# RHODE ISLAND
# NONPOINT SOURCE MANAGEMENT PROGRAM PLAN

**September 2024**

**Rhode Island**
**Department of Environmental Management**
**Office of Water Resources**

# Rhode Island
# Nonpoint Source Management
# Program Plan

Table of Contents

**Tables**

**Figures**



**Appendices**

# Acknowledgements

The updated 2024 Rhode Island Nonpoint Source Management Program Plan was compiled and drafted by the Rhode Island Department of Environmental Management (DEM) Office of Water Resources. The DEM Office of Water Resources acknowledges and appreciates the information and input provided by many individuals and programs both within DEM as well as outside the agency that contributed to the update of the Rhode Island Nonpoint Source Management Program Plan.

The DEM Office of Water Resources (OWR) Nonpoint Source Management Program staff responsible for the production of the 2024 NPS Plan update are Susan Kiernan, Sean McCormick, Jon Zwarg, Betsy Dake and Jake Peterson. Jose Baez of the OWR provided invaluable support to the plan development process. Additional OWR staff that contributed content to the plan include Katie DeGoosh-DiMarzio, Jane Sawyers, Scott Ribas and Jane Sawyers. The DEM OWR is very appreciative of the input from the many additional DEM and other agency staff that were consulted during development of the plan.

DEM appreciates the support and guidance of US EPA Region 1, especially the thoughtful input from Margherita Pryor, Regional Nonpoint Source Coordinator for Rhode Island, and Natalie Schafer, Sandra Fancieullo, and Maryjo Feuerbach.

Funding for the plan was provided in part by the Environmental Protection Agency through the award of funds made available by Section 319 of the Clean Water Act.

## Acronyms Used

| | |
|---|---|
| AIS | Aquatic Invasive Species |
| BMP | Best Management Practices |
| CALM | Consolidated Assessment and Listing Methodology |
| CCMP | Comprehensive Conservation Management Plan |
| CWA | Clean Water Act |
| CRMC | Coastal Resources Management Council |
| CSSLP | Community Septic System Loan Program |
| DEM | Department of Environmental Management |
| DOH | Department of Health |
| DOT | Department of Transportation |
| EPA | US Environmental Protection Agency |
| EQIP | Environmental Quality Incentives Program |
| FEMA | Federal Emergency Management Agency |
| GRTS | Grant Reporting and Tracking System |
| HAB | Harmful Algal Bloom |
| HFPO | Hexafluoropropylene Oxide |
| IC | Impervious Cover |
| LID | Low Impact Development |
| MCL | Maximum Contaminant Level |
| MS4 | Municipal Separate Storm Sewer System |
| NWQI | National Water Quality Initiative (NRCS) |
| NBEP | Narragansett Bay Estuary Program |
| NGO | Non-governmental Organization |
| NPS | Nonpoint Source |
| NRCS | US Department of Agriculture Natural Resources Conservation Service |
| OWR | Office of Water Resources (DEM) |
| OWTS | Onsite Wastewater Treatment Systems |
| PFAS | Per- and Polyfluoroalkyl Substances |
| PFNA | Perfluorononanoic Acid |
| PFOA | Perfluorooctanoic Acid |
| PFOS | Perfluorooctane Sulfonate |
| PPA | Performance Partnership Agreement |
| PPG | Performance Partnership Grant |
| RIEMA | RI Emergency Management Agency |
| RIEMC | RI Environmental Monitoring Collaborative |
| RIIB | RI Infrastructure Bank |
| RINHS | RI Natural History Survey |
| RIGIS | RI Geographic Information System |
| RIPDES | RI Pollution Discharge Elimination System |
| SNEP | Southeast New England Program |
| TMDL | Total Maximum Daily Load |
| URI | University of Rhode Island |
| USDA | United States Department of Agriculture |
| USGS | United States Geological Survey |
| WBID | Waterbody Identifier |
| WBP | Watershed Based Plan |

# 2024 NPS Management Plan – Executive Summary

Nonpoint source pollution (NPS) is considered the dominant source of water pollution in the United States (EPA, 2024) and poses a significant management concern affecting Rhode Island's surface water and groundwater resources. NPS pollution results when water moving over and through the ground picks up pollutants from various land uses and activities and carries those pollutants into rivers, streams, lakes, coastal waters, wetlands, and groundwaters. See Section 2.0 for detailed information on NPS challenges in Rhode Island. The Rhode Island Department of Environmental Management (DEM) has administered a NPS Program for over 35 years that relies on regulatory and non-regulatory strategies to address priority concerns with an emphasis on watershed-based approaches. For this five-year planning period (2024-2029). DEM has highlighted the major NPS pollutants in Rhode Island as pathogens, nutrients, sediments, and trash or litter including plastics. DEM has identified the following five types of NPS pollution sources and stressors as priorities (see Section 2.4 for additional information):

- Stormwater runoff
- Onsite wastewater discharges
- Hydromodification and habitat alteration
- Agriculture
- Trash, litter, and plastics

This NPS Program Management Plan also places special consideration on Environmental Justice (EJ; see Section 1.6) and integrating a changing climate (see Section 4.1).

The DEM NPS Program works closely with RI water quality monitoring and assessment programs to provide information on water quality conditions needed to support water resource management decision-making. DEM and partners will continue to implement a number of ambient water monitoring programs. The RI NPS Program, as reflected in Table 12, will continue to support of volunteer-based monitoring in freshwaters, and targeted monitoring to help assess the effectiveness of NPS implementation actions. To protect public health, Rhode Island will continue to monitor beaches and track cyanobacteria blooms (see Section 2.5.3 for cyanobacteria as a special topic discussion). DEM anticipates an expansion of efforts to characterize the extent of PFAS contamination in RI waters and fish (see Section 2.5.6 for PFAS as a special topic). DEM will be completing statewide water quality assessments, documented in integrated reports, in 2026 and 2028 with the resulting information used to identify potential NPS Success Stories ae well as re-assess and update as needed NPS priority watersheds.

This plan emphasizes watershed-based approaches to NPS pollution management. The long-term goal for all Rhode Island watersheds is to achieve clean and healthy waters. However, limitations on staffing and financial resources demand programs be strategic in targeting their work to optimize results. At the state scale, it is important to identify which watersheds or waterbodies will be the focus of state management attention with respect to NPS pollution.

Over the five-year planning period, the DEM NPS Program has prioritized developing new watershed-based plans for the following planning areas:

- Abbott Run River sub-watershed (Blackstone River basin)
- Aquidneck Island
- Saugatucket River Watershed
- Scituate Reservoir Watershed
- Southwest Coastal (Salt Ponds) Region

In addition, the NPS Program will be striving to support capacity building for local lake management through completion of watershed-based plans for 5 or more lakes expected to include: Central Pond/Turner Reservoir, Georgiaville Pond, Indian Lake, Tiogue Lake, and Upper Dam Pond (Breezy Lake). Priorities will be re-evaluated in 2026 and 2028 to take into consideration updated state water quality assessment results and other input from partners. Table 4 provides detailed information (specifically the NPS management priorities and major planned activities) on the Watershed Planning Areas for the 2024-2029 planning period. With completion of these new watershed-based and lake management plans, DEM expects 46% of Rhode Island's land area to be covered by a plan (compared to 28% prior to this five-year planning period). This expands the number of communities eligible to potentially receive financial assistance for implementation projects through the DEM NPS Program.

The priority actions to be undertaken by DEM and partners to address major NPS pollution sources and stressors (identified in Section 2.0) are presented in Section 4.0. Additional description of NPS actions related to DEM administration, program resources, and program evaluation are described in Sections 5.0 through 7.0. Rhode Island recognizes a combination of both regulatory and non-regulatory programs and activities are needed to effectively manage NPS pollution. These range from program development and planning tasks to full implementation of on-the-ground best management practices (BMPs). Section 4.5 (including Tables 6-10) provides detailed information on each of the major NPS pollution categories and stressors, including key planned implementation actions. Examples include actions to facilitate more effective stormwater management, further eliminate cesspools and improve on-site wastewater treatment system maintenance, build capacity for local lake management, remove barriers to stream connectivity, restore riparian buffers, foster agricultural best management practices, and reduce trash and litter in Rhode Island waters.

The importance of intergovernmental collaboration and partnerships is described in Section 5.0. Given the diversity of NPS pollution sources and stressors, this plan recognizes progress towards clean water goals is enhanced by engagement of all levels of government, collaboration with and among non-governmental organizations (NGOs) and by individual actions. Noting the relationship between land use and water quality, municipalities have an especially important role to play in prevention NPS pollution via exercise of their land use authorities. The administration of the DEM NPS Program is also described in Section 5 (see Tables 11-14), including:

- Organization within the DEM Office of Water Resources

- Non-regulatory NPS program activities
- Statewide coordination
- Public outreach, education, and training

Partnerships Resources to implement NPS management are described in Section 6.0. This includes recognition of federal EPA funding as well as other sources including state grant programs. This plan discusses the synergy between NPS management concerns and the evolving programs targeting resilience and climate change adaptation. Implementation of the NPS Management Plan involves the staff efforts of governmental agencies and partners as well as investments made through various grants, loan programs, NGOs, and private contributions. One objective of strengthened watershed planning is to prioritize and better align available resources from the federal, state, and local levels to accelerate implementation of needed actions. Additional information regarding the many sources of funding that are utilized to implement NPS management in Rhode Island can be found in Section 6.0.

Section 7.0 outlines metrics that will be used in combination with reaching the milestones specified in this plan, to track performance of the NPS Management Program. The periodic statewide assessment of water quality conditions for surface waters and groundwaters continues to provide the basis for evaluating the environmental outcomes to which the NPS Program is contributing during this plan's five-year planning period. Enhanced public outreach is planned to share results with the public, raise awareness, and nurture strong support for the continued actions needed to prevent and mitigate nonpoint sources pollution in Rhode Island.

# 1.0 Nonpoint Source Pollution Management Program Plan

## 1.1 Introduction

Clean water is important to Rhode Islanders who have a long history of strongly supporting public investments in water pollution control. While the resulting improvements in wastewater and stormwater treatment have translated into meaningful improvements in water quality, the challenges related to nonpoint source pollution (NPS) persist and continue to be a major management concern affecting Rhode Island's surface water and groundwater resources. Unlike pollution from point sources discharged from specific locations, such as a pipe outfall, nonpoint source pollution comes from diffuse sources (See Section 2.0). NPS pollution is considered the dominant source of water pollution in the United States (EPA, 2024).

The Rhode Island NPS Management Program Plan, in existence and administered by the Rhode Island Department of Environmental Management (DEM) for over 35 years, is one of several core state water quality programs that work collectively toward clean water goals in Rhode Island's watersheds. The overall NPS Management Plan relies on a mix of regulatory and non-regulatory strategies to address priority NPS management concerns with an emphasis on watershed-based approaches. The DEM NPS Program staff carry out largely non-regulatory activities including monitoring and assessment, watershed planning and implementation, policy and program development, technical assistance, financial assistance in support of voluntary water quality and habitat protection or restoration projects, public outreach, education, and training. Work includes the distribution of federal Clean Water Act Section 319 funds for local watershed projects and tracking of results. Priority actions related to NPS Program activities are reflected in this Plan in Sections 3.0-6.0

As an update to the 2019 NPS Management Program Plan, this plan fulfills a United States Environmental Protection Agency (EPA) requirement associated with Section 319 of the Clean Water Act. The plan is focused on five priority categories of NPS pollution sources and stressors and outlines strategies for addressing them across all levels of government. These major categories of NPS pollution are:

- **Stormwater runoff**
- **Onsite wastewater discharges**
- **Hydromodification and habitat alteration**
- **Agriculture**
- **Trash, litter, and plastics**

While these five major categories are not the only NPS sources evident in RI, DEM intends to focus on them as priorities during the next five years[1]. At the same time, by maintaining an emphasis on watershed – based approaches, DEM will be able to more effectively initiate actions as well as align with partners doing the same to mitigate a variety of pollution sources at the same time within a watershed.

[1] Appendix F contains descriptions of minor NPS pollution sources including contaminants of emerging concern.

The pollutants associated with these sources that cause or contribute to water quality degradation include pathogens (such as bacteria, viruses, and other disease-causing organisms), nutrients (phosphorus, nitrogen) sediment and turbidity, toxics, excessive growth of algae and aquatic invasive plants, and flow alterations. Stormwater runoff is a common pathway by which these pollutants move across the landscape and eventually enter waterbodies. An important element of DEM's approach is to encourage the installation and use of best management practices (BMPs) that address these pollutants together - ideally through nature-based solutions which deliver water quality and other co-benefits in terms of watershed resiliency, climate change adaptation and wildlife habitat, among others. In addition, this Plan notes PFAS contamination as a topic of special concern. NPS pollution problems in Rhode Island are further described in Section 2.0.

Installation of green stormwater infrastructure functions to mitigate multiple pollutants (sediment, nutrients, bacteria) from previously untreated agricultural runoff on a farm in Middletown, Rhode Island.

DEM coordinates NPS Management Program activities in collaboration with other programs managed by the DEM Office of Water Resources (See sidebar below), other state and federal agencies, and many other partners. As Rhode Island's designated water pollution agency, DEM is well positioned to facilitate and enhance coordination among the many programs that contribute to management of NPS pollution. On the state level, the RI Coastal Resources Management Council (CRMC) plays a central role with respect to responsibilities related to coastal nonpoint source pollution and which are further discussed in Section 4.2. NPS Program administration and coordination is further discussed in Section 5.0.

**DEM Office of Water Resources Program and Activities**

Water Quality Standards – Surface Water and Groundwater

Water Quality Monitoring and Assessment

Nonpoint Source Pollution Management Program

Water Quality Restoration Planning (TMDLs)

Lake Management Program

Water Quality Certification Program

Rhode Island Pollutant Discharge Elimination System (RIPDES) including stormwater management

Wastewater Planning and Design

Wastewater Facility Operation and Maintenance Program

Onsite Wastewater Management Program

Groundwater Discharge Program (includes Underground Injection Control Program)

Freshwater Wetlands Program

Shellfish Growing Area Management Program

Financial Assistance – State Grants, certification for Clean Water State Revolving Fund

Technical Assistance – various topics

Professional Licensing (wastewater, OWTS)

## 1.2 Purpose of the Plan

The purpose of this Plan is to describe the strategies Rhode Island will use when carrying out and implementing its NPS Management Program Plan (2024). It is intended to guide and foster coordination and integration of the collective efforts among governmental programs and non-governmental partners engaged in NPS program activities in Rhode Island. The Plan incorporates significant programmatic changes since the submission of the last management plan in 2019 and identifies priority actions to further enhance NPS program activities. Areas of significant program development involve the expansion of efforts to plan for and respond to the impacts of a changing climate, including building capacity for stormwater runoff management and promoting watershed and community resiliency (see Section 4.2), as well as to address environmental justice (see Section 1.6).

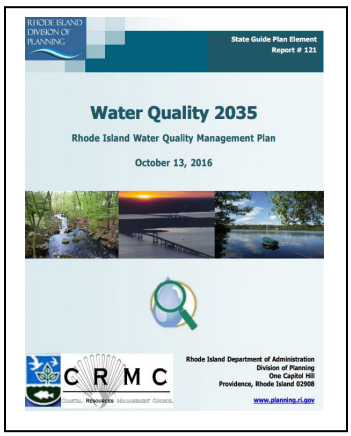
Consistent with EPA guidance, the plan describes priority DEM NPS Management Program activities for the five- year period of 2025-2029. The Plan identifies and describes:

- The major NPS pollutants, sources and stressors affecting RI water resources;
- The long-term protection and restoration goals for the program and a process for engaging the public and stakeholders in prioritizing Rhode Island watersheds for action;

- The priority NPS management actions to be undertaken DEM and partners during FFY25-29 to make progress toward water quality goals in priority watersheds;
- How those actions will be tracked against specific milestones to evaluate implementation of the plan;
- The programs, strategies and resources state agencies and partners bring to bear on priority NPS water pollution challengers.

The plan meets EPA's Section 319 Guidance on key components of an effective state NPS Management Program Plan. Appendix A provides a crosswalk of the EPA key elements to this Plan. The plan also includes limited information on activities concerning minor NPS pollution sources (Appendix F). It is further acknowledged that to support adaptive management this plan may be revised as needed in response to new scientific understanding about NPS pollution as well our as changing climate conditions.

## 1.3 NPS Management Program Long-Term Goals




The nature of NPS pollution makes it is essential that DEM work with a wide range of governmental programs and non-governmental partners to sustain progress toward clean water goals. Rhode Island has been successful in phasing out many of the cesspools located in environmentally sensitive areas and has exhibited state leadership in adopting policies and requirements for low impact development that are helping to prevent future nonpoint pollution problems. However, Rhode Island continues to grapple with persistent nonpoint source water pollution conditions in a significant portion of RI's waters. These are often amplified by the growing urgency of climate change impacts.

The RI NPS Management Program Plan was updated within the context of the overarching goals of the comprehensive planning and policy document RI Water Quality Management Plan Water Quality 2035. Within Water Quality 2035 as well as this Plan, the concept of "water quality" encompasses both water quality and quantity as well as the physical condition of aquatic habitats.[2] It further highlights as priorities:

- Protection and restoration of **drinking water supplies**
- Protection and restoration of **shellfish growing area waters**
- Protection and restoration of waters used for **public recreation including beaches**
- Protection and restoration of **high quality aquatic habitats**

This NPS Management Program Plan is aligned with the overall DEM mission: "to protect, restore, manage and promote Rhode Island's environment and natural resources to preserve

[2] Water Quality 2035 was adopted as an element of the Rhode Island State Guide Plan in 2016. The State Guide Plan has a twenty-year planning horizon, and in addition to water quality, it articulates state policies across a range of topics including land use, transportation, water supply and others.

and improve our quality of life."

The DEM Strategic Plan for FY2024-2026 similarly is consistent with Water Quality 2035 and includes goals to protect and improve water quality, counter climate change, and prioritize environmental justice in all programs.

The long-term goals for the 2024 Rhode Island NPS Management Plan are:

- **Protection of Waters –** To protect the existing quality of RI's waters and aquatic habitats and prevent further degradation due to NPS pollution; and
- **Restoration of Waters –** To restore the quality of waters and aquatic habitats degraded by NPS pollution to conditions that support the intended uses of these waters and habitats; and
- **Informed Public –** To raise public awareness and understanding of the causes and impacts of NPS pollution and stressors.

## 1.4 NPS Management Principles

The strategies and actions identified in the RI NPS Management Program Plan target RI's most pressing NPS pollution challenges. The foundation for these actions is a set of management principles utilized to develop this plan, as well as other state water related management plans. They are:

- A watershed-based management approach is employed in efforts to restore and protect water quality and aquatic habitat;
- Protection and restoration are equally important to achieving RI's goals for water quality and aquatic habitat;
- Water pollution is to be prevented whenever possible as it is a more cost–effective strategy than source control and restoration;
- Compliance with applicable federal, state, and local regulatory programs is necessary for water quality and aquatic habitat protection and restoration;
- Water quality management is based on sound science and regularly integrates new information, including improved scientific understanding, technological innovations, and knowledge of climate change;
- Water quality and aquatic habitat management strategies are designed and adapted to mitigate the adverse impacts of a changing climate;
- Monitoring is an essential component of water quality management that yields information necessary for effective management;
- Indicators of environmental conditions and performance, as well as analytical tools, are used to evaluate and report on progress toward water quality goals and objectives;
- Integrated, well supported data management systems are essential for water

resource protection and restoration program management;

- Limited resources at all levels of government require and justify efforts to prioritize protection and restoration efforts;
- Rhode Island citizens are informed and aware of water quality management priorities and efforts to protect and restore water quality and aquatic habitat, as well as actions they can take to protect and restore our water resources;
- Stakeholders are involved in the planning and implementation of programs for water resource and aquatic habitat protection and restoration through meaningful public engagement;
- No group of people should bear a disproportionate share of negative environmental consequences and there should be equal access and opportunity to enjoy clean water resources;
- All levels of government (federal, state, local), non-governmental organizations (NGOs) including watershed organizations, private entities, and individuals share in the responsibility and duty to protect and restore RI's water resources and aquatic habitats; and
- A collaborative effort is necessary across all governmental jurisdictions, agencies, and programs to ensure success in protecting and restoring RI's water resources and aquatic habitats.

Installation of green stormwater infrastructure to mitigate multiple pollutants (sediment, nutrients, bacteria) along the Seekonk River in Providence.

## 1.5 Water Quality Management Framework

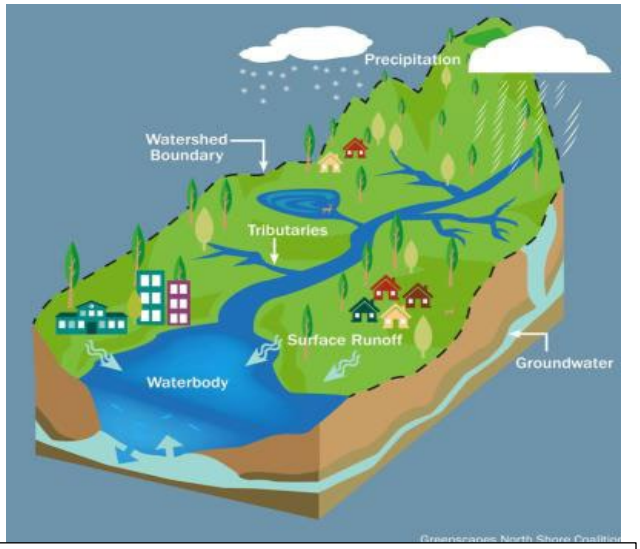
The actions in this NPS Management Program Plan are consistent with and reinforce Rhode Island's overall water quality management framework which is described in the water quality element of the RI State Guide Plan (Water Quality 2035). The framework incorporates the use of a **watershed-based approach** to facilitate effective management of our water resources.[3] It reflects implementation of state and federal water pollution statutes, including the federal Clean Water Act. The framework provides a process for government and other stakeholders to prioritize problems and work collaboratively on a watershed basis. Management activities related to water quality and aquatic habitats are considered and aligned within a given watershed to optimize results in terms of both environmental outcomes and societal benefits associated with improved water quality and habitat. As depicted in Figure 1, this framework can be summarized in six components organized to facilitate the use of sound science in management decision-making. The framework involves:

- **Water Quality Standards,**
- **Monitoring/Data Collection,**
- **Assessment,**
- **Planning to Protect/Restore,**
- **Implementation,**
- **Evaluation.**

Additional description of certain framework activities is included in Appendix B. With respect to planning, a core component of the NPS Program is the development of watershed-based plans that meet 9 minimum elements as specified in EPA guidance (see Appendix D).

**What is a Watershed?**

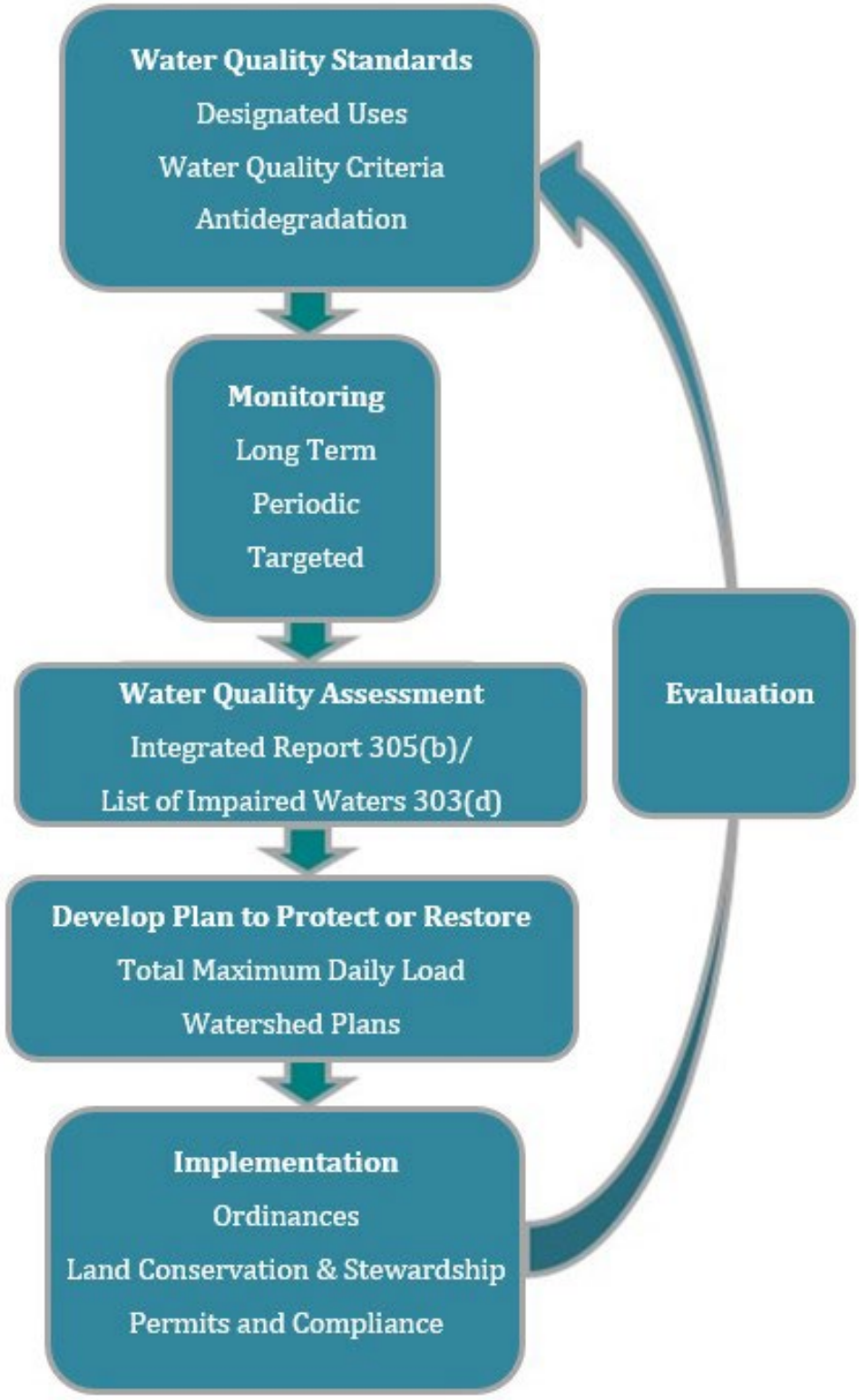
A watershed is the land surface that drains or "sheds" water to a single waterbody, such as a stream, river, lake, or coastal bay. Watershed boundaries are defined by topography and are mapped at different scales aligned with resource management needs.




Watershed Diagram. Credit: Greenscapes North Shore Coalition

[3] Rhode Island water resources are further described in Appendix C

***Figure 1. Water Quality Management Framework***



## 1.6 Consideration of Environmental Justice in NPS Management

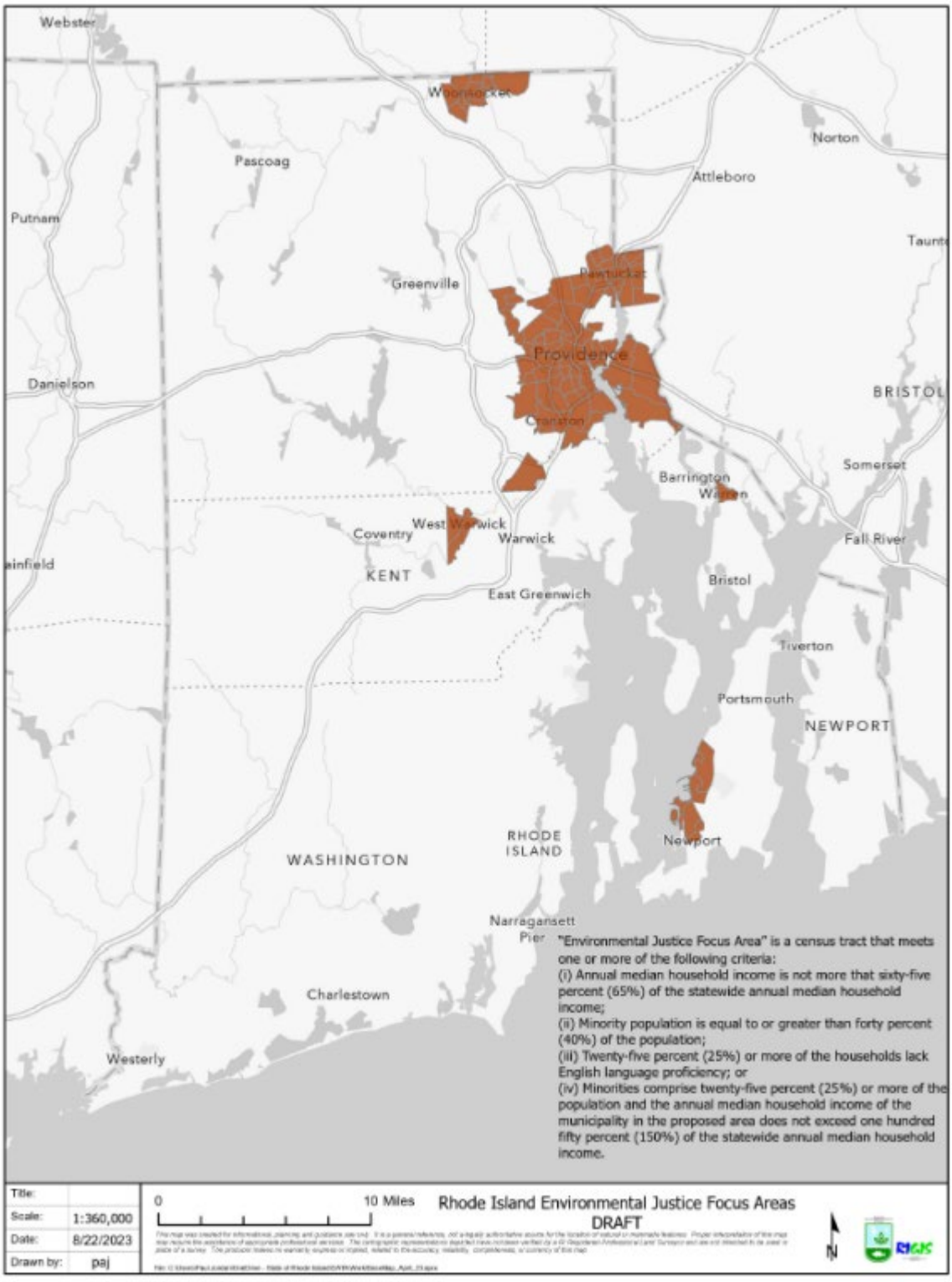
An area of special consideration in this Plan is Environmental Justice (EJ). DEM defines EJ as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, Tribal affiliation, disability, English language proficiency or income with respect to access to the State's natural resources and the development, implementation, and enforcement of environmental laws, regulations and policies." In September 2023, DEM issued its Environmental Justice Policy to guide all programs with the Department. The EJ policy represents the Department's commitment to the inclusion of equity and justice within all programs and is intended to be dynamic, evolving based on feedback from local community groups, businesses, elected officials, faith communities, and communities of color - including individuals who identify as Black, Latino, Indigenous and Native American, Asian American, Native Hawaiian, and Pacific Islander. Communities in Rhode Island with environmental justice concerns face entrenched disparities that are often the legacy of racial discrimination and segregation, redlining, exclusionary zoning, and other discriminatory land use decisions. DEM identified and mapped "EJ Focus Areas" based on four socio-economic criteria assessed by census tract (Figure 2). The EJ areas are located in urbanized areas and as a result overlap with the jurisdiction of the DEM MS4 stormwater program (Figure 3). More broadly, the RI Division of Planning is leading a multi-agency initiative to develop a tool, referred to as the Social Equity Platform, that would also be available to DEM to identify EJ areas on the more detailed census block scale.

DEM has taken steps to support EJ by building staff capacity in the Director's Office, providing training to Department staff and pursuing targeted grants. Later in 2024, with funding from EPA, DEM launched a multi-year initiative to build a model of engagement in the targeted EJ Focus Areas of Providence, Central Falls, and Pawtucket. The DEM Office of Water Resources will be participating in the Project Steering Committee. The NPS Program will benefit from the relationships and collaborations with the community groups fostered through the project as it promotes NPS implementation in these areas.

The NPS Program will also be assessing barriers to greater participation by EJ communities. DEM notes the mapped EJ Focus Areas are located within areas subject to MS4 stormwater program jurisdiction[4]. The rivers in these areas are also known to be impacted by other point sources of pollution, including combined sewer overflows and wastewater treatment facility discharges. These conditions limit the water quality improvement projects that will qualify as eligible under Section 319 of CWA. However, the DEM Program is committed to further exploring the flexibilities that may exist to foster greater participation of these communities in the NPS Program. The initial focus of these efforts is on trash-free waters, ecological restoration (streambank restoration) and green infrastructure projects that are not being required under the DEM MS4 Program. Specific references to EJ-related priority actions are included in Table 12. Additional information can be accessed through DEM's EJ webpage.

[4] See Figures 2 & 3

***Figure 2. DEM Environmental Justice Focus Area Map (2023)***



# 2.0 Nonpoint Source Pollution Challenges in Rhode Island

## 2.1 What is NPS Pollution?

Unlike pollution from point sources that discharges from a specific location, such as a pipe outfall, NPS pollution comes from many diffuse sources across that landscape. It generally results from surface runoff due to precipitation and snowmelt, percolation into the ground and atmospheric deposition. NPS pollution results when water moving over and through the ground picks up pollutants from various land uses and activities and carries those pollutants into rivers, streams, lakes, coastal waters, wetlands and groundwaters.[5] Examples of land uses that may be sources of NPS include urbanized lands, agriculture, silviculture, construction sites and landfills among others. Physical stressors that degrade or alter aquatic habitat, including hydromodification, are also considered within the scope of NPS Program. Given the diversity of NPS pollution sources, it is often difficult to identify, measure and quantify specific NPS pollutant loadings. The NPS Management Program also address physical stressors that degrade or alter aquatic habitats including hydromodifications.

### *When is stormwater runoff a nonpoint source of pollution?*

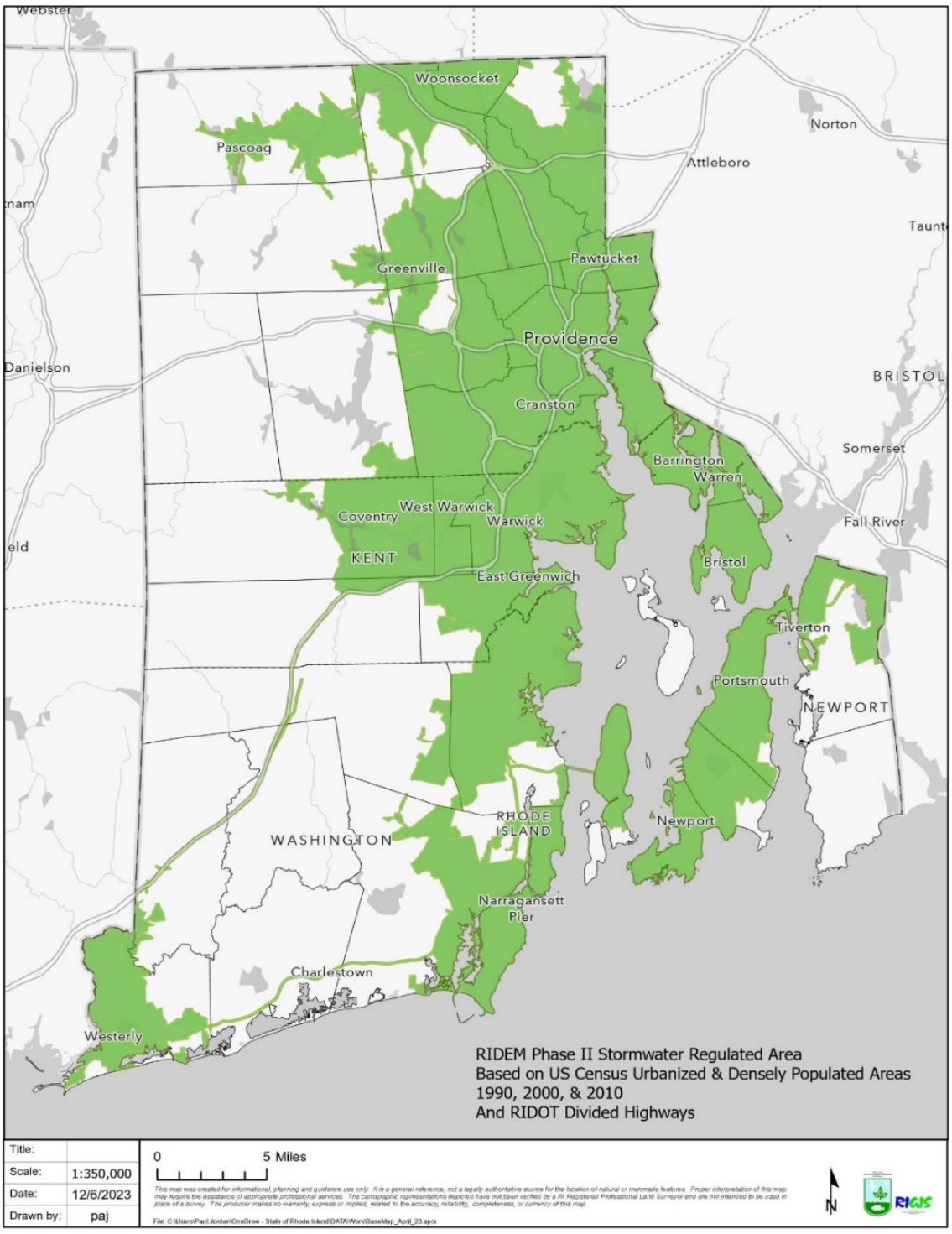
For the purposes of this plan, stormwater runoff from developed land that travels in a diffuse manner is categorized as a nonpoint source of pollution provided that it is not collected in a conveyance system and discharged from a point location, such as a pipe outfall. In contrast, urban stormwater runoff that is collected in infrastructure that leads to a point discharge into a surface water is – in most cases – regulated as a point source via the Rhode Island Pollutant Discharge Elimination System (RIPDES)-Municipal Separate Stormwater System (MS4) program. The Clean Water Act and EPA guidance limits the use of Section 319 funding for actions required under the MS4 permit but allows support for projects that are above and beyond permit requirements. All or portions of 34 of 39 municipalities in Rhode Island are regulated as part of the MS4 program[6] which limits the NPS Program's activities in the urbanized portions of the State with respect to stormwater management. (See Figure 3) This plan identifies actions pertaining to the management of *diffuse* sources of stormwater runoff from developed lands.

Point discharge of stormwater from an outfall pipe.

Stormwater sheet flow along a street that may or may not receive treatment. Credit: Lake Superior Streams.

[5] Rhode Island's water resources are further detailed in Appendix C.
[6] Approximately 42% of RI's land area is included in the MS4 Program.

***Figure 3. Municipal Areas Regulated Under the DEM MS4 Stormwater Program***



## 2.2 Land Use, Impervious Cover, and Water Quality

Research has firmly established a relationship between water quality in streams and the amount of impervious cover (IC) within a watershed. Impervious cover refers to the hard surfaces created by pavement, buildings or other structures which prevent the infiltration of precipitation and as a result, may generate untreated stormwater runoff. Impervious cover associated with urbanization degrades water quality and habitats in a variety of ways including changes in hydrology and stream geometry, increased pollutant loadings and physical alteration to aquatic habitats (CWP 2003). The higher the extent of IC within a watershed the greater likelihood of degradation of aquatic resources with 10% of IC used commonly as a benchmark for when water quality typically degrades.

Rhode Island has a total area of 1,214 square miles, of which 1,055 square miles are land[7]. Across its landscape, freshwater water resources are widely distributed and comprise about 16% of RI's total land area. When summarized, the 2020 Land Use Land Cover data reveals about 29.6% of the state total area is developed, 65.1% is undeveloped and 5.3% is in agricultural use. About 24% of the total state area, (164,465 acres) is identified as conserved open space and/or restricted from development. Overall, the 2020 dataset indicated about 13.3 % of Rhode Island's land area consists of impervious cover, however it is ***not*** distributed evenly across the state. See Figure 4.

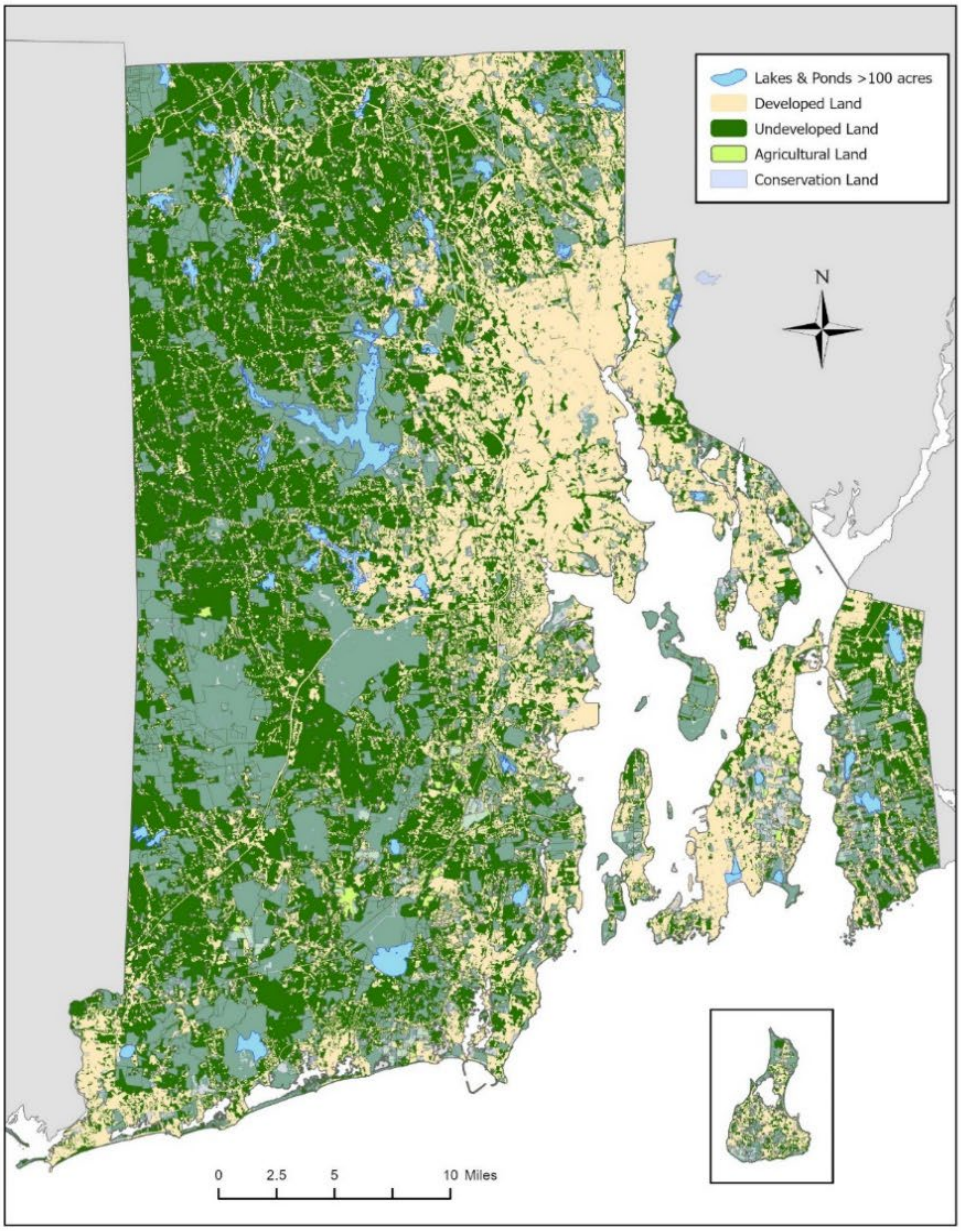
As a general assessment in support of the NPS Program, DEM calculated an updated percent of impervious cover for watershed lands in RI as grouped into watershed planning areas (See Table 3 in Section 3.0 and discussion of watershed planning in Section 4.0). While several watersheds are shared with the neighboring states of MA and CT, the figures here reflect the IC levels for the Rhode Island portion of these watersheds. A comparison to the 2019 Plan figures from a 2011 IC dataset showed that watershed planning areas experienced increases in IC ranging from 0.1% to 1.7 %. In the most heavily urbanized watershed planning areas the % of IC ranged from 28.8% to 47.1% and encompassed all or portions of 20 communities. Of these municipalities, the 8 most densely developed had % of IC ranging from 35% to 66.9% with the urban core of Providence, Pawtucket and Central Falls all falling above 60%. These very urbanized watersheds generally had higher percentage of stream miles with documented water quality impairments indicating a need for sustained restoration efforts, although data gaps limit a full comparison among watersheds.

As noted earlier, the State Guide Plan Water Quality 2035 covers a number of state-wide policies and programs, including those governing land use management under its Land Use 2025 plan. Slated for updating, Land Use 2035 outlines state policies and recommended actions to curb urban sprawl and minimize the adverse environmental impacts of future land development and redevelopment. State law adopted low impact development principles as required state policy. Municipal comprehensive land use plans are required to be consistent with these State policies. Recent changes to the state land use law have been enacted with a goal of facilitating housing production in response concerns with housing availability and affordability. A legislative commission, in which DEM participates, is continuing to review the entire area of land use development including permit approval processes[8]. This work on land use planning highlights the

[7] https://www.ri.gov/facts/trivia.php
[8] https://www.rilegislature.gov/commissions/laus/SitePages/hmaterials.aspx

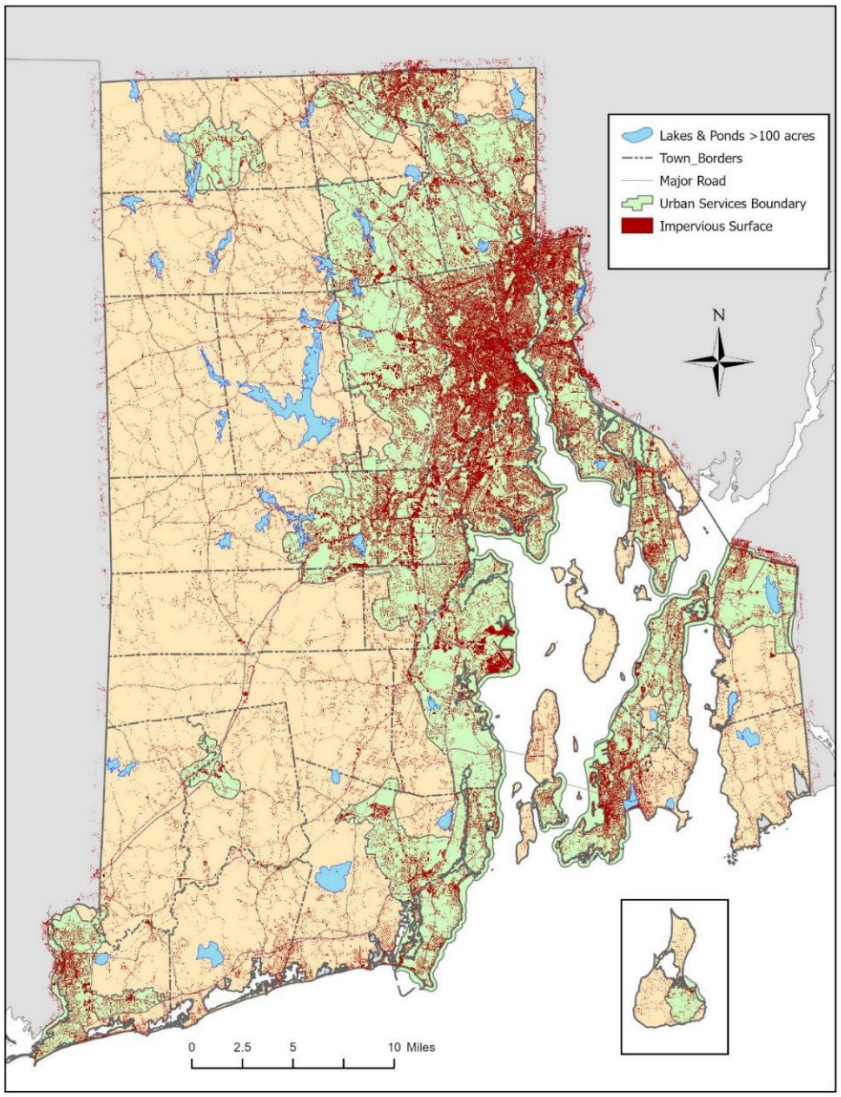
need for effective NPS state and local management policies and strong coordination between the two levels of government.

***Figure 4. Rhode Island Land Use – 2020***



### *Figure 5. Impervious Cover and the Urban Services Boundary*

The urban services boundary (area in green) is designated in the state "Land Use 2025: State Land Use Policies and Plan." This Plan directs the State and communities to concentrate growth inside the Urban Services Boundary which has existing infrastructure to support growth and within locally designated growth centers in rural areas.



## 2.3 Major NPS Pollutant Concerns

Nonpoint source pollution is recognized as a management concern in all RI watersheds due to historic and current human activities. Although there have been notable improvements in water pollution control in Rhode Island, the statewide assessment[9] of water quality continues to find a majority of freshwaters and 36% of estuarine waters are "impaired" – meaning the waters are not fully meeting state water quality standards. (DEM Integrated Report, 2024) Degradation of aquatic habitats has been well documented with barriers to stream connectivity and the growth of aquatic invasive species known priority concerns. Available data indicate groundwater pollution has contaminated hundreds of locations across the state.

Four of the most widespread causes of water pollution commonly associated with NPS pollution documented in Rhode Island are:


***Pathogens*** – Waterborne pathogens include bacteria, viruses, and other organisms that may cause disease or health problems in humans. Nonpoint sources of pathogens include various discharges from failed and substandard onsite wastewater treatment systems (OWTS), boat discharges, pet wastes, and agricultural animal wastes as well as those from waterfowl and wildlife. Elevated pathogens are a human health concern and may result in the closure of shellfish harvesting grounds and public beaches. Stormwater runoff plays a major role in washing pathogens from many of these sources into surface waters.

***Nutrients*** – Nutrients are chemical elements that all living organisms need for growth. Problems arise when too much of a nutrient is introduced into the environment through human activities. In surface waters, excess nutrients fuel algal blooms that upset the ecological balance and can lead to water quality degradation in a process known as eutrophication. Severe algal blooms can result in the depletion of oxygen in the water that aquatic life needs for survival. Excess algae also reduce water clarity, preventing the growth of desirable plants (such as sea grasses) and hampering the ability of aquatic life to find food. Cyanobacteria (aka blue-green algae) blooms may result in the release of natural toxins that can be harmful to humans and animals. Certain types of blooms may result in the release of natural toxins that can be harmful to humans, pets, marine mammals, fish and shellfish. Freshwaters are primarily affected by excess phosphorus (often transported as attached to sediment), while in coastal waters nitrogen is the nutrient of highest concern. In some cases, both nutrients may interact and contribute to the water pollution problem. In groundwater, excess nitrogen can cause nitrate concentrations to rise to levels unsafe for drinking water consumption. The major human nonpoint sources of nutrients in RI include OWTS discharges, fertilizer use, animal manure, pet wastes, and deposition from air pollution. Again, stormwater runoff plays a significant role in transporting excess nutrients into surface waters.

[9] See Appendix B for further discussion of water quality monitoring and assessment

***Sediments –*** Sediment consists of dirt and rocks and may include organic matter as well. Sediment water pollution problems are created via erosion which dislodges sediment which may then is washed into waterbodies or storm drains. Sediment pollution may be generated from construction sites, agricultural activities, yards or any location where loose dirt is not secured. Streambank erosion is also a common occurrence resulting from the higher flows during and just after rain events. Sediment can deliver other pollutants into a waterbody including phosphorus and harm aquatic ecosystems in other ways. Turbid, cloudy water prevents sunlight from reaching native water plants. It also makes it hard for fish and other animals to find their food. Sediment destroys habitat for small animals that live at the bottom of a stream like young fish, dragonfly nymphs, and other aquatic insects. Sediment can also clog fish gills, making it hard for fish to breathe. Excessive buildup of sediment in a waterbody can alter hydrology and contribute to flooding problems in developed areas.

Streambank erosion. Credit: Wisconsin Department of Natural Resources

**Trash, Litter, and Plastics** – Aquatic trash can enter our water ways easily if not properly disposed or securely contained. Once in our water, aquatic trash affects water quality, endangers plants and animals, and pollutes the outdoor spaces that we depend on for tourism and recreation. Though all types of aquatic trash can have potentially harmful impacts, plastic waste is particularly concerning because of its tendency to persist in the environment and its widespread production, use, and disposal. One form of plastic pollution involves microplastics which are generally considered to be those tiny pieces of plastic less than 5 millimeters in length. Recent Research in Narragansett Bay documented the wide occurrence of microplastics in bay sediments (Fulfer, V.M. et al, 2023). As an emerging field of study, the full public health or environmental consequences of microplastics in the environment is not yet clear. Additional research is being pursued by various entities including federal agencies and academic institutions.

There are a variety of other pollutants associated with nonpoint sources of pollution in RI. These include salt, toxics (including PFAS, metals, pesticides, synthetic organic compounds), oils and grease, solid wastes, compounds in pharmaceutical and personal care products, and heat. To date, most of the pollutants have generally not been found in concentrations of concern as frequently as nutrients and pathogens. The exceptions to this are mercury which has been documented in fish tissue in a large majority of freshwater lakes sampled across the state as well as marine fish species and PFAS. Caution is also needed in drawing conclusions as monitoring for these other pollutants is less extensive resulting in data gaps. For additional information on PFAS, see the Special Topic on Page 36.

## 2.4 Major NPS Pollution Categories - Sources & Stressors

Through assessment of the various NPS pollution and stressors on Rhode Island's water resources, DEM identified and prioritized five major NPS categories that are the focus of this Plan. By narrowing its focus, DEM NPS Program will be able to more effectively align with partners that share these priorities. The major sources are listed in Table 1 below and further described in Section 4.0.

**Table 1. Major NPS Pollution Sources and Stressors**

| Major NPS Pollution Source/Stressor | Primary Pollutant/Stressor of Concern | Water Quality /Aquatic habitat Impacts |
|---|---|---|
| **Stormwater Runoff** | Pathogens, nutrients, sediment, oil and grease, metals, other toxic chemicals, salt | Eutrophication of surface waters<br>Degradation of drinking water source waters<br>Beach closures<br>Shellfishing closures<br>Algal blooms and disruption of recreational uses<br>Degraded aquatic habitat |
| **Onsite Wastewater Systems** | Pathogens, nutrients, other pollutant compounds | Eutrophication of surface waters<br>Degradation of drinking water source waters<br>Surface water degradation<br>Groundwater contamination |
| **Hydromodification & Habitat Alterations** | Physical alteration of habitat by filling, erosion and sedimentation, excessive growth of aquatic invasive plants | Loss and degradation of aquatic habitat<br>Loss of recreational uses |
| **Agriculture** | Nutrients, sediments, pathogens, pesticides | Eutrophication of surface waters<br>Degradation of drinking water source waters<br>Degraded aquatic habitat<br>Surface water degradation<br>Groundwater contamination |
| **Trash, Litter and Plastics** | Trash and debris | Degraded aquatic habitat<br>Harm to fish and wildlife |

## 2.5 Water Quality Conditions in Rhode Island

### 2.5.1 Surface Water Quality

On a biennial basis to comply with federal CWA responsibilities, DEM/OWR assesses the quality of the state's surface waters and reports the results in the state's Integrated Water Quality Monitoring and Assessment Report. Waterbodies or waterbody segments are assigned a waterbody identification (WBID) number for purposes of tracking. DEM/OWR compiles readily available data and information and evaluates each WBID as meeting or not meeting Rhode Island water quality standards. The assessment process considers each of the designated uses assigned to the waterbody and uses the narrative and numerical criteria adopted to protect those uses that are part of the water quality standards. All WBIDs are placed into a single assessment category; waters that do not meet water quality standards and require a water quality restoration study referred to as a total maximum daily load (TMDL) are placed onto the 303(d) List (also known as the Category 5 List). Further details on the process are described in the Consolidated Assessment and Listing Methodology (CALM).

**Waterbody ID (WBID) is an identifier used by DEM to track specific waterbodies or portions of waterbodies. DEM has assigned 890 WBIDs to RI's freshwater and coastal waters which are used in the statewide assessment of water quality.**

For the 2024 assessment cycle, DEM/OWR tracked 890 waterbody units, referred to as waterbody IDs (WBIDs), statewide including freshwaters and portions of Rhode Island's coastal waters. Water types are categorized as rivers, lakes, or estuarine and coastal. Of these waters, a majority of the water type coverage (miles, acres, or square miles) were tracked and assessed. Of these assessed waters, a majority of river miles and lake/pond acres were considered impaired, and approximately 61% of the impaired river miles and 46% of the impaired lake/pond acres were identified as requiring a TMDL. Approximately a third of assessed estuarine square miles are impaired and 90% of those impaired waters require a TMDL. Coastal waters consist of the near-shore portions of Rhode Island Sound and the waters surrounding Block Island. All coastal waters are tracked and assessed and found to be meeting water quality standards for recreation and shellfish consumption. These waters are also the location of many public saltwater beaches, and these water quality assessments do not reflect localized beach closures that are typically temporary in nature and do not represent persistent water quality impacts. More information is accessible through the DEM surface water quality webpage.

***Primary Water Uses:***

1. Fish and Wildlife Habitat
2. Fish Consumption
3. Primary Contact Recreation
4. Secondary Contract Recreation
5. Public Drinking Water Supply

***Primary Water Use Assessment Categories***

- Fully Supporting
- Not Supporting
- Not Assessed
- Insufficient Information

## 2.5.2 Rivers and Streams

Rhode Island's rivers and streams have been impacted by past use, historical growth along river corridors, and current development patterns. Data show the water quality in about 79%, or 1,087 of the total river miles tracked in Rhode Island to be fully or partially assessed for the 2024 assessment cycle (DEM, 2024). Elevated pathogens are the most common problem in rivers and are widely distributed through the state. Stormwater runoff clearly contributes to this type of pollution in both urbanized as well as more rural watersheds. Other pollution problems, including metals and impacted aquatic communities, affect fewer streams and occur most frequently within the urbanized portion of the state. Assessment of riverine habitat as part of the biological monitoring protocol for streams has also provided evidence that sedimentation and barriers to stream connectivity such as dams and insufficient culvert size in some streams are degrading aquatic habitat conditions.

***Figure 6. Water Quality Status of Rivers & Streams***

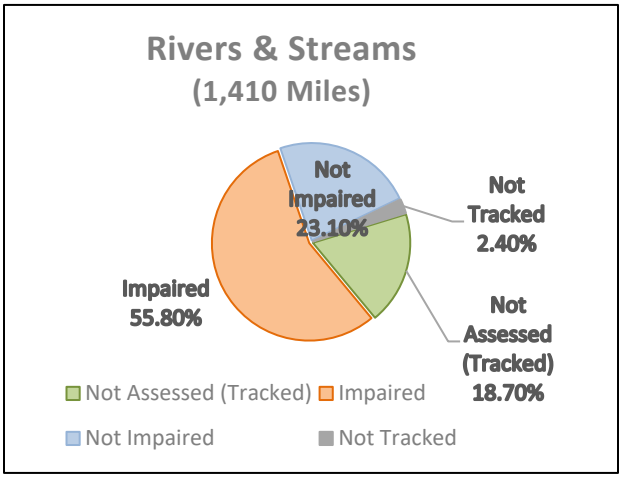
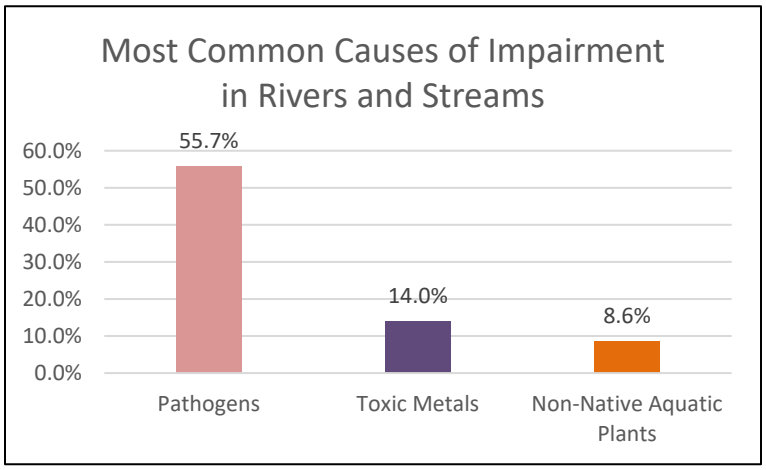



***Figure 7. River & Stream Impairment Causes***




## 2.5.3 Freshwater Lakes and Ponds

DEM currently tracks 233 lakes, ponds and reservoirs covering 18,693 acres or 90% of the total lake acreage in the state. Rhode Island lakes and ponds exhibit not only the impacts of urbanization, but also the degradation of native habitat by invasive aquatic plants and in some cases water withdrawals, e.g. irrigation. DEM has found the largest cause of impairment in lakes and ponds to be mercury in fish tissue (32%, 6,009 tracked acres) (DEM, 2024). Prior work has documented the primary source of mercury in RI waters being the result of atmospheric deposition originating from out of state (NEIWPCC, 2007). The second most prevalent cause of impaired lake acres is aquatic invasive plants (28%, 5,276 tracked acres). Widespread across the state, 15 invasive species have been documented in 112 lakes and ponds which equates to about 61% of the total number of lakes surveyed (DEM, 2024). Other notable impairment causes in lakes were nutrients (18%, 3,334 tracked acres) and causes associated with nutrient impairments, such as chlorophyll-a (6%, 1,092 tracked acres), total organic carbon (6%, 1,196 tracked acres), and oxygen depletion (9%, 1,613.3 acres). No direct discharges of wastewater into lakes are authorized in RI, although some impoundments functioning with the flow of rivers (run-of-river) are located downstream of and may be influenced by wastewater treatment plant discharges.

***Figure 8. Water Quality Status of Lakes/Ponds***

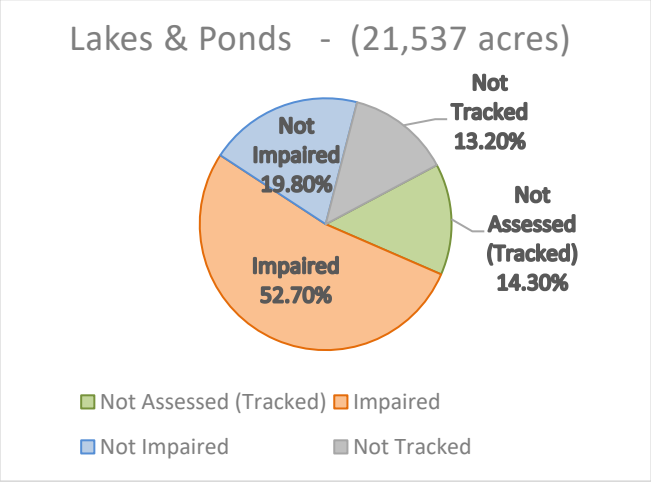
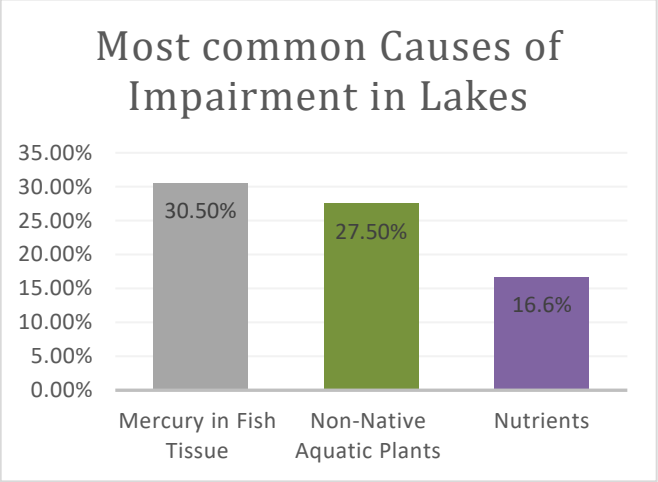



***Figure 9. Lake and Pond Impairment Causes***




Public awareness and concern have grown over the occurrence of harmful algal blooms in RI – especially in lakes. As of September, 2024, DEM has documented cyanobacteria (blue-green algae) blooms in 53 lakes and ponds and two rivers/streams associated with an affected lake/pond. See Special Topic box– cyanobacteria. The increasing trend in reporting of HABs is occurring across New England.

In urbanized areas, DEM has found eutrophic lakes and ponds are affected by a combination of point (i.e., stormwater discharges regulated as point sources) and nonpoint sources of pollution, e.g., waterfowl. In rural watersheds, nutrient management is focused on nonpoint sources including OWTSs, stormwater runoff, waterfowl and wildlife waste and internal phosphorus cycling among others. In contrast to rivers, most lakes do not exhibit elevated pathogens. There are closures of freshwater beaches in lakes each year that which typically reflect localized sources of pollution, including stormwater runoff.

## Special Topic: Cyanobacteria

Cyanobacteria, also known as blue-green algae, are naturally found in many freshwater ecosystems. A combination of excess nutrients, sunlight, and high temperatures can lead to a rapid increase in cyanobacteria, called a "bloom." Some species of cyanobacteria can also produce toxins leading to conditions considered a Harmful Algal Bloom (HAB). The toxins associated with HABs are harmful to people and pets and therefore a public health concern. Cyanobacteria blooms generally occur in late summer into the early fall when water temperatures are warmest and an abundance of sunlight and nutrients are available.

DEM works in collaboration with DOH to conduct surveillance of selected waterbodies with a history of HABs and to collect and analyze water samples to detect and confirm the presence of cyanobacteria blooms and evaluate the potential risks to the public. DEM also responds to reports from the public of suspected cyanobacteria blooms. When necessary, DEM and DOH issue health advisories notifying the public of health risks and recommending contact with the affected waterbody be avoided; e.g. avoid recreational use, swimming, etc.

Over time, the number of public health advisories being issued annually has been slowly increasing in a trend that appears to be reflected across New England. As of September 2024, a total of fifty-five (55) freshwater bodies have been the subject of one or more cyanobacteria bloom advisories since monitoring and notification efforts began in 2011. Currently, twenty-six (26) freshwater bodies are monitored on a bi-weekly basis by DEM, an increase from seventeen (17) waterbodies during the 2023 monitoring season. The current state of monitoring and advisories for 2023-2024 is summarized in the following table. Additional information can be accessed through DEM's Cyanobacteria webpage.

Film on surface of water from blue-green algae can look like spilled paint

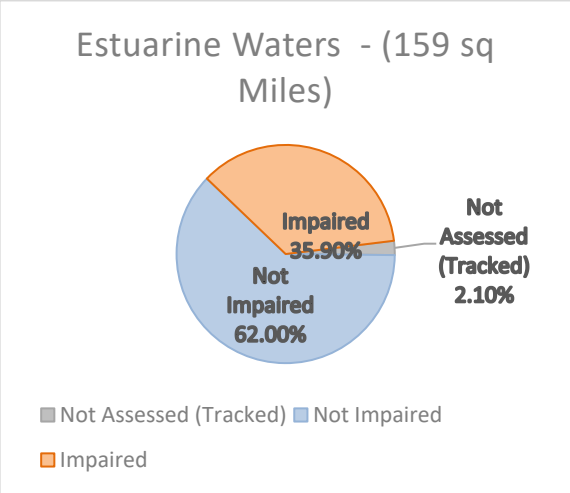
| Year | Total number of advisories | Number of waterbodies for which an advisory was issued | Number of advisories by month | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | May | June | July | Aug | Sept | Oct | Nov |
| 2024 | 29 | 26 | 1 | 2 | 12 | 12 | 2 | - | - |
| 2023 | 24 | 19 | 0 | 2 | 7 | 4 | 3 | 4 | 4 |

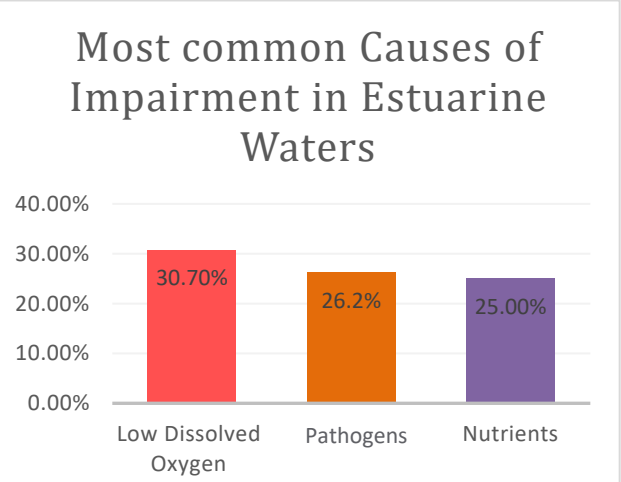
The first advisory in 2024 was issued on 5/9/2024 (Slack Reservoir in Smithfield) which was earlier when compared to the first advisory of 2023 (6/5/2023 - Almy Pond in Newport).
DEM is in the process of creating a public-facing dashboard that shows active and past advisories and monitoring and sampling data. Note that complete data for October and November 2024 was not available as of publication date.

### 2.5.4 Estuarine Water Quality

Data exist to characterize water quality in almost all of Rhode Island's estuarine waters. While a majority of waters are of good quality, there are certain areas which continue to exhibit persistently poor conditions. Elevated pathogens from both point and nonpoint sources prevent shellfish harvesting and recreational uses. Improved water quality has allowed an expansion of shellfish harvesting in Greenwich Bay due in part to NPS abatement actions, while the historic re-opening of shellfishing portions of the Providence River were largely in response to the massive infrastructure investments in Combined Sewer Overflow (CSO) abatement in the upper Narragansett Bay. Most estuarine waters (88%) fully support recreational uses, but the occurrence of saltwater beach closures is indicative of local pollution sources affecting coastal water quality (DEM 2024). In 2023, DOH documented 30 beach advisory events totaling 86 advisory days (DOH, 2024). This marked an increase from 2022, which saw 17 advisory events totaling 41 advisory days. 2023 was observed to be a wet year with many localized large rain events (with accumulations averaging greater than 3 inches) between July and August. Management efforts have focused on identifying local sources of pollution and making improvements through installation of stormwater BMPs and other actions. Water quality improvements have led to City of East Providence committing to establishing a new beach facility at Crescent Point / Rose Larisa Beach. Without strong efforts to control nonpoint sources, however, the increased rainfall anticipated from climate change is likely to produce an uptick in closures again.

***Figure 10. Water Quality Status – Estuaries*** ***Figure 11. Estuarine Impairment Causes***




Excess nutrients result in low oxygen and degraded habitat affecting the diversity of fish, invertebrates and other marine life. Of particular concern for NPS management are RI's southern coastal ponds which remain vulnerable to pollution despite being located in less densely developed watersheds. Sources of pollution to the coastal ponds include OWTS, fertilizer use, and animal wastes (including residential pets as well as wildlife). Stormwater runoff plays a significant role in carrying pollutants into the coastal ponds.

DEM is in the process of reviewing the data on mercury in the tissue of marine finfish in Narragansett Bay. With contractor assistance from EPA initiated in 2023, data was compiled and evaluated to support further assessment of public health risks (Tetra Tech, 2024). The current public health guidance from the DOH recommends avoiding or limiting consumption for certain species with the highest known contaminant levels to once a month.

### 2.5.5 Freshwater and Coastal Wetlands

Wetlands are an important component of Rhode Island's water resources. It is estimated that Rhode Island has lost 25% or more of its freshwater wetlands (Hellyer, G. 1995) and 53% of its coastal wetlands through historical filling and alteration (Bromberg, K. 2005). The functions and values associated with wetlands are degraded by NPS pollution including physical stressors such as filling and hydromodification. Wetland regulatory programs in place with DEM and CRMC have limited *permitted* losses of wetland habitat, however, the state is aware that greater losses occur due to unauthorized alterations.

With funding support from EPA, DEM has developed wetland monitoring strategies for freshwater wetlands and coastal wetlands that reflect a three-tiered approach that includes landscape scale, rapid and intensive assessment tools. DEM has completed a series of projects to develop methods which include tier-2 rapid assessment methods referred to as RIRAM and MarshRAM. The methods involve collection of field data that characterizes the stressors on wetland ecosystems. For freshwaters, an analysis of RIRAM data from 281 vegetated wetlands identified the most common wetland stressors as anthropogenic fluvial inputs, filling and dumping and invasive species (Peach, M. RINHS, 2013). Additional analysis found strong correlations between wetland condition and percent of developed land within 2000 feet around the wetland, thus emphasizing the importance of upland buffer protection. (Kutcher, T. 2017)

With respect to salt marshes, recent work by the RINHS supported by EPA funding used photo interpretation of digital aerial imagery from 1972 and 2020 to estimate historical losses in a representative sample of Rhode Island salt marshes across five decades in which sea-level rise has been rapidly accelerating. Overall, the marshes evaluated in the study lost 11.8% of their original vegetated area. Losses were nearly-evenly distributed on the high-marsh platform, at the seaward edge, and along creeks and ditches, reflecting various mechanisms of marsh loss related to climate change, including pool expansion, edge deterioration, and increased crab herbivory. Loss due to overwash was relatively minor, suggesting that sea-level rise has been a more impactful outcome of climate change for salt marshes than increased storm intensity. (Kutcher, T. 2022) Similarly, findings of recent MarshRAM assessments suggest that sea-level rise is more-strongly impacting marsh platform integrity than any other singular or cumulative human disturbances, and that without management, existing migration corridors may not be sufficient to replace degraded and lost marsh area, indicating a need for active management to sustain the many important functions and services of marshes across Rhode Island. The most common stressors in the surrounding landscape within the 150m buffer were raised roads (34 of the 55 sites), and residential development (38 sites). The most commonly documented direct marsh stressors and disturbances were *Phragmites* incursion (54 of 55 sites), platform ponding and die-off (48), nutrient inputs (48), ditching and draining (45), and filling or dumping (19). Edge erosion and crab burrowing were the disturbances most most-commonly classified as severe, affecting >60% of the marsh edge at 24 and 18 marshes, respectively (Kutcher, T. 2019).

Image: RIWAP Shannon

## 2.5.6 Groundwater Conditions

Rhode Island does not have a long-term network to monitor groundwater quality. Given its geographic setting, data indicative of groundwater contamination are generally localized in proximity to the pollution source. Among available data, a major source of statewide

information on ambient groundwater quality is the RI Department of Health (DOH) data on public drinking water wells that are regularly tested to ensure compliance with drinking water standards. It is acknowledged that most public wells have some degree of land protection in the wellhead area so the assessment results may be of higher quality that other portions of aquifers underlying moderate to dense land development.

Nitrate from OWTSs and fertilizer is used as an indicator of human impacts to groundwater. Natural background concentrations of nitrate are less than 1 mg/l. Five mg/l of nitrate (one–half the drinking water standard of 10 mg/l) has been established as the preventative action limit (PAL) in RI state groundwater quality standards and is often used as a threshold for determining acceptable levels of impact from existing and proposed development. The groundwater transport of nitrogen into coastal waters is a management concern especially for RI's coastal ponds and other poorly flushed sub-embayments. The DOH data from public wells sampled for nitrate from 2019-2023 show most wells had concentrations below the PAL. Elevated nitrates tend to occur in specific areas affected by local land uses and densities and are not generally documented to occur as widespread aquifer contamination.

**Table 2. Nitrate in Public Wells**

| Nitrate Concentration | Number of Public Wells Sampled | | | | |
|---|---|---|---|---|---|
| | 2019 | 2020 | 2021 | 2022 | 2023 |
| <=0.2 | 163 | 166 | 183 | 178 | 181 |
| .21 -- 3 | 366 | 354 | 348 | 339 | 332 |
| 3.1 – 4.9 | 32 | 34 | 30 | 29 | 23 |
| 5.0 – 10.0 | 19 | 15 | 16 | 21 | 18 |
| >10.0 | 3 | 2 | 6 | 2 | 2 |
| **Total Number of Public Wells Sampled** | **583** | **571** | **583** | **569** | **556** |

Volatile organic compounds (VOCs) are another often used indicator of groundwater quality conditions. DOH public well data indicate few wells are contaminated with VOCs at concentrations of concern. Not all public wells are regularly sampled for VOCs as they are for nitrate, which makes annual comparisons for VOCs difficult. The most commonly detected VOC has been methyl tertiary butyl ether (MTBE), which was a common gasoline additive (it is no longer used). Between 2019 and 2023 it was detected in 3-8 sources (public wells). Other VOCs from gasoline are also occasionally detected at low levels but at a reduced frequency due to the measures taken to remove older underground storage tanks and to regulate the design and installation of new tanks. Detections in public wells of VOCs used as solvents has also significantly decreased over the years due to more stringent controls on waste discharges and requirements for collecting and disposing of hazardous wastes as well as site remediation activities. Data from 2019 – 2023 reflected only 2-5 sources (public wells) being found with detections of VOCs. Among those, the levels exceeded drinking water standards only once in 2020 and 2022. While VOC contamination has abated over time, groundwater-based suppliers have been confronted with a new challenge: PFAS compounds. See Special Topic: PFAS below.

In summary, over the five-year planning period, the NPS Program will continue to work closely with related water quality assessment programs to provide information on water quality conditions needed to support water resource management decision-making. As reflected in Table 12, this will involve a full statewide cycle of ambient river monitoring, continued support of volunteer-based monitoring in freshwaters and targeted monitoring to help assess the effectiveness of implementation actions. To protect public health, Rhode Island will continue to monitor beaches and track cyanobacteria blooms. DEM anticipates an expansion of efforts to characterize the extent of PFAS contamination in RI waters and fish. DEM will be completing integrated reports in 2026 and 2028 with the resulting information used to identify potential NPS Success Stories ae well as re-assess and update as needed NPS priority watersheds.

## Special Topic: PFAS

Per- and polyfluoroalkyl substances (PFAS) are a class of chemicals widely used in a variety of products and applications including non-stick cookware, upholstered furniture, clothing, food packaging, and firefighting foam. They have been used since the 1940s to make products water-, grease-, and stain-resistant. Distinct properties of this chemical family cause them to be highly stable in soils, surface water, and groundwater. These properties prevent PFAS chemicals from being easily broken down in the environment, which is why they can still be found decades after a spill or release and why they are often called “forever chemicals.” Scientists are still learning about the health effects of PFAS, but many scientific studies have been published about PFAS exposure and health effects. These studies have largely shown that exposure to PFAS may be linked to harmful health effects in humans and animals. Exposure to PFAS has been linked to higher cholesterol levels, lower infant birth weights, weakened immune response, and increased risk of some cancers, including kidney cancer, as well as interference with the body’s natural hormones. Infants and young children with developing immune systems, people who are breastfeeding, pregnant, or who may become pregnant, and people with weakened immune systems are particularly at risk.

The Rhode Island State Legislature passed the *PFAS in Drinking Water, Groundwater, and Surface Waters Act* in 2022. This law requires public water systems to sample for six PFAS contaminants. The six PFAS contaminants are perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and perfluoroheptanoic acid (PFHpA), and perfluorodecanoic acid (PFDA). The law established an interim state drinking water standard of 20 parts per trillion (ppt) total for these six PFAS which has also been adopted as an ambient groundwater standard for GA and GAA classified aquifers (those known or presumed to be suitable for drinking water without treatment) by DEM. The law applied to 170 community and non-community non-transient water systems. Data collected through October 2023 revealed that 92% of the 170 systems were in compliance with the 20 ppt interim standard and 58% of the water systems did not detect PFAS. Fourteen water systems, all relying on groundwater wells, exceeded the interim standard with three systems exceeding 70 ppt (EPA Drinking Water Health Advisory issued in 2016) triggering a do not drink notice. DOH is overseeing actions by the water suppliers to achieve compliance. In some cases, wells have been taken out of service. EPA announced the National Primary Drinking Water Regulation (NPDWR) for six PFAS compounds on April 10, 2024. EPA established Maximum Contaminant Loads (MCLs), which are legally enforceable levels, for the following: PFOA 4.0 ppt, PFOS 4.0 ppt, PFHxS 10 ppt, PFNA 10 ppt, HFPO-DA 10 ppt, Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS Hazard Index of 1.

Pursuant to the same statute the DEM Office of Water Resources established a PFAS surface water action level that requires regulated facilities to report PFAS if detected in surface water monitoring that is undertaken voluntarily. DEM also compiled a report that documented the work related to PFAS including but not limited to re-remedial site investigations and site remediation work. Some of the PFAS sources noted through this work include firefighting training sites, industrial and industrial processes among others. It notes a background soils study involving 50 sampling sites detected PFAS in all samples but that there were no notable patterns relative to PFAS distribution discerned from the data.

PFAS has been found in wastewater as well as the sludge and biosolids that are generated from treatment processes. Biosolids is a term for wastewater sludge that is intended for beneficial reuse via land application as a fertilizer or soil amendment. Disposal of biosolids is subject to federal (EPA) and DEM regulations. EPA is conducting further risk assessments related to PFAS in biosolids that may restrict the allowable PFAS level in biosolids to be land applied. Currently, while about 90% of sludge generated in RI is incinerated, 8-9% is landfilled or disposed of out-of-state leaving less than 1% that is land applied. DEM has conducted limited private well sampling around biosolids land application sites in RI and found no significant threat to the drinking water wells sampled. Addition sampling and investigation will be necessary to fully assess risk.

Cast as an emerging contaminant five years ago, Rhode Island is fully focused on addressing the environmental and public health impacts of PFAS. This includes staying abreast of the research and technological developments that are building a better understanding of PFAS compounds. Mounting data suggest low concentrations of PFAS compounds are widespread in the environment. As more research and data is forthcoming, including planned sampling of ambient rivers in RI, state managers will continue to collaborate to address the contaminated sites judged to present the highest public health and ecological risks while simultaneously seeking to eliminate PFAS through source reduction actions. Additional monitoring of water resources, including fish tissue analyses, is needed to more fully characterize PFAS contamination in RI's water resources and to identify and prioritize "hot spot" source areas that warrant management action.


Source: Barnstable County, Massachusetts

# 3.0 Watershed-Based Planning and Watershed Prioritization

## 3.1 Watershed-Based Plans - Priority Actions

Primary Partners: EPA, Municipalities, Watershed Organizations

As noted earlier, Rhode Island is placing renewed emphasis on a watershed–based approach to managing water quality. Long recognized as being the most effective means to protect and restore water resources, a watershed-based approach is foundational to the NPS Program (EPA, 1996). DEM has identified 27 watershed planning areas (see Figure 12) as a guide for determining the scale for watershed plan development. These watershed planning areas were chosen based on watershed size, water quality management issues, watershed characteristics, and level of local citizen involvement. Plans can be developed for all of a watershed planning area or a portion of that watershed, i.e., a sub-watershed. To strengthen implementation of this approach, DEM is committing to developing a minimum of 10 additional watershed plans in-house over this next 5-year planning period. In addition, DEM will provide as much support as possible for others that have chosen to develop a watershed plan.

A watershed plan serves as a mechanism to integrate the full range of actions recommended for protecting and restoring water quality and aquatic habitat within a given watershed. The plans will include but not be limited to actions pertaining to nonpoint source pollution. The watershed plan provides an opportunity to identify partners and to collaborate across all levels of the public and private sectors to determine and implement actions supported by sound science. The plans provide an opportunity to give emphasis to protection strategies as well as needed restoration actions. The aim is to integrate and align management activities related to water pollution abatement, flood mitigation, resiliency and aquatic habitat within a given watershed. This approach provides a process for government and other stakeholders to prioritize NPS pollution and other water resource concerns and work collaboratively on a watershed basis to optimize results in terms of environmental outcomes and the other societal benefits associated with improved water quality and habitat.

Watershed plans developed by DEM often build on and cross reference other planning documents (such as any TMDLs, local wastewater and stormwater plans, source water protection plans, etc.) that may exist for those who want or need to delve deeper into a particular topic or strategy. See Appendix B for more details. With the development of municipal resiliency plans, watershed plans developed by DEM are also integrating and describing the synergy between NPS pollution BMPs and climate adaptation and mitigation actions. Watershed plans are intended to be flexible and dynamic. Once the watershed plan is adopted, success toward implementing the plan is evaluated overtime and the plan updated accordingly as part of an adaptive management approach. DEM plans to develop a more systematic approach to updating existing WBPs to sustain their effectiveness and relevance.

While intentionally broad in scope, the plans will at minimum incorporate the required nine elements of a watershed-based plan (WBP) specified by EPA guidance (EPA, 2024). EPA requires that any watershed implementation projects funded under CWA Section 319 directly implement nine-element WBPs or, in a few select cases, EPA-approved alternate watershed-based plans. The

minimum elements of the nine-element plan are outlined in Appendix D of this RI NPSMP plan as well as in Appendix B of the Nonpoint Source Program and Grants Guidelines for States and Territories (EPA, 2024).

Although watershed boundaries often extend beyond local or even state boundaries, many of the actions called for in a watershed plan will necessarily be municipally based, as that is where the authority lies for managing land use and for taking many other steps to protect and restore water quality in Rhode Island. Therefore, it is necessary that the watershed plan be closely coordinated with the local comprehensive planning process. The watershed plan can take a holistic approach by integrating water quality planning with land use planning and planning for activities such as recreation and habitat preservation; e.g., greenway planning. For example, the watershed plan may call for the creation of greenways in the watershed, which protect water quality, provide recreational resources and vital habitat.

The "best" plans – ones that will be successfully implemented – are created with significant input from the people living, working and playing in the watershed. Such plans provide added value by coordinating among entities with vested interest in the watershed to share water quality information, identify NPS pollution and other water quality priorities, and align resources to drive forward the implementation of needed actions. The list of current, active Rhode Island watershed plans can be accessed through the Section 319 Nonpoint Source Program's webpage.

***Figure 12. Watershed Planning Areas***

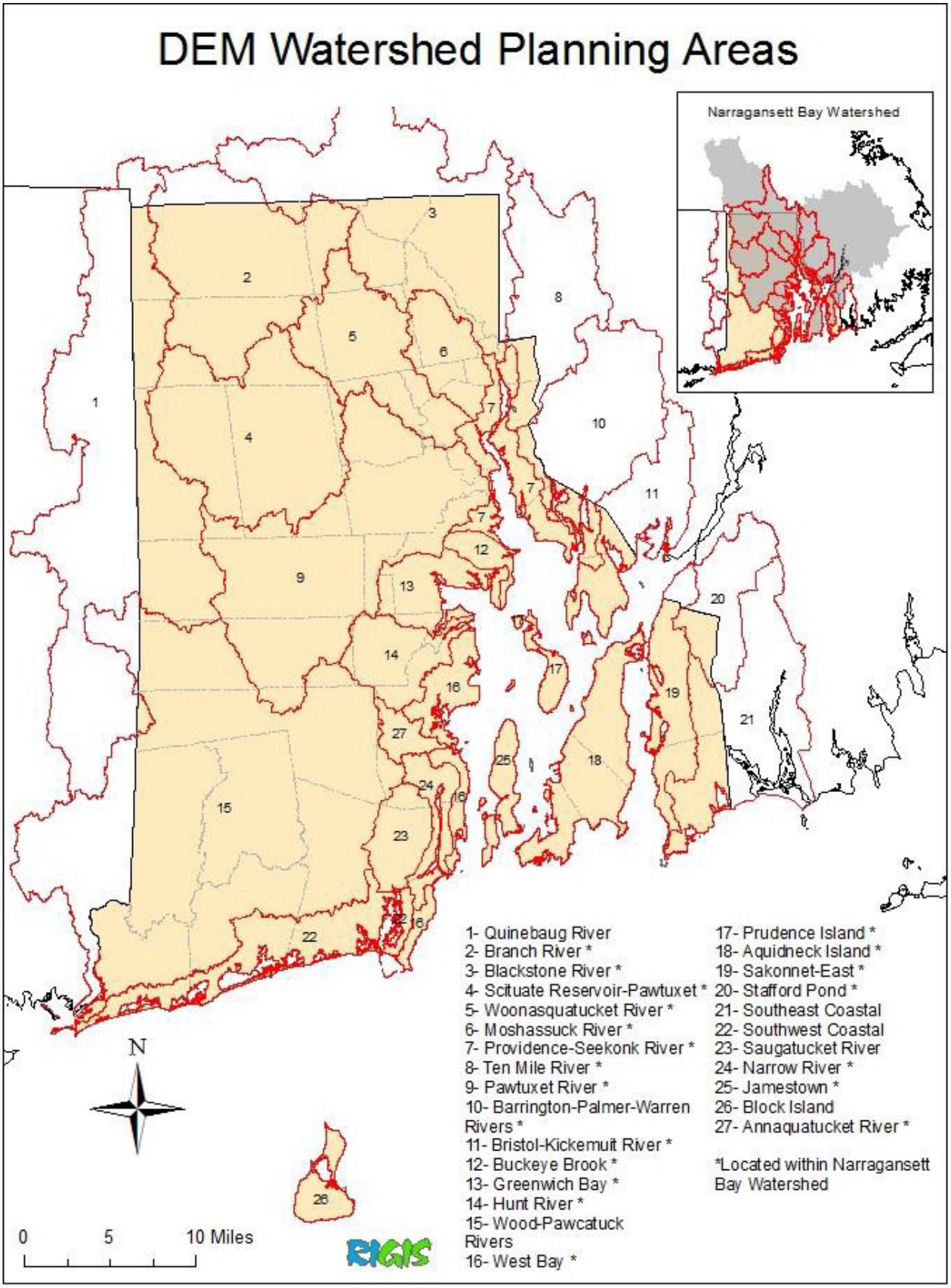
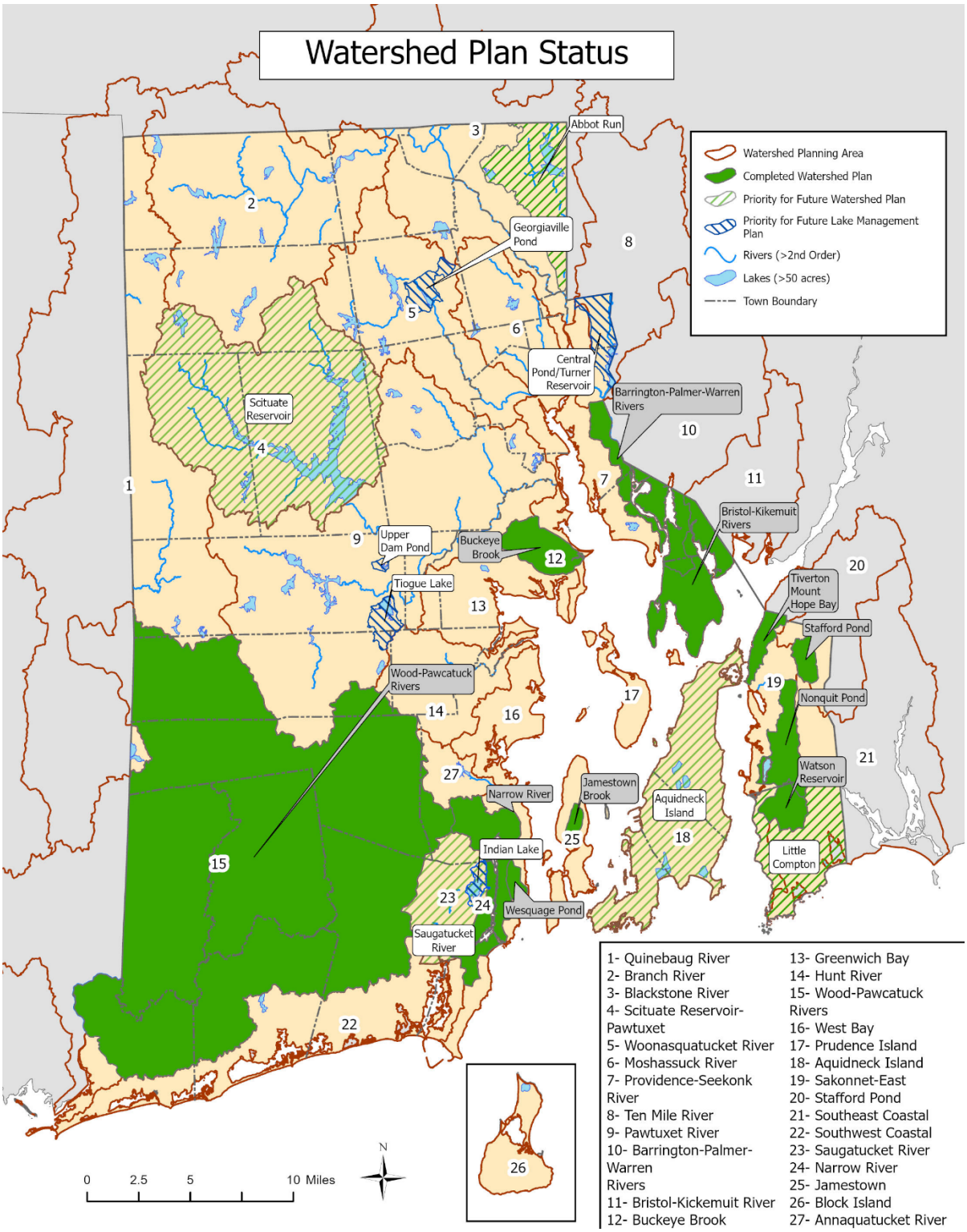


***Figure 13. EPA Approved Watershed Based Plans as of September 2024***



## 3.2 Water Quality Restoration Planning (Total Maximum Daily Loads)

Primary Partners: EPA, Municipalities, Watershed Organizations

Once identified as "impaired," DEM is required by the federal Clean Water Act to develop a Total Maximum Daily Load (TMDL) or alternatively, implement water quality restoration actions addressing each water body and each pollutant causing the impairment. A TMDL is a water quality restoration plan that establishes the acceptable pollutant loads from both point and nonpoint sources of pollution which allow the impaired waterbody to meet water quality standards and support its' designated uses. TMDLs are based on the relationship between pollution sources in the watershed and the ambient water quality conditions. Through the TMDL development process, water quality conditions are more thoroughly characterized and pollution sources are identified, providing the technical basis for the pollution abatement actions specified in the water quality restoration plans. These actions are also incorporated into the watershed plans described in Section 3.1. When available, completed TMDLs, which are approved by EPA, provide a strong technical foundation for development of a NPS watershed-based plan. Additional information regarding the TMDLs development process is described in Appendix B. A list of completed or draft Rhode Island TMDLs can be accessed through DEM's Water Quality Restoration Studies webpage.

The schedule for planned and future TMDL development is reflected in the DEM Integrated Report and associated with the Vision 2.0 process which specifies priorities every two years. With respect to this NPS Plan, in the short-term, DEM has committed to completing TMDLs addressing nutrient pollution for nine (9) waterbodies associated with the source waters of the Newport drinking water supply. TMDL targets will be revisited as part of the process of updating the Integrated Report for 2026 and again in 2028. DEM holds a public hearing to solicit input on the schedule for TMDL development. When feasible, DEM will be aligning TMDL development and NPS watershed planning to reinforce focus within targeted watersheds.

## 3.3 Setting Watershed Priorities

The long-term goal for all Rhode Island watersheds is to achieve clean and healthy waters. Limited staffing and financial resources demand water resources programs be strategic in targeting their work to optimize results. At the state scale, it is important to identify which water quality stressors and which watersheds or waterbodies will be the focus of management attention. A clearly articulated set of priorities helps to facilitate the alignment of resources from various parties and move forward to successfully implement needed actions. The following discusses the DEM process for setting watershed priorities as well as the watershed planning activities projected for the next five years in the NPS Program.

## 3.4 State Level Priority Watersheds

Rhode Island priorities within the state water resources programs reflect an adaptive management approach. Priorities are influenced by federal and state law, federal funding guidance, state policy and initiatives and information concerning environmental conditions. Priorities are periodically re–visited based on new information gained through updated water resource assessments, project results, and new scientific research. The implications of this includes consideration of climate change. As noted in Section 4.2, changes in precipitation patterns and the impacts of climate have heightened public interest in mitigating flooding, coastal erosion and saltmarsh protection. This plan recognizes the synergy among the interest in mitigating NPS pollution and stressors and the interest in mitigating flooding. The projects to address flooding concerns, particularly work to upgrade culverts and utilize "green infrastructure" often deliver meaningful co-benefits that can help address NPS pollution and habitat stressors. DEM encourages the adoption of green infrastructure practices as a primary strategy to promote resiliency, with a caveat acknowledging that fully mitigating flooding impacts in certain existing locations will require additional "gray" infrastructure solutions. It is also understood that the strategies and actions undertaken in this plan will continue to evaluate information on climate change in order to remain effective as conditions change.

**What do these terms mean?**

***Low Impact Development (LID):*** A management strategy that applies a planning and design approach to land use development to reduce stormwater runoff and pollutant loadings with an aim toward mimicking pre-development hydrology.

***Green Infrastructure (GI):*** Green infrastructure refers to an approach to water management that protects, restores, or mimics the natural water cycle. It involves the use of various practices that employ filtration, infiltration, and evapotranspiration to capture and treat stormwater runoff. Examples include bioswales, rain gardens, pervious pavers, and tree box filters which may also be referred to as "Green Stormwater Infrastructure". GI practices are incorporated in LID design plans and are also part of a broader suite of activities known as "Nature-Based Solutions" that optimize protection, management and restoration of natural ecosystems to address societal challenges including impacts from climate change.

In its prioritization approach, DEM first assessed the extent of impervious cover within all designated watershed planning areas in order to provide a foundation of consistent basic information from which to categorize watershed condition and potential for restoration. The resulting categories were developed:

- **Watershed planning areas with less than 10% impervious cover:** These watersheds have fewer surface water quality impairments and may also support some of RI's cleanest waters and highest quality aquatic habitat. Protection and pollution prevention are priorities in these areas although there may also be scattered waterbodies that may also need targeted restoration;

- **Watershed Planning Areas with 10-25% Impervious Cover**: In these areas water quality impairments are more prevalent within watersheds/sub–basins that are more urbanized. DEM has categorized a majority of designated watershed planning areas as being in need of a mix of protection and restoration actions tailored to varying watershed conditions.

- **Watershed Planning Areas with > 25% Impervious Cover**: A smaller number of watershed planning areas have the highest extent of urbanization as well as portions of DEM designated environmental justice areas. The emphasis in these areas is on restoring water quality with recognition that these heavily developed watersheds will require sustained investment in retrofitting the existing landscape and infrastructure over many years in order to achieve water quality goals.

DEM then refined the watershed planning areas grouping assignments based on the documentation of known water quality impairments, excluding mercury in fish tissue which is widespread across RI waters and therefore not useful to distinguishing watersheds for prioritization. In some cases, this resulted in certain watershed planning areas with less than 10% IC being listed in the middle grouping due to the extent of impairment, reflecting the fact that water quality degradation can occur at IC levels below 10%.

## 3.5 Watershed Priorities for 2025-2029

Planning Priorities: To better support a watershed–based approach to implementation, DEM will progressively select watersheds that will be the focus of DEM attention for watershed planning and promoting NPS implementation activities. The factors considered in prioritizing watershed planning activities during 2025-2029 include:

- Priority beneficial uses of water resources being protected or restored consistent with the state water quality goals identified in Section 1.3;
- Prevalence of NPS pollution sources and stressors;
- Status of water quality restoration planning (TMDLs);
- Availability of water quality data and other desired information;
- Local engagement and other partnership opportunities;
- Alignment with DEM Strategic Plan and agency initiatives;

Protection and Restoration Priorities: Based on an internal review of available information and consultation with state and local partners, DEM has identified watersheds of focused attention for the five years addressed by this plan (see Table 3). Factors that influenced the selection of watershed priorities included the following:

- Priority beneficial uses of water resources being protected or restored consistent with the priorities identified above;
- Prevalence of NPS pollution sources and stressors;
- Status of watershed planning;
- Status of water quality restoration planning (TMDLs);

- Potential for documenting water quality improvements;
- Local engagement and other partnership opportunities;
- Alignment with DEM Strategic Plan and agency initiatives including Vision 2.0
- Potential to leverage resources to advance implementation; e.g., NRCS National Water Quality Initiative (NWQI).

**Table 3. Watershed Categorization for Protection and Restoration**

| **Watershed Planning Areas with Emphasis on Protection to Prevent Future Impairments (low levels of impervious cover and existing pollutant impairments)** | | |
|---|---|---|
| Watershed | % Impervious Cover (RI Land Only) | Planning Areas Associated with watersheds extending outside of RI |
| Block Island - New Shoreham | 6.6% | |
| Prudence Island | 3.1% | |
| Sakonnet River East | 8.8% | X |
| Scituate Reservoir | 4.3% | |
| Southeast Coastal | 6.1% | X |
| **Watershed Planning Areas with Emphasis on Mix of Protection and Restoration Strategies** | | |
| Annaquatucket River | 11.0% | |
| Aquidneck Island | 23.3% | |
| Blackstone River | 20.1 % | X |
| Branch River | 6.4% | X |
| Bristol– Kickemuit River | 22.6% | X |
| Hunt River | 14.7% | |
| Jamestown | 13.0% | |
| Narrow River | 12.0% | |
| Pawtuxet River | 18.9% | |
| Quinebaug River | 2.5% | X |
| Saugatucket River | 12.9% | |
| Southwest Coastal | 12.1% | |
| Stafford Pond | 10.6% | X |
| West Bay | 22.7% | |
| Woonasquatucket River | 21.8% | |
| Wood-Pawcatuck Rivers | 5.2% | X |
| **Watershed with Emphasis on Restoration (highest levels of impervious cover and greatest concentration of EJ communities)** | | |
| Barrington –Palmer – Warren Rivers | 28.8% | X |
| Buckeye Brook | 36.9% | |
| Greenwich Bay | 31.1% | |
| Moshassuck River | 34.1% | |
| Providence Seekonk | 47.1% | |
| Ten Mile River | 45.3% | X |

With respect to protection and restoration actions, DEM expects varying levels of implementation will be underway in all watersheds. DEM will focus attention on targeted watersheds by utilizing its staffing resources to enhance coordination and technical assistance and target financial assistance, as feasible. This includes, but is not limited to, coordinating with or participating in technical or other stakeholder committees that work on a watershed basis. Given current resources, DEM will be able to target only a few watersheds each year. The length of time a watershed is targeted will vary (2-5 years) based on local needs and opportunities. Over time, DEM expects to complete watershed plans, conduct monitoring and complete water quality restoration plans (TMDLs) as needed in all of RI's watersheds. This process will extend beyond the five-year period targeted by this plan.

Ideally, the DEM Office of Water Resources would have sufficient resources to assign personnel to support planning and coordination of water quality management activities in all areas of the state. Given this is not possible at this time, DEM will regularly evaluate priorities for watershed plan development and project selection for available CWA Section 319 funds. The process for re-evaluating priorities will involve the following steps:

- Review water quality assessment results within watershed planning areas;
- Solicit public input on planning priorities as part of required public meeting on 303(d) List of Impaired Waters;
- Assess the level of interest in watershed planning and management of the Narragansett Tribe, municipalities, and watershed councils; and
- Consider state strategic priorities and as appropriate consult with federal agencies;
- Use internal discussion among DEM managers to reach a consensus on future watershed targets.

The prioritization process will be done in a manner consistent with DEM's approach to TMDL program articulated via Rhode Island's TMDL Vision 2.0 Framework which describes a framework for prioritizing watersheds for TMDL development as well as protection of healthy watersheds. For the period 2022-2032, through the Vision 2.0, DEM has identified lake nutrient impairments (eutrophication) and declining water quality trends for bacteria in shellfish designated waters as initial areas of intended focus. These are in addition to the completion of pathogens TMDLs for three tributary streams to public drinking water reservoirs that are part of the Newport water supply system.

In the NPS watershed prioritization process, DEM will give significant weight to the willingness of local partners to work with DEM on both watershed planning and implementation initiatives and the opportunities to leverage additional resources. DEM sees advantages to remaining flexible in scheduling and aligning its work in order to continue to be responsive to opportunities that lead to strengthened partnerships and enhanced local capacity. DEM also plans to explore the added value that might be gained by use of the EPA Recovery Potential Tool in the RI prioritization process.

## 3.6 Healthy Waters

In addition to the restoration of impaired waters, DEM has identified watershed planning areas with fewer surface water quality impairments that support some of Rhode Island's cleanest waters and highest quality aquatic habitat. These watershed planning areas tend to fall within areas of the state that have less than 10% impervious cover (for additional information see Table 3 – Watershed Categorization for Protection and Restoration). Healthy watersheds provide many ecosystem services and environmental benefits including clean drinking water, recreational opportunities, fish/wildlife habitat, and reduced vulnerability to severe impacts such as flooding and climate change.[10] DEM understands that the protection of healthy waters today through watershed planning is both ecologically and economically sound and generally requires less resources than restoring impaired waterbodies after they have been damaged. In alignment with EPA's Healthy Watersheds Program, DEM's focus is protection through assessment of potential nonpoint source pollution sources, land conservation, enhancement, and maintenance of riparian buffers, and more.

In summary, over the five-year planning period reflected in Tables 4 and 13, the DEM NPS Program will complete ten (10) nine-element watershed –based plans (WBP). New watershed-based plans will be completed for five (5) watershed planning areas including the Abbott Run River sub-watershed (Blackstone River Basin), Aquidneck Island, Saugatucket River, Scituate Reservoir and the Southwest Coastal (Salt Pond) region. In addition, the NPS Program will support capacity building for local lake management through completion of watershed -based plans for five (5) or more lake sub-watersheds expected to include: Central Pond/Turner Reservoir, Georgiaville Pond, Indian Lake, Tiogue Lake and Upper Dam Pond (Breezy Lake). When completed, the percentage of RI land area covered by an approved watershed plan will increase from 28% to 46%. DEM also anticipates it will complete water quality restoration plans, also known as TMDLs, for nine waterbodies by 2026 for nutrient related impairments. Additional TMDLs to be specified at a future date would be expected to be completed by 2029. Planning priorities will be re-evaluated in 2026 and 2028 to take into consideration updated state water quality assessment results, new program initiatives and other input from partners. These planning efforts will incorporate climate change considerations including integration of flood hazard information and municipal resiliency priorities as appropriate.

[10] https://www.epa.gov/hwp

**Table 4. Prioritization of Watershed Planning Areas for NPS Planning and Implementation**

| Watershed Planning Area | Targeted Waters (Including, but not limited to, the following) | NPS Management Priority | Major Planned Activities | Partners* |
|---|---|---|---|---|
| Aquidneck Island | Bailey's Brook<br>Maidford River<br>Paradise Brook<br>Drinking Water Reservoirs:<br>-Lawton Valley Reservoir<br>-St. Mary's Pond<br>-Sisson Pond<br>-North Easton Pond<br>-South Easton Pond<br>-Nelson Pond<br>-Gardiner's Pond | Drinking Water Supply - restoration of source water quality;<br>Public Recreation – protection of marine beaches. | Complete watershed plan (2025)<br>Develop TMDLs (Melville Ponds); NWQI coordination; Watershed project implementation;<br>Stormwater Management;<br>Nutrient management;<br>Lake management | Municipalities, Eastern RI Conservation District, Aquidneck Island Land Trust, Save the Bay, Salve Regina U., Almy Pond Watershed Protectors |
| Wood- Pawcatuck Watershed | Wood River<br>Pawcatuck River<br>Chipuxet River<br>Queen River<br>Beaver River<br>Meadow Brook<br>Worden Pond<br>Watchaug Pond<br>Chapman Pond | Drinking Water Supply – protection of groundwater quality;<br>Public Recreation – protection and restoration of water quality;<br>Aquatic Habitat – protection and restoration of high-quality habitat. | Little Narragansett Bay TMDL; Watershed project implementation; NWQI coordination;<br>Riverine habitat restoration. | Municipalities, Narragansett Indian Tribe, Wood-Pawcatuck Watershed Association, National Park Service, Wood-Pawcatuck Wild and Scenic Rivers Stewardship Council, The Nature Conservancy, Save the Bay, EPA-SNEP, NBEP. |
| Southwest Salt Pond Region - Coastal Pond Watersheds | Pt. Judith Pond<br>Potter Pond<br>Ninigret Pond<br>Green Hill Pond<br>Quonochontaug Pond<br>Winnepaug Pond<br>Maschaug Pond | Shellfish growing area – restoration of water quality;<br>Public Recreation – protection and restoration of water quality;<br>Aquatic Habitat – protection and restoration of estuarine habitat. | Complete Saugatucket River Watershed Plan (2026)<br>Watershed project implementation;<br>Coastal and aquatic habitat restoration | CRMC, Narragansett Tribe, Municipalities, Salt Ponds Coalition Friends of the Saugatucket River, Friends of Green Hill Pond, Southern RI Conservation District, US Fish and Wildlife Service, NBNERR, EPA-SNEP, NBEP. |

| Watershed Planning Area | Targeted Waters (Including, but not limited to, the following) | NPS Management Priority | Major Planned Activities | Partners* |
|---|---|---|---|---|
| Southeast Salt Pond Region | Watch House Pond<br>Round Pond<br>Long Pond<br>Briggs Marsh<br>Tunipus Pond<br>Quicksand Pond | Public Recreation – protection and restoration of water quality; Aquatic Habitat – protection and restoration of estuarine habitat. | Complete watershed plan (2028) | CRMC, Municipalities |
| Scituate Reservoir | Scituate Reservoir<br>Regulating Reservoir<br>Moswansic Pond<br>Ponagansett River<br>Barden Reservoir<br>Westconnaug Reservoir | Drinking Water Supply – protection of source water quality. | Complete watershed plan; (2027)<br>Watershed project implementation; Nutrient management.<br>NWQI | Municipalities, RI DOH, Providence Water, USDA NRCS, Northern RI Conservation District, Pawtuxet River Authority. |
| Abbott Run Watershed –Pawtucket and Cumberland Water Supplies | Abbot Run<br>Diamond Hill Reservoir Arnold Mills Reservoir<br>Sneech Pond<br>Robin Hollow Pond<br>Happy Hollow Pond | Drinking Water Supply – protection of source water quality;<br>Public Recreation – protection and restoration of water quality; Aquatic Habitat – protection and restoration of high quality habitat. | Complete watershed plan; (2029)<br>Watershed project Implementation. | Municipalities, RI DOH, Water Suppliers, Blackstone River Watershed Council/Friends of the Blackstone, Northern RI Conservation District. |
| Lakes | Publicly accessible lakes in RI, including: Upper Dam Pond, Tiogue Lake, Georgiaville Pond, Central Pond, and Indian Lake | Public Recreation – protection and restoration of water quality; Aquatic Habitat – protection and restoration of habitat. | Complete watershed-based lake management plans Watershed project Implementation.<br>Nutrient management. | Municipalities, Save The Lakes, Lake Associations, Watershed Associations, Conservation Districts. |

| Watershed Planning Area | Targeted Waters (Including, but not limited to, the following) | NPS Management Priority | Major Planned Activities | Partners* |
|---|---|---|---|---|
| Blackstone River | Valley Falls Pond | Public Recreation – protection and restoration of water quality; Aquatic Habitat –restoration Environmental Justice | Watershed Project Implementation. | City of Central Falls, NEIWPCC, EPA-Region 1, EPA-SNEP, Blackstone River Watershed Council/FOB, Blackstone Collaborative, NBEP. |

* Represents some of the partners expected to be engaged in implementing watershed plan actions. The lists are not all inclusive and in no way are intended to limit participation of additional partners. See Section 5.5 for additional discussion on Partnership.

# 4.0 NPS Management Program – Priority Actions

As reflected in this NPS Management Plan, Rhode Island recognizes a combination of both regulatory and non–regulatory programs and activities are needed to effectively manage NPS pollution. These range from program development and planning tasks to full implementation of on-the-ground best management practices (BMPs). This section describes the priority actions to be undertaken by DEM and partners to address the major sources and stressors identified in Section 2.0. Additional description of NPS actions related to DEM administration and evaluation of the NPS Management Program are also described in Sections 5.0 - 7.0.

## 4.1 Integrating Consideration of a Changing Climate

The effects of climate change will strengthen the impacts of many of the nonpoint pollution sources discussed in the previous section, particularly stormwater and the functioning of OWTSs. Climate change is making these sources of pollution more difficult to manage and therefore result in the potential for a greater impact on water quality, especially in vulnerable communities (DeGood, K. 2020). Aquatic habitats are also being affected; saltmarshes in particular are "drowning" in place in some locations due to sea level rise. For each type of threat to water quality and aquatic habitat in this Plan, the impacts of climate change have been considered and where appropriate implementation actions have been included.

Climate change impacts on water quality, quantity, and aquatic ecosystems can vary. Water resources are highly vulnerable to impacts from sea level rise, warming water temperatures, changing precipitation patterns, greater stormwater runoff and flooding. These factors can result in major habitat changes and impacts on biodiversity. Preservation and restoration of saltwater marshes, freshwater wetlands, riverine buffers and floodplains is a key element of green infrastructure and serves as a critical component of efforts to improve climate change resilience and mitigate the impacts of flooding. The increased frequency of intense rainfall events has resulted in greater flooding and heightened public interest in flood mitigation.

CRMC has taken a lead role in addressing coastal resiliency and collaborates with a variety of partners to conduct research, develop planning tools; e.g. "Stormtools" – a method to map coastal storm inundation with or without sea level rise and promote shoreline adaptation and habitat restoration projects among other work. See: http://www.crmc.ri.gov/climatechange.html. Along with work underway on the federal level, RI is continuing to develop additional planning tools to address inland flooding.

Through the RI Municipal Resiliency Program (MRP), the RI Infrastructure Bank in collaboration with The Nature Conservancy has provided direct support to cities and towns to complete a municipal-driven workshop process that brings together climate change information and local knowledge to identify top hazards and identify projects and strategies to improve the municipalities resilience to natural and climate drive hazards. Project implementation is supported through Municipal Resiliency Action Grants. Thirty-five of RI's 39 municipalities have participated in the program since its initiation in 2019 and RIIB has awarded $24.6 million for 56 projects through MRP Action Grants as of September 2024 (RIIB, 2024).

Rhode Island has taken additional steps to bolster its capacity to foster watershed and community resiliency. The RI Chief Resilience Office is now housed within DEM and the agency has dedicated additional staffing to support activities including coordination of the Executive Climate Change Commission (EC4) which is chaired by the DEM Director. The RI Infrastructure Bank has received additional state funding to support municipal resiliency projects. In addition, DEM, through the NBNERR Program, will utilize NOAA capacity building funds to build capacity to advance ecological restoration and community resiliency. Efforts related to flood prevention and mitigation can be complementary to improving water quality and aquatic habitat, through projects that:

- Increase infiltration of stormwater including through green infrastructure;
- Protect and restore saltwater and freshwater wetlands and their buffers;
- Protect and restore riverine buffers; and
- Improve stream connectivity by reducing sub-standard stream crossings.

The complementary relationship between the NPS program, USDA Watershed programs and FEMA's programs should be coordinated wherever practical, particularly with regards to the co-benefits of GI and LID principles and practices. FEMA explicitly promotes incorporating GI methods (both natural restoration and structural practices) in mitigating flood and drought conditions in their Hazard Mitigation Assistance programs. FEMA additionally includes the value of ecosystem services, such as green infrastructure, in the required benefit cost analysis for determining eligible FEMA HMA funded mitigation projects. https://www.fema.gov/grants/mitigation/guide Among its programs, the USDA -NRCS Watershed and Flood Prevention Operations Program helps local governments in RI protect and restore watersheds confronted with flooding issues through a process that begins with assessment of watershed conditions. NRCS is currently conducting this work with partners in a number of watersheds across RI.

The NPS Program also foresees opportunities to collaborate with climate change and resiliency initiatives being promoted or expanded including urban tree initiatives, open space conservation and municipal resiliency planning.

## 4.2 Coastal Nonpoint Source Management

The RI Coastal Nonpoint Pollution Control Program was developed to fulfill requirements of the 6217 of the Coastal Zone Act Reauthorization Amendments of 1990. In April 2000 NOAA and EPA fully approved the Rhode Island Coastal NPS Pollution Control Program, which defines the coastal nonpoint boundary as the entire state. It established strategies to address stormwater runoff from five main sources: urban areas, agriculture, forestry, hydromodifications and marinas as well as management of wetlands and riparian area. The RI NPS Management Plan serves to coordinate and track on-going implementation of the forementioned Coastal NPS Control Program. CRMC is the lead state agency for coastal zone management in Rhode Island. It exercises broad authority to regulate development and other activities in RI's coastal zone in close coordination with DEM. In addition, natural features such as coastal beaches, dunes, barriers, coastal wetlands, cliffs, bluffs, and banks, rocky shores, and manmade shorelines all have an extended contiguous area of two hundred feet from their inland borders that is regulated. In addition to its regulatory programs, examples of activities supporting NPS pollution control in the coastal zone specifically led by CRMC include, but are not limited to, the

development of watershed-based Special Area Management Plans (SAMPs) which address land use and water quality, coastal landscape management programs, and promotion of the voluntary Clean Marina Program. http://www.crmc.ri.gov/

## 4.3 Statewide Regulatory Programs

One unique aspect of RI's NPS program is the regulatory authority that DEM and CRMC exercise over OWTS as well as land development in proximity to wetlands. In many other states, these activities are regulated by county or local governmental agencies. Table 5 lists state regulations most germane to NPS management in RI[11]. The Rules and Regulations aimed at preventing pollution generally apply statewide, although some more stringent rules have been imposed to give greater protection to both surface and groundwater sources of public water supply and to prevent degradation of other high quality special resource waters. Combined, these well-established programs serve to prevent and mitigate NPS pollution from various land uses and activities including emergency response to oil and chemical spills. Certain regulatory programs are cross-referenced under the discussion of major and minor NPS pollution sources.

**Table 5. State Regulations Pertinent to NPS Pollution Prevention and Control**

| | |
|---|---|
| DEM | Water Quality Regulations |
| DEM | Groundwater Quality Rules |
| DEM | Rules Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Management Systems |
| DEM | Rules for the Discharge of Non-Sanitary Wastewater and Other Fluids to or Below the Ground Surface |
| CRMC | CRMC Coastal Resources Management Program |
| DEM | Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act |
| CRMC | Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act in the Vicinity of the Coast |
| DEM/CRMC | Stormwater Management, Design, and Installation Rules |
| DEM | Rules and Regulations Relating to Fertilizers |
| DEM | Oil Pollution Control Regulations |
| DEM | Rules and Regulations Governing Agricultural Composting |
| DEM | Rules and Regulations Relating to Pesticides |
| | Rules and Regulations for Dredging and the Management of Dredged Material |
| DEM | Rules and Regulations for Sewage Sludge Management |
| DEM | Rules and Regulations for Underground Storage Facilities Used for Regulated Substance and Hazardous Materials |
| DEM | Rules and Regulations for Solid Waste (8 rules addressing various facilities |
| DEM | Rules and Regulations for Recycling (4 rules for various materials/wastes) |
| DEM | Rules and Regulations for the Plastic Waste Reduction Act |
| DEM | Rules and Regulations for the Prohibited release of Balloons |
| DEM | Rules and Regulations for Investigation and Remediation of Hazardous Material Releases |
| DEM | Rules and Regulations for the Brownfields Remediation and Economic Development Fund |

[11] DEM also administers CWA programs addressing point source discharges including the Rhode Island Pollution Discharge Elimination Permit (RIPDES).

## 4.4 Management of Major NPS Pollution Sources and Stressors

The following sections discuss the management strategies for various categories of nonpoint source pollution causing water quality impacts. It is important to recognize that most, if not all of these management strategies will need to be adapted to a changing climate which is further discussed in Section 4.2 The pace of climate change in the northeast requires this factor be considered in all aspects of management – planning, implementation, and evaluation.

The 2019 NPS Management Program Plan outlined planned and recommended actions for a broader list of NPS pollution categories. To provide greater focus to priority NPS pollution concerns, this plan groups NPS pollution types into "major" and "minor" categories. Goal, objectives, and milestones are included for each Major Pollution Source/Stressor category along with identifying the primary partners involved in implementing actions to manage the source. Descriptions of minor pollution sources and the existing regulatory and other programs targeting these sources are included in Appendix F.

### 4.4.1 Stormwater Runoff

Pollutants: sediment, pathogens, nutrients, metals, plastics/trash, petroleum products, salt, heat

Primary Partners: EPA, CRMC, RI DOT, Municipalities, NGO

Key points:

- Stormwater is a widespread source of water quality degradation in RI;
- Low impact development design strategies are needed to minimize impacts from new development and redevelopment;
- Untreated stormwater from existing impervious surface must be addressed in order to achieve improvements in water quality;
- Green stormwater infrastructure …Maintenance of stormwater management practices is often neglected and must be improved; and
- Among challenges to abating stormwater pollution, a major obstacle is the lack of a reliable source of funding.

Stormwater runoff is a major, widespread source of water quality degradation in RI and is known or suspected to be associated with the majority of surface water quality impairments (DEM, 2024). Stormwater impacts include: pathogen contamination resulting in beach closures and the closure of shellfish growing areas; nutrient enrichment of waterbodies resulting in algal blooms (including toxic cyanobacteria); elevated levels of other water pollutants (e.g., petroleum products, metals); stream bank erosion; and aquatic habitat alterations from high flows (EPA, 2024). The degree to which stormwater impacts water quality in any particular watershed is primarily a function of the amount of impervious cover and how stormwater generated from the impervious cover is managed.

Diffuse stormwater runoff, such as overland sheet flow, is often categorized as a nonpoint source of pollution. However, in highly urbanized areas prevalent in many portions of RI, stormwater collects in gutters and pipes and is conveyed to a direct discharge into surface waters at the end of a pipe. Pursuant to the federal Clean Water Act, this type of stormwater discharge is regulated as a point source. In Rhode Island stormwater discharges from qualifying urban areas are subject to the federally required Municipal Separate Storm Sewer System (MS4) Program, administered by DEM under the Rhode Island Pollutant Discharge Elimination System Program. Activities which directly implement an MS4 permit requirement are *not eligible* for Section 319 funding. However, use of Section 319 funds for activities that support or exceed permit requirements in MS4 areas may be allowed in some limited situations.

DEM has elected to present the following information summarizing generally applicable stormwater management requirements statewide with the understanding that inclusion in this plan does not affect requirements in place on the use of 319 funding. DEM will be developing guidance to more clearly delineate for municipalities and other partners those stormwater activities that may be able to be eligible for Section 319 funding.

The RI Stormwater Management, Design and Installation Rules (2011, recodified 2018) (formerly part of the RI "Stormwater Manual") is based in part on the following stormwater management requirements in the Smart Development for a Cleaner Bay Act of 2007 (RIGL 45- 61.2-2):

- Maintain pre–development groundwater recharge and infiltration on site to the maximum extent practicable;
- Demonstrate that post-construction stormwater runoff is controlled, and that post–development peak discharge rates do not exceed pre–development peak discharge rates; and
- Use low impact development (LID) design techniques as the primary method of stormwater control to the maximum extent practicable.

The Stormwater Rules require compliance with 11 minimum standards that apply to both new development as well as certain redevelopment of properties subject to state regulatory jurisdiction. This includes projects under the jurisdiction of the following state regulatory programs: DEM and CRMC Freshwater Wetlands Programs, DEM Water Quality Certification Program, DEM Groundwater Discharge Program/Underground Injection Control Program, DEM RI Pollutant Discharge Elimination System Program, and CRMC Coastal Management Program. The RI Stormwater Design and Installation Standards Manual (March 2015) provides guidance on various BMPs that may be employed to meet stormwater standards. Projects must also comply with the Erosion and Sediment Control Handbook that is referenced in the Stormwater Manual. DEM, in coordination with CRMC and with contractor support, will be pursuing an update to both the design manual and the stormwater rules. See Table 6.

State policy emphasizing the adoption of LID practices is intended to ensure future land development is done in a manner that minimizes water pollution impacts due to urban stormwater runoff. DEM and partners are promoting "green infrastructure" practices as the means to abate pollution and enhance a community's resiliency in light of changing precipitation patterns. This includes using techniques that preserve open spaces, riparian buffers, green roofs

and other approaches that can capture pollutants and manage storm flows to prevent and contribute to mitigating flooding risks. Technologies and BMP designs for treating stormwater are rapidly advancing which creates a need for state managers to review and update state standards as appropriate. DEM is collaborating with EPA, MA DEP and others in the region on methods to quantify the performance of various stormwater practices and share success stories to foster their broader acceptance and implementation.

Local governments play an essential role in facilitating LID through implementation of their local land use authorities. At present, many local land use ordinances are still in need of revision in order to more fully implement innovative land use controls. DEM and URI previously prepared a municipal self-assessment tool to evaluate LID site planning and design in local ordinances. The DEM/CRMC "RI Low Impact Development Site Planning and Design Guidance Manual (2011)," provides information on different LID strategies from roadway design to conservation development and provides examples of how to improve local ordinances. The RI Green Infrastructure Coalition advocates for LID by fostering the implementation of green infrastructure in urban communities. Information on the status of the adoption of LID provisions in local zoning and/or subdivision rules is not readily available on a statewide basis. During FY25 DEM, in consultation with partners, will work on developing a baseline for assessing progress toward adoption of local LID requirements. This information will also be used to identify specific training topics related to LID.

Infiltration of stormwater is one of the primary principles of stormwater management to maintain groundwater recharge and decrease flow volumes to surface water. Stormwater infiltration uses engineered BMPs and the natural groundwater flow to treat pollutants. Infiltrating more stormwater necessitates proper management of these groundwater discharges to prevent impacts to groundwater used for drinking water and other beneficial uses. The DEM Groundwater Discharge Rules noted above require compliance with the Stormwater Rules by through the permitting process for stormwater discharges that are placed below the ground surface (e.g., trenches or drywells) and those that infiltrate at the surface without an engineered filter media (e.g., infiltration basin).

The Soil Erosion and Sediment Control Handbook (2014) is intended to assist property owners, developers, engineers, consultants, contractors, municipal staff and others in planning, designing and implementing effective Soil Erosion and Sediment Control Plans for the development and redevelopment of properties in Rhode Island. Implementation of the practices in this Handbook, as required by the RI Stormwater Management, Design and Installation Rules, will significantly reduce sedimentation in surface waters associated with construction activities. While significant changes to established practices are not anticipated, DEM plans to undertake a review of the manual to incorporate new information as needed regarding climate change considerations and new scientific understanding; e.g. effectiveness of erosion and sedimentation controls.

Stormwater management is an essential service that must be integrated into the local government planning, engineering and public works programs. The capacity of RI municipalities to address stormwater challenges confronting their communities is constrained. EPA's establishment in 2019 of the SNEP Network, administered via the New England Environmental Finance Center at the University of Southern Maine, has led to a robust technical assistance and training program that provides access to a network of experts that can assist municipalities and watershed organizations and has been a valued addition to on-going efforts to assist cities and towns. Among its activities, the SNEP Network developed the "Stormwater Training/Facilitated Planning Series" which collectively guides communities to develop to a conceptual design for a nature-based stormwater retrofit option in their selected drainage area. Participants use the tools and techniques presented in the training to identify low-cost stormwater solutions to address the stormwater problem at their specific location. More information at: https://snepnetwork.org/#

DEM also works with partners, including DOT, URI, and others, to provide technical assistance on stormwater topics as resources allow. For example, DEM participates in the Steering Committee of the Providence Stormwater Innovation Center. Based in Rogers Williams Park (Providence) it uses various installed stormwater structures and practices to provide hands-on training for municipalities, engineers, construction companies and scientists who will learn from the successes and failures of their design, implementation, and maintenance. More information at: https://www.stormwaterinnovation.org/

Proper design, siting and installation of BMPs as property is developed are not enough to achieve state water quality goals for waters impaired by stormwater. Two challenges associated with stormwater management include proper maintenance of BMPs and improving treatment of stormwater from existing developed lands. Maintenance of the existing stormwater infrastructure is a glaring weakness at the state, local, and private sector levels. Stormwater management BMPs for improving water quality must be maintained or the water quality benefits of the BMP will largely be lost. Efforts are underway to train workers and promote proper maintenance, but more work is needed. In addition, accelerating the pace at which performance of stormwater management occurs on existing public and private property is improving, but continues to be a significant challenge due to resource constraints.

Many of the completed TMDL's identify the need to improve stormwater management from existing roadways and public and private properties in the watershed to reduce pollutant loadings to impaired waters. Significant responsibility for improved stormwater management rests with municipal governments and the Rhode Island Department of Transportation (DOT). As a regulated MS4, DOT is implementing a strategic program to comply with an EPA consent decree to improve stormwater management. DOT will prepare stormwater control plans where DOT outfalls have contributed to water quality impairments, improve maintenance of their system, and retrofit and construct stormwater BMPs. DOT's collaboration to provide funding and expertise can be essential for restoration efforts. In addition, the DEM Office of Customer and Technical Assistance manages

well established evidence-based environmental compliance assistance and certification programs that have a stormwater component for automotive refinishing, auto salvage and underground storage tank facilities.

Presently, stormwater management practices in Rhode Island vary widely with many municipalities lacking sufficient financial resources, staff or expertise to effectively manage stormwater including proactively planning needed retrofits and keeping up with maintenance of their stormwater infrastructure. Managing the impact of stormwater is especially complex where multiple municipalities contribute stormwater runoff to a shared body of water. In terms of financing stormwater infrastructure improvements, state bond funds (BWRF) have been and could again be a potential future source of state grants. If reauthorized the grants would enhance local capacity to for stormwater management through acquisition of equipment (e.g., vacuum trucks) and support for retrofitting projects. There are also state funds being provided through climate resiliency programs that are resulting in investments to upgrade stormwater infrastructure. Additionally, the federal SNEP Program Watershed Implementation Grants are playing an important role in incentivizing a larger number of stormwater related projects to move forward. Over the next several years, DEM will be working to improve tracking of public investment in stormwater projects within watersheds. However, it is clear that long-term sustainable sources of funding are needed to build local capacity to levels that are adequate to more effectively manage stormwater. This need is further discussed in Section 7.

Climate change is expected to result in wetter and more variable precipitation conditions in the decades ahead with more frequent and more intense storms that have larger amounts of precipitation falling over shorter time periods. Stormwater management systems are designed based on the average precipitation rates in the recent past. Design storm standards were last specified in 2010. The capacity and performance of these systems will be an issue to closely evaluate as precipitation patterns in RI change in response to climate change. As noted above, efforts to improve state and local climate change resiliency through flood prevention and mitigation can be complementary and have co-benefits of improved stormwater management and aquatic habitat. This relationship between stormwater management and flood mitigation is discussed further in the section on Climate Change (see Section 4.1).

In summary, over the five-year planning period, enhancing stormwater management will continue to be a state priority. As reflected in Table 6, working with many partners, DEM will target its work to update the RI Stormwater Design and Installation Manual and related state stormwater rules as well as the RI Soil Erosion and Sediment Control Handbook (as resources allow). DEM will assess the status of adoption of LID site planning and design principles in local ordinances and offer assistance to encourage and support ordinance updates. The DEM NPS program will develop guidance clarifying the eligible uses of Section 319 funding in relation to the DEM MS4 Program and improve tracking of stormwater BMP projects with a focus on retrofitting that addresses water quality and resilience objectives. DEM will continue to offer financial assistance for stormwater management consistent with EPA guidance and pursue leveraging of resources whenever feasible to advance the pace of needed work. Public outreach, training and technical assistance will be used to enhance stormwater BMP design and maintenance activities and build public support for continued investments that enhance stormwater management in RI.

Stormwater is captured and treated in “green infrastructure” practices installed on the campuses of the University of Rhode Island (right) and Providence College (below).

### 4.4.2 On-Site Wastewater Treatment Systems (OWTS)

Pollutants: pathogens, nutrients, pharmaceuticals and personal care products, household hazardous materials

Primary Partners: CRMC, URI, Municipalities

Key points:

- Effective implementation of the OWTS Rules can protect groundwater and surface water quality and public health.
- Alternative OWTS provide opportunities for improved treatment, but they require greater oversight, therefore strategies must be implemented to ensure their proper operation and maintenance.
- Local government can play a major role in ensuring OWTS maintenance.
- Cesspools are a substandard means of wastewater treatment and disposal that should be eliminated statewide.

Wastewater from any structure not served by a sewer system is disposed of onsite typically using an onsite wastewater treatment system (OWTS, also referred to as a septic system). This is a system of pipes, tanks, and chambers used to treat and disperse sanitary wastewater into the soil. Sanitary wastewater is water from toilets, sinks, showers, and baths. Wastewater from commercial and industrial processes (non–sanitary wastewater such as car washes, cooling waters, etc.) that is disposed of onsite where there is no sewer system is regulated as a Groundwater Discharge and in accordance with federal underground injection control requirements as applicable. Further description of non-sanitary groundwater discharges is included in Appendix F - Minor Sources of NPS pollution.

There are approximately 157,000 OWTS in Rhode Island, serving about 30% of the state's population and 80% of the state's land area. In many areas of the state, it is not cost–effective or desirable to extend public sewer service. In addition, Land Use 2025 (RIDOA 2006) discourages the expansion of sewer service outside of the state's designated urban services boundary. Therefore, it's anticipated that communities dependent on OWTS will continue to utilize them to treat their wastewater into the foreseeable future. The exceptions to this are the limited areas identified and targeted for future sewer service in facility plans prepared for public wastewater treatment systems.

Wastewater from an OWTS moves downward through the soil into groundwater carrying bacteria and viruses, nutrients (nitrogen and phosphorus), pharmaceuticals and personal care products, and other contaminants improperly disposed of into the system. The level of treatment provided depends on many factors – system design and installation, system use and maintenance and the local soil characteristics. A properly sited, designed, installed and maintained OWTS will provide decades of use and provide treatment such that the system does not adversely impact public health or the environment. However, there are areas of the state such as the watersheds of coastal salt ponds, lands surrounding some inland lakes, and certain areas dependent on private drinking water wells

where the cumulative impact of OWTS are known to contribute to water quality degradation.

All OWTS are regulated and permitted by DEM through implementation of the DEM "Rules Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Treatment Systems." These rules set prescriptive standards for the OWTS components, size of systems based on intended use and soil conditions on each site, and the location of systems based on maintaining minimum separation distances from drinking water wells, wetlands and waterbodies, property lines, and other structures. Design flow from OWTS range from 345 gallons per day for a 3-bedroom residence to greater than 20,000 gallons per day for some schools and other institutions. DEM is in the process of modernizing its data systems that support OWTS permitting which is expected to enhance data sharing among state and local government entities, applicants and other stakeholders.

Private sector professionals are licensed by DEM to conduct an evaluation of the proposed site soil conditions, and to design and install the systems. DEM partners with the URI New England Onsite Wastewater Training Center to provide sufficient training opportunities year-round to meet the continuing education needs of OWTS design and installation professionals. Twenty-five full scale systems are built at the Center above-ground for hands-on learning. The Center is also a partner in research including collaborations supported by SNEP with the Massachusetts Alternative Septic System Technology Center operating on Cape Cod. Also see Section 5.5 Partnerships.

In addition to conventional system designs specified in the Rules, DEM established procedures for approval of alternative or experimental (A/E) OWTS technologies and leachfields. These technologies are vetted by the Technical Review Committee (TRC), a panel of experts convened under the authority of OWTS rule 6.41(G)(2). The TRC evaluates the performance claims for technologies and makes recommendations to the Department based on their findings. If a technology is approved by the TRC and the Department concurs, that technology may then be used for individual OWTS installations. As of July 2024, 8,537 alternative or experimental treatment components have been installed in the state. These are more complex systems that require a greater level of oversight to ensure that they operate as designed in order to achieve the desired level of treatment.

DEM currently requires alternative OWTS that provide advanced treatment to reduce nitrogen pollutant loadings into coastal waters in the Salt Pond and Narrow River watersheds for any new or repaired system. DEM is working with USGS on projects evaluating nitrogen loadings to the salt ponds and assessing whether there are coastal waters that are similarly vulnerable to nitrogen pollution. If such areas are identified, DEM will evaluate whether requirements for denitrification should be adopted. Various types of alternative systems are also used on difficult sites where a conventional system cannot be installed due to site limitations (e.g., high water table, small lots, nearby private wells). Alternative systems can be installed with a smaller footprint or provide a higher level of treatment, resulting in an equivalent or better environmental condition than a conventional system on an acceptable lot with no site

constraints.

Cesspools are an older, substandard method of disposal which does not provide an acceptable level of treatment and is more likely to fail. A cesspool is any buried chamber (could be a metal tank, a perforated concrete vault, "beehive," or a covered excavation) that receives sewage from a building for disposal into the ground. As of 2024, DEM estimates that there are approximately 12,000 cesspools still in use in RI. The RI Cesspool Act of 2007 (RIGL Chapter 23-19.15) required cesspools within 200 feet of the coastal shoreline, public drinking water wells and drinking water reservoir impoundments to be removed from service by January 1, 2014. DEM's implementation of the Cesspool Act has resulted in the removal of approximately 1100 cesspools within these high priority areas. An estimated 127 cesspools remain in use in violation of the Act as of September 2024 and removal of these primarily coastal cesspools is a NPS priority. The use of large capacity cesspools (those serving any non-residential facility that has the capacity to serve greater than 20 people per day or serves any multi-family residential building) is also prohibited by state and federal rules. It has been DEM's experience that about 600 cesspools not subject to the RI Cesspool Act of 2007 are also being upgraded or taken out of service annually. DEM will continue to use its enforcement authority to achieve compliance.

Phasing out the use of cesspools has been a major DEM initiative and in 2016 the R.I. Cesspool Act was amended to accelerate the removal of cesspools statewide. A provision was added to require cesspools serving properties subject to sale or transfer to be removed from service. The deadline for cesspool removal is one year from the date of the sale/transfer closing. Limited exceptions are provided for property transfers between immediate family members. The amendments are structured to encourage parties to a property transaction to negotiate the removal of the cesspool. DEM is limited in its ability to enforce the point-of-sale provision by the lack of a reporting requirement in the law: the state generally is not made aware when a property transaction involving a cesspool occurs. It is a DEM priority over the five-year planning period to improve data collection to reduce this information gap.


OWTS can fail if they are improperly sited, designed, installed and/or maintained, causing health and water quality concerns as wastewater backs up onto the land surface and flows directly into surface waters or stormwater collection systems or it moves untreated into groundwater. Lack of maintenance is considered to be the primary cause of system failure. Operation and maintenance of existing systems is the responsibility of the property owner and DEM will continue to direct public outreach toward the homeowners reliant on OWTS. All OWTS, both conventional systems and alternative treatment systems with pumps and other electronic components, require periodic maintenance to achieve expected levels of treatment performance. Twenty-one towns in RI have adopted onsite wastewater management plans to encourage or require maintenance activities such as system inspections or pumping of septic tanks (as enabled by RI General Law Chapter 45-24.5) (see Figure 14). Once approved by DEM, these plans make the towns eligible for the Community Septic System Loan Program (CSSLP),

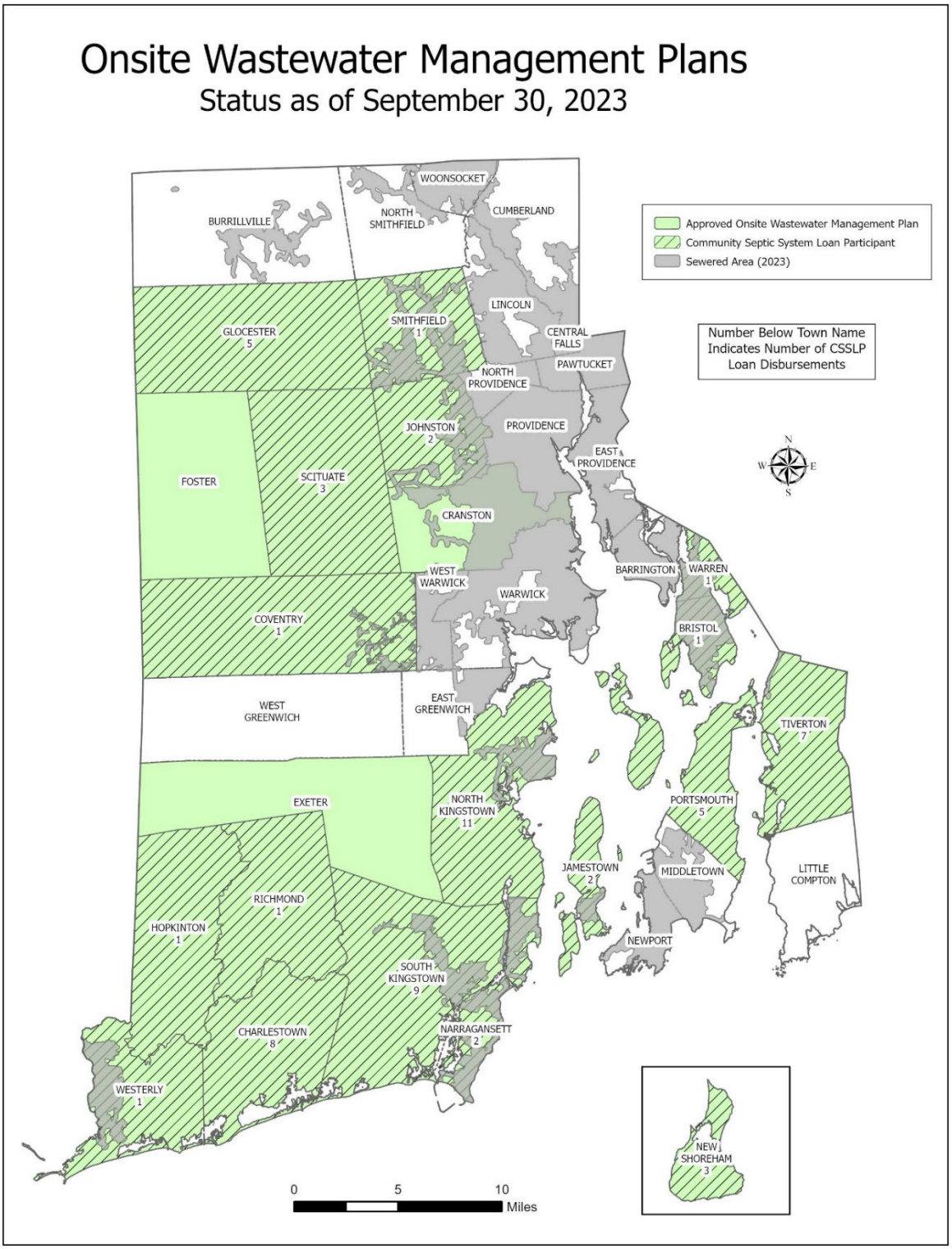
through which the towns can access funds from the Clean Water Revolving Loan Fund for low interest loans to homeowners for OWTS repairs. As of May 8, 2024, 65 loans have been issued to 19 towns over the past 20 years totaling $23,000,000. However, the effectiveness of the plans in improving operation and maintenance is limited in many cases by a lack of local staff capacity and resources. DEM will continue to work on expanding incentives and support for the enhancement of local wastewater management programs.

DEM anticipates revising state OWTS rules during the five- year period of this plan in part to modernize permitting procedures enabled by information technology system improvements. As rules changes are developed, it will be appropriate to consider the new scientific understanding related to climate change and the implications for siting, design and operation of OWTS. Some climate change considerations that may reduce the reduce the effectiveness of OWTS in treating wastewater include:

- Sea level rise will increase the vulnerability of systems in the coastal zone to storm damages;
- Conditions in flood-prone areas may change due to the increased frequency of high intensity rainfall events;
- Rising water tables (due to sea level rise) in the coastal zone will decrease the available aerated soil to treat wastewater beneath the system. Wet and saturated conditions beneath the system favor pathogen survival and transport; and
- Warmer temperatures will change conditions for microbes responsible for wastewater treatment in soil, potentially reducing OWTS effectiveness for reducing nutrients and pathogens.

In summary, over the five-year planning period, as reflected in Table 7, DEM will continue to target effort toward the proper siting and design of OWTS and the elimination of cesspools. Additional NPS Program efforts will be made increase the number of approved local OWTS program by three and support capacity building among local OWTS programs including the promotion of proper OWTS maintenance through expanded public outreach. DEM will also work to improve oversight of compliance with maintenance of alternative and advanced onsite wastewater treatment systems as well as large systems. DEM will continue collaboration with USGS on technical evaluations of nitrogen loading from OWTS to certain coastal waters and with the Town of Burrillville on integrated water and wastewater solutions for Chepachet. DEM is planning updates to state OWTS rules and will be taking into account climate change considerations as those are developed.

***Figure 14. Status of Local Onsite Wastewater Management Plans***



### 4.4.3 Hydromodification and Habitat Alteration

As noted in the initial discussion of "water quality," this plan is concerned with the protection and restoration of aquatic habitats from not just pollution sources but also from other types of stressors discussed in this section that are not directly associated with a specific pollutant. EPA has included these stressors within the broad interpretation of what constitutes nonpoint source pollution. This plan focuses on three of these stressors and identifies actions needed to protect, enhance and restore habitat conditions in support of aquatic life. The targeted three types of NPS stressors that are known to degrade aquatic and riparian habitats in Rhode Island are: Aquatic invasive Species, Barriers to Stream Connectivity and Wetland Buffer Alterations.

#### 4.4.3.1 Aquatic Invasive Species Management

Stressor: Physical alteration of aquatic habitat due to excessive plant growth by invasive species

Primary Partners: Lake Associations, Municipalities NGOs

Key Points:

- The spread of aquatic invasive species in RI freshwaters degrades the beneficial uses of the affected resources.
- Many local entities lack capacity to carry out management, and current levels of available state technical and financial assistance are inadequate to meet local needs.

Rhode Island waters have been degraded by the establishment of aquatic invasive species (AIS). As of November 2023, DEM had documented that one hundred twelve (112) freshwater lakes and ponds as well as 29 river segments contained one or more macrophyte aquatic invasive plants which in many cases have degraded habitat conditions and impaired recreational uses. To date, seventy- four (74) lakes been designated as impaired due to the excessive growth of aquatic invasive plants (DEM Integrated Report 2024). In the late summer and fall of 2023 the invasive plant hydrilla was documented for the seemingly first time in three lakes prompting rapid response actions by DEM and local entities to control its growth and prevent spread to additional waterbodies of the is highly aggressive invasive. Wetlands and brackish water areas also often exhibit invasive plants; e.g., phragmites. Effective management of AIS often involves NPS pollution control activities in the watershed.

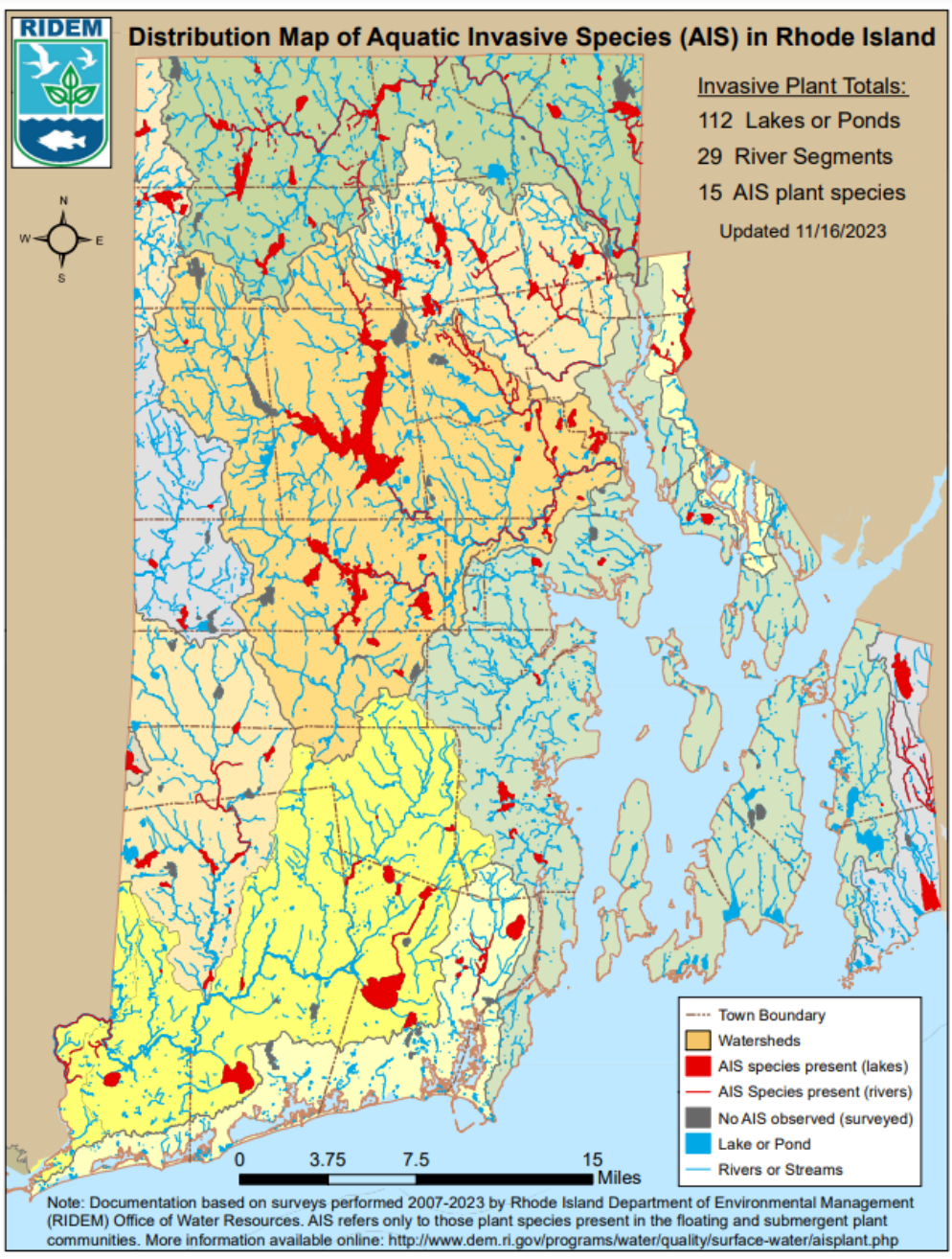
Invasive water chestnut covers Valley Falls Pond in Central Falls

To foster more effective management of aquatic invasive species, Rhode Island developed a report on lakes that outlines actions to prevent, control and mitigate the impacts of AIS in Rhode Island waters (DEM, 2012). This report recommended establishment of a lake management program and an expanded level of technical and financial assistance targeted at protecting and improving conditions in lakes and ponds. DEM was recently authorized to hire and dedicate a new fulltime position to lake management which occurred in February 2023. Stewardship of lake resources is best guided by lake specific management plans that identify the actions needed to mitigate and manage existing AIS infestations and promote good water quality through management of pollution sources. For lakes outside urbanized (i.e., sewered) areas,

these plans directly address nonpoint sources of pollution, in particular phosphorus, that can promote plant growth in freshwater systems. Through the NPS Program, DEM will be supporting development of lake management plans that will also serve as watershed-based plans and expects to support eligible implementation actions through future RFPs for 319 Projects. This includes the installation of additional boat cleaning or washing stations which serve to reinforce the practices of good boat hygiene to prevent AIS spread – to clean, drain and dry a boat after each use.

DEM carries out limited activities on a seasonal basis to address AIS. Certain lakes and ponds are inspected each summer, and DEM will investigate new complaints concerning aquatic plants as part of tracking their occurrence in the state. Technical assistance and limited management support are provided to lake associations and municipalities as resources allow. For example, DEM is collaborating with the City of Central Falls to plan abatement of a major infestation of water chestnut in Valley Falls Pond. Maps and information on each of the AIS detected in RI waters have been posted in the DEM website along with guidance on management of aquatic invasive plants.

***Figure 15. Map of Aquatic Invasive Species Distribution in Rhode Island (November 2023)***



#### 4.4.3.2. Barriers to Stream Connectivity

Stressor: Physical alterations in riverine ecosystems that limit access and passage for aquatic life

Primary Partners: NOAA, US Fish and Wildlife, NRCS, NGOs, Municipalities, FEMA

Key Point: Dams and sub-standard stream crossings pose an impediment to the full functioning of riverine ecosystems.

Rhode Island's development over the last two hundred years resulted in the alteration of rivers and streams throughout the state. Dams of varying size were constructed on all larger rivers and many of the smaller streams in RI (DOA, 2016). There is growing recognition that restoration of stream connectivity is important to enhance the functioning of RI's riverine ecosystems. Many dams no longer serve a useful purpose. Not as dramatic as a dam, but as equally disruptive for some riverine species, are sub–standard stream crossings that are characterized by constricted or inadequate flow, perched culverts, blocked crossings or crossings in disrepair. These barriers to stream connectivity prevent the free movement of aquatic life up and down a river system. The result is fragmented aquatic habitat, potential impacts on water quality and an increase potential for flooding. These hydromodifications to rivers and streams are therefore considered a NPS stressor on aquatic ecosystems.

Regarding dams, the DEM Division of Fish and Wildlife "Strategic Plan for the Restoration of Anadromous Fishes to Rhode Island Coastal Streams," prepared in 2003, served to prioritize locations for fish passage including dam removal. The plan is currently being updated. Several large dam removal projects, achieved through partnerships, have been completed in the Wood-Pawcatuck Rivers watershed and are nearing completion in the Kickemuit River watershed. Planning for additional fish passage projects remains active in the Wood-Pawcatuck watershed and is active in the Blackstone and Pawtuxet River watersheds.

Similar work is underway in targeted inland waters to remove barriers in streams to support connectivity for brook trout and other aquatic life. Projects may involve removing small dams or other remnant structures and replacing culverts with those designed to facilitate fish passage. Various efforts over time have provided needed assessments of stream crossings in certain watersheds. The RI Resource Conservation and Development Council and the Natural Resources Conservation Service Stream Continuity Project between occurred between 2006 and 2013. Of the 4,374 identified stream crossings in RI, over 1200 were assessed in different watersheds for this project, and 69 of these were found to have severe or significant barriers (RIRC&D, 2013). A watershed-wide assessment for flood resiliency undertaken in the Wood-Pawcatuck Rivers watershed involved assessment of over 400 culverts and bridges and provided information to prioritize ecological restoration projects that also addressed flooding concerns (Fuss & O'Neill, 2017). The RI Department of Transportation is actively assessing culverts as part its work and developed a Road-Stream Crossing Design Manual that includes discussion of both aquatic life passage and climate change considerations (DOT, 2021). Compilation of the available data from various sources generating culvert and stream crossing assessments will be beneficial to informing prioritization of needed projects. DEM and partners will continue to advocate for resources to assess stream continuity, identify sub-standard crossings and implement improvements.

This nature-like fishway which replaced the Bradford Dam allows migratory fish to move upstream and experienced paddlers to move downstream. More information at: https://www.fws.gov/story/restoring-pawcatuck-river

#### 4.4.3.3. Wetland Buffer Alteration

Stressor: Physical alteration

Primary Partners: CRMC, NRCS, NGOs

Key Points:

- DEM and CRMC programs need to continue to emphasize the avoidance and minimization of alterations to wetlands.
- Many parties are interested in improving processes to facilitate voluntary restoration actions.

Wetlands are generally those areas that are flooded or that have water at or near the surface of the ground for part of the growing season. Freshwater swamps, marshes, and bogs are some of the most commonly known wetland types. Coastal wetlands include salt marshes and contiguous brackish marshes and areas of associated open water. In Rhode Island, most wetlands are hydrologically linked with surface waters including freshwater lakes, ponds, rivers, and streams or coastal waters. Within the Rhode Island State Wildlife Action Plan, developed by the DEM Division of Fish and Wildlife in collaboration with a wide number of partners, wetland habitats are ranked as valuable to supporting RI biodiversity. The plan identifies various threats to the wetland habitats – some of which directly related to the NPS program. Preventing degradation of wetlands and buffers due to NPS pollution is also important to sustaining healthy and resilient watersheds (DEM, 2015).

While historically there has been a significant loss of wetlands resources due to filling and other alterations, since the 1970s Rhode Island state law and policy has recognized the importance of protecting wetlands and their buffers. DEM and CRMC administer permitting programs that regulate activities that may alter wetlands and their buffers and require that any alterations be avoided and minimized. The agencies have jurisdiction over vegetated wetlands, and flowing and standing surface waters, as well as specified upland lands that surround them.

In 2015, state laws were amended to strengthen protection of wetlands and their buffers while limiting the authority of local governments to do so through their local and use ordinances. Following years of rule development, DEM and CRMC promulgated new Freshwater Wetlands regulations that went into effect in July 2022 and specified stronger protection for wetland buffers.

As noted earlier in Section 2.0, wetland condition is vulnerable to degradation from a number of anthropogenic stressors and alteration in the buffer has been correlated with poorer wetland conditions. With respect to freshwater wetlands, areas of particular state interest include enhancing or restoring the functions and values of riparian wetlands and buffers and identifying and protecting wetlands of high ecological value. To facilitate voluntary restoration of wetlands, the DEM OWR formed the Water Quality and Wetland Restoration Team which provides permitting pre-application assistance to restoration project proponents.

In the coastal zone, Rhode Island is focusing attention on the vulnerability of salt marshes as one of the most susceptible ecosystems to changing climatic conditions. Coastal wetlands provide critical nursery habitat for fisheries, play a role in absorbing nutrients to protect water quality and absorb and mitigate storm surges. RI's salt marshes are currently at an increasing risk of widespread degradation and drowning due to increased inundation and storm events. A project completed by CRMC and partners in 2015 analyzed the potential impacts to coastal wetlands from sea level rise using the Sea Level Affecting Marshes Model and estimated 13% loss of salt marsh acreage in 21 coastal communities with 1 foot of sea level rise. Notably, the project also identified freshwater wetlands likely to be lost due to inundation or conversion to coastal wetlands (CRMC, 2015). NBNERR, in collaboration with the RI Natural History Survey and support from EPA, has developed methods to assess salt marsh condition, prioritize interventions to mitigate the impacts of climate change and to track the success of those efforts over time. State agencies and partners are carrying out projects aimed at mitigating the impacts of sea level rise on salt marshes including a technique known as thin layer deposition. Further adaptation planning is needed to foster resiliency in the coastal areas which are already experiencing impacts from climate change.

Additionally, the State Wildlife Action Plan recommends conservation actions to alleviate those threats, presenting an opportunity to partner with the NPS program. To support the conservation objectives of the Wildlife Action Plan, DEM conducts outreach and provides technical assistance to municipalities and others regarding habitat and wildlife issues. This serves to include outreach efforts on certain topics related to nonpoint source management, e.g., waterfowl management.

Under the Wetlands Reserve Easement Program, NRCS provides technical and financial assistance directly to private landowners and Indian tribes to restore, protect, and enhance wetlands through the purchase of a wetlands easement. NRCS will pay 100% of the easement value for permanent easements and the costs for surveying and recording. Additionally, NRCS will pay between 75-100% of the restoration costs.

In summary, over the five-year planning period, as reflected in Table 8, DEM and partners will continue to collaborate to build capacity for ecological restoration and promote the protection and restoration of wetland buffers. With respect to management of aquatic invasive plants, in addition to watershed planning (Table 4.), DEM will pilot boat cleaning stations and facilitate their installation at additional priority locations. Using other funds, DEM will also continue to provide assistance on volunteer water chestnut pulls and work to build local capacity for the on-going management of freshwater aquatic invasive plants. Regarding barriers to stream connectivity, DEM will complete an update of the statewide strategy for anadromous fish restoration and partner on efforts to plan and implement several site-specific projects. The DEM NPS Program will also promote riparian buffer restoration through the provision of financial and technical assistance. Public outreach will be targeted to all three areas of activity related to aquatic and riparian habitat protection and restoration.

### 4.4.4 Agriculture

Pollutants: Pathogens, nutrients, pesticides, sediment, petroleum wastes

Primary Partners: USDA Natural Resources Conservation Service, State Conservation Committee, Conservation Districts

Key point: Farms should develop and implement a Farm Conservation Plan tailored to their specific operations that identifies the best management practices needed to minimize adverse impacts on water quality.

Rhode Island's farms contribute to the state's economic development and provide Rhode Islanders with local food and plant nursery products, as well as tourism opportunities, farm vistas, and wildlife habitat. But the nature of farming in RI has changed significantly over the past 20 years. There are fewer large farms (particularly dairy) but more of the smaller specialized farms that are producing more locally consumed farm products. The US Department of Agriculture 2022 Census of Agriculture (USDA 2024) shows there are 1,054 farms in RI using 59,076 acres. A farm is defined by USDA as "Any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the Census year." These latest number show a <1% growth of the number of farms and a 3.8% reduction of acres in farmland from the last census in 2017 (1,043 farms, 56,864 acres) to today. The average size of a farm is 56 acres, however, 46% of all farms are less than 10 acres. Given the high price of land in RI, it's reasonable that the trend of growth in small farms will continue. It is important to ensure that these farm operations are conducted in a manner that avoids negative impacts to water quality. The NPS Program will assist in public outreach efforts with partners to heighten BMP awareness among new farmers.

The potential water quality contaminants associated with agricultural operations include nutrients (from fertilizers and animal wastes), pathogens and organic materials (primarily from animal wastes), sediment (from field erosion), pesticides, and petroleum products. Well managed farms can operate with minimal adverse impact on water resources. However, instances pollution of surface water and groundwater have occurred.

In addition, water withdrawals are a management concern in certain watersheds, e.g., the southern portion of the State. The need for irrigation water to support agriculture can place high demands on local groundwater or surface water supplies during times of the year when river and streams are typically lower. This in turn can further deplete streamflow and result in a low flow condition in streams potentially resulting in dramatic negative impacts on stream ecology. (See Water Withdrawals Discussion in Appendix F.)

The Rhode Island Division of Agriculture and Forest Environment works closely with the federal United States Department of Agriculture programs including the technical and financial assistance programs administered through the USDA Natural Resources Conservation Service (NRCS). An important means to minimize the impact of agricultural operations is for a farm to develop and implement a Conservation Plan that addresses water quality issues among natural resource concerns. Plans are usually developed in consultation with DEM and NRCS. The plan describes the schedule for implementing conservation practices needed to solve natural resource concerns and may include multiple components to address resource issues, such as nutrient management, erosion control,

irrigation management, integrated pest management, wildlife and habitat management, forest management and others. In addition to conserving natural resources important to the farm, many of the practices included in such plans offer additional benefits to the farmer including cost–savings.

Conservation Plans are not currently required in RI, unless the farm is participating in the RI Farm, Forest, Open Space Program, which is a state program to allow eligible properties to be assessed for tax purposes at its current use, rather than its value for development. A significant number of farms (almost 1000) have developed plans as a result of participation in the Farm, Forest Open Space Program.

In those instances where farmers decide to take actions to prevent contamination or upgrade their existing structural or management practices, DEM Agriculture and the USDA NRCS will work with farmers to identify the appropriate corrective strategies. Funding to implement best management practices may then be available through the NRCS Environmental Quality Incentives Program (EQIP) or other assistance programs. EQIP is a voluntary program that provides financial and technical assistance to farmers to help plan and implement conservation practices that address natural resource concerns. Farmers that apply through the EQIP may be eligible for cost share assistance on projects built in accordance with the NRCS standards. NRCS in RI has awarded 978 EQIP contracts since 2019 and 2,167 in total since the adoption of the 2008 USDA Farm Bill. In addition, NRCS has dedicated 5% of the EQIP funds for projects in priority watersheds chosen jointly with DEM under the joint EPA/USDA National Water Quality Initiative (NWQI) to work with farmers to implement approved strategies to improve water quality.

DEM Office of Water Resources has continued to partner with the RI Office of NRCS on the National Water Quality Initiative. DEM monitoring has been completed in recent years for the Tomaquag Brook, Maidford River and Nonquit Pond tributaries. Sampling for an unnamed tributary to Stafford Pond was completed in FY2023. NRCS is continuing to prepare watershed assessments through the NWQI which provide valuable content that can be integrated into the development of a Section 319 Watershed Plan. Watersheds selected for NRCS planning in FY23 are Barden Reservoir - Ponagansett River, Moswansicut Pond - Huntinghouse Brook, and Scituate Reservoir.

In addition to NWQI, there is a NRCS program called Source Water Protection, which focuses on specific water quality practices in the watersheds of: Usquepaug River, Chipuxet River, Pawcatuck River, Scituate Reservoir, Barden Reservoir- Ponaganset River, and Moswansicut Pond- Huntinghouse Brook. Between the years of 2020 and 2023, there were 40 total contracts obligated under the Source Water Protection Program.

The DEM Division of Agriculture and Forest Environment is responsible for enforcing pesticide state laws and regulations developed to prevent environmental degradation that might result from improper use of pesticides on farms, in yards, and inside homes. Through this program, commercial pesticide applicators are trained, tested, and licensed to achieve a minimum level of competence in the pesticide application industry. Anyone who applies pesticides on land not owned by themselves or their employers must have a commercial pesticide applicator's license to apply general use pesticides. Farmers and farm workers who apply restricted use and state limited use pesticides to produce an agricultural commodity need to have a private applicator's license. Pesticides that are applied by a licensed applicator on farms, yards and in homes in accordance with the EPA approved label

directions are considered protective of environmental quality, and such application is not reviewed by DEM. (Applications to surface waters for control of aquatic nuisance species are required to obtain permits from DEM division of Agriculture and Forest Environment including an internal review process that involves consultation with DEM Water Quality, Groundwater, and Fish and Wildlife programs.)

In summary, over the five-year planning period, as reflected in Table 9, the DEM NPS Program will focus on working with partners to facilitate implementation of watershed projects and conservation practices on agricultural lands including riparian buffers. Given the growth of new small farms, planned activities include enhanced guidance and outreach as well as promotion of training opportunities; e.g. NRCS. DEM will continue to encourage adoption and implementation of farm Conservation Plans and offer financial assistance for implementation of agricultural BMPs to minimize adverse effects on water resources and the aquatic environment in eligible watersheds. The NPS Program will support water quality monitoring in an estimated 3-5 targeted watersheds in coordination with NRCS as part of the NWQI program. Coordination with NRCS will occur through NPS Program participation on the State Technical Team and periodic joint meetings of DEM and NRCS staff.

### 4.4.5 Trash, Litter, and Plastics

Styrofoam cups, plastic drinking water bottles, fishing line, cigarette butts floating in our waters and washed up on our beaches are not pleasant images of our "Ocean State." This debris is not just a visual litter or waste issue – is a water quality issue. Trash can enter our waterways easily if not properly disposed of or securely contained. Referred to as “Aquatic Trash” by EPA, it results in multiple adverse impacts: Aquatic trash affects water quality, endangers plants and animals, and pollutes the outdoor spaces that we depend on for tourism and recreation. Though all types of aquatic trash can have potentially harmful impacts, plastic waste is particularly concerning because of its tendency to persist in the environment and its widespread production, use, and disposal. Many species mistake plastic debris for food or inadvertently ingest plastic debris while feeding or swimming (EPA, 2024).

On the federal level, EPA initiated a Trash Free Waters (TFW) Program in 2013 that has focused on prevention, removal and research. https://www.epa.gov/trash-free-waters
Coastal clean-ups have been coordinated in RI by NGOs, including but not limited to RI Audubon Society, Save The Bay and formerly Clean Ocean Access for many years, often as part of the annual International annual coastal clean-ups hosted the Ocean Conservancy. Inland, a variety of clean-ups are hosted and carried out by watershed organizations, conservation and others in riparian areas and along shorelines. The NPS Program can play a role by supporting efforts to build local capacity for cleanups and continuing to prevent aquatic trash through outreach and other strategies. Technologies are evolving to provide techniques for preventing trash from entering into

storm drains and being carried into receiving waters. More broadly, Governor McKee launched a "Litter-Free Rhode Island" initiative that in part provided microgrants in 2024 for cleanups across communities (land and water.) Under this program, a total of 76 organizations, including municipalities, watershed groups, land trusts, schools, NGOs and others, were awarded mini-grants to support clean-ups. Additionally, 31 of 39 cites and towns have or will soon adopt resolutions pledging to commit to cleaner communities. The volume of trash and litter being collected is being tracked on the program's dashboard.

Plastic pollution has been a primary concern for many years as plastic production has increased and more plastic material ends up in our waterways. Under Governor Raimondo, a Task Force to Tackle Plastics examined the topic and issued recommendations in a 2019 report. Areas of proposed action included reducing single use plastics, increasing public awareness and encouraging voluntary reduction in use of plastics. Legislation followed in 2022 with adoption of the "Plastic Waste Reduction Act" which led to a statewide ban on single-use plastic bags that went into effect in January 2024.

However, visible plastics represent only part of the plastic problem in our waters. More recently, studies are documenting the impacts of microplastic pollution. Microplastics are usually defined as pieces of plastic <5 mm in any dimension. The primary source of microplastics is the breakdown of larger pieces of plastic over time, however other sources include synthetic fibers from clothes washing, resin pellets, paints and as abrasives in consumer products. All sizes of plastics in the water will leach out potentially harmful additives and will adsorb many toxic chemicals that may be in the water. Given that microplastics are more likely to be ingested, these chemicals may then be transferred to aquatic life and potentially cause harm to such organisms. Recent research by URI found extensive microplastics in Narragansett Bay. Researchers estimated that more than 1,000 tons of microplastics have accumulated in the top 2 inches of bay sediments in just the last 10-20 years (Fulfer V.M., 2023).

In addition to reductions in single-sue plastics, DEM and RI Marine Trades Association collaborate on the "Zero Plastics Marina Initiative" which promotes best practices to reduce use of plastics in marina operations.

In summary, over the five-year planning period, the NPS Program will carry out a two-pronged strategy to reduce trash, litters and plastics in RI waters. This Trash-Free Waters approach will consist of expanded public outreach, including alignment with RI's larger Litter-Free Rhode Island initiative and continued financial assistance to expand local capacity for both prevention and mitigation actions including local clean –ups. DEM anticipates RI will provide assistance to 25 – 50 organizations annually.

Volunteers from Friends of the Saugatucket River demonstrate how many plastic bottles were collected during clean-up activities in Washington County.

## NPS Plan Implementation Tables

The following tables reflect the goals and objectives of the 2024 NPS Management Program Plan and the priority actions planned to address the objectives. Milestones are specified for each action and along with a relative annual cost estimate associated with implementing the action. Within columns portraying the schedule, an "X" means that action will be active during that federal fiscal year. For some actions, a more specific milestone target is specified. DEM will be tracking milestones and reporting on progress via its NPS Program annual report.

| Table 6. NPS Implementation – Major NPS Sources - Stormwater | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal: Stormwater infrastructure is designed, installed, and maintained in a way that minimizes pollution to receiving waters | | | | | | | | |
| Objective | Actions | Milestones | Schedule | | | | | Estimated Annual Cost ($ - $$$)[12] |
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| Ensure RI stormwater rules and guidance reflect up-to-date scientific understanding of documented and projected changes in precipitation patterns and sea level rise. | Update the RI Stormwater Design and Installation Manual and DEM/CRMC stormwater management rules to reflect updated design storm sizes based on trends in precipitation data and make other appropriate changes. | Develop revisions to Manual | X | X | | | | $ |
| | | Revised Manual | | | X | | | $$ |
| | Update RI Stormwater Management Guidance for Individual Residential Lot Development. | Develop revised stormwater rules | X | X | | | | $ |
| | | Adopted revisions to stormwater rules | | | X | | | $ |
| | Update RI Stormwater Management Guidance for Individual Residential Lot Development. | Updated Residential Guidance | X | X | | | | $ |
| | Update the RI Soil Erosion and Sediment Control Handbook. | Revised Handbook | | | | | X | $$ |
| Utilize low impact development planning and design to minimize impacts from stormwater and maintain pre-development hydrology. | Increase the level of LID strategies required in municipal development review ordinances. | Number of municipal ordinances amended to support LID. | | 2 or more | | 2 or more | | $$ |
| | Develop enhanced LID training such as recorded materials accessible via websites and improve coordination with local officials | Training workshops and enhanced materials | 1 new tool | 1 event 1 new tool | 2 new tools | 2 new tools | 2 new tools | $ |

[12] Estimated annual costs for carrying out the actions: $: <$100,000; $$: $100,000 - $400,000; $$$: >$400,000

| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$) |
|---|---|---|---|---|---|---|---|---|
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| Foster implementation and proper maintenance of green infrastructure to reduce impacts of NPS pollution. | Develop guidance clarifying eligibility for stormwater projects that can be supported with Section 319 funding in RI taking into account MS4 status of a community. | New and updated Guidance document on Stormwater Eligibilities in NPS Program in RI helps build a pipeline of NPS projects. | X | | X | | X | $ |
| | Improve tracking of stormwater BMP projects. | Data systems modified to facilitate tracking & reporting of stormwater BMPs implementation. (Multi-year effort) | | X | X | | | $$$ |
| | Work with partners to build capacity and technical understanding of green stormwater practices including proper maintenance. | Training sessions and educational events. | 2-4 per year | 2-4 per year | 2-4 per year | 2-4 per year | 2-4 per year | $$ |
| Align with and leverage funding to advance implementation of stormwater projects. | Track and prepare a report on public investment in green stormwater infrastructure projects (CWSRF, SNEP, NBEP, NBC, etc. | Annual report on GSI projects | X | X | X | X | X | $$$ |
| | Coordinate NPS funding with other funding programs targeting water quality, resiliency and climate adaptation projects where appropriate to advance projects that mitigate NPS pollution. | Number of completed co-funded projects | 5 | 5 | 5 | 5 | 5 | $$$ |

| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$) |
|---|---|---|---|---|---|---|---|---|
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| Ensure methods for calculating and crediting stormwater BMP pollutant load reductions reflect current science. | Review and update methods for calculating pollutant load reductions from various stormwater BMPs, including non-structural BMPS, and refine policies on crediting as needed. | Review and develop of methods | | X | | X | | $ |
| | | Refined methods for calculating stormwater BMP load reduction | | | X | | X | $ |
| Promote development of sustainable funding for stormwater management. | Provide technical assistance and guidance to regional or local efforts to develop sustainable funding mechanisms. | Report on number of communities exploring or adopting sustainable funding mechanisms | | X | X | X | X | $$ |

| Table 7. NPS Implementation – Major NPS Sources – Onsite Wastewater Treatment Systems | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal: Conduct education/outreach activities and implement funding assistance projects | | | | | | | | |
| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$)[13] |
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| <u>OWTS Rule Revisions:</u><br>OWTS rules are updated to incorporate new science, including projections for sea level rise, as well as process improvements resulting from data system modernization. | Compile and prioritize list of needed rule changes | Draft revised OWTS Rules | X | | | | | $ |
| | Develop draft rules with stakeholder engagement. | Promulgation of draft rule revisions | X | | | | TBD | $ |
| | Execute rulemaking following state procedures. | Execution of final rule revisions | X | | | X | TBD | $ |
| Coordination among state and local building officials OWTS is strengthened. | Develop updated guidance on site suitability for property owners considering altering buildings to add housing capacity; e.g. bedrooms. | Updated guidance (Accessory Dwelling Units - ADUs) | X | | | | | $ |
| | Develop annual training forum for building officials that includes OWTS topics. | Annual meeting | 1 | 1 | 1 | 1 | 1 | $ |
| | Ensure consistency between OWMPs and Wastewater Facility Plans. | # of plan reviews per year | 1 | 1 | 1 | 1 | 1 | $ |
| | Complete periodic mapping updates of sewered/non-sewered areas. | Updated map | 1 | 1 | 1 | 1 | 1 | $ |

[13] Estimated annual costs for carrying out the actions: $: <$100,000; $$: $100,000 - $400,000; $$$: >$400,000

| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$) |
|---|---|---|---|---|---|---|---|---|
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| Communities relying in whole or part on OWTS develop Onsite Wastewater Management Plans (OWMPs). | Provide funding to assist communities develop new or update existing OWMPs prioritizing communities impacted by sea level rise. | Number of new or updated OWMPs. | 1 | 1 | 1 | TBD | TBD | $ |
| Nitrogen inputs from OWTS to sensitive coastal waters are reduced. | Assess the status of implementation of OWTS denitrification requirements in RI Coastal Ponds and Narrow River critical resource areas. | Data compilation | X | X | | | | $ |
| | Collaborate with USGS on SNEP supported projects to evaluate the need for additional measures to reduce nitrogen inputs to other coastal waters; e.g. embayments, ponds and further evaluate nitrogen pollutants loadings. | Technical Summary Memoranda | | X | | | | $$ |
| | | Technical Report (USGS) | | X | | | | $$ |
| | Continue to evaluate and demonstrate alternative technologies that provide denitrification. | # new N-reducing OWTS installed | 600 | 600 | 600 | 600 | 600 | $$$ |
| | Continue enforcement of 2007 Cesspool Phaseout Act requirements and evaluate compliance status. Baseline: 127 cesspools remain. | Annual Compliance Report/# targeted cesspools removed | 10 | 10 | 10 | 10 | 10 | $$$ |
| | Continue to track cesspools removed from service statewide. | Number of cesspools removed | 625 | 625 | 625 | 625 | 625 | $$$ |

| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$) |
|---|---|---|---|---|---|---|---|---|
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| Community-based solution for OWTS management in Chepachet guides implementation. | DEM and DOH collaborate on SNEP supported project to develop an integrated solution to wastewater and water supply issues in Chepachet. | Participation in Project Team<br><br>Final Project Report | X | X | X | | | $$$ |
| OWTS are properly operated and maintained. | Promote proper OWTS maintenance through outreach and training. | Report on outreach actions including Septic Smart Week; includes posts to list-serves, training events etc. | 30 actions | 30 actions | 30 actions | 30 actions | 30 actions | $ |

| Table 8. NPS Implementation – Major NPS Sources – Hydromodification and Habitat Alteration | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal: Degradation of RI aquatic habitats is prevented or minimized and also mitigated through ecological restoration. | | | | | | | | |
| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$)[14] |
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| River ecosystem functioning is restored through the removal of barriers to stream connectivity. | Update the statewide strategy for anadromous fish restoration. | Updated strategy document finalized | | X | | | | $$ |
| | Compile information on stream continuity assessments that identify and prioritize substandard stream crossings. | List of prioritized culvert and stream crossings for upgrade | X | X | X | X | | $ |
| The introduction of aquatic invasive species is prevented and the spread of AIS is controlled to minimize degradation of conditions in RI waters. | Pilot the installation and use of boat cleaning stations at more public boat ramps providing access to river and lakes. | Number of cleaning stations installed | 2 | 1 | 1 | 1 | 13 | $$ |
| | Support development of lake management plans that address both water quality and AIS control strategies. | Completed WBPs for lakes | 3 | 2 | TBD | TBD | TBD | $ |
| The introduction of aquatic invasive species is prevented and the spread of AIS is controlled to minimize degradation of conditions in RI waters. | Collaborate with partners to execute volunteer water chestnut pull events. | # of water chestnut pull events | 5-10 | 5-10 | 5-10 | 5-10 | 5-10 | $ |

[14] Estimated annual costs for carrying out the actions: $: <$100,000; $$: $100,000 - $400,000; $$$: >$400,000

| Goal: Degradation of RI aquatic habitats is prevented or minimized and also mitigated through ecological restoration. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$)[15] |
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| Alterations and losses of wetlands and their vegetated buffers are minimized. | Provide technical and financial assistance to advance projects to restore riparian buffers with emphasis on priority watershed and designated urban zones. | Number of riparian buffer projects completed | 2-5 | | 2-5 | | 2-5 | $$ |
| Complete field verification and mapping of riparian buffer restoration opportunities in urban zones designated under RI Freshwater Wetland Rules | Prioritized list of restoration opportunities | | X | | | | | $ |

[15] Estimated annual costs for carrying out the actions: $: <$100,000; $$: $100,000 - $400,000; $$$: >$400,000

| Table 9. NPS Implementation – Major NPS Sources – Agriculture | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal: Agricultural lands are operated using best management practices the prevent and minimize adverse impacts water quality. | | | | | | | | |
| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$)[16] |
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| Farmers have access to training and technical assistance to foster use of agricultural practices that are protective of water quality and aquatic habitats. | Develop updated guidance on agricultural BMPs and waste management. Topics to be determined annually. | Updated agricultural BMP guidance documents. | 1-2 | 1-2 | 1-2 | 1-2 | 1-2 | $ |
| | Collaborate with partners to promote training opportunities on agricultural BMPs and related topics. Topics identified annually with NRCS. | Number of workshops or other trainings. | 1-2 | 1-2 | 1-2 | 1-2 | 1-2 | $ |
| | Encourage preparation and updating of Conservation Plans associated with the Farm, Forest and Open Space Program. | Number of farms with new or updated Conservations Plans. | TBD | TBD | TBD | TBD | TBD | $ |
| Implement agricultural best management practices. | Provide financial assistance, via partners, to projects that implement BMP and best practices to reduce impacts from agricultural runoff and improve nutrient management. | Report on Agricultural BMP Projects completed. | | TBD | | TBD | | $ |
| | Develop protocols for compile data on new farm BMPs installed. | # of Agricultural BMP projects completed | | TBD | | TBD | | $ |
| | Promote protection and restoration of riparian buffers on agricultural lands. | Report on Number of buffer restoration projects completed | | | | TBD | | $ |

[16] Estimated annual costs for carrying out the actions: $: <$100,000; $$: $100,000 - $400,000; $$$: >$400,000

| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$)[17] |
|---|---|---|---|---|---|---|---|---|
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| Leverage additional funding opportunities | Leverage funding opportunities through collaboration with USDA and other partners to advance projects that address NPS pollution from farms. | Participation in NRCS State Technical Team meetings | 2/yr | 2/yr | 2/yr | 2/yr | 2/yr | $ |
| Collaborate with USDA NRCS | Continue collaboration with NRCS to develop approved watershed assessments, direct funding to prioritized watersheds and measure the effectiveness of installed BMPs. | Annual report of NWQI activities | X | X | X | X | X | $ |

[17] Estimated annual costs for carrying out the actions: $: <$100,000; $$: $100,000 - $400,000; $$$: >$400,000

| Table 10. NPS Implementation – Major NPS Sources – Trash and Litter | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal: Agricultural lands are operated using best management practices the prevent and minimize adverse impacts water quality. | | | | | | | | |
| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$)[18] |
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| Increase public awareness of trash and litter pollution in RI waters | Develop and execute outreach campaigns to raise awareness about the problems of trash and litter in RI waters and engage citizens in addressing the problem through both prevention and clean up actions. | Summary report of outreach activities: Events, social media, etc. | X | X | X | X | X | $ |
| Reduce trash and litter in RI waters. | Support projects to mark storm drains to deter improper depositing of trash and litter. | # of projects advanced to prevent aquatic trash | 1-3 | 1-3 | 1-3 | 1-3 | 1-3 | $ |
| | Support projects to Install signage to deter improper disposal of trash and litter. | # of signs installed | 10-15 | 10-15 | TBD | TBD | TBD | $ |
| | Expand local capacity for conducting cleanups that remove trash and litter from RI waterbodies. | # organizations supported to carry out cleanups | 50 | 25-50 | 25-50 | 25-50 | 25-50 | $ |
| | Encourage elimination of single use plastics often found in RI waters. | # of education / outreach materials developed | X | X | X | X | X | $ |

[18] Estimated annual costs for carrying out the actions: $: <$100,000; $$: $100,000 - $400,000; $$$: >$400,000

# 5.0 NPS Management Program Administration, Coordination, and Partners

## 5.1 NPS Program Administration:

The DEM NPS Program is part of the Watersheds Section within the larger DEM Office of Water Resources (DEM-OWR). It has the lead responsibility for tracking and reporting to EPA on efforts across DEM to address NPS pollution and to enhance coordinate with and among the many other partners described in this Section. The NPS program is well positioned to integrate with and collaborate across the DEM Office of Water Resources (including its two major regulatory sections organized as Surface Water Quality and Groundwater and Freshwater Wetlands) as well as other DEM regulatory and non-regulatory programs. The DEM NPS Program relies upon a foundation of technical information concerning nonpoint source pollution problems that is largely generated by other DEM-OWR programs including Water Quality Monitoring, Standards and Assessment Programs and the TMDL Program, among others. Accordingly, the DEM NPS Program collaborates with these programs to: produce information that allows for statewide tracking of NPS pollution; target assessments of NPS impaired waters and set priorities; implement actions for controlling NPS pollution; and to measure progress toward restoration and protection goals.

The program interfaces with a large number of programs and partners with respect to planning and implementation actions. (See Section 4.0). Organizationally, in 2024 the DEM NPS core program staff were re-aligned into two teams focused on Watershed Planning/Groundwater Protection and Financial Assistance/NPS Implementation Tracking. Additionally, work related to the National Water Quality Initiative (NWQI) was shifted within the DEM-OWR into the Monitoring and Assessment Program. Administration of the NPS Management Program includes quality assurance activities, data management and reporting. DEM maintains an agency Quality Management Program Plan which assists in the review of any required Quality Assurance Project Plans (QAPP). The NPS Program operates with an overall program QAPP which describes the process for awarding and administering subawards among additional activities (DEM, 2019). Additionally, specific project QAPPs are required when involve data collection activities. DEM also maintains the RI project information hosted in the EPA NPS Grant Reporting and Tracking System (GRTS) and shares data with other federally required databases (WQX). DEM has undertaken a major data system modernization project for several of its permitting programs. This is expected to enhance tracking of stormwater BMPs when fully implemented. DEM will also be continuing work to improve tracking of other implementation actions.

Evaluation of progress toward NPS water quality goals is an essential step in RI's overall water quality management framework. Management effectiveness is primarily evaluated by the assessment of water quality and aquatic habitat conditions over time. In addition, DEM and its partners continue to work toward the development of commonly used environmental indicators that serve to supplement water quality assessments results. Information garnered through evaluation will provide a basis for updating the Nonpoint Source Management Program Plan every five years to adapt to new scientific understanding of emerging issues and changes in water quality. In addition, the plan may be revised as needed to address changes resulting from legislation or budgetary actions that affect the availability of resources.

## 5.2 Statewide Non-Regulatory NPS Program Activities

Primary Partners: Multiple Partners

As a complement to the regulatory oversight exercised by state and local officials, the RI NPS Program was organized to coordinate a variety of non–regulatory activities aimed at encouraging voluntary actions to strengthen NPS pollution prevention and facilitate water quality restoration. Through its annual Performance Partnership Grant (PPG), DEM utilizes EPA funds to support monitoring, assessment and watershed planning activities described above in Section 4.0. In addition, consistent with the overall water quality framework, the program staff carries out the following activities to promote and implement effective NPS pollution management:

- Policy development to foster prevention and abatement of NPS pollution;
- Participation in regional workgroups on NPS priority topics; e.g. NEIWPCC NPS Workgroup;
- Carry out water quality monitoring to support assessment;
- Technical assistance to municipalities, watershed/lake organizations and others on implementation of NPS best management practices (BMPs);
- Financial assistance, in the form of grants of PPG (319) funds and state grants (as funding allows) for NPS implementation projects; See Section 6.0.

## 5.3 Coordination

Primary Partners: NRCS, NBEP, RIRC, URI, Division of Statewide Planning

Several formal coordination mechanisms exist on the state and regional level which facilitate the on-going coordination of activities related to NPS management in Rhode Island. These include a variety of committees, some of which are established by state law as well as others formed to address specific issues. Coordination mechanisms operate at different levels within state government and include organized committees, ad hoc committees and less formal arrangements among agency staff. By meeting regularly, these committees provide forums for information exchange, fostering collaboration and aligning resources to advance needed work to address NPS pollution. These mechanisms help ensure various programs are working with a shared understanding of NPS water quality problems and toward common objectives regarding an issue, project or program. These committees include, but are not limited to:

- NRCS - State Technical Team
- RI Rivers Council
- Narragansett Bay Estuary Program Steering Committee, Science Committee
- Climate Change Coordinating Committee (EC4)
- CRMC Policy Committee
- State Conservation Committee
- DOH – DEM PFAS Working Group

- RI Environmental Monitoring Committee
- NEIWPCC NPS Workgroup
- SNEP Program Steering Committee and Subcommittees
- State Planning Council & Technical Committee

One of the roles of the DEM NPS Program is to facilitate coordination among NPS–related activities and track progress towards protecting and restoring water quality and aquatic habitat. In this regard Rhode Island's small size is an advantage in that the state agencies are often familiar with the local stakeholders actively working within a given watershed. A significant amount of collaboration is taking place between the state and local levels and it is neither practical nor necessary to reflect all instances where this occurs. However, select examples of existing collaboration by the DEM NPS Program and its partners are provided in Section 5.5 to illustrate how work is being coordinated and aligned to achieve NPS pollution management goals. A variety of coordination mechanisms are used to foster collaboration among programs and alignment of work to optimize the efficient delivery of programs.

## 5.4 Public Outreach, Education, and Training:

Primary Partners: Multiple Partners

An informed public is necessary to build support for needed management actions. DEM and its partners also strive to increase the public's understanding of individual actions they can take on a regular basis to protect and restore water quality and aquatic habitat. Local municipal officials and staff are routinely making decisions that affect water quality. It is important that this decision making be based on accurate information and training about water quality, NPS pollution and management strategies.

DEM and its partners utilize a variety of tools to support public outreach, education and training including extensive collaboration. Efforts to better inform the general public and local officials is a need that must be continually addressed to be successful. The means by which the public seeks and receives information is continuing to evolve with greater use of various social media platforms and cell phone applications. DEM will be expanding the content available on the DEM NPS website pages. DEM will be taking steps to make greater use of social media. The NPS Program will be developing new communication tools as means to share information with stakeholders and will be developing more creative public outreach campaigns. As noted in this plan, over the next five years, enhanced outreach will be part of the priority actions targeting in some way all five priority NPS categories: Stormwater, OWTS Maintenance, Aquatic Invasive Species, Agricultural BMPs and Trash-Free Waters.

As part of the NBNERR Program, DEM oversees an on-going coastal training program that is a partner with the NPS Program on topics of shared interest. Other on-going training in RI includes the URI-NEMO Program, Providence Stormwater Innovation Center, NRCS and URI Onsite Wastewater Center among other programs. This NPS Pollution Management Program Plan highlights planned training

activities by DEM and partners over the next five years on the topics of LID, stormwater BMPs maintenance, OWTS and agricultural BMPs. Also see SNEP Network description in Section 4.4.1.

## 5.5 Partners in NPS Management

As the lead state agency for water quality management and water pollution control, DEM has responsibility for developing and implementing this Nonpoint Source Management Program Plan consistent with its authorities. However, as noted earlier, there are many federal, state, quasi– state, municipal, academic, and non–governmental entities, and various user groups (fishing, boating, etc.) that contribute in significant ways to the management of NPS pollution in RI that are discussed below. Implementation of RI's NPS Management Program Plan, including the continuing development of watershed plans, requires active public engagement and stakeholder involvement. While the state may have a lead role in monitoring and assessing water resources, the participation of all entities most affected by management decisions is needed throughout the planning, implementation and evaluation steps in the process. DEM envisions that broad stakeholder engagement is a pre-requisite for success and will encourage the active involvement of all interested stakeholders in the NPS program: federal, state, local governments, quasi-governmental agencies, watershed councils, and other non–governmental organizations, interested business and individuals. Effective public engagement ensures environmental objectives are well integrated with related economic, social and cultural goals, which in turn builds support for implementation of needed actions.

### 5.5.1 Federal Government Partners:

**Environmental Protection Agency** – Among its activities, EPA establishes national requirements for implementation of federal laws for water quality management; provides funds to the state to implement water quality programs under federal law and conducts research on water quality issues. EPA administers Clean Water Act programs, including the NPS Program, nationally, and collaborates with RI DEM and partners on its implementation. EPA collaborates with states on special projects that advance environmental protection by mitigating NPS pollution, e.g., initiatives related to NPS pollution include Trash -Free Waters, Smart Growth, Green Infrastructure and Watershed Management to name a few. EPA also provides a variety of training opportunities, including webinar series that support transfer of technical information. RI green infrastructure projects, supported with CWA Section 319 funding, have been featured in the EPA "Soak up the Rain" series. (Also see description of the EPA Southeast New England Program [SNEP] and SNEP Network).

**United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS)** – provides funds and technical assistance to farmers to implement best management practices for water quality management and habitat improvement under several funding programs. The DEM Office of Water Resources, EPA and others interested in resource stewardship are members of the NRCS State Technical Team, which generally meets 2 – 4 times per year. Opportunities are provided for water quality concerns to be a key part of NRCS programs and in the development of conservation practice standards. DEM and NRCS are also actively coordinating in the implementation of the National Water Quality Initiative (See discussion under Agriculture).

**US Geological Survey (USGS)** – conducts water quantity and quality studies of groundwater and surface water resources. In RI, through a joint funding agreement USGS conducts water quality monitoring on the state's largest rivers, operates the stream gage network and measures groundwater elevations. Periodically, USGS carries out additional projects ranging from field investigations, water modeling (e.g., HSPF) and data analysis and synthesis ; eg. USGS has characterized water quality trends in the Blackstone and other rivers.

**Federal Emergency Management Agency (FEMA)** – FEMA's mission is to help people before, during, and after disasters. FEMA works with Rhode Island on hazard mitigation projects including flooding through publication of flooding risk maps and resources. Among the assistance it provides, FEMA distributes grant funding to state, local and tribal governments to support hazard mitigation planning aimed at reducing risks. It also carries out floodplain mapping and administers the National Flood Insurance Program.

**National Park Service (NPS) –** NPS provides funding assistance for habitat restoration projects and designates rivers (such as the Wood-Pawcatuck and Taunton) as Wild and Scenic. The NPS manages the Blackstone River Valley National Historical Park and age Corridor and continues to be a partner in NPS-related projects including enhancing fish passage.

**National Oceanic and Atmospheric Administration (NOAA)** - NOAA, a large federal agency, that intersects and aligned with the RI NPS Program in terms of its activities, including research and delivery of data services, related to climate and resiliency, flood forecasting, coastal habitats and fisheries and coastal zone management. NOAA supports certain monitoring activities in RI including long-term tide gauges. NOAA also funds the NBNERR program. As part of its national program of estuarine research reserves. NOAA provides support to the Narragansett Bay National Estuarine Research Reserve that includes monitoring tidal data within Narragansett Bay. In addition, the National Weather Service (NWS) housed within NOAA provides flood forecasting.

**United States Fish & Wildlife Service (USFWS) -** The purpose of the USFWS is to conserve, protect, and enhance fish, wildlife, plants, and their habitats for their continuing benefits. Among its activities, USFWS operates national wildlife refuges in Rhode Island and is recognized for its expertise in fish passage. DEM works with USFWS on habitat preservation and restoration projects.

### 5.5.2 Tribes

**Narragansett Indian Tribe**: The Narragansett Indian Tribe are descendants of the aboriginal people of the State of Rhode Island. The Tribe is federally recognized and manages lands in Charlestown, Rhode Island that includes ponds and streams and has collaborated with DEM staff on topics including water quality monitoring.

### 5.5.3 Regional and Interstate Programs:

**Southeast New England Program (SNEP)** - In 2012, at the direction of Congress, the U.S. Environmental Protection Agency (EPA) created the Southeast New England Program (SNEP), a comprehensive effort to restore and protect the region's coastal waters and watersheds. The geographic region for SNEP extends from Westerly, RI to Pleasant Bay on Cape Cod, encompassing

the major estuaries of Narragansett Bay and Buzzards Bay, and their watershed lands as far north as Worcester, Mass. It includes the south shore of Cape Cod as well as Martha's Vineyard, Nantucket, Block Island and the Elizabeth Islands. Non- point source pollution issues, including nutrient enrichment and habitat degradation or loss are common challenges across the region. SNEP works in partnership with stakeholders in these states to promote a resilient ecosystem of clean water, healthy diverse habitats, and sustainable communities in Southeast New England. EPA SNEP funding is distributed via grants in partnership with Restore America's Estuaries (RAE), NBEP and other mechanisms to support projects advancing SNEP goals.

**SNEP Network** - In the fall of 2019, the US Environmental Protection Agency (US EPA) awarded a five-year cooperative agreement to the New England Environmental Finance Center based at the University of Southern Maine to establish a technical assistance network for the Southeast New England region. The SNEP Network brings together 16 partner entities including local environmental organizations, academic institutions, regional planners, and consultants who work collaboratively to provide municipalities, tribes and organizations access to free training and technical assistance to advance stormwater management and ecological restoration goals across the region. https://snepnetwork.org/#

**New England Interstate Water Pollution Control Commission (NEIWPCC)** – This is a state and federal funded regional commission to support State water management programs.
DEM participates in several NEIWPCC workgroups that provide a forum for states to share best practices and lessons learned on numerous NPS and aquatic habitat management topics, including: Nonpoint Source Management, Stormwater, Onsite Wastewater, Emerging Contaminants, Wastewater Residuals, Water Quality Standards, Harmful Algal Blooms, Source Water Protection, and Climate Change.

**Narragansett Bay Estuary Program (NBEP)** – Established in 1987 pursuant to Section 320 of the Clean Water Act, the Narragansett Bay Estuary Program uses federal funds to protect and restore Narragansett Bay through initiating and coordinating projects with public and private partners. The program targets the bi-state watershed of Narragansett Bay as well as southern RI watersheds and accordingly constitutes a regional program with involvement from both Rhode Island and Massachusetts. The program has initiated a process to update the Comprehensive Conservation and Management Plan for Narragansett Bay that is targeted for completion in 2025 and which will include recommended actions pertaining to NPS problems in RI. The NBEP has also played a role in distributing grants for research, capacity building and, various implementation projects, including funding from the SNEP and BIL. Among other activities, the DEM and NBEP collaborate on outreach to build support for effective management (e.g., Story Maps, Status and Trends Report).

**Narragansett Bay National Estuarine Research Reserve (NBNERR) –** preserves, protects and restores coastal and estuarine ecosystems of Narragansett Bay through long-term research, education and training. The NBNERR Coastal Training Program has provided many opportunities for professionals to improve skills and knowledge to address NPS issues. NBNERR is a partner in Bay water quality monitoring. Research focuses on salt marsh ecology in the context of climate change and sea level rise.

**Blackstone Collaborative** - The Blackstone Collaborative is a network of non-profit organizations, universities, businesses, and others across Rhode Island and Massachusetts who work to ensure a healthier and more resilient Blackstone River Watershed by addressing its industrial past, ongoing urbanization, and the impacts of climate change. NBEP has provided funding to establish and support the Collaborative.

**Blackstone River Valley National Heritage Corridor** – A non-profit organization formed as a management entity for the John H. Chafee Blackstone River Valley Heritage Corridor shares with the NPS Program the mission of protecting the natural resources in the watershed.

### 5.5.4 State Government and Quasi- Governmental Entities:

**RI Coastal Resources Management Council (CRMC)** – lead agency for coastal zone management. CRMC manages and plans for the preservation of the coastal resources and permits all activities within tidal waters. DEM and CRMC jointly developed and implement the RI Stormwater Design and Installation Standards Manual and Rules, which reflects requirements for low impact development and establishes treatment standards for stormwater discharges. The agencies have also worked closely to revise and implement the Freshwater Wetland Rules. Regulatory staff routinely coordinate on permitting projects in the coastal zone including the emergency repair of OWTS following storms. In addition, CRMC and DEM collaborate on programs related to resource management including monitoring, protection and restoration of coastal wetlands and management of aquatic invasive species.

**RI Emergency Management Agency (RIEMA)** – RIEMA serves as the primary emergency response entity for the State of Rhode Island and coordinates with FEMA on implementation of multiple programs including but not limited to emergency preparedness, hazard mitigation, floodplain mapping and insurance. It also coordinates with DEM on dam safety.

**Rhode Island Environmental Monitoring Collaborative (RIEMC)** – the RI Comprehensive Environmental and Watershed Monitoring Act (R.I.G.L. § 46-31) in 2004 established the Rhode Island Environmental Monitoring Collaborative to develop and, through its members, implement comprehensive environmental monitoring to support management of Rhode Island's natural resources. With support from the EPA SNEP funding, DEM collaborated with the RIEMC on an expansion of its website in 2018 and a workshop on environmental indicator development. The RIEMC provides a forum for government agencies, university– based programs, non–governmental organizations, and volunteers to collaborate on monitoring activities, determine monitoring priorities and identify critical gaps in data collection.

**RI Department of Health (DOH)** – regulates public water suppliers to ensure that water provided to the public meets drinking water standards; monitors water quality at saltwater bathing beaches; and is only one of two laboratories on the East Coast approved to test for the biotoxin domoic acid. DEM staff work closely with DOH Programs on source water protection planning and responding to instances of public and private drinking water contamination, including PFAS, investigation and abatement of water pollution affecting public beaches and other water related public environmental health threats including cyanobacteria blooms in surface waters, seafood caused illnesses, and fish

tissue contamination. DEM organizes an annual interagency meeting with DOH to coordinate cyanobacteria monitoring and bloom response efforts. DOH coordinates an interagency PFAS work group that meets regularly. DOH also provides laboratory services to DEM water monitoring programs via an annual contractual agreement.

**RI Infrastructure Bank (RIIB)** – administers the Rhode Island Clean Water State Revolving Fund to finance primarily municipal wastewater, stormwater and other clean water projects. RIIB in cooperation with DEM administers the Community Septic System Loan Program (CSSLP), in which the towns that have a DEM–approved Onsite Wastewater Management Plan can access funds that provide low interest loans to homeowners for OWTS repairs. RIIB administers additional financial assistance programs including the municipal resiliency program and action grants. It's newest program, the Ocean State Climate Adaptation and Resiliency (OSCAR) fund is co-managed with DEM and CRMC.

**RI Water Resources Board** – oversees the management and use of drinking water resources: identifies potential sources, allocates drinking water supplies and administers financial programs to ensure adequate supplies of drinking water. DEM and DOH are members of the RI Water Resources Board. DEM staff coordinate with Board staff on issues of water allocation and withdrawal and their impact on water quality and aquatic habitat and management of state land protected for water supply (big river). DEM NPS staff also review the water supply system management plans required by the Water Resources Board of the major water suppliers in the state.

**Department of Administration** – creates long-term plans (referred to as elements of the State Guide Plan) for the state's development and management of its natural resources, and ensures municipalities comply with local planning requirements. DEM staff worked closely with DOA on the development of the State Guide Plan Element "Water Quality 2035, RI Water Quality Management Plan" that was adopted in 2016. (This plan is undergoing update and revision). Rhode Island cities and towns must have a locally adopted Community Comprehensive Plan that must be updated at least once every five years. Municipal plans are required to be reviewed by the State for consistency with State goals and policies. In turn, State agency projects and activities are to conform to local plans that have received State approval. DEM NPS Program staff review draft local comprehensive plans for consistency with this Plan, Water Quality 2035, and DEM water related regulations and policies. The review process is coordinated across state government by the Department of Administration Division of Planning. DEM is represented on the DOA managed State Planning Council and its Technical Advisory Committee.

**RI Department of Transportation** – maintains state and federal roads, which includes stormwater management and road salting and sanding. As a regulated MS4, DOT is implementing a strategic program to comply with an EPA consent decree to improve stormwater management. DOT has partnered with watershed organizations and other entities to facilitate the implementation of stormwater retrofits with an emphasis on "green infrastructure."

**Executive Climate Change Coordinating Council (EC4)** – The Council was established by state law, and it is charged with incorporating consideration of climate change in the powers and duties of all

state agencies. It is responsible for setting specific greenhouse gas reduction targets and planning for mitigation and adaptation to climate change. The Council is chaired by DEM and it works with an ECH advisory board and a Science and Technical advisory board. The Council provides a forum for evaluating how a changing climate in RI may impact nonpoint source pollution management; e.g. design standards for OWTS and stormwater BMPs.

**RI Rivers Council** – RI state law (RIGL 46-28) established the RI Rivers Council to coordinate and support activities of local watershed associations. RI DEM is a member of the Council and hosts the Council's monthly meetings. Ten watershed organizations have been designated by the Rivers Council in RI. State law bestows certain rights to these designated organizations. These watershed organizations vary in capacity -- from those with paid professional staff to solely volunteer organizations. However, they all fulfill a critical stewardship role in their watersheds by raising awareness, coordinating and implementing projects and advocating for protection and restoration actions.

**Wood Pawcatuck Rivers Wild and Scenic Stewardship Council –** The Stewardship Council was created in early 2019 following the Wood-Pawcatuck Watershed receiving a National Wild and Scenic River designation. The Council includes representatives from the twelve towns in the watershed (across Rhode Island and Connecticut) along with state agencies and non-profit organizations. The Council's mission is to help preserve, protect, and enhance the special environmental, cultural, and recreational values of the Wood-Pawcatuck Watershed.

**State Conservation Committee and Conservation Districts** – Rhode Island's Conservation Districts, the Rhode Island State Conservation Committee, and the Natural Resources Conservation Service are collectively known as the Conservation Partnership. DEM is a member of the State Conservation Committee. Rhode Island's three regional conservation districts share a mission of promoting proper stewardship of natural resources and have a long track record of carrying out initiatives involving education and outreach, and various forms of technical assistance as well as project management support on nonpoint source pollution.

**Narragansett Bay Commission (NBC) –** NBC is the regional wastewater utility that services the Providence metropolitan region. It carries out a variety of monitoring activities and is partner in the Fixed-Site Monitoring Network in Narragansett Bay. Among its community-based activities, it supports river clean-ups and is implementing and promoting "green infrastructure" for stormwater management.

**Regional Water Suppliers** – provide drinking water to the public and work to protect their sources of water supply. Water suppliers are eligible recipients of CWA Section 319 grant funds for source water protection and restoration of water quality in their watersheds/wellhead protection areas.

### 5.5.5. Municipalities

Given the strong relationship between land use and water quality, local governments have an especially important role to play in water quality management through the exercise of their authorities to govern land use. Local land use planning and zoning establishes the type and level of

intensity of development on the landscape, which determines to a major degree the potential impacts to water quality. Municipalities have many tools available that can be applied to guide land use development in a manner that is protective of water resources. In doing so, they comply with the goals and policies for development specified in *State Guide Plan – Land Use 2025* that will reduce the impacts of development on water quality, such as:

- Zoning to ensure the type and density of development is suitable for the resources that may be impacted; may include overlay districts that restrict land uses that pose higher pollution risks;
- Conservation Development: This is a zoning technique in which the character–defining features of a parcel are identified and protected before land is developed. It differs from traditional development in that assessment of natural resources, not identifying building sites, is the first step in the process;
- Land acquisition of open space to protect drinking water and other important water sources and to conserve priority natural habitats; and
- Low impact development (LID) practices, which utilize site planning and design techniques to mitigate the impacts of stormwater and site disturbance on our water resources. In addition to conservation development, LID practices include (see also section on Stormwater):
    - Site clearing and grading standards
    - Roadway and parking design guidelines
    - Compact development
    - Landscaping and tree preservation

In addition to their primary role in regulating land use, many municipalities implement local onsite wastewater management programs, local stormwater management programs and may operate other programs that support water quality management including acquisition and management of open space.

### 5.5.6 Academic Institutions:

**University of Rhode Island** – DEM works collaboratively with various individual researchers as well as programs at URI. Collaboration ranges from projects of short duration to ongoing efforts that have been in place for twenty years or more; e.g., Environmental Data Center and GIS applications. Examples of ongoing collaboration with DEM on NPS related topics include the following Cooperative Extension Programs:

- RI Nonpoint Education for Municipal Officials (NEMO) Program: Supports local decision makers in the management of land use impacts on natural resources;
- Home*A*Syst Program: Provides residential pollution prevention programs, including drinking water well protection and landscaping for water resource protection. The Program continues to hold private well owner workshops across the state in cooperation with the DOH; and
- Watershed Watch Program: A scientist–led volunteer water quality monitoring program. Data collected by the Watershed Watch Program is considered by DEM in the water quality assessment process.

**URI Onsite Wastewater Resource Center**

DEM partners with the Onsite Wastewater Resource Center based at the University of Rhode Island which provides programs to educate communities and wastewater practitioners on onsite wastewater systems. The Center provides training for wastewater professionals and advances research on optimizing treatment performance of OWTs, including nitrogen removal technologies and other topics including the impact of climate change on the OWTS. It maintains the New England Onsite Wastewater Training Center facility which has 25 full scale systems constructed above ground for hands-on learning. Training Center staff conduct classes throughout the year in classroom, field and online formats.

**URI Coastal Institute** – advances knowledge and develops solutions to environmental problems in coastal ecosystems through a variety of project and initiatives.

- Chairs and coordinates the RIEMC;
- Hosts the RI Climate Change Collaborative; and
- Hosts forums on timely topics such as stormwater management.
- Involved with research on PFAS.

**URI Coastal Resources Center** – mobilizes governments, business and communities to work together as stewards of coastal ecosystems. Areas of current focus that align with the NPS Program include coastal community planning, climate change and capacity building. DEM collaborated with the Resources Center on the stormwater module for the PREP-RI training to provide resilience education for planning preparedness in RI.

**URI Graduate School of Oceanography –** partners with DEM –OWR to deploy, operate and retrieve equipment used in the Narragansett Bay Fixed-Site Monitoring Network which provides long-term datasets on water quality. URI-GSO also maintains long-term data collection programs that measure phytoplankton and fisheries.

**Roger Williams University** - RWU hosts the Narragansett Bay Estuary Program and utilizes funding from the National Estuary Program to further planning, research, and outreach for programs that engage local communities on issues such as wildlife and habitat restoration, water quality, storm protection, and rising sea levels.

**Salve Regina University -** Salve Regina University has partnered with non-profit organizations and local residents on Aquidneck Island to improve water quality through good land stewardship and watershed protection. This includes work at Almy Pond.

**Brown University –** Brown University hosts the Climate Solutions lab which works to create, learn and distribute climate knowledge.

### 5.5.7 Non-governmental Organization (NGOs):

Environmental NGOs, which range in size and capability, are often collaborators with governmental agencies on watershed protection and restoration projects and initiatives. Such groups take on various roles in advocating for and carrying out NPS implementation projects. Larger organizations including Save The Bay, Audubon Society of Rhode Island, and The Nature Conservancy are broadly involved with environmental issues statewide and operate ongoing programs in areas such as monitoring, education, land stewardship, and habitat restoration that contribute to the implementation of this plan. Save The Lakes serves as statewide umbrella organization for lake associations and other interested stakeholders. Watershed and lake organizations, which may employ staff or be solely volunteer-based organizations, carry out a variety of programs, projects and activities within their geographic area of focus. Additional organizations representing user groups or other specific interests, such as, Trout Unlimited, Surfriders, Blueways Alliance, and RI Nursery Association also carry out activities supportive of the goals in this plan. In addition, local land trusts acquire important aquatic, riverine and upland habitat for protection of water quality and aquatic life. Finally, there are also professional organizations that collaborate and engage with DEM on various NPS topics. Examples of such groups are the RI Flood Mitigation Association, American Council of Engineering Companies, and RI Society of Environmental Professionals and RI Environmental Business Council.

| Table 11. NPS Program Administration, Coordination/Partnerships, and Outreach | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal: Governmental and non-governmental programs and partners collaborate to ensure success in protecting and restoring Rhode Island's water resources. | | | | | | | | |
| Objective | Actions | Milestones | Schedule | | | | | Estimated Annual Cost ($ - $$$)[19] |
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| Program Administration: Manage the RI NPS program to meet program objectives and make progress on priority NPS water quality problems. | Develop the annual NPS workplan. | Approved annual workplan | 1 | 1 | 1 | 1 | 1 | $ |
| | Manage funds in accordance with EPA 319 guidelines & federal requirements including commitments in the DEM-EPA Performance Partnership Agreement | Timely award & oversight of subawards per RFP priorities | 2-5 new awards | 2-5 new awards | 2-5 new awards | 2-5 new awards | 2-5 new awards | $$ |
| | Consistent with CWA Section 319(h), compile and provide EPA with sufficient information and data about RI's NPS Program to determine if satisfactory progress for the prior year was achieved. Includes annual report and estimated load reductions. | RI NPS Program receives EPA Satisfactory Progress Determinations on annual basis | X | X | X | X | X | $ |
| | Complete EPA required reporting into GRTS. | Annual updated GRTS information accepted by EPA | X | X | X | X | X | $ |
| | Update the NPS Program QAPP | Updated NPS Program QAPP | X | | | | X | $ |
| | Annual Success Story approved | Success Story accepted by EPA/yr | 1 | 1 | 1 | 1 | 1 | $ |
| | Update the RI Nonpoint Source Management Program Plan following solicitation of partner and public input | Approved RI NPS Management Program Plan for 2030-2034 | | | | | X | $ |

[19] Estimated annual costs for carrying out the actions: $: <$100,000; $$: $100,000 - $400,000; $$$: >$400,000

| Objective | Actions | Milestones | Schedule | | | | | Estimated Annual Cost ($ - $$$) |
|---|---|---|---|---|---|---|---|---|
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| <u>Tracking Implementation:</u> Compile and assess Information concerning investments in water quality and ecological restoration projects to support tracking progress toward NPS program goals. | Develop and modify data systems to improve tracking of water quality and ecological restoration projects including installed BMPs. | Updated systems to track water quality restoration actions on statewide basis. | X | X | | | | $$ |
| | Maintain data collection and project tracking. | Data collection and project tracking systems maintained | Ongoing | X | X | X | X | $ |
| <u>Program Coordination/ Partnerships</u>: Foster a collaborative approach among governmental and non-government partners to effectively implement the RI NPS Management Program Plan. | Support collaboration through formal and ad hoc interagency coordination mechanisms. | Annual Report on initiatives pertinent to NPS Program implementation: PFAS, Cyano | X | X | X | X | X | $ |
| | Host an annual meeting with the RI Rivers Council to facilitate planning and information exchange. | Annual meetings with follow-up actions identified | 1 | 1 | 1 | 1 | 1 | $ |
| | Participate in annual meeting of Save The Lakes as invited. | Annual meetings | 1 | 1 | 1 | 1 | 1 | $ |
| | Strengthen coordination with USDA Watershed Programs through periodic meetings for information exchanges | Two or more annual meetings with USDA-NRCS | 2 | 2 | 2 | 2 | 2 | $ |
| <u>Program Coordination/ Partnerships</u>: Foster a collaborative approach among governmental and non-government partners to effectively implement the RI NPS Management Program Plan. | Coordinate with RI Division of Planning on updates to state guide plan elements | Number of plans reviewed | 1-5 | 1-5 | 1-5 | 1-5 | 1-5 | $ |

| Objective | Actions | Milestones | Schedule | | | | | Estimated Annual Cost ($ - $$$) |
|---|---|---|---|---|---|---|---|---|
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| <u>Outreach and Education</u>: Make Rhode Islanders aware of water quality management priorities and informed on actions they can take to protect and restore water quality. | Update general NPS outreach materials and provide versions in additional languages to better serve EJ communities. | Updated and multi-lingual outreach materials (documents/web site pages). | | | 2-4 | | 2-4 | $ |
| | Carry out targeted outreach campaigns to foster actions to prevent and reduce NPS pollution. | Targeted outreach campaigns: Lakeside property owners, OWTS, Pet Waste. | 2-3 | | | | | $ |
| | Utilize enhanced outreach tools such as StoryMaps or videos to bolster outreach efforts. | Report on new outreach tools, including StoryMaps on major NPS Sources | 1 | 1 | 1 | 1 | 1 | $$ |
| | • Maintain existing Watersheds List-serve and develop similar communication mechanism targeting lake management. | Activity on various employed to list-serves to reach targeted audiences. | 100 **postings** | 120 **postings** | 140 **postings** | 160 **posting** | 180 **postings** | $ |

| Table 12. Monitoring, Assessment, and Prioritization | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal: Monitoring provides the information needed for management decision-making including determining and prioritizing actions. | | | | | | | | |
| Objective | Actions | Milestones | Schedule | | | | | Estimated Annual Cost ($ - $$$)[20] |
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| <u>Water Monitoring</u>: Monitor to provide data and information needed to support effective water resource management decision-making. | Support ambient river monitoring (rotating basins) to obtain data to evaluate NPS implementation | Annual dataset generated via ARM program | 1 | 1 | 1 | 1 | 1 | $$ |
| | Support citizen scientist programs that provide data that compliments state ambient monitoring activities. | Annual dataset generated by URI-Watershed Watch. | 1 | 1 | 1 | 1 | 1 | $$ |
| | Carry out water monitoring in targeted watersheds to support the NWQI initiative. | Data and annual report on NWQI activities. | X | X | X | X | X | $$ |
| | Support monitoring in targeted areas of NPS implementation to measure progress toward water quality goals. | # Targeted Locations sampled/Data reports | 1-2 | 1-2 | 1-2 | 1-2 | 1-2 | $$ |
| | Improve access to data collected through NPS Program activities. | DEM website modifications to provide access to additional data. | X | X | X | X | X | $ |
| | Review and prepare QAPPs as needed to support monitoring activities. | EPA approved QAPPs | X | X | X | X | X | $ |

[20] Relative annual costs for carrying out the actions: $: <$100,000; $$: $100,000 - $400,000; $$$: >$400,000

| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$) |
|---|---|---|---|---|---|---|---|---|
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| <u>Assessment:</u><br>Periodically assess water quality data is to identify causes of impairments and to characterize NPS pollution | Compile water quality data and provide content for preparation of the Biennial Integrated Water Quality Monitoring and Assessment Report (IR). | Data reports and related content on water quality documented for inclusion in the IR. | | X | | X | | $$ |
| | Compile data and information on other NPS stressors, including habitat alterations, and provide content for IR. | Data reports and related content on water quality documented for inclusion in the IR. | | X | | X | | $$ |
| | Review changes in water quality status to identify 1 or more Success Stories annually. | EPA approved Success Story | X | X | X | X | X | $ |
| | Track NPS pollutant load reductions | Load reductions in GRTS | X | X | X | X | X | $ |
| <u>Watershed Prioritization:</u><br>Evaluate NPS priority watersheds using new information as it is made available | Using statewide water quality results, other new information and public input, review watershed priorities and modify as needed to support adaptive management. | Conduct NPS priority watershed review | X | | X | | X | $ |
| | Evaluate integrating the EPA Recovery Tool into the DEM prioritization process. | Complete EPA Recovery Tool evaluation | | X | | | | $ |

| Table 13. Watershed Planning | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal: Watershed-based plans (WBPs) articulate the priority actions to protect and restore water quality and aquatic habitats. | | | | | | | | |
| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$)[21] |
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| Watershed Planning: WBPs are utilized to guide priority NPS implementation actions in additional watersheds/sub-watersheds. | Develop 5 or more additional watershed plans for designated watershed planning areas. | Number of new watershed plans that receive EPA approval | 1 | 1 | 1 | 1 | 1 | $$ |
| | Develop 5 or more lake management plans that satisfy NPS 9-Element plan requirements. | Lake management plans approved by EPA as WBP 9-element plans | 3 | 2 | | | | $$ |
| | Develop water quality restoration plans (TMDLs) for waters known or presumed to be impaired in whole or part from NPS pollution sources consistent with DEM Vision 2.0. | Completed TMDLs for waters impaired in whole or part by NPS pollution sources. | | 9 WBIDs | TBD | TBD | TBD | $$ |
| | Refine policies for aligning content on climate change and resiliency into watershed-based plans. | Updated DEM guidelines on preparing WBP | | X | TBD | TBD | TBD | $ |

[21] Relative annual costs for carrying out the actions: $: <$100,000; $$: $100,000 - $400,000; $$$: >$400,000

| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$) |
|---|---|---|---|---|---|---|---|---|
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| <u>WBP Updates:</u><br>WBPs are periodically updated to support adaptive management and incorporate new understanding of climate change | Develop a protocol for reviewing and updating WBPs. | Protocol for updating WBPs (e.g. template for an addendum) | | X | | | | $ |
| | Review WBPs prepared ten or more years ago to re-assess NPS sources and status of actions and incorporate new information. | Number of WBPs reviewed and updated | | | 1-2 | 1-2 | 1-2 | $ |
| <u>Habitat Planning Assessments</u>:<br>Opportunities identified for restoration of vegetated buffers to | Complete field verification and mapping of riparian buffer restoration opportunities in urban zones designated under RI Freshwater Wetland Rules | Prioritized list of restoration opportunities in urban zones | X | X | | X | | $ |

| Table 14. Statewide NPS Implementation Actions – Funding | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal: Conduct education/outreach activities and implement funding assistance projects | | | | | | | | |
| Objective | Actions | Milestones | Schedule | | | | | Estimated Cost ($ - $$$)[22] |
| | | | 2025 | 2026 | 2027 | 2028 | 2029 | |
| Funding: Section 319 funds are awarded in a timely manner to support NPS implementation projects | Execute bi-annual RFP to solicit proposals for NPS projects | RFP issued | X | | X | | X | $$$ |
| | Administer subawards to ensure efficient and timely expenditure of funds. | New subawards announced | 4-8 | | 4-8 | | 4-8 | $$$ |
| | | Completed NPS implementation projects | 5 | 3-5 | 3-5 | 3-5 | 3-5 | $$$ |
| Funding: State administered programs provide funding assistance to projects contributing to NPS implementation. (OSCAR, Bay and Watershed Restoration Fund, Municipal Resiliency, CSSLP) | Distribution of state financial assistance aligned with NPS Program, includes RIIB. | Number of new grants awarded | 15 | 5-10 | 15 | 5-10 | 5-10 | $$$ |
| | | Number of CWSRF or CLSSP loans | 2-4 | 2-4 | 2-4 | 2-4 | 2-4 | $$$ |
| | | Completed state-funded projects that support NPS implementation | 5 | 5 | 5 | 5 | 5 | $$$ |
| Funding: The public investment in NPS implementation is tracked and quantified. | Develop improved system for tracking public investment in NPS implementation (Water quality and ecological restoration) from federal, state and local governments. | Report on public investment in NPS Implementation. | | | | | X | $ |

[22] Relative annual costs for carrying out the actions: $: <$100,000; $$: $100,000 - $400,000; $$$: >$400,000

# 6.0 Resources for Implementation

Many sources of funding are utilized to implement NPS management in Rhode Island. At the state level, the DEM NPS Program is supported with federal Clean Water Act Section 319 program funding through a mechanism known as the Performance Partnership Agreement (PPA) and associated Performance Partnership Grant (PPG) which is executed between DEM and EPA. The program funds fulltime staff as well as water quality monitoring activities. EPA also provides other funds to DEM to support water quality assessment program, water quality restoration and additional water program activities relied upon by the NPS program.

On an annual basis, the total financial needs to fully address the actions in this plan to control nonpoint sources of pollution and to protect and restore aquatic habitats exceeds the amount of funding currently available to state and local entities. This includes significant needs related to building the capacity of state and local programs for this work as well as within the regulatory permitting and compliance programs important to NPS management. However, this is also a period of historic federal investment in water infrastructure, ecological restoration and resiliency programs as a result of the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act. This has provided additional resources, for the short-term, to a number of programs and RI agencies continue to actively seek new funding through new competitive grant solicitations. This higher level of investment is benefitting the collective efforts to prevent and mitigate NPS pollution.

The NPS Program aims to strike an appropriate balance between activities to proactively protect water resources from NPS threats and activities to abate NPS pollution. DEM is pursuing watershed planning in a manner that gives renewed attention to protection activities including the integration of water quality and habitat protection activities within a watershed. Given the extent of urbanization in RI, it has proven impractical to fully segregate watersheds based on need for protection versus restoration at the scale at which watershed planning occurs. Rather, DEM believes a mix of both types of activities will be necessary to achieve water quality goals in all watersheds in RI. Accordingly, over time DEM is aiming for an equitable allocation of resources to protection and restoration activities within the federally funded DEM NPS Program.

Implementation of the NPS Management Plan involves the staff efforts of governmental agencies as well as investments made through various grants, loan programs, NGO and private contributions. One objective of strengthened watershed planning is to prioritize and better align available resources from the federal, state and local levels to accelerate implementation of needed actions.

**Sources of Funding to Support Implementation Projects**

**Clean Water Act (CWA) Section 319 Grants:** DEM administers a competitive grant program that makes available federal EPA PPG (CWA Section 319 project funds) for implementation of actions to prevent or abate NPS pollutions and stressors. Consistent with federal guidance, DEM-OWR currently directs the project funds, which constitute 50% of the total 319 allocation to Rhode Island, to implementation activities that are negotiated annually via the PPA-PPG process. Watershed project proposals are solicited via a RFP process. Given the amount of funding available annually, DEM plans to issue an RFP every two years. The funds distributed as grants for watershed projects

generally require project match of 40% and project completion within a 1-3 year time period. To incentivize local watershed projects, DEM has a policy that may allow a lower match amount (25%) upon justification. This flexibility is allowed only when the overall match available to the NPS program from all sources allows DEM to meet the statutory program match requirement (40%) under CWA Section 319 via its Performance Partnership Grant (PPG) with EPA. A quality assurance program plan (DEM 2019) is in place that describes the process used to manage NPS Management grants.

**RI Infrastructure Bank:** The RI Infrastructure Bank administers the following Programs that support NPS project implementation. The Bank can also play a critical role on some reimbursable grant implementation projects where grantees do not have the up-front funds necessary (referred to as "bridge loans"). The RI Infrastructure Bank has established a Stormwater Project Accelerator program that offers upfront capital for green stormwater infrastructure projects that will eventually be funded through reimbursable state or federal grants.

**Community Septic System Loan Program (CSSLP):** As discussed in the Section on OWTS (Section 4.5.2), 18 towns in RI have adopted DEM approved onsite wastewater management plans to encourage or require maintenance activities such as system inspections or pumping of septic tanks. These plans make the towns eligible for a financial assistance program managed by the RI Infrastructure Bank referred to as the Community Septic System Loan Program. The program allows eligible towns to access funds from the Clean Water State Revolving Fund for low interest loans to homeowners for OWTS repairs. Since its inception in FY99 through FY23, the CSSLP has loaned $23 million to 18 municipalities with 11 of those borrowing multiple times.

**Clean Water State Revolving Fund Loan Program (CWSRF):** available to governmental entities for NPS watershed projects. Between 1990 and 2013, the program had issued over $1 billion in loans with the majority allocated to wastewater projects including upgrades to treatment works and abatement of combined sewer overflows. Many of the actions to implement the NPS Management Plan and the Narragansett Bay Comprehensive Conservation and Management Plan are eligible for SRF funding. In RI, the CWSRF loan program has also been used for NPS watershed projects including land acquisition for water quality protection, landfill closures and green infrastructure practices to protect bathing beaches. Recent changes to federal legislation (Water Infrastructure Finance and Innovation Act) may open up additional opportunities for financing NPS pollution abatement.

**Sewer Tie-In Loan Fund Program:** Modeled after the CSSLP, the RI Infrastructure Bank also administers a program that allows sewer system owners to access funds for low interest loans to homeowners to connect their residences into the local sewer system and abandon their OWTS.

**Municipal Resilience Program Action Grants:** Participating municipalities in the MRP Program are eligible to apply for MRP Action Grants that are distributed annually as resources allow. Eligible projects are required to be identified through the MRP workshop process, improve climate resilience, and result in engineering/design and construction. Project types supportive of NPS goals have included green stormwater infrastructure and other nature -based solutions, coastal and riparian resiliency, urban tree plantings, and other watershed resiliency actions. As of March 2024,

$24.6 million has been awarded to 56 projects.

**Ocean State Climate and Adaptation and Resilience Program:** Newly introduced in 2024, the Ocean State Climate and Adaptation and Resilience Program (OSCAR) program is focused on projects that enhance coastal and riverine habitats to address climate change. Co- administered by RIIB, DEM and CRMC, an initial allocation of $4 million supports this state grant program. Grants are limited to those that own or otherwise control public lands.

**Climate Resilience Fund:** This DEM grant program supports the design and construction of nature-based solutions to protect or enhance Rhode Island's natural systems in the face of projected climate change impacts. Projects can include green infrastructure projects that utilize vegetation and pervious surfaces to manage coastal, riverine, and inland flooding, erosion and storm damage. The program also addresses projects to redesign, relocate ore remove vulnerable infrastructure and facilities.

**Southeast New England Program (SNEP):** The Southeast New England Program region consists of coastal areas in Massachusetts and Rhode Island including Cape Cod, Narragansett Bay and Buzzards Bay. This EPA program includes government and non-government organizations all of whom are currently working collaboratively and innovatively to maintain and improve water quality and habitat conditions within these coastal watersheds. SNEP works to address complex issues at the ecosystem level, use existing resources more efficiently, find synergies and leveraging opportunities across multiple agencies and organizations, and increase the likelihood of developing sustainable solutions. The program has provided over $20 million in grants and assistance to the region including a variety of projects that benefit RI communities and their waters. It continues to be an important source of funding for work to protect and restore water quality and habitats in the RI.

**NRCS Grant Programs:** As discussed in Section IV. D. Agriculture, funding to implement best management practices is available through the NRCS Environmental Quality Incentives Program (EQIP) or other assistance programs. EQIP is a voluntary program that provides financial and technical assistance to farmers to help plan and implement conservation practices that address natural resource concerns. Farmers that apply through the EQIP may be eligible for cost share assistance on projects built in accordance with the NRCS standards. Since the adoption of the 2008 USDA Farm Bill, 1189 EQIP contracts have been awarded in RI. In addition, NRCS has dedicated 5% of the EQIP funds for projects in priority watersheds chosen jointly with DEM under the joint EPA/USDA National Water Quality Initiative to work with farmers to implement approved strategies to improve water quality.

**SNEP Opportunity to Advance Resiliency:** The SNEP SOAR Program provides grants to improve and support the SNEP region with meaningful community involvement as it relates to the design and implementation of projects to address the anticipated effects of climate change and historic, long-term impacts of environmental and social justices. Projects support planning, implementation, outreach, training, and capacity building.

**State Narragansett Bay and Watershed Restoration Fund (BWRF):** DEM administers a competitive state grant program that provides financial assistance to eligible entities primarily for

implementation of projects that restore water quality associated with NPS pollution, including all types of stormwater discharges as well as aquatic habitat. Established in 2006, the fund is supported by state bond funds approved periodically by RI voters. In 2014, the fund was expanded to include a category for flood prevention projects that utilize approaches that provide environmental quality co-benefits. In 2017 DEM awarded $3,784,800 under the Stormwater and Nonpoint Source Pollution Sub-Fund for projects to construct stormwater pollution abatement BMPs and enhance capacity for stormwater management. Grantees are required to provide matching contributions to projects (25-50%) and complete projects within a 1-3 year time period. Future grant rounds will be contingent on a renewal of funding for this program. As of 2019, the BWRF was largely allocated and any future solicitation for projects will require new funding.

**Marina Pump-out Grants:** DEM administers an ongoing financial assistance program that supports the installation, repair and upgrade of pump out facilities that service boats in Rhode Island's estuarine waters. Pursuant to the Clean Vessel Act, the program directs federal funds from the Sport Fish Restoration and Boating Trust Fund, provided to DEM by the United States Fish and Wildlife Service for this purpose. An average of $150,000-$200,000 has been made available annually**.**

**Narragansett Bay Estuary Program:** The NBEP has offered grants for targeted purposes and acted as a conduit for certain SNEP funding from EPA. Its small grant programs in recent years have focused on building capacity and supporting project planning, applied research on bay and watershed topics and implementation of small projects. SNEP has also funded larger projects involving nutrients, stormwater and habitat topics among others.

**Coastal Habitat Restoration Program:** Pursuant to state law, CRMC administers a state grant program capped at $250,000 per year that provides grants to support planning and implementation of coastal habitat projects including the restoration of anadromous fish passage.

**State General Revenues**: The DEM annual budget includes state funding that supports the two positions that oversee the DEM NPS Program, the staff of the OWTS and Freshwater Wetlands regulatory programs and limited operating expenses. General revenue funds have not been available for distribution as grants in the Office of Water Resources.

**Municipal Funding:** Local governments devote resources to implementation of this Management Program Plan in a number of ways. Chief among them are staffing and operational expenses to administer local programs and matching funds for watershed projects that address NPS pollution. The total expended annually varies considerably due to number and scale of projects.

**Watershed Organizations and Nongovernmental Organizations:** While capacity varies, NGOs often provide funding or in–kind services in support of monitoring, outreach and education and the planning, design and execution of NPS watershed projects.

# 7.0 Evaluation of Performance

Implementation of the RI Water Monitoring Strategy, described in Section 2, provides a majority of the ambient water quality data necessary to evaluate success in preventing new impairments and restoring existing impaired waters. This data may be supplemented by targeted studies as needed and as resources allow. The periodic statewide assessment of water quality conditions for surface waters and groundwaters produces information which can be used to track progress toward water quality goals in individual waterbodies. For surface waters, if no new waterbodies, particularly those previously assessed as in acceptable condition, are added to the list of impaired waters, then Rhode Island has by one measure succeeded in meeting its prevention goal. Additional tracking of trends in water quality will be performed to determine if waterbodies of high-quality conditions are experiencing degradation (decline in condition). A return to condition that complies with surface water quality criteria marks a success. However, as full restoration is often a very lengthy process, DEM is continuing to work toward indicators that will allow reporting of partial progress. Success in protecting groundwater resources will be evaluated in terms of the number of public wells that report exceedances of applicable drinking water standards that are associated with source water conditions. In addition to water quality assessment, DEM and its partners continue to work toward indicators of condition for freshwater wetlands and salt marshes. These will provide an additional means of characterizing the condition of this important component of a watershed once they are fully reviewed and adopted into agency policy and practice.

In addition to direct measures of water quality, the following table (Table 15) lists other indirect, but nonetheless valuable, environmental indicators that can be used to describe progress. These indicators can be used statewide and within particular watersheds as applicable. Certain measures can be evaluated annually while others would be better determined periodically (every two to five years).

**Table 15. Measures of Progress**

| Performance Measures | | | |
|---|---|---|---|
| **NPS Category** | **Pollutant/Stressor** | **Environmental** | **Programmatic** |
| • Stormwater runoff from developed lands<br>• Onsite wastewater treatment systems<br>• Hydromodification and Habitat Alteration<br>• Agriculture<br>• Trash, Litter, and Plastics | Pathogens<br><br>Baseline:<br>DOH Annual Beach Report -2024<br>DEM Shellfish Closure Map – 5/24<br>2024 Integrated Report<br>Annual Marina Pump Out report - 2024 | Reduction in beach closure events<br><br>Reduction in shellfish closures<br><br>Reduction in surface waters impaired for recreation uses | Number of cesspools removed<br><br>Progress in developing local OWTS programs<br>Baseline: 21 of 28 (2024)<br><br>Progress toward implementing local LID ordinances<br>Baseline: to be developed<br><br>Number of watershed projects implemented to address nonpoint sources of pathogens<br><br>Number of marine pump-out facilities operating and volume of wastewater collected<br><br>Number of NRCS contracts addressing manure management |
| • Stormwater runoff from developed lands<br>• Onsite wastewater treatment systems<br>• Hydromodification and Habitat Alteration<br>• Agriculture<br>• Trash, Litter, and Plastics | Nutrients<br><br>Baseline: DEM Cyanobacteria Annual Report – 2024<br>DEM Integrated Report - 2024 | Reduced number of confirmed cyanobacteria blooms<br><br>Full and partial progress toward meeting water quality criteria<br><br>Improved water clarity (lakes) | Progress in developing local OWTS programs<br>Baseline: 21 of 28 (2024)<br><br>Number of denitrification OWTS installed<br>Target: 600/year<br><br>Progress toward implementing local LID ordinances |

| Performance Measures | | | |
|---|---|---|---|
| **NPS Category** | **Pollutant/Stressor** | **Environmental** | **Programmatic** |
| | Nutrients (continued) | | Number of watershed projects implemented to address nonpoint sources of nutrients<br><br>Number of NRCS contracts addressing nutrient management<br><br>Number of green certifications issued for the turf management and golf course industries. |
| • Stormwater runoff from developed lands<br>• Onsite wastewater treatment systems<br>• Hydromodification and Habitat Alteration<br>• Agriculture<br>• Trash, Litter, and Plastics | Sediments<br><br>Baseline; DEM Integrated Report 2024 | Reduction in aquatic life impairments associated with sedimentation | Number of watershed projects implemented to address nonpoint sources of sediments<br><br>Progress toward implementing local LID ordinances<br><br>Number of NRCS contracts addressing sediment management |

| Performance Measures | | | |
|---|---|---|---|
| **NPS Category** | **Pollutant/Stressor** | **Environmental** | **Programmatic** |
| Alteration of wetlands | Physical alteration of habitat<br><br>Baseline: status and trends report | Total acreage of authorized wetland loss<br><br>Total acreage of wetland restored | Number of watershed projects implemented to improve wetland buffers or abate NPS pollution |
| Aquatic Invasive Species | Physical alteration of habitat | Reduction in number of lakes impaired by aquatic invasive species | Percent of public lakes managed pursuant to lake management plan |
| Barriers to Stream Connectivity | Physical alteration of habitat | Total stream miles with improved stream connectivity due to removal of barriers | Number of watershed projects implemented to improve stream connectivity |

# References


Bromberg, K. and M. Bertness. 2005. Reconstructing New England Salt Marsh Losses Using Historical Maps. Estuaries Vol. 28, No. 6, P. 823-932.

Center for Watershed Protection. 2003. Impacts of Impervious cover on Aquatic Systems. Watershed Protection Research Monograph No. 1. Center for Watershed Protection. Ellicott City. Maryland.

CRMC, 2015. The Rhode Island Sea Level Affecting Marshes Model (SLAMM) Project. Summary Report. RI Coastal Resources Management Council. Wakefield, RI. 28 pp.

DeGood, K., 2020. "A Call to Action on Combating Nonpoint Source and Stormwater Pollution". Center for American Progress. Washington, DC. 30 pp.

DEM 2011. Rhode Island Statewide Total Maximum Daily Load for Bacteria Impaired Waters. RI Department of Environmental Management. State of Rhode Island. Providence, RI.

DEM 2012. Rhode Island Freshwater Lakes and Ponds: Aquatic Invasive Plants and Water Quality Concerns. A Report to the Governor and Rhode Island General Assembly. RI Department of Environmental Management. Providence. 130 pp.

DEM, 2015. Rhode Island Wildlife Action Plan. https://dem.ri.gov/natural-resources-bureau/fish-wildlife/conservation-research/ri-state-wildlife-action-plan

DEM 2016. Integrated Water Quality Monitoring and Assessment Report. RI Department of Environmental Management. State of Rhode Island. Providence, RI.

DEM 2019. Rhode Island Section 319 Nonpoint Source Grant Program Quality Assurance Project Plan. RI Department of Environmental Management. State of Rhode Island. Providence, RI.

DEM, 2020. Forest Action Plan. RI Department of Environmental Management. Providence, RI. 148 pp.

DEM, 2023. Distribution of Aquatic Invasive Species. https://dem.ri.gov/environmental-protection-bureau/water-resources/research-monitoring/aquatic-invasive-species-response-efforts

DEM, 2023. Environmental Justice Policy. Version 1.4, Providence, RI. 6 pp.

DEM, 2023. DEM Strategic Plan for FY2024-2026. https://dem.ri.gov/media/72571/download

DOA 2006. Land Use 2025: State Land Use Policies and Plan; State Guide Plan Element 121. RI Department of Administration, Division of Planning.

DOA 2014. Road Salt Application in Rhode Island (Draft), March 2014. Statewide Planning Technical Paper #163. RI Department of Administration, Division of Planning. State of Rhode Island. Providence, RI.

DOA 2014. Road Salt/Sand Application in Rhode Island. Technical Planning Paper #163. RI Division of Planning. Providence, Ri. 16 pp.

DOA 2016. Water Quality 2035. State Guide Plan Element Report 121. RIDOA Division of Planning. 206 pp.

DOH, 2024. Beach Closure Data. https://health.ri.gov/data/beaches/#closures

DOT, 2021. Road -Stream Crossing design Manual. Rhode Island Department of Transportation. Providence, RI. 161 pp.

EPA, 1996. Watershed Approach Framework. United States Environmental Protection Agency. Washington, DC. 15 pp.

EPA, 2024. https://www.epa.gov/nps/basic-information-about-nonpoint-source-nps-pollution#Overview

EPA, 2024. https://www.epa.gov/soakuptherain/soak-rain-whats-problem

EPA, 2024. Trash-Free waters: https://www.epa.gov/trash-free-waters

Fulfer,V.M, Walsh, J. P. Extensive Estuarine Sedimentary Storage of Plastics from City to Sea: Narragansett Bay, Rhode Island, USA. Sci Rep 13, 10195 (2023)

Hellyer, Greg. 1995. Memorandum. Wetland Losses in Rhode Island 1780's-1990's. U.S. Environmental Protection Agency 4 pp.

Kutcher, T. 2017. Personal Communication with Sue Kiernan, DEM.

Kutcher, T. 2022. Salt Marsh Rapid Assessment Method, MarshRAM: Expanding a multi-marsh reference Sample to support salt marsh Management in RI. P by Rhode Island Natural History survey for DEM. Kingston, RI. 16 pp.

New England Water Pollution Control Commission, 2007. Northeast Regional Mercury Total Maximum Daily Load. Lowell, MA. 113 pp,

New England Water Pollution Control Commission, 2014. Regional Clean Water Guidelines for Fertilization of Urban Turf. NEIWPCC. Lowell, MA. 30 pp.

Peach, Michelle, April 2013. Powerpoint presentation. Rhode Island freshwater Wetlands Monitoring and Assessment Plan (WMAP). Rhode Island Natural History Survey. Kingston, RI.

RC&D 2013. Road Crossings as Potential Barriers to Fish and Wildlife Movement: The RI River and Stream Continuity Project. RI Resource Conservation and Development Council.

Task Force to Tackle Plastics, 2019. Report of the Task Force to Tackle Plastics Recommendations to the Governor". Providence, RI. 30 pp.

Tetra Tech, 2024. Analysis of Data and Methodology to Support Assessment of Mercury in Estuarine Fish Species and Impacts to EJ/DAC Communities in Rhode Island. Fairfax, VA. 56 pp.

USDA 2019. National Agricultural Statistics Service 2017 Census of Agriculture. US Department of Agriculture.

USEPA 2013. EPA Nonpoint Source Program and Grants Guidelines for States and Territories; issued April 12, 2013.

USEPA 2024. EPA Nonpoint Source Program and Grants Guidelines for States and Territories; issued April 12, 2024.

# APPENDIX A.

| Table A-1. Crosswalk of the Rhode Island NPS Management Plan and the EPA Key NPS Program Components | |
|---|---|
| **EPA Key NPS Program Components** | **Rhode Island NPS Management Program Plan** |
| 1. Identify water restoration and protection goals and the program strategies (regulatory, nonregulatory, financial and technical assistance, as needed) to achieve and maintain water quality standards. It includes relevant, current, and trackable annual milestones that best support program implementation. | Section 2<br>Section 3<br>Appendix B |
| 2. Identify the primary categories and subcategories of NPS pollution and a process for prioritizing impaired and unimpaired waters and identify how national and state priorities may align. | Section 2 |
| 3. Identify management measures that will be undertaken to reduce pollutant loadings resulting from each category, subcategory, or particular nonpoint source identified in component 2 above. The measures should also consider the impact of the BMPs on groundwater quality | Section 4<br>Section 5<br>Section 7<br><br>*See Tables* |
| 4. Use both watershed projects and well-integrated regional or statewide programs to restore and protect waters, achieve water quality benefits, and advance any relevant climate resiliency goals. | Section 4<br>Section 5<br>Appendix E<br><br>*See Tables* |
| 5. Identify and enhance the state's collaboration with appropriate federal, state, interstate, Tribal, and regional agencies as well as local entities (including conservation districts, private sector groups, utilities, and citizens groups) that will be utilized to implement the state program. Furthermore, the state supports capacity-building in disadvantaged, underserved, or overburdened communities. | Section 5 |
| 6. Show how the state manages and implements its NPSMP efficiently and effectively, including necessary financial management. | Section 5<br>Section 6<br>Section 7<br><br>*See Tables* |
| 7. Evaluate the state's NPSMP using environmental and functional measures of success and revise its NPSMP plan at least every five years. | Section 4<br>Section 5<br>Section 7<br><br>*See Tables* |

# APPENDIX B.

## Water Quality Standards and Assessment

### Water Quality Standards

DEM water quality standards are used to protect Rhode Island's surface water and groundwater resources. For surface waters, the water quality standards consist of three components: designated uses (denoted by classification); criteria; and an anti–degradation statement that specifies the level of water quality necessary to maintain designated uses. These standards are subject to approval by the EPA pursuant to the federal Clean Water Act and may not be less stringent than federal requirements. All surface waters of the state are assigned to a water quality classification. Specific designated uses are associated with each classification. Every waterbody in the state is designated for swimming (primary and secondary recreational contact), fish consumption, and aquatic life (fish and wildlife habitat) uses. Some waters are also designated for shellfish consumption, shellfish controlled relay and depuration, or drinking water supply uses. Associated with each designated use are water quality criteria which specify the conditions that will support the designed use.
https://rules.sos.ri.gov/regulations/part/250-150-05-1

The DEM Groundwater Quality Rules classify all of the state's groundwater resources and establish groundwater quality standards for each class. Protection of drinking water sources is the primary objective of these rules, but the Rules also prohibit contaminated groundwater from adversely impacting surface waters. The four classes are designated GAA, GA, GB, and GC in accordance with the RI Groundwater Protection Act of 1985 (RI General Laws 46-13.1). Groundwater classified GAA and GA is to be protected to maintain drinking water quality, whereas groundwater classified GB and GC is known or presumed to be unsuitable for drinking water use without treatment. Greater than 90% of the state's groundwater resources are classified as suitable for drinking water use (i.e., class GAA and GA). https://rules.sos.ri.gov/regulations/part/250-150-05-3

### Water Quality Monitoring

Water quality monitoring is needed to generate information on the nature and extent of nonpoint pollution. The DEM Office of Water Resources has a primary role in both conducting monitoring programs and collaborating on water monitoring carried out by other entities. DEM has executed formal agreements with DOH, URI, USGS and NOAA in support of water-related monitoring for decades. Monitoring activities follow the DEM Quality Management Program (QMP) and EPA Quality Assurance Project Plans when applicable. Collectively, DEM's monitoring programs are aimed at gathering ambient water quality and physical data to assess water quality conditions, characterize hydrology and support management decision-making at various scales. The NPS Program relies on information generated from monitoring to characterize water quality conditions, measure progress toward clean water goals, develop watershed plans, and evaluate the effectiveness of various NPS management strategies. A mix of monitoring strategies is employed to collect data from estuarine waters, freshwater rivers and streams, and lakes and ponds and are described further in the Rhode Island Water Monitoring Strategy (2019).

https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/benviron/water/quality/surfwq/pdfs/ri-water-monitoring-strategy-19.pdf

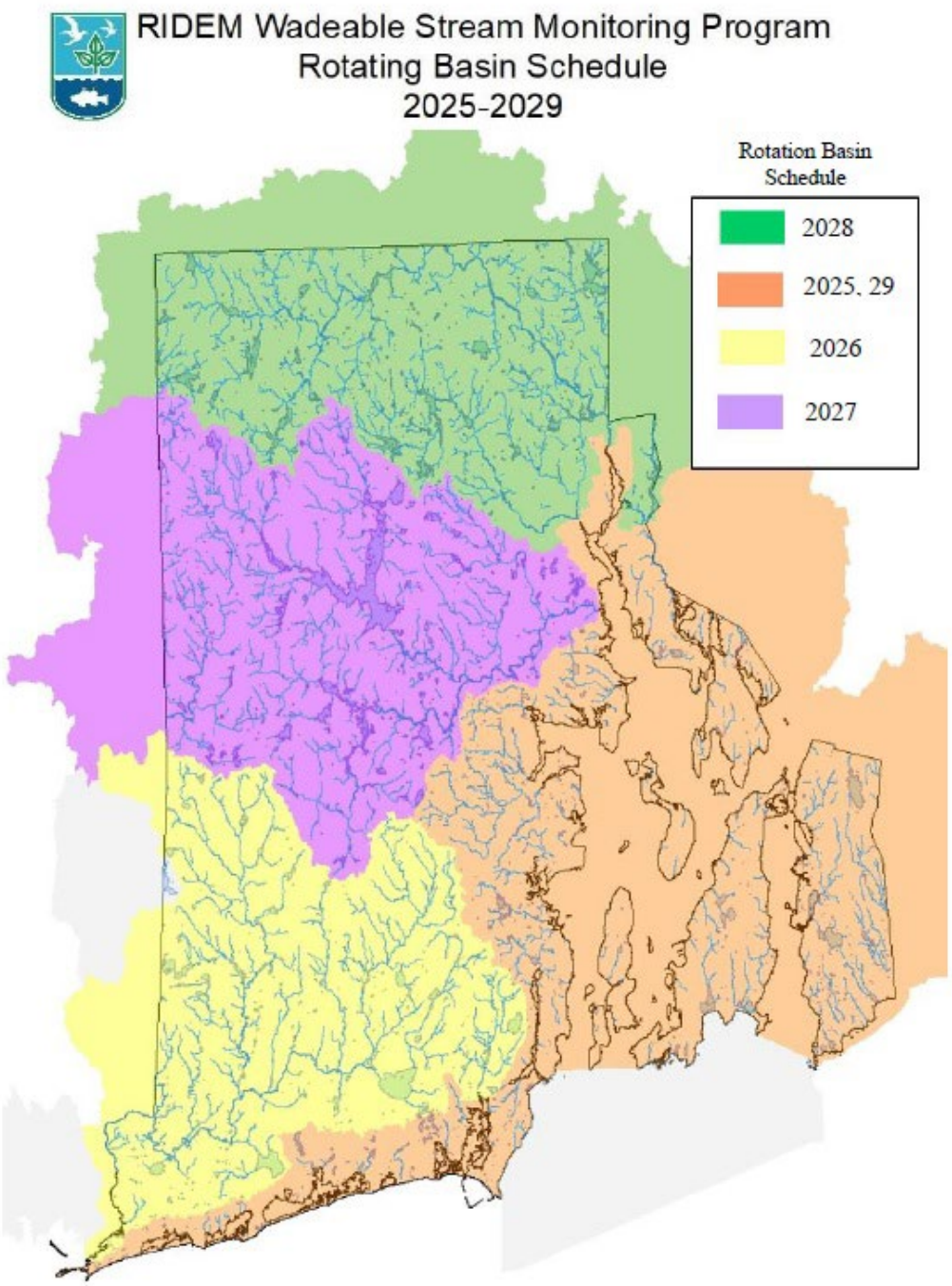
Programs important to characterizing NPS pollution include volunteer–based monitoring of lakes, ponds, rivers and streams coordinated by the URI Watershed Watch Program, the DEM ambient river monitoring program, shellfish growing areas and cyanobacteria monitoring programs. DEM monitors rivers on a rotating schedule that supports assessment of water quality across a watershed (see Figure B-1). Ambient monitoring programs are supplemented by more intensive targeted monitoring to characterize pollution sources and develop water quality restoration plans (i.e., TMDLs). Targeted monitoring may be conducted to document changes in conditions associated with the implementation of water quality restoration actions, including NPS pollution abatement actions and support National Water Quality Initiative (NWQI) activities. The NPS program also uses data generated by the RI DOH Beach Monitoring Program, DEM surveys on aquatic invasive species in freshwater. The RI Environmental Monitoring Collaborative website provides overviews of priority monitoring programs in RI. Additional information on water monitoring, along with certain monitoring data, is available on the DEM and partner websites.

Unlike the multi–faceted surface water quality monitoring efforts, Rhode Island lacks a comprehensive and coordinated groundwater quality monitoring program. Groundwater monitoring presents particular challenges associated with the manner in which pollutants move in different aquifer settings. Groundwater data is therefore compiled from monitoring of public and private drinking water wells, site- specific monitoring as well as studies and research.

Assessment of Water Quality Conditions

DEM water quality standards provide the basis for assessing water quality conditions. On a bi-annual basis to comply with federal CWA responsibilities, DEM/OWR assesses the quality of the state's waters and reports the results in the state's Integrated Water Quality Monitoring and Assessment Report. For surface waters, waterbodies or waterbody segments are assigned a waterbody identification (WBID) number for purposes of tracking. DEM/OWR compiles readily available data and information and evaluates each WBID as meeting or not meeting Rhode Island water quality standards. Consistent with EPA guidance, all WBIDs are placed into a one of five assessment categories, and waters that do not meet water quality standards and require a water quality restoration study referred to as a total maximum daily load (TMDL) are placed onto the 303(d) List (also known as the Category 5 List). Further details on the process are described in the Consolidated Assessment and Listing Methodology (CALM). https://dem.ri.gov/sites/g/files/xkgbur861/files/2023-02/calm24.pdf and at: https://dem.ri.gov/environmental-protection-bureau/water-resources/research-monitoring/water-quality-resources/integrated-reports

Figure B-1. RI DEM Ambient River Monitoring Program – Rotating Basin Schedule



Water Quality Restoration – Total Maximum Daily Loads (TMDLs)

Pursuant to federal Clean Water Act requirements, waters impaired by pollutants become targets for Total Maximum Daily Load (TMDL) development or the subject of other effective pollution control actions that are expected to restore water quality. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. TMDLs are based on the relationship between pollution sources in the watershed and instream water quality conditions. A TMDL addresses individual pollutant(s) or stressor(s) for each waterbody or waterbody segment. The water quality studies performed to support TMDL development often yield additional information that helps characterize the nonpoint sources of pollution that may be affecting a specific waterbody. The process results in a water quality restoration plan, or TMDL plan, that identifies and provides the technical basis for the actions needed to restore water quality. Common to the development of most TMDLs:

- Identify the impaired waterbodies and pollutant(s) not meeting water quality standards;
- Assemble and review available data and information on the waterbody and its watershed;
- Identify stakeholders having an interest in the waterbody and/or watershed;
- Identify data gaps that need to be addressed to satisfactorily characterize water quality conditions and pollution sources causing the identified impairment, and any factors affecting the extent and severity of the impairment;
- If needed, develop and implement a monitoring plan (and Quality Assurance Project Plan) to collect additional data to further characterize water quality and pollution sources. As part of the assessment process, pollution sources are identified and their significance assessed including point sources, such as wastewater treatment facility discharges and stormwater outfalls, and nonpoint sources, such as septic systems and unchannelized runoff from agricultural and urbanized areas;
- Estimate the current amount of pollutant load from point and nonpoint sources entering the waterbody;
- Establish the TMDL water quality target (typically the applicable water quality criteria) and allowable load of the pollutant of concern that the waterbody can receive and still meet water quality standards. For pathogen TMDLs, a concentration–based approach may be applied whereby a percentage reduction in fecal coliform concentrations is determined to represent necessary pollutant reductions;
- Allocate allowable loads between point and nonpoint sources, including providing a margin of safety;
- Develop an implementation plan identifying the specific actions necessary to achieve the waterbody's water quality target(s);
- Conduct public meeting(s) and formally solicit and respond to public comments; and
- Submit the draft TMDL to EPA for formal approval.

More information: https://dem.ri.gov/environmental-protection-bureau/water-resources/research-monitoring/restoration-studies-tmdl-2

# Appendix C: Rhode Island's Water Resources

| | |
|---|---|
|  | ***Freshwater Rivers and Streams:*** 1,410 miles of rivers and streams, 86% of which are small headwater streams. (1:24,000, RIGIS, 2022) |
|  | ***Freshwater Lakes and Ponds:*** 21,537 acres of lakes, ponds and reservoirs (1:24,000 RIGIS,2022) and many other very small ponds. DEM estimates 75% of lakes 20 acres and larger are manmade impoundments. |
|  | ***Groundwater Aquifers:*** 22 major stratified drift aquifers covering 190 square miles; four federal sole source aquifer designations. (RIGIS, April 2024) |
|  | ***Freshwater Wetlands:*** About 91,600 acres or approximately 13.7% of Rhode Island's land area is comprised of freshwater wetlands including swamps, marshes, bogs and fens. Wooded swamp is the most abundant wetland type in RI. (DEM, 1993) |
|  | ***Estuarine Waters***: 159 square miles of estuarine waters including Narragansett Bay and its sub–embayments, Little Narragansett Bay, eleven coastal lagoons are located along the southern RI shore and salt ponds on Block Island. |
|  | ***Salt marshes:*** 3,630 acres of salt marsh located along RI's coastal shorelines. (RI Ecological Classification -2011, RIGIS) |
|  | ***Marine Waters***: Rhode Island and Block Island Sounds. |

# Appendix D.

## EPA Required Minimum Nine Elements of a Watershed-based Plan (WRB)

*(From: EPA Nonpoint Source Program and Grants Guidelines for States and Territories; issued April 12, 2013.)*

The nine elements are provided below.

***Element a. Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan. Sources that need to be controlled should be identified at the significant subcategory level along with estimates of the extent to which they are present in the watershed (e.g., X number of dairy cattle feedlots needing upgrading, including a rough estimate of the number of cattle per facility; Y acres of row crops needing improved nutrient management or sediment control; or Z linear miles of eroded streambank needing remediation).***

***Element b. An estimate of the load reductions expected from management measures.***

***Element c. A description of the nonpoint source management measures that will need to be implemented to achieve load reductions in element b, and a description of the critical areas in which those measures will be needed to implement this plan.***

***Element d. Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.***

***Element e. An information and education component used to enhance public understanding of the plan and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.***

***Element f. A schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious.***

***Element g. A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.***

***Element h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.***

***Element i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under element* h.**

## APPENDIX E.

## Integration Watershed Planning

There are a variety of ongoing planning efforts relevant to NPS watershed planning. Integrating across these planning efforts helps to reinforce a more holistic approach to watershed management. Described below, these other planning activities, which typically have a narrower specific focus, can contribute content related to the protection and restoration of water resources. These plans often serve as a source of watershed specific recommended actions that should be reflected in a watershed plan.

### Water Quality Related Plans

Water Quality Restoration Plans (TMDLs) – TMDL documents provide the technical basis for prioritizing water pollution abatement actions. Also see Appendix B description.

Special Area Management Plans (SAMPs) – The CRMC has prepared these comprehensive plans that provide for natural resource protection and reasonable coastal–dependent economic growth in policies and actions set forth for a specific coastal area of the State. Protection of water quality is a key component of SAMPs. The following SAMPs have been prepared: Metro Bay, Greenwich Bay, Aquidneck Island West Side, Narrow River, Salt Ponds Region, Pawcatuck River, Ocean, and Shoreline Change (Beach).

Lake Management Plans –DEM continues to encourage the development of lake management plans that integrate topics related to water quality and management of aquatic invasive species taking into account the larger watershed within which the lake is located. A lake management plan provides the framework for fostering more effective management by identifying the threats to water quality and habitat conditions, actions needed to prevent degradation and restore and manage existing conditions.

Water Supply System Management Plans – Water Supply System Management Plans are required by the Water Resources Board for RI's 29 large public drinking water suppliers – those supplying greater than 50 million gallons of water per year. These comprehensive management plans have a water quality protection component wherein the supplier is required to identify actions for protecting water quality in its source water protection area (reservoir watershed and/or wellhead protection area). Plans must be updated every 5 years.

Source Water Protection Assessments/Plans (Large supplier) – These plans were prepared by the RI DOH for the 29 large water suppliers in RI in 2003 in response to federal Safe Drinking Water Act requirements to conduct source water assessments. Plans included an assessment of the vulnerability of the water supply based on water quality data and activities in the source water protection area and recommendations to protect the water supply. Although there has been no required comprehensive update of these assessments, some of the suppliers have prepared updated source water assessments following the methodology recommended by the

State.
Source Water Protection Plans (Small supplier) – Source water protection/supply system plans for the smaller suppliers (all those not subject to Water Supply System Management Plan requirements) are not required but are strongly recommended. A number of plans have been prepared for willing suppliers using state and federal resources as they become available.

National Water Quality Initiative (NWQI) Assessments - NRCS prepares the required Watershed Assessments for the priority watersheds selected for the National Water Quality Initiative (NWQI). These assessments must meet specific NWQI criteria that will provide detailed information about the watershed's characterization, hydrology, and water quality.

**Water Infrastructure Planning**

Wastewater Facility Planning – Facility plans are long-term (20 year) planning documents that document the needs of wastewater treatment systems. Based on sound engineering principles, they identify need related to enhanced treatment, system capacity and service areas; e.g., identify areas that may require sewer service in the future. Facility plans are prepared by the operators of wastewater treatment facilities and certain municipalities that have responsibility over portions of a sewer collection systems but not treatment facilities. The plans are subject to DEM review and approval. Consistency with a facility plan is a pre–requisite for decisions by DEM to authorize modifications to existing wastewater infrastructure. It also is a factor in determining projects as qualifying for funding, such as the state's Clean Water State Revolving Fund. DEM coordinates reviews among its public wastewater and OWTS programs to ensure consistency between facility plans and local wastewater management plans.

Onsite Wastewater Management Plans – Local communities that rely on onsite wastewater systems have been encouraged to develop local onsite wastewater plans and programs. The plans identify specific actions a community expects to carry out to promote proper operation and maintenance of OWTS. The plans also identify actions that would enhance local programs. DEM approval of an Onsite Wastewater Management Plan is a prerequisite to participating in the Community Septic System Loan Program (CSSLP).

Stormwater Management Plans – Most RI municipalities have developed local stormwater management plans which outline actions needed to prevent and abate impacts to water quality from stormwater runoff. The plans may identify actions municipalities want to take to enhance locally administered programs, such as pre– and post – construction oversight of stormwater BMPs, as well as specific projects that are needed to retrofit existing infrastructure in support of water quality restoration goals. DOT, as a regulated MS4, is implementing a strategic program to comply with an EPA consent decree to improve stormwater management. DOT will prepare stormwater control plans where DOT outfalls have contributed to water quality impairments, improve maintenance of their system, and retrofit and construct stormwater BMPs.

Water Supply System Management Plans – In addition to the water quality protection

component described above, Water Supply System Management Plans include information on the water supply infrastructure and water use which is relevant to watershed hydrology and watershed plans.

Hazard Mitigation Plans – Local hazard mitigation plans are prepared in association with FEMA and RIEMA. Integrating Green Infrastructure and Low Impact Development into local hazard mitigation planning across the state broadens opportunities for using different funding sources and make efficient use of limited resources. In addition to the benefits of improving water quality, GI and LID provide benefits for hazard mitigation through reduced flood volumes and enhanced resiliency.

**Land Use Plans**

Land Use 2025: State Land Use Policies and Plan (State Guide Plan Element 121) -- this Plan identifies an Urban Services Boundary, based upon a detailed land capability and suitability analysis that demonstrates the capacity of this area to accommodate future growth. The Plan directs the State and communities to concentrate growth inside the Urban Services Boundary and within locally designated centers in rural areas, and to pursue significantly different land use and development approaches for urban and rural areas. This boundary presents an opportunity for evaluating its use as a tool in prioritizing water quality protection and restoration activities. The plan also reinforces low impact development policies.

Comprehensive Community Plans – Rhode Island cities and towns must have a locally adopted Community Comprehensive Plan that is intended to be regularly updated.e.g.at least once every five years. Municipal plans are required to be reviewed by the State for consistency with State goals and policies including all elements of the State Guide Plan. In turn, State agency projects and activities are to conform to local plans that have received State approval. The local comprehensive plan sets the basis for the exercise of key local implementing powers for land use – zoning and development review ordinances.

The Rhode Island Comprehensive Planning and Land Use Regulation Act (RIGL 45-22.2) specified the requirements for municipal comprehensive plans, calling each “a statement (in text, maps, illustrations, or other media of communication) that is designed to provide a basis for rational decision–making regarding the long-term physical development of the municipality.” There are nine required elements with many opportunities to include provisions for the protection and restoration of water quality.

Special Area Management Plans (SAMPs) – In addition to the strategies to protect water quality, the SAMPs, in conjunction with the CRMC Coastal Management Program, direct allowable land uses and activities within the coastal zone jurisdictional area.

**Habitat Protection and Restoration Plans**

State Wildlife Action Plan – Rhode Island has prepared a State Wildlife Action Plan that is part of

a national program was created by Congress in 2000 to address the longstanding need to fund actions to conserve declining fish and wildlife species before they become threatened or endangered. The plan, subject to USFW approval, allows RI to remain eligible for matching grants. DEM prepared the first plan in 2005 and updated the Plan in 2015. Intended to be proactive, the plans assess the health of each state's wildlife and habitats, identify the problems they face, and outline actions needed to conserve them over the long term. It encompasses both marine and freshwater habitat types and provides recommended actions on conservation that will be relevant to watershed plans. https://dem.ri.gov/natural-resources-bureau/fish-wildlife/conservation-research/ri-state-wildlife-action-plan

Coastal Habitat Restoration Strategies – The growing interest in habitat restoration has prompted a commitment by CRMC and DEM to update and further develop habitat restoration strategies. DEM is in the process of updating the statewide plan for fish passage that includes site specific recommendations for dams on coastal tributary rivers and streams. This program supports restoration of anadromous fisheries, but improved passage also benefits other aquatic species. In the coastal zone, CRMC, DEM, the RI Natural History Survey and NBNERR collaborated to develop a Rhode Island Coastal Wetland Restoration Strategy completed in 2018 which focuses on salt marshes.
http://www.crmc.ri.gov/habitatrestoration/RICWRestorationStrategy.pdf

# Appendix F.

## Minor NPS Pollution Sources

In this plan the NPS pollution sources have been categorized as either major or minor. In the process of updating the 2019 plan, sources were categorized as minor if they did pose a major threat of NPS pollution due to existing regulatory oversight or management through voluntary programs. Effective control of these minor sources and stressors presumes continuing support for to these programs to their combined activities remain effective at controlling and lessening the impacts of the minor sources.

Boating and Marinas

Pollutants: Pathogens, nutrients, petroleum waste, chemicals

Boating is a major recreational activity and economic generator in RI. There were over 38,983 boats of varying lengths registered in RI in 2024. Potential NPS pollution from boats is regulated through enforcement of the EPA's No Discharge Area designation for all of its marine waters which has prohibited the discharge of untreated *and* treated boat sewage since 1998. With support from Clean Vessel Act funding, a network of pump-out facilities is in place to service the estimated 8,500 RI and 5,000 out of state vessels that likely to have on-board sanitation devices. As of 2024, 63 marine sanitation pump-out facilities were operating in RI waters – 48 dockside pump-out facilities and 15 pump-out boats. During the 2023 season, 600,000 gallons of wastewater was collected from the pump-out facilities. From 2000 to 2023, the Pump-Out Program has prevented more than 13 million gallons of untreated wastewater from being discharged into RI's waters.


There are 260 facilities in RI's tidal waters that meet the CRMC definition of a marina, which includes yacht clubs and any dock or facility that can accommodate 5 or more boats. With partners, the RI Coastal Resources Management Council developed and adopted the state's Clean Marina Program in 2007. The voluntary program was designed to protect the state's coastal waters and benefit the marina industry in Rhode Island, and rewards marinas that go beyond regulatory requirements by applying innovative pollution prevention best management practices (BMPs) to their day-to-day operations. In 2020, the CRMC, with the collaboration and cooperation of the RI Marine Trades Association (RIMTA), RI Department of Environmental Management, Rhode Island Sea Grant, and the University of Rhode Island Coastal Resources Center, overhauled the Clean Marina Program. The partners made the program more industry-friendly and forward-facing, appointing RIMTA as the point of contact for the industry and CRMC as the certification agent. The State developed the RI Clean Marina Guidebook to aid marina operators in their efforts to obtain a Clean Marina designation. As of 2024, 15 marinas had received Clean Marina certification.

During the five-year planning period, DEM will continue oversight of the No Discharge requirements, support the network of marine pumpout facilities, and assist in promoting the Clean Marina Program.

**Other Groundwater Discharges**

Pollutants: Petroleum products, toxic chemicals, metals

Discharges of non-sanitary wastewater – any wastewater not regulated by the OWTS Program – to groundwater occur throughout the state in both sewered and non-sewered areas. This includes the discharge of stormwater to the subsurface. Just about any type of activity may have such a discharge into a floor drain, piped into a subsurface system (dry well, leaching chambers, septic system, etc.) or piped to the ground surface. Common discharges include stormwater, car washes, cooling waters, commercial and industrial process waters/rinse waters, injections of chemical and biological materials to clean-up contaminated groundwater, and floor drain drainage from a wide variety of activities, including vehicle and equipment repair shops.

Localized instances of soil and groundwater contamination have occurred because of these groundwater discharges. The primary contaminants of concern are petroleum products, chemical wastes, volatile organic compounds, and metals. It is particularly important in dealing with groundwater resources to prevent contamination from occurring in the first place. Once in the groundwater, contaminants may persist for decades. The process of completely remediating groundwater is generally very lengthy, very expensive, and often technically infeasible.

The DEM "Rules for the Discharge of Non-Sanitary Wastewater and Other Fluids To or Below the Ground Surface" (Groundwater Discharge Rules) regulate discharges into the ground and onto the ground surface that will reach groundwater. The rules incorporate the requirements of the federal Underground Injection Control Program for discharges below the ground surface in order to maintain authority from US EPA to implement the program at the state level. In short, the Groundwater Discharge Rules address all discharges to groundwater that are not addressed under the OWTS Program. Program activities include the review of discharge applications and the issuance of discharge system approvals and registrations, the oversight of voluntary and involuntary closures of groundwater discharges, and review of facility operations for compliance with permit conditions (e.g., monitoring of effluent and groundwater quality).

It is estimated that there are many unauthorized groundwater discharges that have not yet been evaluated. Lack of awareness on the part of facility owners also contributes to this continuing problem of non–compliance with the Groundwater Discharge Program requirements. Recent efforts have focused on identifying, permitting and closure of unauthorized discharges at higher risk facilities such as floor drains at motor vehicle facilities.

Over the five-year planning period, DEM will target the elimination of unauthorized groundwater discharges through closures or permitting, focusing on those facilities located in areas dependent on groundwater for water supply.

## Lawn and Turf Management

Pollutants: Nutrients, pesticides, sediment

The care and maintenance of residential lawns and gardens, and other landscaped areas such as golf courses, cemeteries, athletic fields, and parks, can contribute to water quality degradation. It is a major feature of all but the highest density urban landscapes, and how it is managed impacts water quality. Excessive amounts and poor timing of applications of fertilizers and pesticides can result in losses to the environment via leaching to groundwater or stormwater runoff.

Proper turf management depends on the use of the turf. Athletic fields, golf courses and other heavily used grassed areas, are managed much differently than residential lawns. There is no single maintenance approach that is applicable to all turf areas whether due to type of use or the site's soil characteristics. Turf at high intensity use areas (athletic fields, golf courses, etc.) are usually professionally managed and represent a small fraction of the overall turf area compared to home lawns. Most homeowners are not aware of the appropriate best management practices to reduce the impacts to water quality in managing their lawns.

Many states, including five in the New England/New York region, have enacted state laws to minimize pollution from the overuse and misuse of fertilizer on turf grass. RI does not have a state law to address fertilizer use. Furthermore, local government actions to address fertilizer use have generally been limited to resolutions, ordinances requiring the use of sustainable vegetation, and placing conditions on permit approvals. The Town of Charlestown has established a Voluntary Recommended Landscaper Process. Landscapers and local retailers who sign onto the program have agreed to follow the town's landscaping and fertilizer process to reduce nitrogen use. These companies are listed on the town's website.

Strategies for managing fertilizer and pesticide use on turf are focused on education and training. The New England Interstate Water Pollution Control Commission worked with the New England states and New York to produce a report with detailed guidelines for turf management (NEIWPCC, 2014) that will be a useful tool in promoting appropriate management strategies. The URI Cooperative Extension Program, including the Master Gardener Program, and other associations have produced public information and provided on–site training and education on proper lawn management. The intent has been for RI residents, landscaping companies, turf managers for golf courses and athletic fields, and garden centers to be aware of and to implement the appropriate strategies to reduce water quality impacts from lawn care activities. The DEM Office of Customer and Technical Assistance has developed a green certification program for turf management with certification available for municipalities, landscaping companies, golf courses and higher education facilities (athletic fields). This is a volunteer program for those municipalities and businesses that want to improve their management of fertilizers, pesticides and water use.

As noted above in the discussion of Agriculture, the DEM Division of Agriculture and Forest Environment is responsible for enforcing pesticide state laws and regulations to prevent environmental degradation that might result from improper use of pesticides. Commercial pesticide applicators are trained, tested, and licensed to achieve a minimum level of competence in the pesticide application industry. Anyone who applies pesticides on other people's property must have a commercial pesticide applicator's license.

Lawn watering is the primary use of our water resources in the summer – the time when water levels in streams and groundwater are at their lowest. This water use can stresses public supplies, jeopardizing public safety (water for fire suppression) and the resulting low stream flows have devastating effects on stream ecology (see Water Withdrawals). The most effective way to minimize water quality impacts associated with lawn care is simply to minimize lawn area. To the extent that some landscaping is desired, minimum maintenance/minimum disturbance and xeriscaping strategies (the use of plant materials that require low moisture and/or nutrient requirements) should be pursued.

With regard to both residential and non-residential turf management, problems can also originate from storage and disposal practices. Chemicals can leak from hoses and containers, either accidently or because of carelessness or negligence.

For the five-year planning period, DEM will ensure that educational materials on lawn care are available and distributed as widely as possible. DEM will also continue implementation of the green certification program for turf management and pesticide regulatory programs.

**Road Salt and Sand**

Pollutants: Salt, sediment

Road salting and sanding done for public safety purposes is a topic of heightened interest and concern in New England states. Salt and sand can wash into surface waters impacting aquatic life, and salt can enter groundwater and contaminate drinking water wells. Some states have documented rising chloride concentrations in freshwaters.

Salt and sand are applied to RI roads by RI Department of Transportation (DOT) staff, municipal staff and private contractors, generally either as a mixture of 1:1 salt to sand ratio or as sand alone. Weather conditions ultimately determine how much is applied. Municipal data is not readily available, but DOT annual average number of pounds of salt per lane mile from 2005 to 2013 ranged from a high of 791 to a low of 382, averaging 516 pounds per lane mile per year (RIDOA 2014).

The technology and practices utilized by DOT is more advanced than that used by municipal governments and the private contractors. For example, no vehicles other than DOT use the advanced spreader technology. Private contractors play a significant role in winter maintenance in support of state and local governments on public roads and on private property. Up to 300 private contractor vehicles can be used by DOT in any single storm, depending on the severity of the winter (RIDOA 2014).

The sand and sediment that remains on the roadway after the winter season is either washed into our waters, dramatically affecting aquatic life and streambed habitat, or it becomes a major contributor to stormwater BMP failure by clogging the systems. DOT estimates that only about five to 10 percent of the sand applied is recovered as street sweepings (RIDOA 2014).

The sand and salt must be stored in a manner to reduce impacts to water quality, primarily by covering of the salt pile in a structure and containing runoff from the site. DEM Groundwater Quality Rules require covering of all piles (public and private) with at minimum a durable cover in areas where groundwater is classified GA and GAA. As of 2023, all but 1 of the 20 state salt piles were under cover in a permanent structure (RIDOA 2014). All but 3 of the 37 town facilities had a permanent structure housing the salt.

As of 2023, several state and municipal salt facilities reduced their or use no sand. The Town of Narragansett estimates that the volume of street sweepings fell by 80% when the town stopped using sand. In addition, the use of brine when weather conditions allow, can reduce the use of salt by two thirds (Stephen Daignault, Narragansett Public Works Director). As of 2023, about half of the state salt facilities and 3 of the 38 municipal facilities were using brine or calcium/magnesium chloride.

Over the five-year planning period, DEM will target its efforts to evaluate compliance with the DEM requirements for salt storage, and support actions by state and local governmental entities to reduce the amount of salt and sand applied to road surfaces through modified and improved practices.

**Pet Waste**

Pollutants: Pathogens, nutrients

One of the most common sources of pathogens, as well as nutrients in stormwater, is pet waste, primarily dog waste, although other backyard pets (horses, goats, etc.,) can cause localized problems. Dog waste in urban and suburban areas left on the sidewalk, or on grass near the street, can be washed into stormwater drainage systems by runoff. It has been estimated that for a small bay watershed (up to 20 square miles), 2 to 3 days of droppings from a population of 100 dogs contribute enough pathogens to temporarily close a bay to swimming and shellfishing (USEPA website). Dog waste can harbor a host of different bacteria, parasites and viruses that can cause human illness and disease. One gram of dog waste contains 23 million fecal coliform bacteria, almost twice as much as human waste (DEM 2010). In Rhode Island, there are approximately 200,000 dogs and it is generally estimated that dogs produce one–half pound of feces per dog per

day (DEM 2011), which means that approximately 100,000 pounds of dog waste is generated per day in RI.


All of our waters, particularly those identified as impaired for pathogens, can benefit from better control of pet waste. Management of pet waste is clearly the pet owner's responsibility, but only about 60% of dog owners pick up after their pets (Center for Watershed Protection). Proper disposal of pet waste can be accomplished by flushing, burying, or sealing it in bags and putting it in the trash. Efforts by local governments to control pet waste to minimize water quality degradation in RI include ordinances requiring pet owners to pick up the waste, signage, and the installation of pet waste stations.

For the five-year planning period, DEM will have educational materials available and distribute as widely as possible and support local efforts to reduce pet waste.

**Waterfowl**

Pollutants: Pathogens and nutrients

Despite the public appeal of feeding the ducks, most people don't realize that ducks and geese can significantly contribute to water pollution. Feeding of waterfowl and suburban development with large lawns and open land for waterfowl to land and congregate, especially near waterbodies, can result in dramatic and unnaturally high concentrations of waterfowl in some locations.

Recent concern has focused on the large numbers of resident Canada geese. As reported by the Southern RI Conservation District, a single Canada goose can eat up to 4 pounds of grass and produce up to 2 pounds of fecal waste a day. Whether by direct deposition into the water or via transport by stormwater, the pathogens and nutrients in their waste can end up in our waterbodies. Although most people find a few geese acceptable, problems develop as local flocks grow and their droppings become excessive. Canada goose populations in Rhode Island can be broken into two broad groups: migratory and resident. Migratory Canada goose populations are not considered to be a problem in Rhode Island since they do not nest locally and experience significant hunting pressure across much of their migratory routes. However, resident Canada goose populations have increased greatly over the last 50 years in southern New England.

Efforts to control waterfowl to minimize water quality degradation that have been attempted in RI

include:

- Education on the negative impacts of feeding waterfowl;
- Stopping the public from feeding waterfowl (signs, local ordinances);
- Modifying habitat. Waterfowl, especially grazers like geese, prefer easy access to water.
- Maintaining an uncut vegetated buffer along the shore makes the habitat less desirable to geese; and
- Controlling goose populations with hunting and nest disruption.

During the five-year planning period, DEM will continue to make available information on controlling waterfowl to interested parties.

**Dredging and Dredge Material Management**

Pollutants: Sediment, metals, toxic chemicals Primary

In a state with significant boating and shipping sectors, dredging of our waterways is vital to maintain navigational access to harbors and marinas. Sediment from natural sedimentation patterns and that which is carried off the landscape by stormwater is deposited in our waterways and builds up to levels that impede ship and boat traffic. Due to RI's long industrial history, sediments from urbanized rivers and coastal waters targeted for removal may contain a variety of pollutants, such as metals and hydrocarbons.

Permitting is required for dredging since it can impact water quality and aquatic habitat at both the point of material removal and the subsequent location of its in-water disposal, if this option is chosen. The impacts to the aquatic environment are similar at both steps:

- Suspended sediment that is deposited can impact marine life, such as submerged aquatic vegetation and fish larvae;
- Loss of marine life from the location of dredging; and
- Loss of bottom habitat in the area being dredged and at the place of disposal.

The upland disposal of dredged material also has potential impacts, primarily the infiltration to groundwater of contaminants in the sediment, including chlorides.

DEM and CRMC administer the "Rules and Regulations for Dredging and the Management of Dredged Material" to ensure that dredging in the marine environment and management of the associated dredged material is conducted in a manner which is protective of groundwater and surface water quality. The material to be dredged must be analyzed in order to ensure that the use or disposal of the dredged material will not impact water quality. RI strongly encourages the beneficial use of dredged material for brownfields redevelopment, beach nourishment, landscaping, habitat restoration and/or creation, construction projects, landfill cover and other useful purposes.

Dredging projects in the northern half of the state mainly use the Confined Aquatic Disposal cells located in the upper Providence River. These sediments are typically contaminated, but the cells

are required to be capped with clean material. These cells have limited capacity. New CAD cells will be developed as part of the Army Corps of Engineers maintenance dredging of the Providence River shipping channel.

Dredging projects in the southern half of the state will typically dispose of sediments as beach nourishment. Some marinas will reuse material on-site. Dredging also occurs in the coastal ponds and breachways. Coastal storms wash away beaches and transport sediment into the ponds and breachways. In several cases, this coastal pond/breachway dredged material has been deposited on nearby salt marshes as a thin layer in an effort to build up the marshes to combat sea level rise. Dredge projects where the sediment does not meet beach nourishment criteria can dispose of the material at a federally designated offshore regional disposal site in Rhode Island Sound known as 69B, provided the material meets Army Corps of Engineers suitability determination criteria.

During the five-year planning period, DEM will continue to administer the rules governing dredging and dredge disposal in coordination with CRMC and ACOE as applicable.

**Surface Mining**

Pollutants: Sediments

Surface mining activities in Rhode Island are generally limited to sand and gravel operations and stone quarrying/rock crushing operations, of which there are approximately 15-20 facilities regularly operating in RI. The primary water quality concern from these operations is deposition of sediments in nearby surface waters and wetlands from improperly managed sites and poorly reclaimed former sites. Sedimentation is exacerbated by a failure to establish adequate buffers prior to commencing operations, by not limiting the areas of disturbance or failing to maintain erosion and sedimentation controls. Any washing or other type of processing conducted on-site adds to the water quality concerns associated with mining operations. In addition, the process of removing material decreases the depth to the water table from the surface, in some cases exposing the water table, thus increasing the vulnerability of the groundwater resource to spills or leaks from machinery operating in the excavation area.

Active sand and gravel mining and stone quarrying facilities must adhere to the conditions of the DEM "Multi-Sector General Permit for Stormwater Associated with Industrial Activity." This permit is administered by the DEM RI Pollutant Discharge Elimination Program, and it requires a plan to control stormwater. Many municipalities have earth removal ordinances that address these facilities and protect water quality by specifying operational and reclamation standards.

Abandoned or improperly restored mining pits pose additional problems. Sand and gravel operations are too often planned and carried out with little regard for post-production reclamation needs, such as regrading, restoring topsoil, and re-vegetating. Exposed sites that are not properly restored may continue to erode for many years. Abandoned mining pits have also tended to become a convenient location for illegal dumping and disposal of wastes.

During this five -year planning period, DEM will continue to exercise its regulatory authorities over sand and gravel operations and stone/rock quarrying operations to protect water quality.

**Former Solid Waste Landfills**

Pollutants: Toxic chemicals, metals, sediment

For decades, solid waste was disposed of in community disposal sites that were not properly managed to prevent environmental impacts. These sites were each closed under standard practices in use at the time of closure. The conditions of closure and the environmental monitoring required at each of these sites vary considerably. Currently, there are no municipal landfills in operation. All other solid waste in RI is disposed of at the RI Resource Recovery Corporation Central Landfill in Johnston or is transferred to out of state facilities.

Former solid waste landfills contain a vast array of contaminants that have the potential to pollute groundwater and surface water. As precipitation seeps through the landfill, it collects contaminants produced by the waste materials. This leachate can move into groundwater and then to surface waters. In addition, soil erosion of the cover material on the fill side slopes can contribute sediment to nearby surface waters.

Closure of former landfills is overseen by the DEM Office of Land Revitalization and Sustainable Materials Management, which administers state regulations governing the disposal of solid waste. There are over 70 sites listed in the inventory of former landfills. Proper closure of these former solid waste landfills to minimize impacts to water resources typically involves:

- Installation of a suitable cap to minimize infiltration of precipitation;
- Stabilization of side slopes to prevent soil erosion and sedimentation; and
- As necessary, monitoring of groundwater and surface water quality.

During the five-yar planning period, DEM will continue to oversee the closure and remediation of former solid waste landfills.

**Silviculture**

Pollutants: Sediment

While harvesting forest products can contribute to water quality degradation due to increases in soil erosion and sedimentation, the utilization of BMPs and the generally small scale of such activities limit the overall impacts to water quality in RI. With the exception of clearing for development (subject to stormwater permitting), the timber harvesting operations that take place in RI generally involve selective cutting in localized areas. Commercial woodcutting operations are regulated by DEM Division of Forest Environment, which requires that any harvester be registered with DEM, file a Notification of Intent to Cut, implement required BMPs to prevent impacts to water quality, and comply with the Freshwater Wetlands Program Rules. Strategies for protecting water quality during forest harvesting operations are outlined within the 2020 DEM Forest Action Plan. Several water suppliers have significant forest resources in their watersheds, and it is important to ensure these forest resources are properly managed to protect the drinking water supply.

There has been a dramatic increase in solar siting in Rhode Island, with previous state incentives benefitting the lowest cost options. Often the lowest cost options were in forested areas, resulting in clear cuts of "core forests," which can provide several ecological and water quality benefits. A core forest is classified as continuous forested land of 250 acres or greater. Legislation approved by the General Assembly in June of 2023 has incentivized development of future solar projects away from core forests and onto rooftops, parking lots, and industrial sites. DEM has drafted guidance on the process for determining whether a proposed project is in a core forest, and eligible for state incentives.

**Water Withdrawals**

Stressor: Physical alteration associated with water withdrawals

Withdrawals of water from certain streams or adjacent aquifers can severely impact the quantity and quality of stream water available during low flow periods. Impacts to the aquatic habitat occur due to loss of riverbed area covered by water, receding wetlands, loss of vernal pools and inadequate baseflow and in-stream water depth for a healthy, reproducing natural fish population. Additionally, lower flows increase pollutant concentrations downstream of dischargers and where discharge limits are based on certain flow assumptions, the limits may no longer prove protective. The impacts of water withdrawal are going to be exacerbated by climate change, which is going to cause an increase in water supply demand due to temperature increases, longer growing seasons, and potentially longer dry periods.

Rhode Island does not have a separate permitting system to regulate water withdrawals. Conditions may be placed on new projects involving withdrawals subject to the state freshwater wetlands rules or the water quality regulations. The RI Water Resources Board has been designated as the overall authority to devise a fair and equitable allocation of water resources among users to ensure that long range considerations of water supply prevail over short term considerations by prioritizing water withdrawals. To support this and other activities, the Water Resources Board's strategic plan reflects the continued efforts needed to develop water availability estimates and improve water resource management.

DEM has developed a watershed-based approach for reviewing water withdrawal requests and the Water Resources Board has incorporated this approach into their assessments of water availability. The Stream Flow Depletion Methodology presumes a withdrawal done consistent with the methodology will maintain stream flows that are protective of aquatic ecosystems during varying hydroperiods including the low flow period. This approach identifies those watersheds or portions of watersheds where adequate stream flows will support additional withdrawals as well as those which have constraints to further withdrawals. Analysis of current conditions indicates that the Chipuxet River, Hunt River, and Annaquatucket River watersheds are the primary water supply basins where peak demand routinely exceeds the available supply necessary to avoid adverse impacts to water quality.
The primary strategies for suppliers, farmers and other users of large water volumes to reduce

water use is to increase the efficiency of water use, reduce water loss, and consider water reuse. Another strategy to mitigate impacts of water withdrawal is to increase the amount of recharge to the subsurface that will supply groundwater wells and streams in dry periods. Recharge can be increased by infiltrating as much stormwater in a watershed as practicable and by considering other opportunities such as aquifer storage and recovery.

**Contaminants of Emerging Concern**

Pollutants: Multiple chemicals

Thousands of chemical compounds are constantly being introduced into production systems and consumer products without adequate knowledge of the health and environmental impacts. Only a small subset of the vast number of chemicals in use are monitored in our water resources as part of a federal or state program. It is generally due to research projects or when a problem occurs that our society takes notice and a chemical (or group of chemicals) becomes an emerging concern that needs to be addressed from a public health and environmental perspective.

Nonpoint sources of contaminants of emerging concern into RI's waters are primarily OWTS and stormwater. However, they may also originate from non-OWTS wastewater discharges to groundwater, animal feeding areas and land application of biosolids and manure.

These contaminants of emerging concern do not have public health/drinking water or environmental standards to use to respond to instances where they are discovered. In the absence of standards, the RI DOH takes the lead in establishing health-based standards. In addition, there will likely be a need for ambient water quality standards for some of these contaminants, in which case DEM will be the lead state agency. DEM and DOH will have to keep abreast of information from other states and EPA and be prepared to update RI's standards accordingly.

One large class of emerging contaminants has grown into a significant management concern: per and polyfluoralkyl substances (PFAS). See Special Topic Box in Section 2.0 on page 36.

Another category of emerging contaminants are compounds used in pharmaceuticals and personal care products (PPCPs). These comprise a diverse and vast group of chemicals including, but not limited to, prescription and over-the-counter human drugs, veterinary drugs, diagnostic agents, nutritional supplements and vitamins, and other consumer products such as antibacterial soaps, fragrances, cosmetics, and sun-screen agents. PPCPs are being detected in groundwater and surface water of the Northeast at very low concentrations. Currently there are no US EPA/state ambient water quality criteria, water quality standards, or drinking water standards for most of the PPCPs. The presence of these chemicals in waterbodies has been linked to impacts on aquatic species, including changes in fish sex ratios, development of female fish characteristics in male fish, changes in nesting behavior by fish, and adverse effects on invertebrates. At this time, many unknowns remain regarding the potential for adverse effects on public health and the environment.

Recent efforts to control PPCPs in our environment have focused on proper disposal of unused

drugs by encouraging the public not to flush these drugs into the sewer systems or into onsite wastewater treatment systems and by promoting use of drug disposal designated locations (e.g., police stations). However, most of the drugs that enter the environment do so as a result of human excretion of the unmetabolized drug and their breakdown products.

Perchlorate and 1,4-dioxane are two additional unregulated chemicals that have been found in groundwater and surface water in RI and nationally for many years. These chemicals will likely continue to be a concern potentially warranting the establishment of a drinking water and/or groundwater quality standard.

Expecting wastewater treatment systems to treat our waters to remove these chemicals and materials (and those yet to be determined) is unrealistic. The long-term solution is to consider the environmental and public health consequences of drugs and other chemicals/materials (and their degradation by-products) when the formulations are being developed (a process referred to as “green chemistry”).