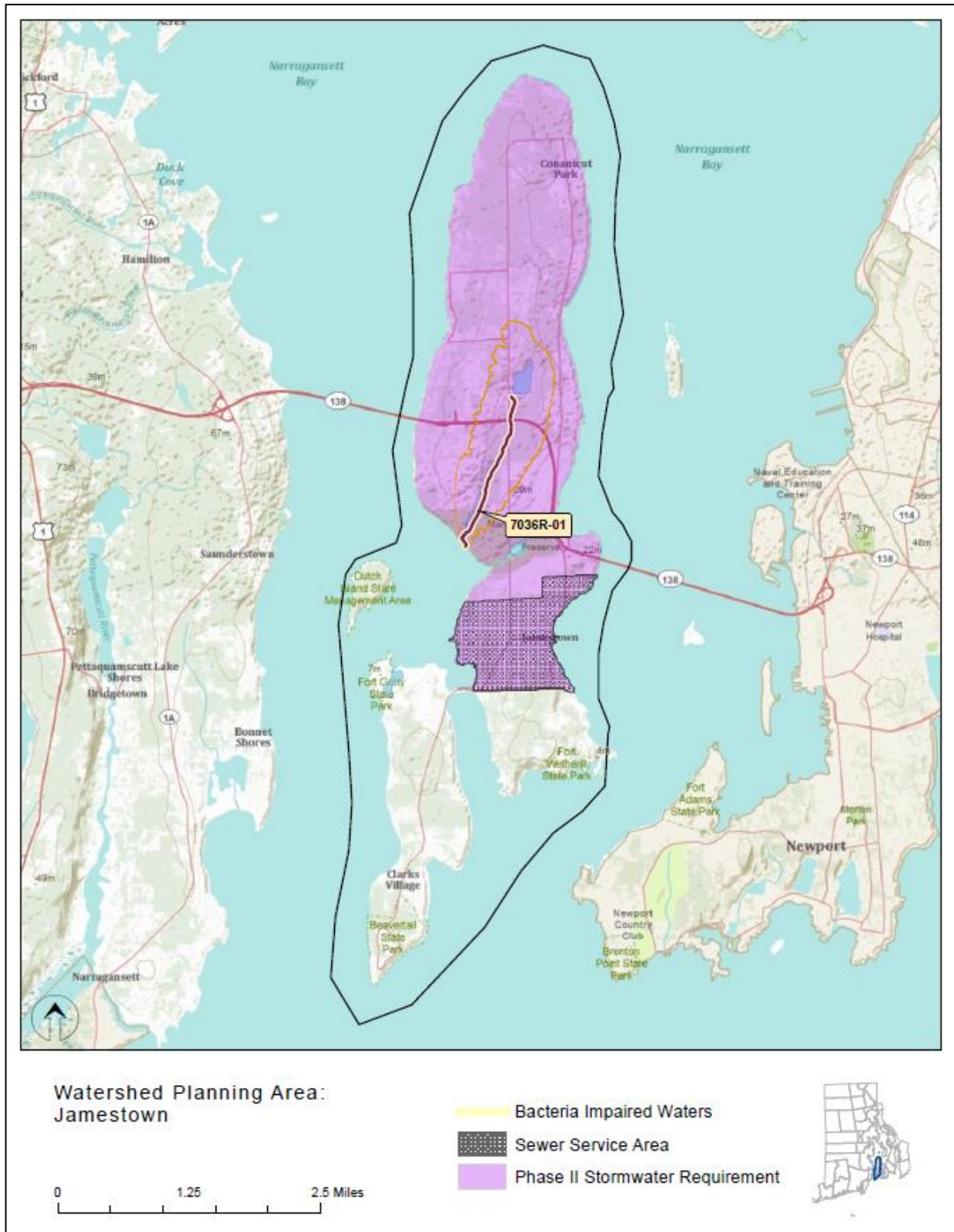
The Jamestown Brook watershed has an impervious cover of 5%. Impervious cover is defined as land surface areas, such as roofs and roads that force water to run off land surfaces, rather than infiltrating into the soil. Impervious cover provides a useful metric for the potential for adverse stormwater impacts.

## Assessment Unit Facts *(RI0007036R-01)*

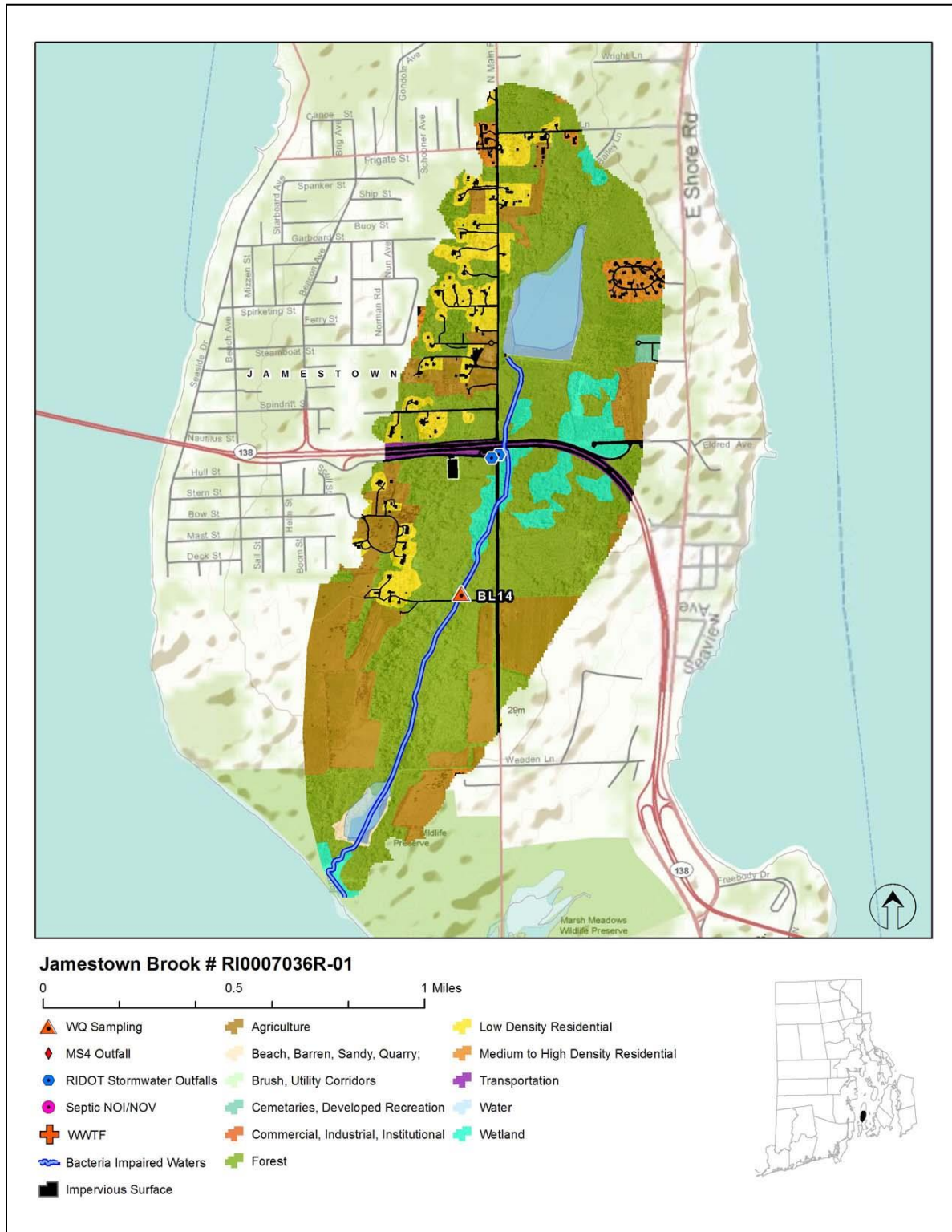
- **Town:** Jamestown
- **Impaired Segment Length:** 1.4 miles
- **Classification:** Class AA
- **Direct Watershed:** 1.1mi<sup>2</sup> (711 acres)
- **Impervious Cover:** 5%
- **Watershed Planning Area:** Jamestown (#7)



**Watershed Land Uses**



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



**Figure 2: Map of Jamestown Brook watershed with impaired segment, sampling station, and land cover indicated.**



### Why is a TMDL Needed?

Jamestown Brook is a Class AA freshwater stream and is a tributary within the Jamestown public drinking water supply system. However, as it is not a terminal reservoir, its applicable designated uses are primary and secondary contact recreation (RIDEM, 2009). During 2000-2003, water samples were collected from sampling location BL14 and analyzed for the indicator bacteria, fecal coliform. The water quality criteria for fecal coliform, along with bacteria sampling results from the 2000-2003 study and associated statistics are presented in Table 1. Throughout the study, the 90<sup>th</sup> percentile statistical metric for these data exceeded the water quality criteria value.

To aid in identifying possible bacteria sources, the geometric mean and 90<sup>th</sup> percentile values were also calculated for wet-weather and dry-weather sample days, where appropriate. The dry-weather geometric mean and 90<sup>th</sup> percentile values did not exceed the water quality criteria for fecal coliform. However, wet-weather values did suggest a potential wet-weather source.

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

Jamestown Brook has also been assessed by RIDEM as not meeting water quality standards for biodiversity, lead, iron, and copper. To date, TMDLs for these impairments have not been completed.



*Figure 3: Partial aerial view of Jamestown Brook watershed (Source: Bing Maps)*

## Potential Bacteria Sources

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

### Onsite Wastewater Treatment Systems

Previous investigations have concluded that failing onsite wastewater treatment systems (OWTS), such as septic systems and cesspools, are potentially important sources of bacteria to Jamestown Brook (RI HEALTH, 2003; Fuss & O'Neill, 2004). Seventy-four percent of Jamestown residents rely on OWTS and no expansion of the existing town sewer service is planned (Siegmund & Associates, 2003). As a result, new development will likely rely on septic systems.

Failing OWTS have been identified as potential threats to the water resources of the Town of Jamestown. In 2001, Jamestown developed a Wastewater Management Program to conduct mandatory inspections of all 1,724 septic systems on the Island (Jamestown, 2003) with initial inspections occurring between 2003 and 2006. This ambitious program, managed and enforced by the Department of Public Works requires citizens to have their OWTS inspected by properly trained wastewater professionals. These inspections include an initial inspection and routine maintenance inspections every three to five years. As of 2006, 94% of the septic systems on the island had received an initial inspection. Of those, 93% passed, 2% failed, and 5% were determined to be substandard systems (cesspools and steel tanks) (Town of Jamestown, 2009).

### Agricultural Activities

There are multiple agricultural operations located within the Jamestown Brook watershed, particularly in the southern portion of the watershed. Agricultural operations are an important economic activity and landscape feature in many areas of the state. However, agricultural runoff may contain pollutants, including bacteria. Agricultural practices such as allowing livestock to graze near streams, crossing livestock through waterbodies, spreading manure as fertilizer, and improper disposal of manure can contribute to bacterial contamination.

### Waterfowl, Wildlife, and Domestic Animal Waste

Most of the Jamestown Brook watershed is undeveloped. 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.

Residential development is concentrated in the northwestern portion of the watershed. Waste from domestic animals, such as dogs, in these residential neighborhoods may also be contributing to bacteria concentrations in Jamestown Brook.

### Developed Area Stormwater Runoff

Approximately 14% of the Jamestown Brook watershed is developed and most of the development is concentrated in the northwestern portion of the watershed. The Jamestown Brook watershed has an impervious cover of 5%. 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 the Jamestown 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 may be beneficial to support identification of sources of potentially harmful bacteria in the Jamestown 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 and stormwater runoff, and other source identification may also be beneficial.

Based on existing ordinances and previous investigations (RI HEALTH, 2003; Fuss & O'Neill, 2004), the following steps are recommended to support water quality goals.

### Onsite Wastewater Management

As mentioned previously, the Town of Jamestown has an active Wastewater Management Program that has implemented a mandatory inspection and maintenance program for all OWTS in the watershed. It is recommended that the town continue this program. As mentioned in Section 6.7 of the Core TMDL Document, the Rhode Island Cesspool Act of 2007 requires the replacement by January 1, 2013, of cesspools located within 200 feet of all shoreline features bordering tidal areas, within 200 feet of all public wells, and within 200 feet of a waterbody with an intake for a drinking water supply. In July of 2011, the Jamestown Town Council adopted amendments to its Onsite Wastewater Management

Ordinance. These amendments included a town-wide phase-out of cesspools and steel tank septic systems by January 1, 2016. In addition, Jamestown adopted a High Groundwater and Impervious Cover Overlay District Ordinance (Zoning Section 314) in 2003. Amended in 2007, this ordinance requires advanced treatment OWTS systems, stormwater infiltration and management practices, and enforces impervious coverage restrictions in the Jamestown Shores and Northern end of the Island. Also in 2003, Jamestown adopted an ordinance (Zoning Section 308) that requires a 150-foot buffer between an OWTS system and freshwater wetland.

To provide funding to residents that must replace OWTS identified as needing repair or replacement, the town should continue to participate in the Community Septic System Loan Program (CSSLP). To date, the Town of Jamestown has borrowed \$300,000 at a rate of 2% from this program.

### 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. These plans should 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 related to manure and fertilizer management are in place.

### Waterfowl, Wildlife, and Domestic Animal Waste

The Town of Jamestown should develop education and outreach programs to highlight the importance of picking up after dogs and other pets and not feeding waterfowl. Animal waste should be disposed of away from any waterway or stormwater system. Jamestown should work with volunteers to map locations where animal waste is a significant and a chronic problem. The town should also evaluate 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 town 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 Jamestown 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 the Ashaway River and can harm human health and the environment.

### Stormwater Management

The Town of Jamestown (RIPDES permit RIR040025) and the Rhode Island Department of Transportation (RIDOT, RIPDES permit RIR040036) are municipal separate storm sewer system (MS4) operators in the Jamestown Brook watershed and both have prepared the required Phase II Stormwater Management Plans (SWMPP). The entire watershed is regulated under the Phase II program.

Jamestown's SWMPP (2004) outlines goals for the reduction of stormwater runoff to Jamestown 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 and post-construction erosion and sediment control ordinances, and conducting public education activities (RIDEM, 2010). In 2006, Jamestown hired an Environmental Scientist and GIS Coordinator and began a focused implementation of its Phase II Stormwater Management Program.

In 2005, the Town of Jamestown adopted an illicit discharge detection and elimination ordinance. This ordinance prohibits illicit discharges to the MS4 and provides an enforcement mechanism. The town should develop a program to locate priority areas to identify and eliminate illicit discharges in the Jamestown Brook watershed. Illicit discharges can be identified through 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 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 Jamestown Brook, additional efforts are needed to restore the river's water quality. The Town of Jamestown and RIDOT should continue to implement the goals of their SWMPPs, including dry-weather sampling, extensive street and catch basin cleaning programs, and public education activities.



### Land Use Protection

Currently, the Jamestown Brook watershed is approximately 65% undeveloped (RI HEALTH, 2003). Protected area in the watershed includes a buffer around Jamestown Reservoir, as well as the majority of the watershed south and west of Route 138. As source waters to Jamestown's water supply, preserving these natural areas is particularly important. Woodland and wetland areas within the Jamestown Brook watershed absorb and filter pollutants from stormwater and agricultural runoff, and help protect both water quality in the stream and stream channel stability. It is important to preserve these undeveloped areas, and institute controls on development in the Jamestown Brook watershed (RI HEALTH, 2003).

Since 2003 the Town has made great efforts in preserving open space in Jamestown. In 2009 the Town of Jamestown in conjunction with several State, Private and Federal agencies, preserved the development rights to 150 acres of farmland, much of which is within the Town drinking water watershed. In addition, the Town purchased several key public water supply drinking water watershed parcels. The Town's goal is to purchase all parcels within this watershed. To date, the Town has protected over 95% of this watershed. The Town also purchased 100 *old filed record plat* lots in the Jamestown Shores area. These lots were purchased to prevent development and protect the groundwater quality of this fragile area. The Conanicut Island Land Trust has also assisted in preservation of more than 75 acres of land on the island in the last 10 years (Jamestown, 2011).

The steps outlined above will provide a reasonable start toward the goal of mitigating bacteria sources and meeting water quality standards in Jamestown Brook.

**Table 1: Jamestown Brook Bacteria Data**

**Waterbody ID:** RI0007036R-01

**Watershed Planning Area:** 7 - Jamestown

**Characteristics:** Freshwater, Class AA, Tributary within a Public Drinking Water Supply, Primary and Secondary Contact Recreation, Special Resource Protection Water (SRPW)

**Impairment:** Fecal Coliform (MPN/100mL)

**Water Quality Criteria for Fecal Coliform:**

Geometric Mean: 200 MPN/100 mL

90<sup>th</sup> Percentile Maximum: 400 MPN/100 mL

**Percent Reduction to meet TMDL: 23% (Includes 5% Margin of Safety)**

**Data:** 2000-2003 from RIDEM

**Single Sample Fecal Coliform (MPN/100 mL) Results for Jamestown Brook (2000-2003) with Geometric Mean and 90<sup>th</sup> Percentile Statistics at Station BL14**

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean	90th Percentile
BL14	Watson Farm Rd.	12/17/2003	58	Wet	37	485 <sup>†</sup> (23%)*
BL14	Watson Farm Rd.	9/10/2003	660	Dry		
BL14	Watson Farm Rd.	6/16/2003	70	Dry		
BL14	Watson Farm Rd.	3/16/2003	1	Dry		
BL14	Watson Farm Rd.	12/18/2002	7	Dry		
BL14	Watson Farm Rd.	7/31/2002	310	Dry		
BL14	Watson Farm Rd.	6/11/2002	160	Dry		
BL14	Watson Farm Rd.	3/22/2002	3	Dry		
BL14	Watson Farm Rd.	11/2/2001	18	Dry		
BL14	Watson Farm Rd.	7/27/2001	2100	Wet		
BL14	Watson Farm Rd.	6/20/2001	250	Dry		
BL14	Watson Farm Rd.	3/20/2001	1	Dry		
BL14	Watson Farm Rd.	12/19/2000	78	Wet		
BL14	Watson Farm Rd.	9/18/2000	130	Dry		
BL14	Watson Farm Rd.	5/31/2000	15	Dry		
BL14	Watson Farm Rd.	3/16/2000	3	Dry		

Shaded cells indicate an exceedance of water quality criteria

\* Includes 5% Margin of Safety

† 90th percentile used to calculate percent reduction to meet TMDL

**Wet and Dry Weather Geometric Mean Fecal Coliform Values for Station BL14**

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
BL14	Watson Farm Rd.	2000-2003	3	13	37	212	25

Shaded cells indicate an exceedance of water quality criteria  
 Weather condition determined from rain gage at Newport County Airport in Middletown, RI

**Wet and Dry Weather 90<sup>th</sup> Percentile Fecal Coliform Values for Station BL14**

Station Name	Station Location	Years Sampled	Number of Samples		90th Percentile Value		
			Wet	Dry	All	Wet	Dry
BL14	Watson Farm Rd.	2000-2003	3	13	485	1696	298

Shaded cells indicate an exceedance of water quality criteria  
 Weather condition determined from rain gage at Newport County Airport in Middletown, RI

### References

- Fuss & O'Neill (2004). Phase II Storm Water Management Plan, Town of Jamestown, Jamestown, RI. Fuss & O'Neill, Inc, Consulting Engineers, Manchester, CT. March 2004.
- Jamestown (2003). Onsite Wastewater Management Plan. 2003.
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- RIDEM (2009). State of Rhode Island and Providence Plantations Water Quality Regulations. Amended December, 2009. Rhode Island Department of Environmental Management.
- RIDEM (2008). State of Rhode Island and Providence Plantations 2008 303(d) List – List of Impaired Water Bodies. Rhode Island Department of Environmental Management.
- RI HEALTH (2003). Jamestown 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.
- Siegmund & Associates (2003). Facilities Plan Update, Wastewater Treatment & Collection System, Volume 1. Prepared for the Town of Jamestown by Siegmund & Associates, Inc, Providence, RI. March 2003.