Tiverton Mount Hope Bay Watershed Plan

May 2023

Mt. Hope Bay

Prepared by:
Office of Water Resources
RI Department of Environmental Management

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Tiverton Mount Hope Bay Watershed Plan

The Tiverton Mount Hope Bay watershed is a small watershed in northwestern Tiverton, Rhode Island and Southern Fall River, Massachusetts, the waters of which drain to Mount Hope Bay. The northern end of this watershed is in Fall River, MA, but for the purposes of this plan, the Tiverton, RI portion will be the applicable area. The area of Mount Hope Bay that this watershed drains to is designated by the Rhode Island Department of Environmental Management (RIDEM) as impaired. The purpose of this plan is to:

1) Identify actions that need to be taken to protect and restore water quality and aquatic habitat in the watershed; and
2) Fulfill requirements of the federal Nonpoint Source Program and thereby qualify the watershed as eligible for financial assistance for implementation activities via Clean Water Act Section 319 funds administered by RI.

This Plan assumes a basic understanding of water pollution and water resources management. Other resources are available to provide education and supporting information on pollution sources and aquatic habitat issues and management.

The water quality restoration plans (aka "TMDLs") that are referred to in Section II Water Quality should be referred to for more detailed information on water quality, sources of pollution, and implementation activities.

I. Watershed Description

The Tiverton Mount Hope Bay watershed is a subwatershed of the larger HUC 12 Mount Hope Bay Watershed. Most of the Tiverton Mount Hope Bay watershed is within the larger Mount Hope Bay Watershed, but due to the nature of the differences in delineation methods of the subwatershed, some areas fall outside of or do not include areas within the Mount Hope Bay Watershed (See Figure 1). This subwatershed data is derived from the "Sub-Basins of RI HUC12 Watershed Boundary" dataset, which was created in cooperation with the EPA to assist local communities in environmental planning. The data layer is at a finer scale than HUC 12 and has some discrepancies due to more spatial variability from included impervious surface data that can affect flow direction. For the purposes of this plan, further references to "the watershed" will refer only to the smaller Tiverton Mount Hope Bay Watershed.

Of the whole 3,762 acres of the watershed, 1,645 acres (44%) are in Rhode Island, and entirely within the town of Tiverton. The remaining area is in Fall River, Massachusetts. The majority of the watershed is north of the Sakonnet River Bridge and borders Mount Hope Bay. The much smaller part of the southern watershed that is south of the Sakonnet River Bridge, and generally North of the Stone Bridge Area, borders the northernmost section of the Sakonnet River.

The topography of the watershed consists of a gently rolling terrain that rises from the waterfront to low bluffs along the Sakonnet River and Mount Hope Bay. The highest elevation is in the eastern part of the watershed at Pocasset Hill, which is about 350 feet above sea level, and forms a part of a ridgeline that extends north to Fall River. Ledge formations near the surface in the watershed present a common constraint to development, including septic system functioning. The soils in the watershed are generally dense, slowly permeable till and are characterized by an underlying restrictive layer and high water tables.

Due to the size and topography of the watershed, there are limited surface waters and wetlands present within the watershed. There are a handful of small, unnamed streams that travel through residential neighborhoods and outlet into Mount Hope Bay.

Watershed Info:

- The Tiverton Mount Hope Bay watershed covers 3,762 acres, of which, 1,645 acres (44%) are in Tiverton Rhode Island. The remainder is in Fall River, MA.
- Land Cover in the RI Area of the Tiverton Mount Hope Bay watershed is 68% developed. See the table below and Figure 3.
- There are no cold-water fisheries in the watershed.
- There is one small area of known rare/endangered species habitat in the southern portion of the watershed (2021 RI Natural Heritage Data, RIDEM, TNC, RIGIS)
- There is one pond in the watershed (Creamer Pond), which is approximately 9 acres in area, dammed, and surrounded by residential properties.
- Public drinking water is distributed to all structures in the watershed three suppliers: the City of Fall River, Massachusetts, the Stone Bridge Fire District, and the North Tiverton Fire District (NTFD). Water received from the City of Fall River comes from the Wattupa Reservoir in Fall River, MA, and water received from the Stone Bridge Fire District comes from Stafford Pond in Tiverton, RI. Both sources are outside of the Tiverton Mount Hope Bay watershed. NTFD does not have its own water supply and purchases treated water from both the City of Fall River and the Stone Bridge Fire District.
- The southern end of the Tiverton Mount Hope Bay watershed is mainly served by onsite wastewater treatment systems (OWTS), but some sewer lines exist along the coastal area of the watershed that convey wastewater to the Fall River wastewater treatment facility. The Tiverton Wastewater District (TWWD), established in 2014, is responsible for managing the sewer system.[1]
- 15 acres (<1%) of the watershed is in conserved land (including agricultural easements) (see Figure 4).

Land Cover	**Area (Acres)**	**% of Watershed (RI Area)**
Developed- Residential	924.5	56%
Developed- Non-residential	193.3	12%
Agriculture	27	2%
Forest & Wetlands	422.9	26%
Open (Cemeteries, developed recreation areas, mixed barren areas, etc.)	65.1	4%
Water	11.8	1%
Impervious Surface	510	31%

*The Massachusetts portion of the watershed has a similar distribution of land use percentages and is similarly developed.

[1] At this time, the Mount Hope Bay Sewer Interceptor is owned by the Town of Tiverton but is expected to be transferred to the TWWD in the near future.

Figure 1. Watershed Boundaries

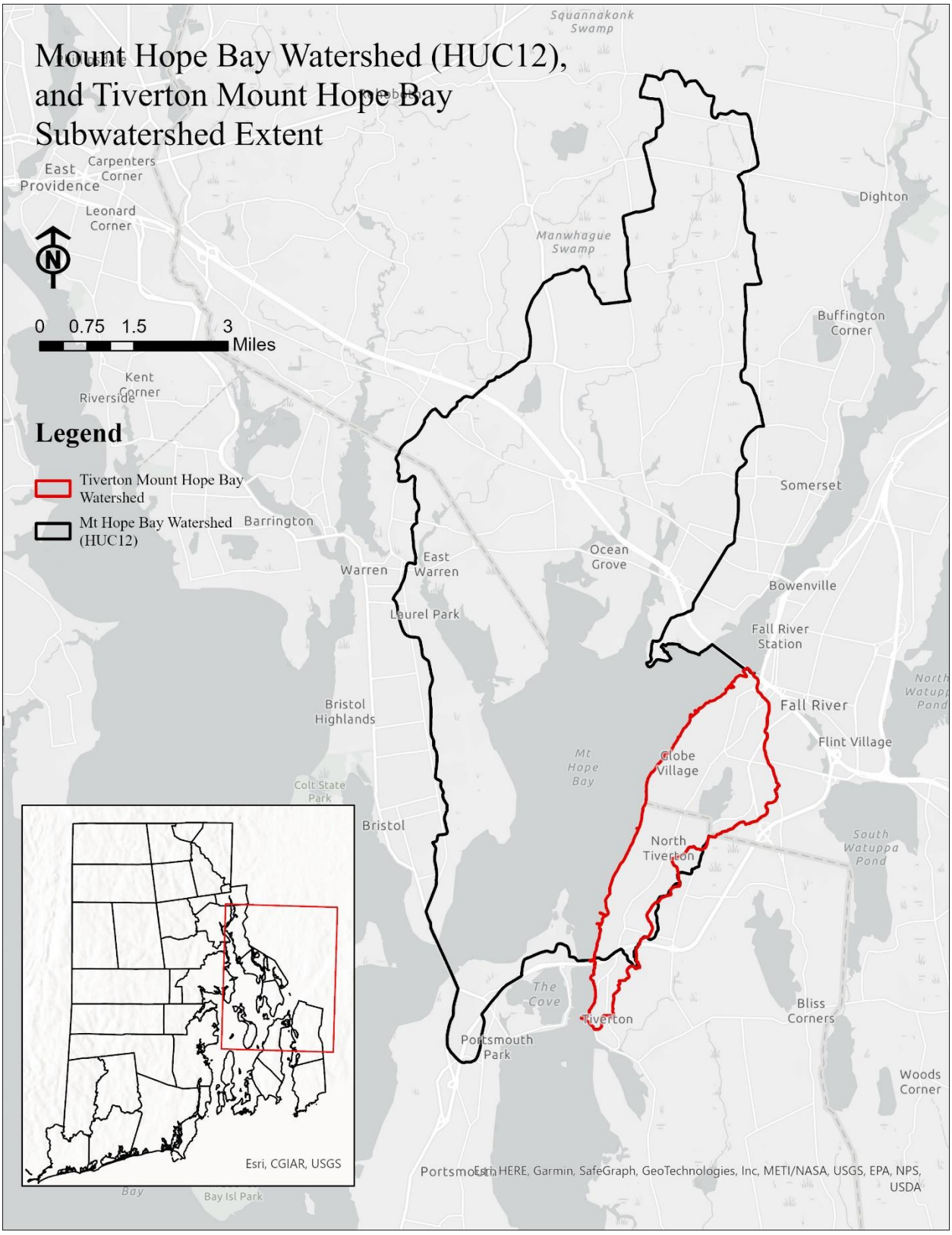


Figure 2. Surface Water Resources

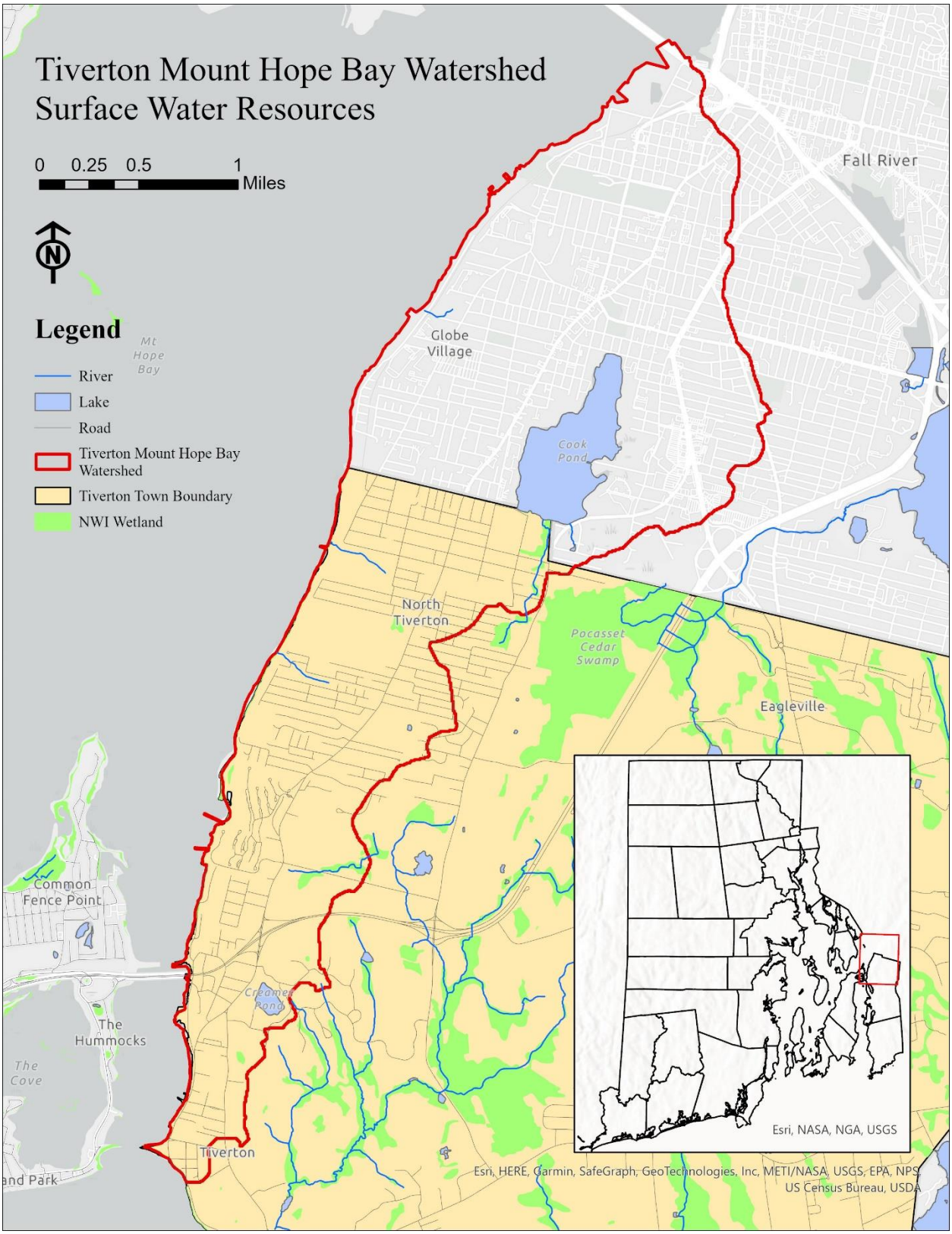


Figure 3. Land Cover

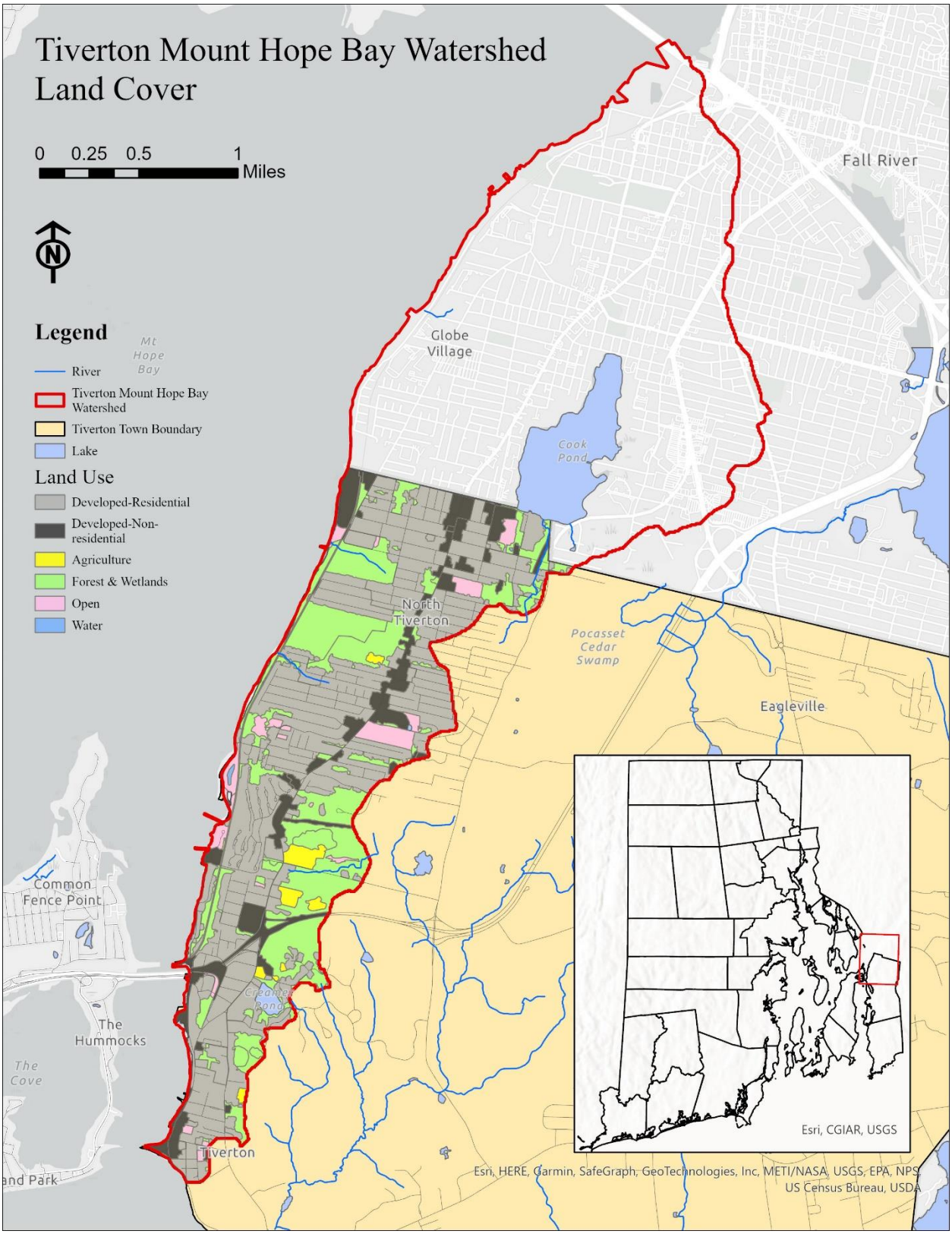
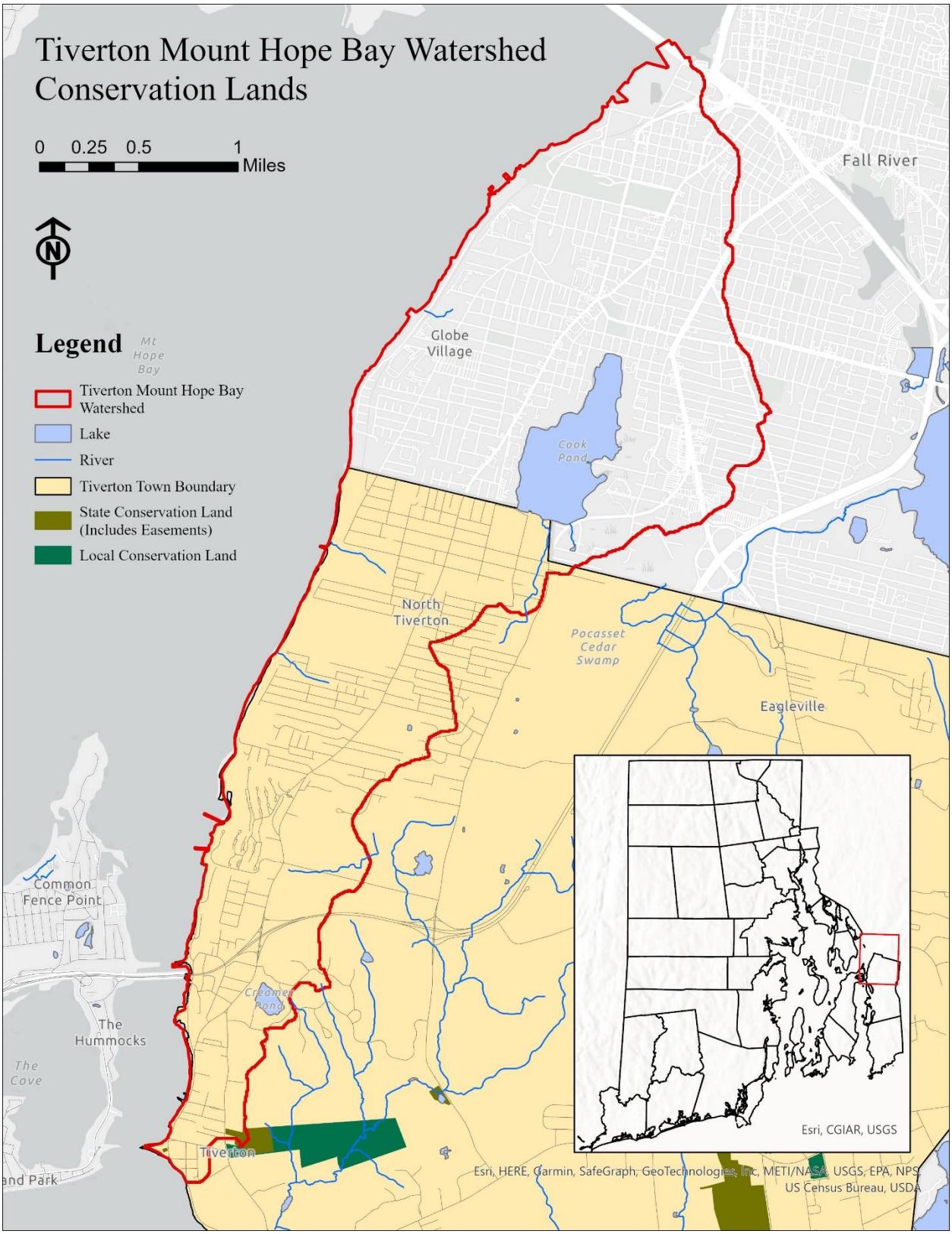


Figure 4. Conservation Lands



II. Water Quality

A.1 Surface Water

The RI Water Quality Rules specify the criteria each waterbody in the State shall meet based on its designated uses. When a waterbody does not support one (or more) of its designated uses (does not meet water quality criteria for that use), it is considered "impaired" for that use and the cause of the impairment is identified. There are no assessed freshwater waterbodies in the Tiverton Watershed, but the saltwater waterbody segment RI00077032E-01C (see Figure 6), within Mount Hope Bay, borders the entirety of the watershed along its coast. The Tiverton Mount Hope Bay watershed empties into this segment of Mount Hope Bay and is therefore pertinent to this waterbody segment. The assessment of this waterbody is shown in Table 1 below with its use classification, assessment status including causes of impairment when applicable. Waters not assessed are the result of gaps in available data.

The three uses assessed for water bodies in Rhode Island include: fish and wildlife habitat, fish consumption, and recreation. For saltwater bodies, "shellfish controlled relay and depuration" is included. Excess total nitrogen is considered an impairment to fish and wildlife habitat due to its ability to cause an overstimulation of growth of aquatic plants and algae, which can reduce dissolved oxygen present in a water body.

Table 1. Tiverton Mount Hope Bay watershed Use Assessment Status (Source: RIDEM Final Integrated Water Quality Monitoring and Assessment Reporting (March, 2022))

Mount Hope Bay RI0007032E-01C Class SB				
Use Description	Use Attainment Status	Cause of Impairment	TMDL Schedule	TMDL Approval
Fish and Wildlife Habitat	Not Supporting	Total Nitrogen	2029	None
		Dissolved Oxygen	2029	None
Fish Consumption	Insufficient Information			
Primary Contact Recreation	Not Supporting	Fecal Coliform Bacteria		1/14/2010
Secondary Contact Recreation	Not Supporting	Fecal Coliform Bacteria		1/14/2010
Shellfish Controlled Relay and Depuration	Fully Supporting			

A.2 Water Quality Restoration Plans

Once a waterbody is designated impaired it is then targeted for a water quality restoration plan, referred to as a TMDL (total maximum day load) report. The "Total Maximum Daily Load Study for Bacteria, Mount Hope Bay and the Kickemuit River Estuary" was completed in 2010 for the impaired waters targeting different parameters. As outlined in this TMDL, the load reductions required to meet water quality criteria are listed below.

The Tiverton Mount Hope Bay watershed empties to Mount Hope Bay, which has a prohibition on shellfish harvesting due to bacteria pollution, as per the 2022 RIDEM Notice of Polluted Shellfishing Grounds. This area is identified as Growing Area 17- Mount Hope Bay (GA17-2).

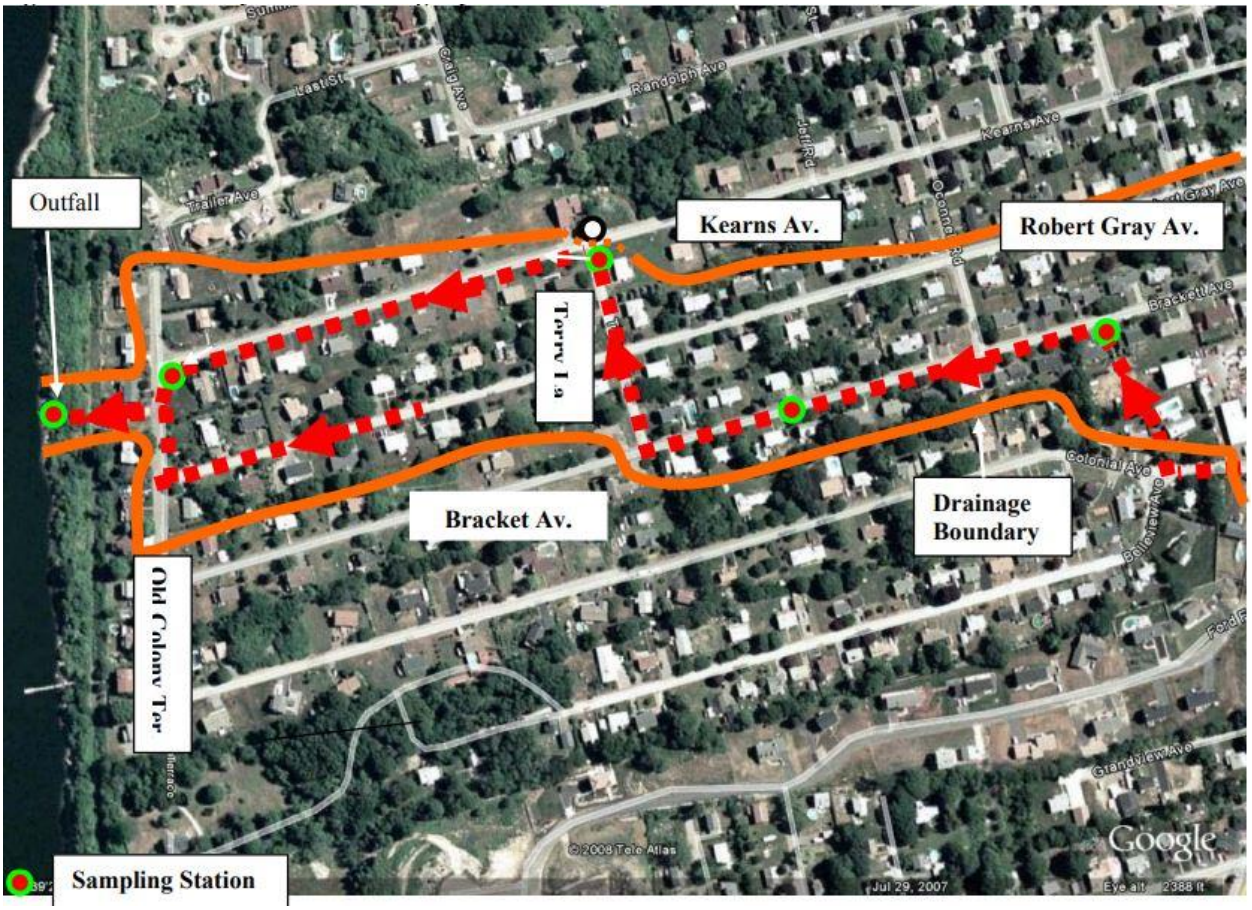
Table 2. Fecal Coliform TMDL expressed as percent reductions in bacterial loadings to meet concentration targets. (Source: RIDEM Total Maximum Daily Load Study for Bacteria, Mount Hope Bay and the Kickemuit River Estuary)

Waterbody Name/ Waterbody Segment ID	Class	Representative Shellfish Sampling Station	Geometric Mean Value (MPN)3	90th Percentile Value (MPN)3	Allowable Concentration (MPN) geometric mean/90th percentile value	Required Segment Reduction %
Mount Hope Bay RI0007032E-01C	SB	GA-17-3	23	108	14 / 49	82
		GA-17-7	16	210	14 / 49	
		GA17-8	10	89	14 / 49	
		GA17-9	12	17	14 / 49	
		GA17-10	6	48	14 / 49	

The TMDL identifies two locations within the watershed as "Prioritized Sources." Both are located in close proximity to one another and are between Robert Gray and Summerfield Lane, which is an area serviced by older individual septic systems, including cesspools. The soils and topography of the area also increases the likelihood of system failure. The Robert Gray Avenue outfall is a 24" culvert that discharges into Mount Hope Bay just north of the intersection of Robert Gray and Colony Terrace (See Figure 5). The pipe drains a dense residential area and shows high concentrations of fecal coliform and coliphage in both wet and dry weather and appears to indicate the presence of illicit tie ins and failing septic systems. There is a small stream at the Summerfield Lane location that drains into Mount Hope Bay. This stream is fed by another smaller stream that discharges from a 36" culvert upgradient and drains a dense residential area. Initial sampling of this location showed high levels of fecal coliform and coliphage, indicating the presence of failing septic systems. Follow-up investigations by DEM Office of Compliance and Inspections, even during wet weather have recorded low concentrations, and have since closed the file on the Summerfield Lane outfall. It should still be noted as an area of concern.

The lack of assessment data on freshwater surface waters in this watershed does not indicate that there is no risk of impairment. Given the conditions noted above, unnamed streams are considered vulnerable to pollution due to pathogens and excess nutrients. In addition, it is currently unknown whether the pond has similar impairments or experiences harmful algae blooms which are caused by cyanobacteria and are a management concern in many watersheds. Also known as blue-green algae, cyanobacteria occur naturally in many freshwater ecosystems. A combination of excess nutrients, sunlight, and high temperatures can lead to a rapid increase in cyanobacteria, called a "bloom." Blooms of cyanobacteria generally occur in late summer into the early fall when water temperatures are warmest, and an abundance of sunlight and nutrients are available. Some species of cyanobacteria can also produce toxins which are harmful to people and pets.

Figure 5. Robert Gray Ave Location



B. Groundwater

As shown in Figure 7, the groundwater in the watershed is entirely classified GA. Groundwater classified GA is to be protected in order to be suitable for drinking water without treatment, even in those areas where it is not currently consumed.

There is no available groundwater quality data, however, one of the primary reasons to be concerned about groundwater quality is the transport of pollutants from groundwater to surface waters as part of the stream baseflow. The groundwater resources in this watershed are associated with bedrock aquifers and overlaying till deposits.

Private and public wells do exist in the watershed. Aging underground oil tanks and failing septic systems are concerns for the quality of the groundwater, and the town has an ordinance requiring residents to locate and register underground storage tanks (USTs) and prohibits and unregistered USTs (Tiverton, Rhode Island - Code of Ordinances. Chapter 38, Article V, Sec. 38-163 & 164).

There is a known area of contaminated soil in the Bay Street neighborhood in the northwestern corner of the watershed. During the construction of the sewer interceptor line in the neighborhood in 2002, hazardous substances were discovered and later confirmed by an investigation and subsequent studies. This contaminated soil originated in the 1960s/70's from a local energy company. Some remediation work has occurred, but the area is not yet fully remediated or clear of contaminated soil.

Figure 6. Waterbody Segment

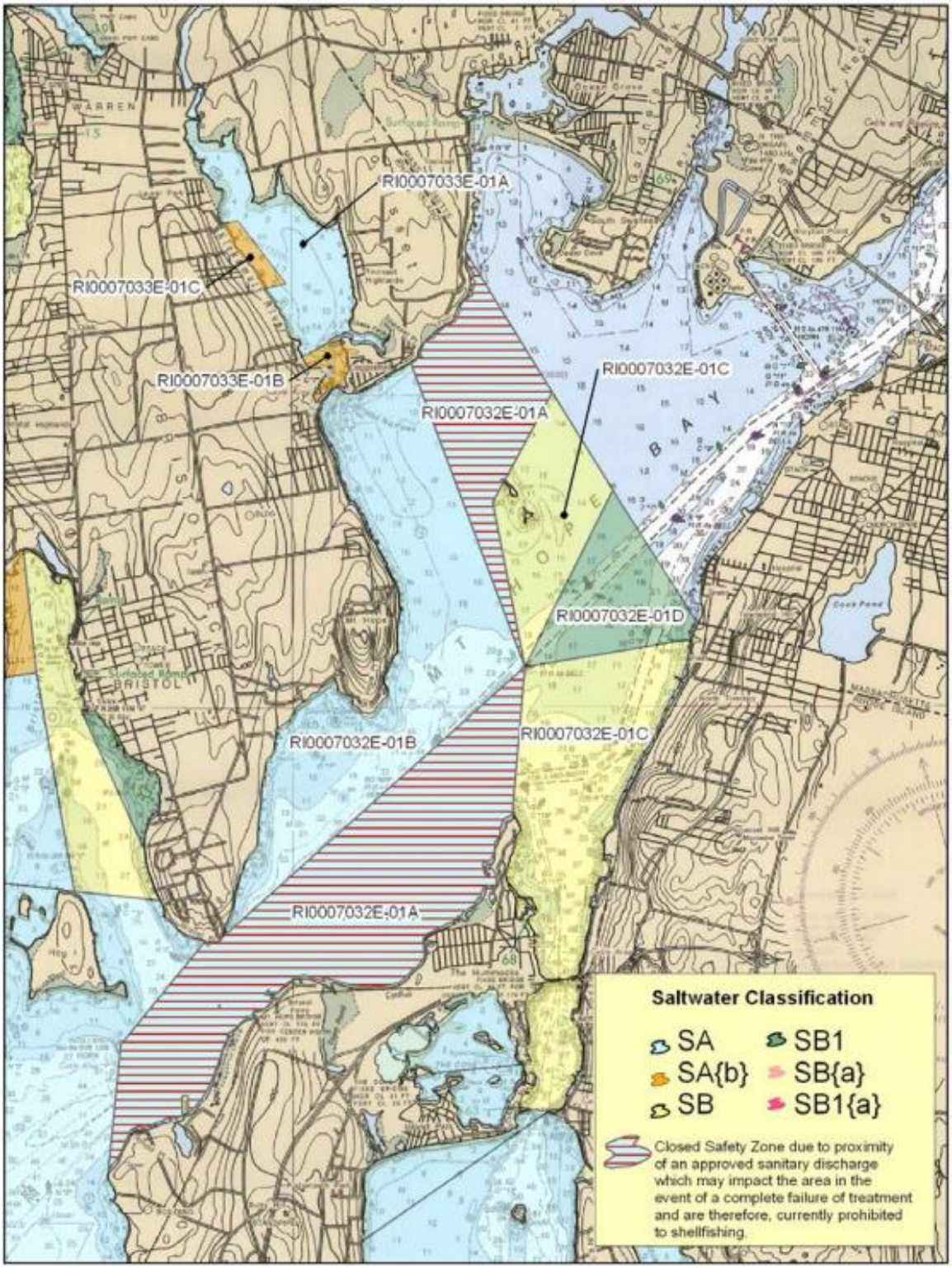
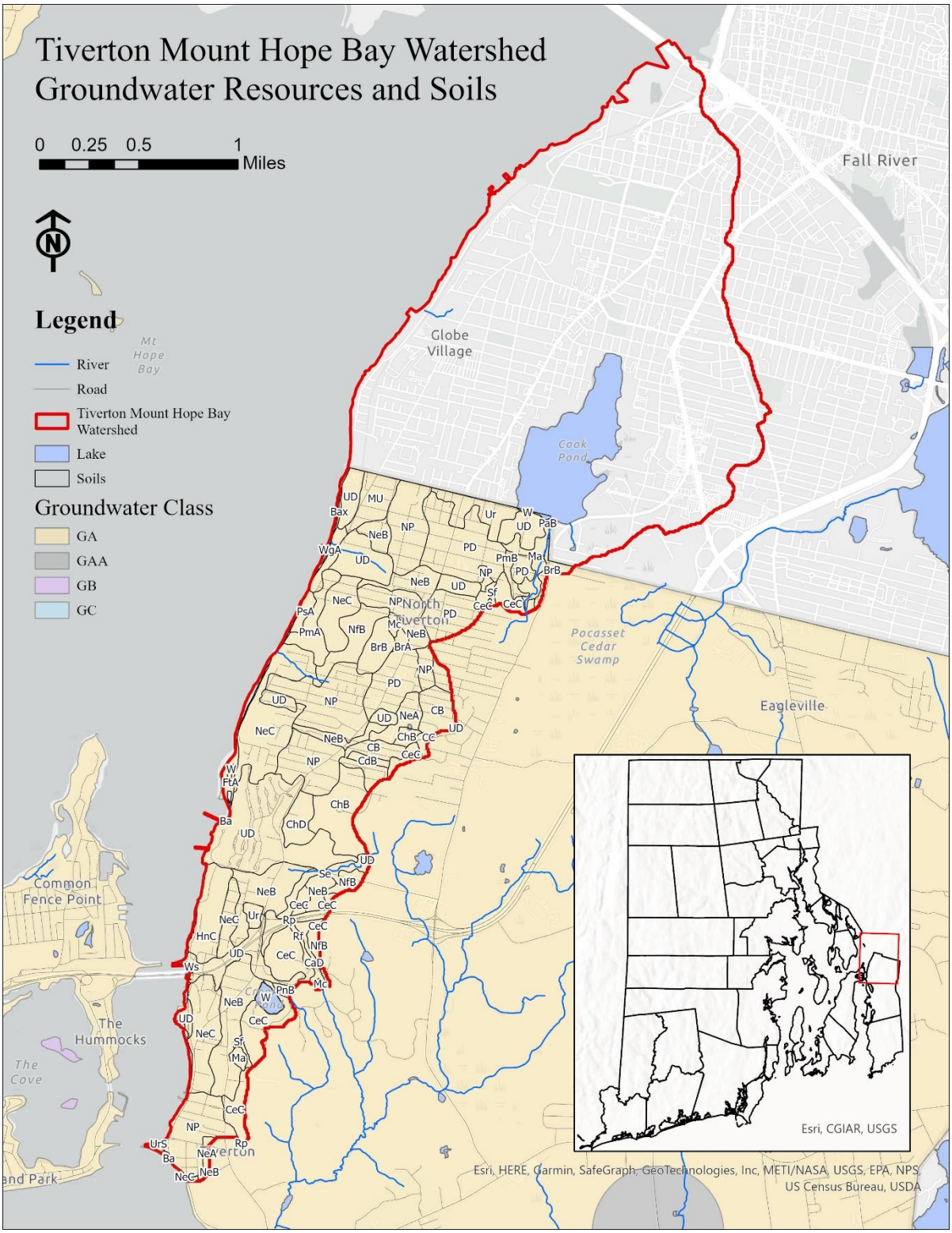


Figure 7. Groundwater Resources and Soils



The entirety of the watershed is classified as GA Groundwater Class. Additional soil descriptions and information can be found at the USDA-NRCS Web Soil Survey.

III. Pollution Sources

A. Stormwater

Stormwater is a major source of water quality degradation in the watershed. The pollutants typically washed off the ground and carried by stormwater come from all around us:

- Bacteria and other pathogens that may limit recreational use of waters from:
    - Pet waste left on the ground
    - Surface backup from failing septic systems and cesspools
    - Farm animals and wildlife (in particular, resident Canada geese)
- Nutrients (nitrogen and phosphorus) that can result in algal blooms (including toxic cyanobacteria) from:
    - Farm and lawn fertilization
    - Waste from pets, farm animals and wildlife
    - Surface backup from failing septic systems and cesspools
- Salt and sand from winter road safety maintenance;
- Runoff as a result of soil and sediment from construction sites, plowed farmland, and eroding areas can result in changes in aquatic habitat conditions, and other pollutants (such as metals) can be attached to and transported with the sediments;
- Petroleum products and metals from automobiles;
- Nitrogen, phosphorus, mercury, and other contaminants from the combustion of fossil fuels are deposited from the atmosphere directly into waterbodies or on the ground where they are transported in stormwater.

The degree to which stormwater impacts water quality in any particular watershed is a function of the amount of impervious cover and how that stormwater generated from the impervious cover is managed. The Tiverton Mount Hope Bay watershed is approximately 31% impervious surface, which is generally considered a high degree of landscape alteration. (See Figure 8). Typically, watersheds begin showing signs of degraded water quality and habitat with impervious cover as low as 10%.

The negative impacts of this impervious cover result from both the pollutant loadings transported by stormwater runoff and the physical changes that occur with increased volumes and velocities of runoff, e.g., eroded stream channels and reduced biodiversity of existing streams. Because water runs more rapidly off an impervious area, flooding also becomes both more common and more intense downstream. Meanwhile, because less water is soaking into the ground, water tables may be altered which may result in impacts to wetlands and streams, as well as reduced water table recharge. In brief, impervious surfaces may significantly change both the quality and quantity of runoff.

Proper design, siting, and installation of stormwater best management practices (BMPs) as property is developed or redeveloped are not enough to achieve water quality goals. Two additional challenges associated with stormwater management include:

- Proper maintenance of BMPs: Ensuring maintenance of the existing stormwater infrastructure is a critical and often-overlooked task; and
- Improving treatment of stormwater from existing developed lands. New development is required to meet certain stormwater management controls, but these typically do not apply to existing development. The responsibility for upgrading stormwater infrastructure in the watershed rests largely with the Town and the Rhode Island Department of Transportation (RIDOT).

Stormwater discharges are regulated under RIDEM Pollutant Discharge Elimination System Program (RIPDES) General Permit for Stormwater Discharge from Small Municipal Separate Storm Sewer Systems (MS4s). The Town of Tiverton and the Rhode Island Department of Transportation are MS4 operators in the Tiverton Mount Hope Bay watershed, and as such are responsible for preparing and implementing required Stormwater Management Program Plans (SWMPP). The Stormwater Management Program Plan describes the Best Management Practices (BMPs) for each of the following required six minimum measures, including goals and implementation schedules. The six minimum measures are:

1. Public Education and Outreach
2. Public Involvement/Participation
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post Construction Runoff Control
6. Pollution Prevention/Good Housekeeping

The Town of Tiverton submitted to DEM a revised Stormwater Management Program Plan on August 5, 2005. Recognizing the link between stormwater and OWTS management, the plan recommends that the town develop and maintain an Onsite Wastewater Management Plan (OWMP), consistent with the Wastewater Facilities Plan update. The OWMP is a standalone document that helps to develop short- and long-term goals for unsewered areas of the town. This plan was completed in February of 2003 but has not been updated since. It is recommended that update this plan to account for the requirements of the state Cesspool Act and the availability of new nitrogen-reducing systems. The SWMPP also recommends that the town "establish an OWM District where onsite wastewater treatment systems shall be properly operated, regularly inspection, and routinely maintained. See section B of the Tiverton Onsite Wastewater Plan for sources of funding for repair and replacement of failed septic systems.

As new stormwater permit requirements and regulations developed by RIDEM go into effect, the Town should update its ordinances and regulations accordingly.

Low Impact Development

Low impact development (LID) is a comprehensive approach to project design that minimizes the impacts of development or re-development on water quality and aquatic habitats by improving stormwater management. The goal of LID is to design a site so that water moves over and through the site similarly to how it would move under natural, pre-developed conditions. Stormwater treatment practices are placed throughout the site to decrease, infiltrate, manage and treat runoff as close to the point where it is generated as possible.

To assist in incorporating LID into community planning processes, RIDEM, University of RI (URI), and RIDOT have developed "LID Site Planning and Design Techniques: A Municipal Self-Assessment." (https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/benviron/water/permits/ripdes/stwater/t4guide/lid-checklist-primer.pdf) The self-assessment contains questions covering a variety of topics related to low impact development (LID). These topics range from conserving open space and minimizing land disturbance to reducing impervious surfaces and controlling soil erosion. Working through the assessment tool allows an in-depth review of the local regulations that shape development in the community and a comparison to LID benchmark techniques and practices. The intent is to identify which LID techniques are in place and which techniques could be improved or employed.

The town's 2018 Comprehensive Community Plan calls for the revision of applicable land use regulations to effectively comply with the RI Stormwater Manual's Minimum Standard 1: LID (Low Impact Development) Site Planning and Design Strategies.

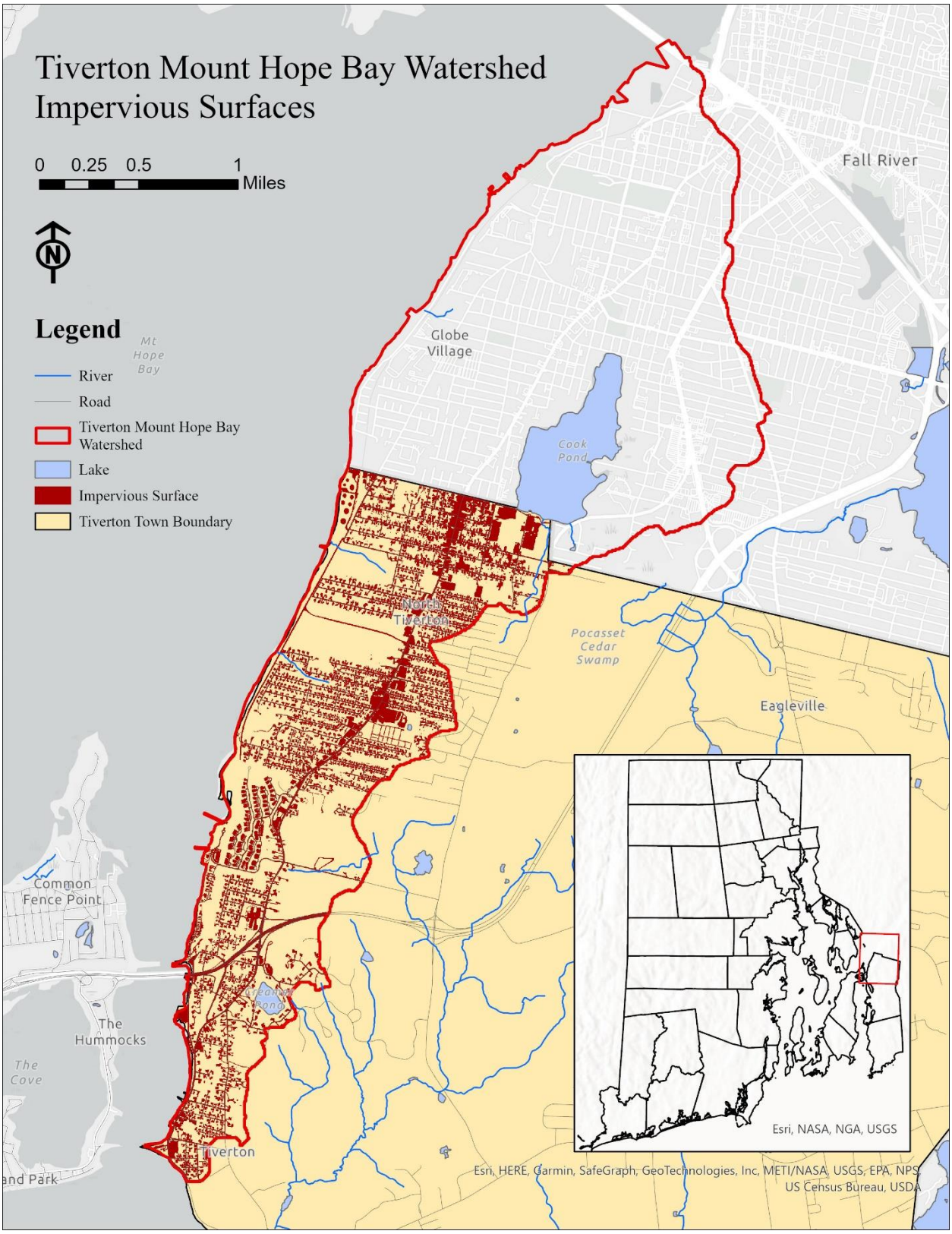
Sustainable Funding for Stormwater Management

One way for a community to address local funding shortfalls for stormwater management is to explore the feasibility of establishing a sustainable local funding source such as a stormwater enterprise or utility fund that will assess property owners a stormwater fee. A stormwater fee is based on the demand placed on the municipal stormwater system by each user, not on property's assessed value. It is therefore considered more equitable than other funding methods since users with a large burden on the stormwater system will pay their fair share. As with a water or sewer utility, a stormwater utility fee generates revenue based upon the amount of stormwater generated on a property and conveyed to a public stormwater system. These fees are assessed by measuring the amount of impervious cover within a parcel and are determined by the stormwater management financing needs of the municipality. They can be adjusted over time to continually meet those needs. A stormwater utility provides a means for: (cont.)

- Consolidating or coordinating responsibilities that were previously dispersed among several departments and divisions;
- Generating funding that is adequate, stable, equitable and dedicated solely to managing stormwater;
- Creating incentives for property owners to reduce the stormwater generated on their properties; and
- Developing stormwater management programs that are comprehensive, cohesive, and consistent year-to-year.

Creamer Pond, looking west from Tiverton.

Figure 8. Impervious Surfaces



B. Wastewater

Pollutants in wastewater from domestic, commercial, and industrial use include excess nutrients (nitrogen and phosphorus), pathogens (bacteria and viruses), pharmaceuticals, personal care products, chemical pollutants (including household hazardous materials), metals, and other contaminants of emerging concern.

The southern portion of the Tiverton Mount Hope Bay watershed is mainly served by onsite wastewater treatment systems (OWTS), but some sewer lines exist along the coastal area of the watershed. The Tiverton Wastewater District (TWWD), established in 2014, is responsible for managing the sewer system. The TWWD Wastewater Facilities Plan (updated in 2014 and amended in 2017) describes plan to expand this sewer system to include neighborhoods north and south of the Sakonnet River Bridge. These sewer lines will connect to Fall River MA's interceptor sewers and ultimately, the Fall River wastewater treatment facility.

As of the writing of this plan, the sewer expansion project is ongoing and will service connections to 181 properties. Robert Gray Avenue and Riverside Drive neighborhoods are being connected into existing sewer lines that run north-south along the coast in this watershed. There is an anticipated completion date for this project of Fall 2023. The Tiverton Wastewater District has been active in the Rhode Island Infrastructure Bank's Community Sewer Tie-In Loan Fund (STILF) since at least 2015. STILF is a lending program that provides low-cost, long-term financing to residential property owners for the costs associated with connecting to sewers.

The Town of Tiverton has been active in the Rhode Island Infrastructure Bank's Community Septic System Loan Program (CCSLP) since at least 2006. CCSLP is a lending program that provides low-cost, long-term financing to residential property owners for the repair or replacement of substandard or failing septic systems or to replace cesspools when the homeowner wishes to upgrade to a septic system. Municipalities must opt in to provide this service to their residents. One of the criteria needed in order to be eligible for this program is for the Town to develop an RIDEM approved Onsite Wastewater Plan, which was completed in February of 2003.

The Onsite Wastewater Management Plan (OWMP) helps to "ensure the proper design, location, construction, function and maintenance of onsite sewage disposal systems." The OWMP also outlines the locations, causes, and impacts of Individual Sewage Disposal Systems (ISDS), possible sources of funding to address these impacts, as well as goals and recommendations.

The Rhode Island Cesspool Act of 2007 requires cesspools to be upgraded to a new OWTS or connected to a sewer line if available based on geographic proximity to shoreline, public wells, water bodies providing drinking water supply, as well as for properties subject to sale or transfers. An updated OWMP should include these requirements.

The town should consider updating their Onsite Wastewater Plan so that it accurately describes current conditions, outlines completed projects, and updates goals and recommended actions.

Some means by which wastewater may not be properly treated include the following:

- Overflow of wastewater sewer facilities (pump station, manholes, etc.) due to extraneous water inputs from stormwater or groundwater.
- Cracks in wastewater sewer pipes (wastewater seeps into groundwater, and may subsequently enter surface waterbodies or stormwater drainage pipes)
- Illicit connections of wastewater to the stormwater pipe system. This may be through direct connections or through cracks.
- Failing OWTS or cesspools (cesspools do not provide any treatment)

The Town of Tiverton has an ordinance pertaining to the inspection, operation, and maintenance of onsite wastewater treatment systems These ordinances include allowing baseline and routine maintenance inspections from town-approved inspectors, complying with inspection report recommendations, and the addressing and notification of failed OWTS systems (Tiverton, Rhode Island- Code of Ordinances. Appendix C- Sewers and Sewage Disposal. Sec 18-9.7. – OWTS Inspection and Maintenance).

C. Other Pollution Sources

Marinas

Pollutants from marinas and boatyards can include chemicals used on boats, such as certain oils, paints, and cleaners, as well as spilled fuel, and human waste. These pollutants can lead to high toxicity, increased nutrients, and elevated bacteria counts in the surrounding waters.

There are two marinas on the coast of the southern end of the watershed, south of the Sakonnet River Bridge; Standish boat Yard, and The Tiverton Yacht Club. As per the Rhode Island No-Discharge Compliance program, it is illegal for boats to discharge any sewage- treated or untreated- into the waters of Rhode Island. Boats with holding tanks (Type III MSD) must be emptied at a shoreside facility called a pumpout facility. There is a dockside pumpout facility at the Standish boatyard. Rhode Island encourages best management practices at marinas through the Clean Marina Program coordinated by RI CRMC. This program provides a designation for operations that go beyond the requirements under the state's stormwater regulations. The program is voluntary and provides guidance for pollution prevention in marina operations.

D. Road Salt and Sand

Road salt washes into surface waters, changing the salinity and impacting aquatic life. The sand is either washed into the waters impacting streambed habitat dramatically, or it becomes a major contributor to stormwater BMP failure by clogging the systems. Generally, only a small percent of the sand applied to the road is recovered as street sweepings.

The salt and sand should also be stored in a manner to reduce impacts to water quality. RIDEM regulations for salt storage require salt and salt/sand mixtures to be covered if the groundwater at the site is classified GAA or GA. The Town of Tiverton stores salt and sand outside of the watershed at its Facility at 50 Industrial Way. The town conducts street sweeping operations and catch basin cleaning for the entire town annually. The use of new techniques, such as New Hampshire's "green SnoPro" program, where operators are certified and trained on the most up to hate removal technologies, should be explored.

E. Pet Waste and Waterfowl

Pet waste can be a significant contributor of bacteria and other pathogens and nutrients (nitrogen and phosphorus) to surface waters. The primary issue is dog waste, although other backyard pets (horses, goats, chickens, etc.) and wildlife can cause localized problems. Pet waste in urban and suburban areas that is left on the sidewalk or on grass near the street is often washed into stormwater drainage systems. Dog waste can harbor a host of different bacteria, parasites, and viruses that can cause human illness and disease.

Concentrations of geese, gulls, and ducks are of particular concern because they often deposit their waste directly into surface waters. Therefore, they can be major sources of pathogens, particularly near lakes and ponds where large resident populations have become established in the area.

Non-migratory geese are reported frequently along the shorelines of Mount Hope Bay, including the shores of the Tiverton Mount Hope Bay watershed. The geese are known as resident geese, as they do not migrate in the winter, and are well adapted to the urban-residential areas of the watershed. Significant populations of swans have been reported in certain areas of Mount Hope Bay as well.

F. Lawn and Grounds Management

The care and maintenance of landscaped areas can contribute to water quality degradation. Excessive amounts of fertilizer (nutrients) and pesticides, inappropriate formulations of fertilizer, and poor timing of fertilizer and pesticide applications can result in losses to the environment via stormwater runoff and/or leaching to groundwater. Lawn areas adjacent to waterbodies also attract geese and other waterfowl.

Many homeowners are not aware of the appropriate best management practices to reduce the impacts to water quality in managing their lawns. Landscape contracting businesses may also overapply fertilizers. Aside from professional pesticide application (which requires a license), no certification or educational requirements exist for lawn care management. Education of homeowners and landscape contractors on proper turf management continues to be the primary strategy to minimize water quality impacts from lawn and grounds management.

G. Agriculture

Only 2% of the land within the Tiverton Mount Hope Bay watershed is used for agriculture. Most of this land is classified as "pasture" and is generally not suitable for tillage. The potential surface water and groundwater pollutants from agricultural operations include nutrients (nitrogen and phosphorus) from fertilizers and animal wastes; pathogens and organic materials primarily from animal wastes; sediment from field erosion; pesticides; and petroleum products. Well-managed farms that address the following can operate with minimal negative effect on water resources:

- Provide sufficient stream/wetland buffers,
- Manage fertilizer and pesticides properly,
- Provide fencing to restrict access of livestock to streams and wetlands,
- Properly manage animal waste (handling and disposal).

H. Other Pollution Threats from Residential Land Use

Threats to water quality from residential land use include several of the topics that are further discussed elsewhere in this section (i.e., stormwater runoff, lawn management, and pet waste). Other potential sources of groundwater and surface water contamination from residential uses include:

- Household cleaning chemicals, automotive fluids (oil and gasoline), and paints and solvents disposed of down the drain or onto the land surface (aka, Household Hazardous Waste). Most citizens are unaware of the effects of numerous potential contaminants stored, used, and disposed of around the home;
- Heating oil storage (above and below ground tanks) and spills -- Although most heating oil tanks sized to hold less than 1,100 gallons that are located at residences are likely above ground (outside or in a basement), an unknown, but potentially significant number of heating oil tanks are buried and will eventually leak.

If taken on an individual basis, the threat from a single residence is normally less than the threat from other land uses, but when factoring in all residences, they form a significant source of potential contamination.

IV. Aquatic Habitat Management

A. Wetlands

Wetlands (freshwater and saltwater) are one of our most valuable natural resources. They are transition zones between land and water where the flow of water and the cycling of nutrients meet to produce a

unique ecosystem -- making these areas very important features of a watershed. Wetlands are the most biologically fertile and diverse landscapes in RI. All wetlands in RI are protected by law, as are the bordering lands adjacent to certain wetlands, which serve as buffers for water quality and important habitat. (Note: in RI, under RIDEM and the Coastal Resources Management Council (CRMC) Freshwater Wetland Rules, surface waters, i.e., lakes, ponds, rivers, and streams, are also considered "wetlands" for regulation purposes.) See Figure 2 for general locations of wetlands in the Tiverton Mount Hope Bay watershed, which are limited in their extent.

Wetlands have many important functions. They:

- Help control floodwaters by storing excess water during heavy periods of rain and snowmelt,
- Provide key links in the water cycle by helping to maintain streamflow and water resources through much of the year by releasing water from both surface and groundwater storage,
- Naturally filter polluted runoff,
- Help mitigate the effects of climate change and are natural sinks for greenhouse gases,
- Serve as important habitat for many plants, animals, and fish,
- Support recreational activities including fishing, hunting, hiking, photography, bird watching, education, and nature studies.

When wetlands are altered, these services are diminished or lost. Direct disturbance to wetlands includes activities such as cutting of vegetation, filling, illegal dumping, excavating, water diversion, or roads and crossings (section IV.D below). Indirect impacts include the loss of vegetated upland buffers (see section IV.B. below).

B. Vegetated Upland Buffers

A vegetated upland buffer bordering a pond or lake, a stream or wetland will act to:

- Filter out sediments, nutrients, pesticides and other pollutants coming off the landscape;
- Provide valuable habitat for plants and animals;
- Absorb stormwater and therefore mitigate potential streambank erosion and flooding; and
- Moderate water temperature by providing shade.

In this heavily developed watershed, there are only a few riparian areas, which are generally surrounded by greenspace. It is important that these vegetated buffers are maintained to maximize the benefits they provide. In areas where a minimal to no buffer exists, buffer restoration should be promoted wherever possible.

C. Stream Connectivity

Stream connectivity is about ensuring the free movement of fish and other wildlife up and down a stream corridor. Barriers to this movement can be caused by dams and sub-standard road/driveway culverts preventing wildlife from using certain portions of the river system resulting in fragmented aquatic habitat. In some cases, undersized culverts can also cause localized flooding.

There is one dam in the watershed, present in the north end of Creamer Pond. An Inspection/evaluation report was compiled in June of 2021 by Pare Corporation and submitted to RIDEM and includes recommendations for proper maintenance of the dam.

There are 4 unnamed first order streams present in the watershed, none of which appear to be hydrologically connected to any larger stream network. A review of aerial photographs and ground truthing identified 6 potential stream crossings in the watershed. The condition of these crossings relative to connectivity for aquatic life has not been determined. The RI Department of Transportation has developed a "Road-Stream Crossing Assessment Handbook" to systematically assess road crossing

conditions for flooding impact and aquatic organism passage (https://www.dot.ri.gov/documents/about/protecting/stormwater/RIDOT_RoadStream_Crossing_Assessment_Handbook.pdf). Further work is needed to identify and prioritize the upgrades to stream crossings that may be needed. The stream crossings identified in the watershed are located along the following roads:

- Souza Road
- Last Street
- Bent Street
- Canonicus Street
- Hooper Street
- Birch Street

V. Implementation – Protection and Restoration Actions

A. Citizen Action

Watershed protection and restoration can only be successful when those that live and work in the watershed realize that they are a crucial part of their watershed. Individual actions may not seem to have much of an effect by themselves, but the overall cumulative impact (positive or negative) on water quality in the watershed by individuals can be dramatic. Actions that can be taken include:

- Take steps identified in the DEM brochure "Simple Ways YOU Can Help Keep Rhode Island's Waters Clean" in Appendix 1.
- Participate in local activities that benefit the environment.
- Attend public meetings on water related issues.
- Advocate for strong municipal government actions for water resources and open space protection.
- Volunteer and support the efforts of local/regional/statewide non-profit groups that can help make a difference in the Tiverton Mount Hope Bay watershed.

B. Implementation Table

This Implementation Table identifies priority actions for water quality and aquatic habitat protection and restoration in the Tiverton Mount Hope Bay watershed. The action items are derived from the development of the Plan and from review of the TMDLs cited earlier.

The Implementation Table is organized by management topic and includes the information below for each action. Unless otherwise specified, all actions are the responsibility of the Town.

- Action Item
- Timeframe: ongoing, 1-2 years, 3-5 years, 5-10 years.
- Cost Estimate: Relative indication of estimated cost as follows:
    - $ = <$25,000;
    - $$ = $25,000 -- $100,000;
    - $$$ = >$100,000
- Priority:
    - H – High
    - M – Medium
    - L – Low

*NGO = non-governmental organizations

Implementation Table

Action Items - Listed by Management Topic - Unless otherwise specified, actions are the responsibility of the Town - Refer to the TMDLs for more detailed information on implementation actions	Timeframe	Cost Estimate	Priority
Stormwater Management			
Implement the RIPDES Phase II MS4 Stormwater Management Program Plan. (Town and DEM)	Ongoing	$$$	H
• Consider adopting local stormwater requirements, including soil erosion control, for development projects smaller than one acre (smaller than the state minimum requirement) for new and redevelopment applications.	3-5 Years	$	L
• Continue illicit discharge detection sampling program and address unauthorized connections that contribute pollutants.	Ongoing	$	M
• Establish public outreach programs to encourage residential BMPs that improve management of stormwater runoff, such as rain gardens.	Ongoing	$	L
• Using the TMDLs, identify and prioritize locations for stormwater BMP retrofits throughout the watershed	Ongoing	$$$	H
• Increase Frequency of stormwater BMP Maintenance	Ongoing	$$	H
Reduce stormwater runoff by encouraging construction of rain gardens and dry wells which facilitate groundwater infiltration on private and public properties.	1-2 Years (then ongoing)	$	M
Complete the LID Self-Assessment. Review existing planning and development ordinances to evaluate what LID techniques are included, decide what LID techniques would be appropriate for the community to incorporate, and adopt the use of the selected LID techniques into local development regulations for use in proposed development and redevelopment projects.	1-2 Years	$	H
Other Sources of Pollution			
Marinas- Standish Boatyard and Tiverton Yacht Club- Continue maintenance of wastewater pumpout station and monitoring for emergency spill cleanup. (Private Boat Yard)	Ongoing	$	M
Marinas- Encourage enhanced best management practices for the handling and disposal of oil and hazardous materials (paint, solvents, etc.) through the Clean Marina Program	Ongoing	$	M

Action Items - Listed by Management Topic - Unless otherwise specified, actions are the responsibility of the Town - Refer to the TMDLs for more detailed information on implementation actions	Timeframe	Cost Estimate	Priority
Wastewater Management			
Develop and complete sewering expansion project for residential areas to address failing septic systems and illicit connections.	Ongoing	$$$	H
C-2023-001 Robert Gray & Riverside Drive Phase 1 Sewer Expansion, in order to facilitate lateral connections of existing properties to the public sewer collection system.	Ongoing	$$$	H
C-2023-001 Community Sewer Tie-In Loan Fund Program.	Ongoing	$$$	H
C-2023-003 Hooper and Shove Street Sewer Extension.	1-2 Years	$$$	H
C-2023-004 Robert Gray Area Phase 2 Sewer Expansion.	1-2 Years	$$$	H
C-2023-005 Carpenter, Audet, Blaisdell Street Sewer Replacement.	1-2 Years	$$$	H
Upon completion of sewering projects, sample storm drains outfalls to evaluate reduction in bacteria pollutant loadings.	3-5 years	$	H
Road Salt and Sand			
Conduct street sweeping at a frequency that minimizes water quality impacts. Consider increased sweeping on mild winter days. (Town and RIDOT)	Ongoing	$$	M
Identify strategies and technology innovations minimize the use of road salt and sand throughout the watershed. Implement such actions. (Town and RIDOT)	5-10 Years	$-$$$	L
Pet Waste and Waterfowl			
Educate the public about the impact of pet waste on water quality. Consider providing pet waste educational materials with dog licensing renewals. (Town and NGO)	Ongoing	$	M
Install pet waste signage at high intensity use locations in the watershed.	1-2 Years	$	L
Install signage instructing the public not to feed the waterfowl at public areas where feeding may occur.	1-2 Years	$	L
Lawn and Grounds Management			
Inform residents on proper amounts and application of fertilizers and pesticides to lawns and gardens to minimize water quality impacts. (Town and NGO)	1-2 Years (then ongoing)	$	M

Action Items - Listed by Management Topic - Unless otherwise specified, actions are the responsibility of the Town - Refer to the TMDLs for more detailed information on implementation actions	Timeframe	Cost Estimate	Priority
Agriculture			
Encourage farms to work with the RIDEM Division of Agriculture and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) to adopt best farm conservation practices and develop a conservation plan for their farming activities within the watershed, if applicable. (Farmer with NRCS support)	3-5 Years	$	L
Heating Oil Storage Tanks			
Educate homeowners of the threat to water quality from existing above-ground and underground home heating oil tanks and the steps to take to minimize risk. (Town and NGO)	3-5 Years	$	L
Wetlands and Vegetated Upland Buffer Protection			
Maintain and restore wetlands and associated wetland/stream/pond upland buffers in the watershed. (Town, State, and NGO)	Ongoing as opportunities arise	$	H
Stream Connectivity			
Assess stream connectivity at road crossings in the watershed. (Town, State, and NGO)	3-5 Years	$$	L
Open Space/ Conservation			
Adopt appropriate land stewardship practices for town open spaces. As feasible, acquire additional open space.	Ongoing (as opportunities and funding arise)	$$$	M

Action Items - Listed by Management Topic - Unless otherwise specified, actions are the responsibility of the Town - Refer to the TMDLs for more detailed information on implementation actions	Timeframe	Cost Estimate	Priority
Water Quality Monitoring			
RIDEM continues to monitor water quality in accordance with statewide monitoring strategy, including the ongoing sampling of shellfish growing areas. (RIDEM)	Ongoing	$	H
Public Information and Outreach			
Inform residents about the watershed and promote actions that can be taken by homeowners and others to protect water resources and aquatic habitats. (Town and NGO)	Ongoing	$	M

VI. Financial Support/Implementation Tools

Funding assistance for water quality and aquatic habitat protection and restoration actions is available from various government and private sources. This section provides a brief program overview and contact agency for financial and technical assistance that may be used to implement some of the actions in this plan.

A. Federal Clean Water Act, Section 319 Nonpoint Source Implementation Grants

Section 319 Grants are available for projects to protect and restore water quality through reducing and managing nonpoint source pollution and for projects restoring aquatic habitat. Projects must be consistent with the goals and actions in the USEPA-approved RI Nonpoint Source Management Program Plan. These grants are made possible by federal funds provided to RIDEM by the USEPA under Section 319 of the Clean Water Act.
Eligible applicants: Projects must be in watershed with an approved watershed plan; municipal, state, or regional governments, quasi-state agencies, public schools and universities, and nonprofit watershed, environmental, or conservation organizations.
Contact: RIDEM's Office of Water Resources

B. R.I. Infrastructure Bank, Clean Water State Revolving Fund Loans, and other

The Clean Water State Revolving Fund is a federal/state partnership designed to finance the cost of infrastructure needed to achieve compliance with the Clean Water Act. The program is available to fund a wide variety of water quality projects including 1) Traditional municipal wastewater treatment projects; 2) contaminated runoff from urban and agricultural areas; 3) wetlands restoration; 4) groundwater protection, and 5) brownfields remediation. Through this program, Rhode Island maintains revolving loan funds to provide low-cost financing for a wide range of water quality infrastructure projects. Funds to establish or capitalize these programs are provided through federal government grants and state matching funds. The interest rate charged to the Clean Water State Revolving Fund is one-third off the borrower's market rate.

One program that utilizes federal dollars from the Clean State Water Revolving Fund is the Community Septic System Loan Program (CSSLP). CSSLP is a lending program that provides low-cost, long-term financing to residential property owners for the repair or replacement of substandard or failing septic systems or to replace cesspools when the homeowner wishes to upgrade to a septic system. Municipalities must opt in to provide this service to their residents and must have a DEM approved On-Site Wastewater Management Plan.

The Municipal Resilience Program (MRP) is another program from the RI Infrastructure Bank that provides support for cities and towns to complete a municipal driven workshop process that identifies challenges, hazard and strengths pertaining to climate resiliency. Upon completion of the MRP workshop, municipalities are designated as "Resilient Rhody Municipalities" and can then apply for MRP Action grants to implement identified projects. Examples of programs that may be eligible for grants can include but are not limited to, dam repair and removal, road elevation, hardening or elevation of pump stations, berms and levies, culvert repair, green stormwater infrastructure, solar & battery storage back-up power, energy efficiency, watershed restoration, urban tree planting, and coastal erosion control.

In addition to the programs described above, the Infrastructure Bank has a Sewer Tie-In Loan Fund for homeowners to access funds to connect to the local sewer system. Individual loans are funded from a Clean Water State Revolving Fund loan to a sewer system owner and are administered locally by Rhode Island Housing. Loans to homeowners up to $10,000 are offered at a 2% interest rate for up to a five-year term.

Finally, the Infrastructure Investment and Jobs Act (IIJA) is an historically large opportunity for municipalities to potentially address issues and fund projects that they may have otherwise not been able to accomplish.
Eligible applicants: Statewide, including municipal, state, or regional governments, and quasistate agencies. Funds are awarded to projects based on ranking of environmental benefits of the project, readiness to proceed, and availability of funds.
Contact: RIDEM Office of Water Resources; Rhode Island Infrastructure Bank

C. Narragansett Bay and Watershed Restoration Bond Fund

State funds approved by RI voters are periodically available from this bond fund to restore and protect the water quality, and enhance the economic viability, environmental sustainability and resiliency of Narragansett Bay and it the state's watersheds. $3 million was allocated in 2022. The fund is meant to provide funding assistance for the feasibility analysis, design, and construction of means to control nonpoint sources of pollution, stormwater pollution control projects, riparian buffer and aquatic habitat restoration projects.
Eligible applicants: Statewide; municipal, state, or regional governments; quasi-state agencies, public schools and universities, and non-profit watershed, environmental, or conservation organizations; and non-governmental for-profit businesses, private schools.
Contact: RIDEM Office of Water Resources

D. U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Grants

Environmental Quality Incentives Program (EQIP)

This is a voluntary conservation grant program designed to promote and stimulate innovative approaches to environmental enhancement and protection, while improving agricultural production. Through EQIP, farmers and forestland managers may receive financial and technical help to install or implement structural and management conservation practices on eligible agricultural and forest land. Examples of eligible EQIP activities include practices for farm waste storage, nutrient management, riparian buffers and stream bank improvements, wetland restrictions, and groundwater and surface water conservation activities. EQIP payment rates may cover up to 75 percent of the costs of installing certain conservation practices.
Eligible applicants: Any person engaged in livestock, agricultural production, aquaculture, shellfishing, or forestry on eligible land.
Contact: USDA NRCS – RI State Office/Service Center

Wildlife Habitat Incentives Program (WHIP)

This program is a voluntary program for landowners who want to develop and improve fish and wildlife habitat on private agricultural land, non-industrial private forest land, and tribal land. Through WHIP, farmers and forestland managers may receive financial and technical help to develop upland, wetland, aquatic, and other types of wildlife habitat on their property. The current focus of WHIP in RI is on coastal habitats, freshwater wetlands, vernal pools, riparian habitats, upland habitats of State significance (early successional habitats), and the restoration of native habitats impacted by invasive species.
Eligible applicants: Any person owning private agricultural land, non-industrial private forest land, or tribal land.
Contact: USDA NRCS – RI State Office/Service Center

Easement Programs

NRCS offers various easement programs to landowners who want to maintain or enhance their land in a way beneficial to agriculture and/or the environment. NRCS provides technical help and financial assistance to protect private lands through a variety of programs. These programs include the Farm and Ranch Land Protection Program, the Grasslands Reserve Program, the Healthy Forests Reserve Program, and the Wetlands Reserve Program.
Eligible applicants: Private landowners.
Contact: USDA NRCS – RI State Office/Service Center

E. EPA Southeast New England Program (SNEP)

The US EPA Southeast New England Program for Coastal Watershed Restoration brings together partnerships to protect and restore coastal watersheds of southeast New England from Westerly to Cape Cod. Through its SNEP Watershed Implementation Grants (SWIG), the Program provides competitive funding for projects that leverage multiple resources to implement innovative solutions for water quality improvement, habitat restoration, and climate resilience. Through its SNEP Network, the program also provides free training and assistance to municipalities, organizations, and tribes to advance stormwater and watershed management, ecological restoration, and climate resilience in Rhode Island and Massachusetts.

Restore America's Estuaries (RAE) is a non-profit conservation organization that partners with EPA to support the goals of the SNEP Strategic plan by managing the annual SWIG project solicitation via RFPs.
Eligible applicants: Municipalities, non-profit organizations, states, and research/educational institutions.
Contact: US EPA, Southeast New England Program

F. State Open Space Grants

RIDEM administers a grant program to facilitate land conservation relying on State bond funding and Federal program funds. Local Open Space Grants provide up to 50% matching funds to preserve valuable open space through ownership or easements.
Eligible Applicants: Municipalities, land trusts, watershed councils, and non-profit organizations.
Contact: RIDEM Office of Planning and Development

G. Narragansett Bay Estuary Program

The Narragansett Bay Estuary Program is a stakeholder-led organization pursuing place-based conservation across the three-state Narragansett Bay region. Program work spans boundaries to provide independent convening, scientific data analysis, and watershed project funding. The Program supports often under-funded pre-project steps, including studies, assessments, and engineering design.
Eligible Applicants: Typically, municipalities, land trusts, watershed councils, and non-profit organizations.
Contact: Narragansett Bay Estuary Program

H. Community Development Block Grants

Title 1 of the Housing and Community Development Act of 1974 authorized the Community Development Block Grant program. The program is sponsored by the US Department of Housing and Urban Development, and the Rhode Island program is administered through the State of Rhode Island Office of Housing and Community Development. These grants include water and sewer system improvements.
Eligible applicants: Municipalities

Contact: R.I. Department of Administration, Division of Planning, Office of Housing and Community Development

I. Technical Assistance Organizations

University of Rhode Island (URI) Cooperative Extension

As a function of URI's Land Grant mission, URI's Cooperative Extension Water Quality Programs include the following four areas of activity:

- New England Onsite Wastewater Training Program
- RI Nonpoint Education for Municipal Officials (NEMO)- provides information, education, and assistance to local land-use officials regarding how they can accommodate growth while protecting their water resources
- URI Home*A*Syst – provides information and training on pollution prevention for homeowners
- Watershed Watch Program– coordination of volunteer water quality monitoring

Eastern Rhode Island Conservation District (ERICD)

The mission of the Eastern RI Conservation District is to promote and achieve a healthy environment and sustainable use of natural resources for the people of Bristol and Newport Counties and the State of Rhode Island, now and for the future, by coordinating partners to provide technical, educational, and financial resources.

J. USDA Rural Services Water and Environmental Programs

Through Rural Utilities Service Water and Environmental Programs (WEP), rural communities obtain the technical assistance and financing necessary to develop drinking water and waste disposal systems. Safe drinking water and sanitary waste disposal systems are vital not only to public health, but also to the economic vitality of rural America. Rural Development is a leader in helping rural America improve the quality of life and increase the economic opportunities for rural people.

WEP provides funding for the construction of water and waste facilities in rural communities and is the only Federal program exclusively focused on rural water and waste infrastructure needs of rural communities with populations of 10,000 or less. WEP also provides funding to organizations that provide technical assistance and training to rural communities in relation to their water and waste activities. WEP is administered through National Office staff in Washington, DC, and a network of field staff in each State.

Eligible applicants: (Grant depending) Typically, individuals, public bodies, municipalities, tribes, nonprofit organizations

Contact: USDA Rural Development

K. RI Rural Water Association

The Rhode Island Rural Water Association was incorporated in 2021 to serve as not only an advocate for the association members of the state, but a partner in their missions to provide their essential services to the public. They are a non-profit trade association that provides training, technical assistance, and source water protection to the rural and small utilities in RI."

This assistance is supported through NRWA by the United States Congress and is provided in partnership with USDA Rural Utilities Service, the Farm Service Agency, and the Environmental Protection Agency. They will also represent rural and small utilities in the regulatory and legislative process.

VII. Evaluation- Monitoring and Measuring Progress

A. Monitoring

Bacteria and nutrients are the primary water quality challenges in this watershed and should be included in any monitoring strategies.

The DEM Shellfish Program collects water samples from shellfish growing areas and summarizes data that is relevant to the water quality challenges in this watershed. DEM uses this data to measure progress on water quality in Rhode Island's waters.

To fulfill the requirement of the RIPDES Storm Water General Permit, the Town of Tiverton must submit its Small Municipal Separate Storm Sewer System (MS4) Annual Report to DEM. Part of the requirements for any MS4 includes an illicit discharge detection and monitoring program. MS4s are not designed to accept or process illicit discharges (non-stormwater waste). These illicit discharges often enter the system through direct connections, such as mistaken or deliberately connected piping to stormwater drains, malfunctioning sanitary systems, or spills collected by drain outlets. The pollutants from these discharges can be high enough to significantly degrade water quality. Part of the requirements of the MS4 illicit detection and elimination program include a robust sewer system and outfall map, prohibitions on non-stormwater discharges into the MS4, a plan to detect and address non-stormwater discharges, the creation of appropriate BMPs to meet permit requirements, and the education of the public and businesses on the hazards of illicit discharges.

B. Measuring Progress

There are several indicators of progress that can be used to measure and document improvements in water quality and aquatic habitat protection and restoration in the watershed. The most direct and straightforward indicators are water quality measurements. Water quality monitoring data can be compared with the water quality criteria for the waterbody classification. Monitoring can extend to biological indicators, such as aquatic macroinvertebrates. Biological monitoring can look at species population levels, species composition, and/or contaminant levels in tissues.

An additional way to measure progress is to systematically track the implementation of the actions in the Implementation Table in Section V. Taking this a step further, the programmatic performance indicators below may be used to measure plan implementation. Although these actions are not a measure of direct environmental improvements, they are assumed to contribute to water quality and aquatic habitat improvements. Some potential performance indicators for water quality and aquatic habitat improvements include:

- Number of stormwater BMPs installed.
- Increase in impervious area that is connected to stormwater treatment (area that is disconnected).
- Number of illicit discharges discovered.
- Acreage of open space/percent of watershed in conservation.
- Number of properties/existing dwellings connected to sewer system.
- Acreage of wetlands protected, and acreage of restored wetlands.

- Number of watershed projects implemented to improve and protect wetlands.
- Acreage of buffers protected, and acreage of restored buffers.
- Number of watershed projects implemented to improve and protect riparian buffers.
- Number of stream connectivity projects implemented to improve connectivity.
- Number of contact hours of educational outreach attained for board members, elected officials, and municipal staff.
- Awareness among residents and other targeted audiences as measured by surveys.

VIII. Next Steps

This plan is provided to the Town of Tiverton to guide in the long-term protection and restoration of water quality and aquatic habitat in the Tiverton watershed.

The Plan will satisfy the requirements for eligibility for USEPA Section 319 funds that are administered by RIDEM. Projects requesting Section 319 funds must be either identified in the Plan's implementation section or at minimum consistent with the intent of the Plan, in addition to meeting the criteria of the RIDEM Section 319 funding program. The Plan will also be useful in showing support for applications to other sources of funding for implementation.

This Plan should be continually evaluated and updated in order to guide appropriate actions to protect and restore water quality and aquatic habitat in the Tiverton Watershed

Appendix 1. RIDEM Water Quality Brochure

REDUCE YOUR LAWN by creating "no-mow zones" of native wildflowers, grasses, shrubs, and trees, especially as buffers near ponds and streams. This reduces water, fertilizer, and pesticide use and provides a welcoming habitat for wildlife.

FERTILIZE SMART Have your soil tested before applying fertilizer to your lawn to see if it even needs it. Don't over-fertilize - more is not better. During rainstorms, nutrients from fertilizers can wash off lawns into local waters where the excess nutrients promote algae blooms, including some algae that are harmful to people and pets. Algae blooms cause a decrease in oxygen in the water which endangers aquatic life and can cause fish kills. Use phosphorus fertilizer for new lawns only, unless the soil test shows a need for phosphorus on an established lawn. Sweep up fertilizer that spills on hard surfaces. Leaving grass clippings on your lawn can reduce your fertilizer needs by up to 25%. For more information on soil testing see www.URIMasterGardeners.org

REDUCE USE OF LAWN AND GARDEN PESTICIDES Investigate use of biological controls and products with natural ingredients. Read the labels—apply the right amount at the right time and be aware of the toxicity warnings.

REDUCE RUNOFF Increase the amount of stormwater absorbed into the ground by directing downspouts onto your lawn, not onto paved surfaces where the runoff could pick up oil, yard waste, and other debris. Install a rain barrel— use the water for plantings. Install a rain garden to increase the amount of stormwater absorbed into the ground. For more information, see www.RIStormwaterSolutions.org

DON'T DRAIN YOUR SWIMMING POOL into storm drains, wetlands, rivers, or ponds. Instead drain it onto the ground away from your drinking water well. Drain your pool only when your test kit does not detect chlorine levels so that it won't harm vegetation.

PUMP IT, DON'T DUMP IT! If you own a boat, have your holding tank emptied at one of the local pumpout stations around Rhode Island. For a list of pumpout locations contact DEM.

VOLUNTEER with clean-up efforts or water quality monitoring. Participate in local activities that benefit the environment. Find out if there is a watershed council for your area. YOUR opinion counts! Attend public meetings. Your participation makes the statement that your community is concerned about local waterways. If you see a problem or want something done, say something! If you don't have time to attend meetings, call or contact a city or town official, a state representative, or DEM.

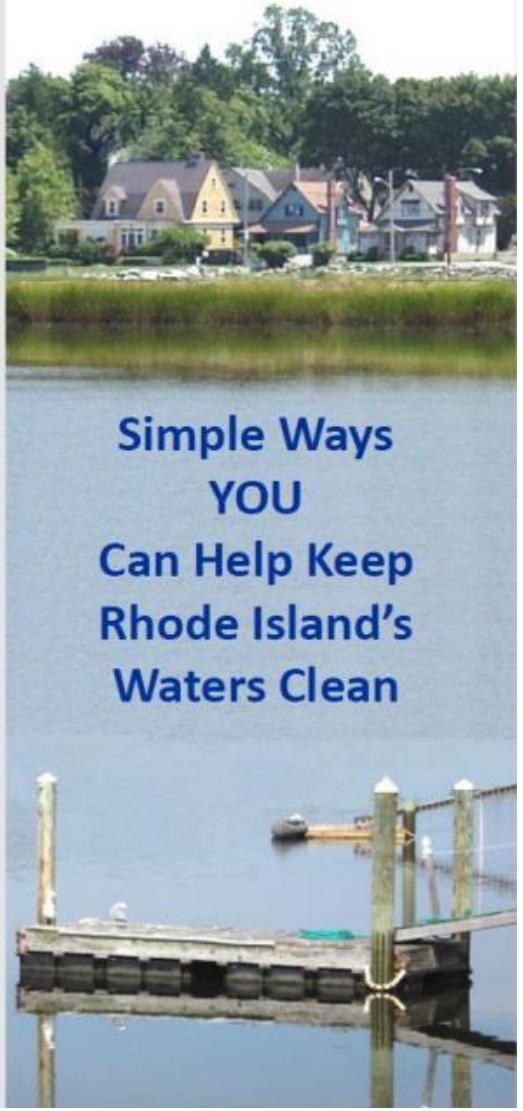
NOW...GET OUT AND ENJOY THE WATER !

Swim, sail, surf, kayak, fish, boat, shellfish, go birding or walk along the shore. Explore Rhode Island's waters.

If you need more information on any of these topics contact DEM Water Resources

RI Department of Environmental Management
Office of Water Resources
235 Promenade Street
Providence, RI 02908-5767
401-222-4700
www.dem.ri.gov

Rev 3/2015



YOU Can Make A Difference!

- **DO YOU EVER STOP AND WONDER** what you can do to make a difference in keeping our waters safe enough to swim in, fish from, or use for drinking? What you can do to protect the groundwater that supplies your drinking water well?
- **WHEN IT RAINS** water travels across our properties collecting pollutants such as animal feces, fertilizers, soil, oil, and chemicals. This runoff then flows untreated into local rivers, lakes, and streams; polluting water for human use as well as plant and animal life.

LEARN ABOUT YOUR LOCAL WATERS Everyone lives in a watershed, which is the area that drains to a nearby river, stream, lake, or pond. Think about washing everything in a sink then letting it go down the drain. The sink is your watershed and the drain is your local river or stream. Find out what waters are closest to you and where they flow.

TAKE CARE OF YOUR SEPTIC SYSTEM Faulty septic systems can pollute local waters. Systems should be inspected every three to five years and tanks pumped as recommended. Don't drive or park anywhere on your septic system. Plant only grass over and near the system. If you have a cesspool, consider replacing it with a septic system.

DON'T FEED THE DUCKS! Feeding geese, ducks, gulls, and other waterfowl can cause large populations of birds to become concentrated in areas that are incapable of supporting them. The waste they produce contributes bacteria to our waterways and results in beach closures and pollution of shellfishing areas.

SCOOP THE POOP Pet waste left on sidewalks, streets or yards can be washed away by rainwater and carried into storm drains and drainage ditches which flow untreated to nearby rivers, ponds and beaches. Pet waste contains bacteria that can cause human illness and contribute to the closing of beaches and shellfish beds. Always carry a baggie - scoop up waste, bag it, and put it in the trash.

DON'T FLUSH MEDICATIONS Old or unwanted prescription drugs and over the counter medications flushed down the toilet or drain can end up in our waters and harm organisms living there. Check to see if you can drop off medications at your police station. If not, properly dispose of them in the trash. Crush pills and tablets. Put the medicine into a sealable plastic bag. Place the sealed bag in the trash.

MINIMIZE THE USE OF HAZARDOUS PRODUCTS as much as possible. Cleaning and other household products contain many hazardous chemicals. Read labels and try to use the least harmful products available. Don't dispose of products down the toilet or drain. Dispose of household hazardous chemicals (e.g., oil based paint, pesticides, drain cleaner, oven cleaner, pool chemicals) using the RI Eco-Depot Program. See www.rirrc.org

DRIVEWAY CARE Driveway sealant can be either an asphalt or a coal tar mixture. Coal tar has much higher levels of chemicals harmful to human health and aquatic life. As sealants wear down, particles wash off in stormwater. If you must seal your driveway, use an asphalt sealant.

WASH VEHICLES ON YOUR LAWN (away from your drinking water well) or use a commercial car wash. Washing on your lawn minimizes the amount of dirty, soapy water flowing into the storm drains that run directly into our waterbodies. If you are unable to wash your car on your lawn, use only biodegradable, phosphate-free cleaners. If washing near a storm drain, temporarily divert the water towards grassy areas. Commercial car washes typically use far less water, recycle their wash water, and treat their water prior to releasing it into the sewer system.

RECYCLE USED MOTOR OIL AND ANTIFREEZE Don't dump automotive fluids down the storm drain or dispose of them in your trash. Contact your local Department of Public Works or see the RI Eco-Depot Program at www.rirrc.org

CONSERVE WATER Don't overwater your lawn. Lawns need only one inch of water per week (from either watering or rain). Excessive water use, especially in summer, can dramatically reduce flow in rivers and streams, harming aquatic life.

If your house is connected to a public sewer, conserving water will help reduce the discharge from your wastewater treatment facility into local waters AND save you money! If you use a septic system, water conservation helps prevent system failures.