Rhode Island:
Coastal Resources Management Council
Department of Environmental Management
Division of Planning, Statewide Planning Program

RI State Guide Plan Update:
Water Quality Management Plan Advisory Committee Meeting

Tuesday, April 8, 2014
10:00 AM – 12:00 PM

Room 300
Department of Environmental Management
235 Promenade Street, Providence

Agenda

1. Agenda Overview

2. Feedback on Draft Goals & Policies for Aquatic Invasives

3. Subject Topics and Technical Presentations:

    a. Water Quality Management Framework- (continued from 3.11.14)
        i. Roles & Responsibilities
        ii. Resources & Capacity
        iii. Regional Solutions

        Discussion Questions on Capacity and Resources

    b. Overview and Discussion of Preliminary Draft of Pollution Source Sections

4. Discussion & Feedback – All - moderated by Sue Kiernan

5. Looking ahead -
    a. Next Meeting Date – April **?** , 2014
    b. Committee Homework – Feedback on Draft Pollution Source Sections

6. Adjourn 12:00 PM

DICUSSION QUESTIONS – CAPACITY AND RESOURCES

Capacity Building & Resources

Stormwater infrastructure does not have a stable source of funding yet faces increasing costs due to the need for retrofitting and increasing operation and maintenance costs. Several communities are exploring stormwater utility districts as the mechanism to meet this need. What should the State Guide Plan Element say about this?

Limited funding is made available annually by the State for habitat restoration. The State has also relied on periodic bond issues to provide funding for implementation of projects. Do you have ideas on how additional funding could be generated for both planning and implementation of habitat (ecological) restoration?

What are other areas of concern with respect to capacity to protect restore and manage our water resources?

What actions can the State take to optimize the use of the existing resources it has to support local implementation? (BWRF, State bond funds, 319 funding)

- Would you favor a more predictable schedule of funding availability?
- If yes, what time of year would be favored for issuance of grant RFPs?

Local organizations, including watershed councils, are often volunteer-based and face difficulties participating in federal or state grant programs that work on a reimbursement basis. Should RI work toward building capacity within one or more organizations to function in the role of fiscal agent or project manager in order to facilitate partnerships with small organizations?

Having discussed capacity, do you have additional ideas for what actions the State Guide Plan might recommend in order to address capacity issues? For example: Should the Sate periodically survey the capacity related to implementation of local programs including stormwater management, local wastewater management and land use planning and then use that information to provide incentives for building/sustaining capacity?

With respect to environmental protection, do you think it is necessary for the State to create mandates in order to build capacity within municipal governments?

Where do regional solutions have potential to address gaps in capacity?

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RI State Guide Plan Update:
Water Quality Management Plan Advisory Committee Meeting

Tuesday, March 11, 2014

10:00 AM – 12:00 PM

Room 300
Department of Environmental Management
235 Promenade Street, Providence

Meeting Notes

Committee Members in attendance were: Eric Boettger (NRCS), Janine Burke (NWPCA/Warwick), Rachel Calabro (RIRC/Save the Bay), Ames Colt (BRWCT), Clay Commons (RIDOH), David Everett (Providence), Peter Healey (RIDOT), Alicia Lehrer (WRWC), Eugenia Marks (Audubon), Jennifer Paquet (Town of West Greenwich), Margherita Pryor (EPA), Nicole Rohr (URI), Marilyn Shellman (Town of Westerly). DEM/CRMC/Statewide Planning staff in attendance included: Sue Kiernan, Ernie Panciera, and Alisa Richardson of RIDEM, Jeff Willis of CRMC and Nancy Hess and Paul Gonsalves of Statewide Planning.

Agenda Overview and Comments on 2/25/13 Meeting Notes

Sue Kiernan started the meeting with a brief overview of the agenda, including a call for comments on the meeting notes from 2/25/14.

Presentation: Biological Functions of Stream Flow & Hydrology for Aquatic Habitat

Alisa Richardson of RIDEM, Office of Water Resource was next up with a presentation. She began with a description of the state of aquifers in RI, as there is no really large aquifer as in other states, but a collection of smaller aquifers throughout the state. In discussing stream flow management, she pointed out

that not all rivers/streams are created equal, so the amount of water that can be safely withdrawn varies. To determine the amount of water that can be safely drawn, a total metric score is calculated based on set criteria. If an entity expects to withdraw more than what is recommended by DEM, they would have to justify it via a wetlands permit. Alisa also touched upon other issues that could affect stream flow and stream connectivity such as climate change and impacts from wells. Sue and Eric added points related to the importance of the need for strong partnerships.

Aquatic Invasives

Sue began to give details on the status of invasive species in aquatic habitats. The basic definition of an "aquatic invasive" is a species not native to a particular area that causes harm to the habitat, or to other species, aside from natural predators. Aquatic invasives are the largest cause of impairments to water bodies in the state, not including algae. Among the goals discussed included the prevention the introduction and establishment of invasives, control of the growth and spread of current invasives and the abatement of impacts of invasive species. In order to take a closer look at this problem, an aquatic species working group was formed between RIDEM and CRMC. The group's main focus has been prevention for the 13 identified. Margherita asked if there is a long enough track record through monitoring to see a peak or decline in invasives. There is no indication enough monitoring has been done to date.

As for methods used to combat invasives, the use of chemicals (herbicides) can be controversial. There are only a few chemicals approved for use. Rhode Island currently has regulations to prevent the spread of invasives, but the ability to enforce needs to be strengthened.

Water Quality Management Framework

Ernie kicked off the next topic for discussion. He started with a description of the 5 step process for the water quality management framework. The overall vision is for clean water and a productive aquatic habitat. The steps he outlined were:

- Monitor- Targeted approach- Bays, Rivers, Watersheds Coordination Team and RI Environmental Monitoring Collaborative involved
- Assessment- Identification of high quality water and habitats, pollution problems and degraded habitats. Data management tasks, further

investment needed

- Plan for Protection and Restoration-Prioritization occurs at different scales. The watershed plans will be featured at this level. The watershed plans will be key in prioritizing protection and restoration actions, as they integrate planning strategies from several levels. Watershed councils are needed to play a significant role. DEM and CRMC working on updated coastal habitat restoration strategy. Several pieces of pending legislation are in the works
- Implement Protection and Restoration Actions- State level approach, but also work at the watershed level. Pollution prevention and control. Water quality and habitat restoration and habitat protection.
- Evaluate Progress- Track progress towards goals, analyze data gained through previous steps.

Next Meeting Date

The group agreed upon a date of March 25th for the next meeting. (Later postponed until April 8th).

Draft Summary – Goals, Policies, Actions

Aquatic Invasive Species (AIS)

Goal: **Prevent the introduction and establishment of aquatic invasive species.**

Policy: Ensure a coordinated approach to preventing the introduction of invasive waters.

Action:

- Enhance the coordination among programs working on AIS within RI as well as with neighboring states, regional and national entities engaged in AIS prevention and management.
    - AIS Working Group, RI Invasive Species Council
- Prioritize the risk of AIS introductions using standardized criteria that are refined as scientific understanding advances.
- Minimize the risk of introductions through new regulations (e.g. governing the possession, transport and disposal of AIS)and through collaborative voluntary programs (e.g. programs to address the disposal of aquarium fish).
- Raise awareness about how individuals, businesses and other entities can prevent the introduction of AIS through the use of best practices including proper boat hygiene.
    - Target outreach campaigns to specific vectors for introduction of AIS.
    - Target prevention efforts at lakes not yet known to be infested with AIS.
- Develop early detection and rapid response protocols for AIS at risk of being introduced into RI.
- Monitor for the introduction and spread of AIS in coastal ecosystems and freshwaters.

Goal: **Control the growth and spread of aquatic invasive species in RI.**

Goal: **Abate the impacts and minimize harmful effects of aquatic invasive species.**

Policy: Promote the active management of aquatic invasive species present in RI to mitigate the negative impacts on native flora and fauna and the recreational and other human uses of affected waterbodies.

Action:

- Monitor the status of AIS in RI freshwaters and coastal waters.
- Expand state capacity to provide technical and financial assistance for lake management by establishing a lake management program. Support the development of lake management plans to guide local actions to manage AIS.
- Expand public outreach providing information on the AIS known to occur in specific waterbodies.
- Support research and development to develop improved technologies or practices to prevent AIS introductions (shipping/boating) and to control and manage infestations (treatment options) and improve understanding of the effects of AIS on coastal and freshwater ecosystems.

DRAFT – Water Quality State Guide Plan

April 4, 2014

VI. Pollution Source Management

Overarching Management Issues

Highlighting those pollution source management issues that extend beyond the specific pollution source/programmatic approaches described later in this section.

Nutrient Management

As is evident from Section xx, excess nutrients – nitrogen and phosphorus -- are a major contributor to water quality degradation in RI. The sources of these nutrients are many and include the following, all of which are discussed in detail later in this section: wastewater treatment plant discharges, OWTS, stormwater, agriculture, atmospheric deposition, lawn fertilizer, pet waste and waterfowl.

In 2005 DEM prepared the "Plan for Managing Nutrient Loadings to Rhode Island Waters." This Plan focused on implementation of the legislative charge to reduce nitrogen loadings from wastewater treatment facilities by 50% compared to the 1995-96 pollutant loadings. (See section x)

Action: Develop an updated comprehensive nutrient management plan for the state's waters – surface water and groundwater.

Pollution Prevention

Pollution prevention is putting into practice the common sense idea that the best way to manage waste is to avoid generating it in the first place. It is any practice which reduces the amount of any hazardous substance, pollutant or contaminant entering any waste stream or otherwise released into the environment prior to recycling, treatment or disposal. Pollution prevention focuses attention away from the traditional end-of-pipe treatment and disposal of waste, toward eliminating or reducing substances used in the production process itself. Pollution prevention practices include the cost effective use of resources through source reduction, improved housekeeping, energy efficiency, reduced water consumption, and reuse of input materials during production.

DEM Office of Customer and Technical Assistance, as part of its pollution prevention efforts, has produced manuals and other materials regarding hazardous waste compliance (as well as other issues) for autobody shops, used oil recycling, and auto salvage facilities. In addition, the Office has established a green certification program for golf courses (*Others?*) and has worked with CRMC on the Clean Marinas Program (see section xx) – all of which have the reduction of wastes generated as a significant component.

Action: Increase and support continued efforts to encourage industries and specific businesses to adopt pollution prevention strategies.

Data Management

Any particular site (location, property, facility) may be subject to permitting and compliance with many of the regulatory programs discussed in detail below. A better integrated database management system for facility application and compliance review would greatly enhance agency program coordination, tracking and reporting. In addition, the large volumes of water quality monitoring data would be more useful if better coordinated and integrated. Any improvements in state and federal data management must be done with the complementary goal of improving the public's access and benefit from the data.

Action: Enhance the state data management systems to facilitate improved agency effectiveness and improving public access and benefits from the data.

Wastewater Point Sources/Sewer

Pollutants: pathogens, nutrients, ammonia, BOD, toxic contaminants, pharmaceuticals and personal care products

Key Issues Highlight:
- Nutrient reduction strategy
- CSO abatement
- Funding gap relative to needs

Most Rhode Islanders utilize public sewer systems to handle residential and commercial wastewater flows. Over 140 million gallons per day of wastewater is collected via sewer systems and treated by Rhode Island's nineteen major wastewater treatment facilities. Over 75% of this treated wastewater is discharged by thirteen major wastewater treatment facilities (WWTFs) directly into coastal waters, including the state's largest WWTF at Fields Point operated by the Narragansett Bay Commission. The remaining six major WWTFs discharge into four freshwater rivers: the Blackstone, Clear, Woonasquatucket and Pawtuxet Rivers. Additional permitted discharges into rivers or coastal waters include 54 minor sanitary wastewater, eleven cooling water and four industrial wastewater. No wastewater is authorized for direct discharge into lakes in RI. AS part of their operations, the major WWTFs operate thirteen septage receiving facilities which accept over 40 million gallons of septage waste primarily from licensed haulers. WWTFs also generate sludge, XXX per year, which is most often disposed of off-site, with the majority going to RI's Central Landfill.

Centralized collection of wastewater in Rhode Island likely began in the late 1800s. The original NBC Field Point Treatment Facility was constructed in 1901 and by 1960 twelve WWTFs were in service. Following the passage of the federal Clean Water Act in 1972, the state's water

pollution control program, administered by DEM, developed financial and regulatory programs that resulted in the construction of five additional WWTFs and the upgrade of all other RI WWTFs to what is referred to as secondary wastewater treatment. Rhode Island received $284.2 million via the EPA Federal Construction Grants Program that was matched by $64.6 million in state bonds resulting in a total investment of over $348 million in wastewater treatment facility and system improvements from the mid 1970's to 1998. Industrial pretreatment programs were instituted in the early 1980s and dramatically reduced the discharge of toxic metals such as cadmium, copper, and nickel, and toxic organic compounds such as cyanide. The Narragansett Bay Commission has reported a 97% reduction in total metal loadings since 1981 from its Field's Point WWTF, from 950,000 lbs. to 26,000 lbs. annually from 2002 onward.

In 1990, the Clean Water State Revolving Loan (SRF) program replaced the construction grant program. Co–managed by DEM and the Rhode Island Clean Water Finance Agency, the SRF has awarded over $1 billion in below market interest rate loans for XXX projects in 27 communities and it remains the state's largest financial assistance program. The capacity of the CWSRF and limited other financial assistance programs is far exceeded by the estimates of $1.858 billion in wastewater infrastructure needs documented in the 2012 Statewide Needs Survey. Funding concerns as further discussed in Section X.

With authority delegated from the EPA, DEM administers the Rhode Island Pollutant Elimination Discharge System (RIPDES) permitting program. In the late 1980's, DEM started incorporating more stringent effluent limits based on updated federal wastewater treatment standards and increased consideration of the receiving water conditions. All major WWTF and most minor permittees now operate with water quality based permits that reflect effluent limits developed using assessments specific to the water quality of particular waterbodies and corresponding wasteload allocations. Thirteen of 19 major WWTF have effluent limits for ammonia, nitrogen and/or phosphorus which require advanced treatment. Effluent monitoring data is collected monthly, reported to DEM and shared with EPA. As part of an adaptive management approach, permits are periodically re-issued allowing advancements in scientific understanding to be incorporated into discharge permits as necessary.

Insert discussion of facility planning.

Ensuring WWTF effluent limitations are met requires controlling the flows into WWTFs. Through oversight of wastewater facility plans, expansion of sewer service districts and other system modifications, DEM works with the WWTFs to ensure plants operate within their design flows. This oversight, coupled with state mandated operator certification and training, and state inspections has resulted in a high level of compliance with WWTF effluent limits around Rhode Island. However, as more plants are upgraded and treatment systems become more complex, continued training for operators will be important to sustain the overall excellent performance oRhode Island's WWTFs.

While there has been significant recent investment in WWTF plant upgrades, the age and condition of the collection or sewerage system infrastructure remains a management challenge. *Insert updated statistics*. EPA and DEM have recently emphasized addressing SSOs. DEM receives reports of dozens of SSOs annually and is encouraging WWTFs to adopt or expand

asset management approaches to the operation and maintenance of their collection systems. NBC has been actively reducing the number of SSOs in its system through implementation of an Assent Management Program, by eliminating CSO discharge points, reconstructing regulator pipes and by instituting inspection and monitoring initiatives.

Controlling Nutrient Pollution

As described previously, WWTF discharges are major sources of nutrient pollution in Rhode Island waters. The three major WWTFs discharging to the Pawtuxet River were among the first in Rhode Island to move to advanced treatment to remove nutrients – both phosphorus to protect the river and nitrogen to protect downstream coastal waters. Revised permits issued in 1989 compelled WWTF upgrades to reduce discharges of ammonia and organic material. Construction was completed by 2006 and all three WWTFs have achieved compliance with their current effluent limits. As a result, DEM monitoring during the expected worst condition period in the summer of 2007 found the Pawtuxet River complied with dissolved oxygen criteria.

Aware of evidence of hypoxia in the Providence River dating back to 1979, and reflecting a national trend in estuarine management, in the mid-1990s DEM began focusing on reducing WWTF loadings of nitrogen in order to abate persistent hypoxic conditions in the upper Bay. As of 2103, about one-third of Narragansett Bay was documented as experiencing episodes of low dissolved oxygen known as hypoxia. As WWTFs designed upgrades for other purposes, nutrient reduction was incorporated. In 2004, on the basis of recommendations from the Governor's Commission on Narragansett Bay and its watershed, a predecessor to the BRWCT, the General Assembly established a goal of achieving a 50% reduction in seasonal summer nitrogen pollutant loadings from Rhode Island's WWTFs. Building on work already underway, in 2005 DEM released a nutrient reduction plan that targeted eleven RI WWTFs to achieve a 50% reduction in the summer seasonal nitrogen loadings into upper Narragansett Bay over levels from 1995-1996. The plan reflected an adaptive management approach to nutrient controls that phased in the necessary nutrient reductions and allows for continued monitoring and re-assessment of the need for further reductions. Revised permits with effluent limits ranging from 5-8 mg/l of total nitrogen were issued and WWTF upgrades proceeded. Work is largely completed with the last upgrade scheduled for completion in 2017. In addition to reductions in RI, several WWTFs in Massachusetts which discharge upstream of RI waters have been required by the EPA to curb nutrient pollutant loadings. The largest of these, the Upper Blackstone Water Pollutant Abatement District WWTF serving the Worcester metropolitan region, achieved its limit of 5 mg/l in 2011. *Insert statement on having met goal and nature of response in the bay; need for continued monitoring*.

Combined Sewer Overflows

The primary sources of bacteria in upper Narragansett Bay are combined sewer overflows (CSOs) that discharge a combination of untreated sewage and stormwater. The Narragansett Bay Commission (NBC) has a three phase plan to address the 86 CSO outfalls known to discharge into the Providence River and its tributaries in 2008. CSOs also degrade water quality in Newport Harbor and Mt. Hope Bay (from Fall River, MA.).

NBC has completed Phase 1 and is implementing Phase 2 of the CSO Abatement strategy developed via a stakeholder process. Phase 1, which cost $359 million, entailed construction of a bedrock storage tunnel with 66 million gallons of capacity under the City of Providence, two stub tunnels and a major facility upgrade of the Bucklin Point WWTF. The Phase I bedrock storage tunnel became operataional in late fall 2008. On average, the tunnel captures X gallons per year and directs that flow to treated at the WWTF. As a result, DEM has been able to raise the rainfall amount that triggers the closure of shellfishing in the upper bay region and thereby allow for more open days of shellfishing. Phase II, estimated to cost $363 million, includes construction of two near-surface interceptors, one to receive overflows along the Woonasquatucket River and one to receive overflows along the Seekonk River. Phase II also entails construction of sewer separations for the CSO located on the Seekonk River and the CSO located on the Moshassuck River, and construction of a wetlands facility in Central Falls. Phase II scheduled to be completed in 2014.

Evaluation of Phase 3 has been initiated through a new stakeholder process. *(Add some detail including cost issue)*

Incorporating Sustainability into Wastewater Management

Another area of recent attention has been energy efficiency. Energy is often the second largest expense behind labor in running a WWTF. Advanced treatment processes at WWTFs consume even more electricity. In many municipalities, wastewater treatment facilities are the largest municipal user of energy. (EPA, 2008) EPA, through its energy challenge program, is offering technical assistance to encourage the adoption of energy efficiency measures that often present major operating cost savings. Four RI communities to date have chosen to participate. The State's capacity to assist these efforts remains limited, but should be expanded to promote more use of renewable energy sources. NBC is finalizing two alternative energy feasibility studies; one investigating installation of a wind turbine generator at Field's Point, and the other evaluating the use of biogas (generated by the WWTFs anerobic solids digesters) to fuel a micro-turbine or reciprocating engine. Ranking criteria for the Project Priority List (maintained by the Clean Water Finance Agency and DEM) have been updated to favor energy efficiency and sustainable infrastructure practices when considering funding requests.

Adapting to Climate Change

By their design and function, a wastewater treatment facility is typically located downgradient from the majority of its service districts. This places them in low-lying areas adjacent to the waters to which they discharge. As a result, wastewater infrastructure is vulnerable to climate change impacts associated with both sea level rise and changing precipitation. Assessments of each system is planned and will lead to prioritization of adaption measures that will be needed to minimize impacts on the functioning of public wastewater infrastructure.

Goal: Wastewater systems are planned, designed, constructed and operated to protect surface water quality and public health.

Policy: Wastewater planning is based on time horizons that reflect the useful life of the infrastructure; e.g. twenty or more years.
Actions:

- On a statewide basis, periodically survey wastewater systems to identify, document and prioritize capital needs.
- Maintain and enhance data systems that document capital needs of wastewater systems to facilitate data sharing.

Policy: The facility planning process guides the orderly expansion and utilization of public wastewater systems including the extension of public sewers to those areas deemed necessary to achieve water quality protection goals.
Actions:

- Mandate all publicly owned wastewater systems maintain facility plans. Encourage data collection to reduce gaps in information on the location and ownership of public sewer lines.
- Strengthen the state oversight role in wastewater system facility planning and ensure modifications to such plans, to either expand or reduce service, are done in a manner that is cost-effective and supports the optimal use of existing infrastructure.
- Continue state review and approval of facility plans. Ensure such plans are consistent with policies reflected in Land Use 2025.
- Evaluate opportunities for regional approaches to various aspects of wastewater management, especially within the urbanized service districts in which different authorities maintain portions of a common system.
- Complete vulnerability assessments of wastewater systems relative to potential impacts from climate change. Use the resulting information to devise and implement over time adaptation strategies that will improve wastewater system resiliency to a changing climate.
- Periodically update facility plans to reflect new information including the results of assessments pertaining to climate change impacts.
- Develop incentives for wastewater system owners to develop, update and implement facility plans.
- Strengthen state authority to compel municipalities to develop community –based solutions to persistent on-site wastewater management problems; e.g. develop sewer systems or extend service.

Policy: Ensure wastewater management for on-site wastewater systems and sewered areas within a community or service district is coordinated.
Actions:

- Foster the development of community-wide wastewater plans that integrate facility planning and on-site wastewater management planning.
- Strengthen state oversight to require that comprehensive plans, local wastewater management plans and facility plans are consistent. Develop procedures to resolve conflicts among the plans.

- Strengthen policies and/or state law to ensure properties with ready access to public sewer systems are connected.
- Provide guidance to wastewater systems to foster sewer assessments and use fees that are fair and equitable.
- Develop targeted financial assistance program to facilitate sewer extensions and connections to priority areas necessary to restore water quality in circumstances where traditional financing mechanisms constitute an obstacle to implementation, e.g. excessive individual property owner cost.
- Develop policies to ensure privately constructed WWTFs are properly operated and maintained and that sufficient financial resources will be available to repair and upgrade such systems as needed in the future.

Policy: Ensure wastewater systems are designed and constructed to provide reliable wastewater treatment in a manner consistent with facility plans.
Actions:

- Continue state oversight of the design of major components of wastewater system infrastructure.
- Ensure policies for the design of wastewater systems accommodate advancements in technologies and allow for the incorporation of newer technologies that have been demonstrated effective elsewhere.
- Utilize inspection processes to ensure wastewater infrastructure projects are properly constructed as designed.

Policy: Ensure discharge permits are protective of water quality.
Actions:

- Continue to maintain the state discharge permitting program (RIPDES) as delegated by the EPA pursuant to the federal Clean Water Act.
    - Implement water quality monitoring programs to ensure data is available to support the development and re-issuance of RIPDES permits. This includes monitoring the ecosystem response in receiving waters as part of an adaptive management approach to wastewater management.
    - Continue to develop, refine and apply improved scientific tools and data systems, e.g. water quality models, to support permitting decision-making.
    - Develop and periodically update water quality based permits for public and industrial wastewater discharges that include discharge limits that will allow water quality standards to be achieved.
    - Develop and periodically update permits for cooling water discharges to ensure thermal impacts do not degrade aquatic ecosystems.
- Stay abreast of technological innovations in wastewater management and utilize advanced treatment technologies where warranted to abate water quality degradation associated with wastewater discharges.
- Improve data management systems to ensure effluent data and other important information on wastewater treatment performance is reported and reviewed in a timely and efficient manner among federal, state and local entities. In coordination

with federal EPA requirements, adapt data systems to support the electronic submittal of permit applications and associated reports.

- As new science warrants, develop policies to address pollutants of emerging concern including compounds associated with personal care products and pharmaceuticals discharged from wastewater facilities in their effluent or solids (sludge).

    - Reduce the deliberate disposal of unused drugs into wastewater systems via expanded public education.
    - Expand capacity of existing programs that provide alternative disposal of unused pharmaceuticals to capture a wider range of contaminants; e.g. over-the-counter drugs.
    - Encourage research

Policy: Encourage and support efforts to achieve effective control of upstream wastewater discharges in MA which affect downstream water quality in RI.
Actions:

- Continue to collect, synthesize and share scientific information that characterizes the upstream contribution from MA to water pollution problems in RI waters.
- As needed, participate in EPA decision-making to ensure downstream impacts on RI waters from MA wastewater sources are properly considered in EPA permit decisions.

Policy: Prevent the introduction of toxics and other substances into wastewater systems in quantities that may cause disruption of desired treatment processes.
Actions:

- Continue to implement effective pretreatment programs at the state and local/system level.
- Develop policies to improve coordination among municipal pretreatment programs and private operators of WWTFs.
- Expand programs that collect grease from restaurants and other sources fro beneficial re-use.

Policy: Ensure wastewater systems are operated and maintained to provide effective wastewater treatment.
Actions:

- Require operation and maintenance plans for all WWTFs to be followed. Continue to conduct periodic inspections of WWTFs.
- Maintain wastewater operator certification program to ensure qualified staffing at wastewater treatment facilities.

    - Provide sufficient training to meet needs of WWTF operators including those associated with the greater use of more advanced and complex treatment technologies.
    - Provide training and professional development opportunities to attract and develop effective managers to serve in wastewater systems.

- Expand wastewater certification requirements where warranted to ensure effective operation of privately owned and industrially operated wastewater treatment systems.

- Establish asset management programs within all major public wastewater systems to facilitate preventative maintenance and prompt replacement or repair of wastewater infrastructure.
- Continue to implement policies that require prompt reporting and response actions in the event of sewer system overflows.
- Provide technical assistance to wastewater dischargers to foster improved performance.
    - Develop programs to provide technical assistance to private businesses, in particular small businesses.
- Revise policies to broaden the use of sustainable practices in wastewater operations.
    - Facilitate the broader use of beneficial reuse of biosolids generated via wastewater treatment.
    - Promote the practice of wastewater reuse where appropriate and cost-effective.
    - Reduce amount of chemical use where feasible.
    - Promote practices that achieve energy efficiencies and increase use of cost-effective alternative energy sources.
- Maintain and periodically update a statewide plan to ensure Rhode Island has adequate septage disposal capacity that is reasonably distributed throughout the state.

Policy: Sludge generated via wastewater treatment is handled and disposed of in a manner that is protective of public health and the environment.

Actions:

- Maintain and update a statewide sludge management plan to ensure sufficient disposal for sludge generated at WWTFs.
- Promote the beneficial re-use of sludge; e.g. compost. Revise policies as needed to support acceptable re-use opportunities.

Policy: Utilize informal and formal enforcement procedures to deter non-compliance by wastewater dischargers.

<u>Goal: Wastewater infrastructure is improved to reduce pollutant loadings to restore water quality.</u>

Policy: Reduce nutrient pollutant loadings from wastewater treatment facilities.

Actions:

- Complete implementation of strategy to upgrade WWTFs to reduce pollutant loadings of nitrogen from 11 RI WWTFs affecting upper Narragansett Bay.
- Encourage timely implementation of WWTF upgrades in MA portion of the Narragansett Bay watershed.
- Complete implementation of upgrades for phosphorus controls at targeted WWTFs.

- Develop improved decision-making tools that can be applied to support future decisions on nutrient reductions from WWTFs discharging to the Narragansett Bay watershed including its tributaries.

Policy: Minimize untreated discharges from Combined Sewer Overflows.
Actions:

- Implement CSO abatement strategies for Providence metropolitan region and City of Newport.
    - Evaluate the effectiveness of Phase 2 of NBC CSO abatement and use information to adapt Phase 3 plans.
- Encourage CSO abatement in MA portion of Narragansett Bay watershed (Fall River).
- As practicable, minimize the generation of combined sewer overflows by redirecting and capturing stormwater runoff through application of green infrastructure practices in urbanized areas.

Policy: Reduce discharges that result from sewer system overflows.
Actions:

- Develop and implement effective programs to detect, replace or repair conveyance systems and pump stations in order to prevent sewer systems overflows within all public wastewater systems.
- Conduct infiltration and inflow detection programs to identify and eliminate sources of excessive amounts of water entering into sewer systems.
- Continue to provide state technical assistance to aid in the investigation of sewer system overflows.

Policy: Extend or establish public sewer service to mitigate pollution problems resulting from continued reliance on septic systems.
Actions:

- On a statewide basis, identify and prioritize areas where sewers are needed, as determined by technical information including water quality data or other factors (e.g., public health risks from increasing numbers of failing systems).
- Enact state law to require connections to public sewer systems. Such law should allow for reasonable waiver period for properties that have recently installed or repaired an OWTS.

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<u>Goal: Wastewater systems have sufficient financial resources to meet operating and maintenance needs as well as invest in priority infrastructure repairs and upgrades.</u>

Policy: Ensure wastewater systems have access to needed financial support.
Actions:

- Continue to provide financing via the Clean Water SRF Program.
- Evaluate long-term infrastructure financing needs and identify options for supplementing existing funding mechanisms including increasing capacity of the State Revolving Fund.

- Encourage the use of enterprise funds as an appropriate means of managing WWTF financial resources.
- Lower annual operating costs through by incorporating energy efficiencies and use of sustainable energy sources in wastewater operations.

Onsite Wastewater Treatment Systems (OWTS)

Pollutants: pathogens, nutrients, pharmaceuticals and personal care products
Key Issues Highlight:
- Alternative systems require greater oversight
- Local government role in OWTS maintenance
- Coordinate local planning with wastewater facility systems – one local wastewater plan
- Eliminate cesspools

Wastewater from any structure not served by a sewer system is disposed of onsite 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 (see Section xx)

OWTS most commonly serve an individual building (residence, business, industry or institution) and are located entirely on a single lot. They may also be designed such that one system serves groups of buildings or even a neighborhood. The key distinction from a sewage treatment plant is that the treated wastewater is discharged into the ground rather than through a pipe into a river, bay, or ocean. Management of OWTSs is a shared responsibility involving the State (DEM), municipalities, private sector and the property owner.

There are approximately 157,000 OWTS in Rhode Island, serving approximately 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 desired to extend public sewer service. In addition, Land Use 2025 discourages the expansion of sewer service outside of the urban services boundary. Therefore, communities dependent on OWTS will continue to utilize them to treat their wastewater far into the foreseeable future. The exception 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 with it bacteria and viruses, nutrients (nitrogen and phosphorus), pharmaceuticals and personal care products and any other contaminants that are improperly disposed of into the system. The level of treatment provided to that wastewater 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.

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. Private sector professionals are licensed by DEM to conduct an evaluation of the proposed site soil conditions, design and install the systems.

In addition to the conventional system design specified in the Rules, DEM has established a procedure for approval of alternative or experimental OWTS technologies and drainfields for use in RI. As of January 1, 2014, 19,047 alternative or experimental technologies and drainfields have been installed in the state. These are more complex systems that require a greater level of oversight to ensure they operate as designed in order to achieve the desired level of treatment.

Alternative systems are used on difficult sites where a conventional system can not be installed due to site limitations. The alternative system can be installed with a smaller footprint or provide a higher level of treatment, therefore, resulting in an equivalent or better environmental condition than a conventional system on an acceptable lot with no site constraints. An acknowledged concern with this approach is the inevitable development of sites that were formerly considered undevelopable, but due to new technologies, an OWTS can now be installed. However, the approval of the OWTS allows the lot to be developed and bringing with it impacts from that development not related to OWTS, such as stormwater runoff. Municipalities should be prepared for this and plan the development of their community accordingly. Alternative systems are also used in sensitive areas to meet water quality objectives as demonstrated by he requirement for denitrification systems in the Salt Pond and Narrow River watersheds for any new or repaired system'

OWTS can fail if they are not properly sited, designed, installed and 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 moves untreated into groundwater. Lack of maintenance is considered to be the primary cause of system failure. Cesspools are an older substandard method of disposal that essentially is just a hole in the ground that is more likely to fail and which does not provide an acceptable level of treatment. As of 2014, there are approximately 20,000 cesspools still in use in RI. Phasing out the use of cesspools has been an major DEM initiative. The R.I. Cesspool Act of 2007, (RIGL Chapter 23-19.15), requires 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. As of February 11, 2014, 504 cesspools have been replaced and 442 have been identified that need to be replaced. (*371 unknown systems within the 200-foot zones warrant further investigation.)*

Operation and maintenance of existing systems is the responsibility of the property owner. 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. 18 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). These plans make the towns eligible for the Community Septic System Loan Program (CSSLP), in which the towns can access funds from the Clean Water Revolving Loan Fund for low interest loans to homeowners for OWTS repairs. As of September 2013, 37 loans have been issued to 12 towns over the past 15 years totaling $8,800,000.

HIGHLIGHT BOX??

Local action best suited to overseeing proper operation and maintenance…

DEM has identified the elements of a comprehensive municipal program (Note: None of the elements below are required by state or federal rule or law)

Does the town have an approved Onsite Wastewater Management Plan?
Does the town participate in the Community Septic System Loan Program?
Has the town adopted an Onsite Wastewater Management ordinance?
Does the Onsite Wastewater Management Plan have mandatory inspections?
If so, has the town taken enforcement actions in cases of non-compliance?
Does the town have a web-based tracking system (e.g., RI Wastewater Information System)?
Does the town have a website for information and education on OWTS issues?
Does the town have a staff person whose primary responsibility is management of the municipal onsite wastewater management program?
Does the town have a cesspool phaseout program? If so, has the town taken enforcement actions in cases of non-compliance?

The impacts of projected climate change through sea level rise and warmer soil temperatures will decrease the effectiveness of OWTS in treating wastewater.

- Sea level rise will increase the vulnerability of systems in the coastal zone being damaged or destroyed during storm 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 soil temperatures statewide will reduce available oxygen for wastewater treatment in the soil.

Goal: OWTS are managed (properly sited, designed, constructed and maintained) to protect groundwater and surface water quality and public health.

Policy: Ensure proper siting, design and construction of onsite wastewater management systems.
Actions:

- Implement current OWTS Rules and continually evaluate the effectiveness of these Rules.
- Provide sufficient training opportunities to meet the needs of OWTS design and installation professionals.
- Evaluate DEM licensed professionals through continual DEM oversight, including field inspections.
- Strengthen disciplinary process for DEM licensed professionals.

- Support development of alternative technologies to provide advanced treatment options to address site limitations.
- Enhance the DEM data management system to allow for more efficient tracking of applications and the integration of OWTS information across water quality management programs.

Policy: Ensure that OWTS are properly operated and maintained, with particular emphasis on alternative treatment systems. Actions:

- Evaluate performance of advanced treatment OWTS and the level of maintenance necessary. Revise rules, guidance and technology approvals accordingly.
- Establish a technical working group to develop standards and processes to ensure operation and maintenance of alternative treatment OWTS. Implement strategies accordingly.
- Establish operating permits for large OWTS to ensure permit compliance.
- Evaluate the need for additional treatment standards for discharges with high-strength wastewater, e.g., restaurants.
- Promote proper use of OWTS through active public outreach programs.
- Promote efforts to educate new homeowners on their responsibilities for managing their OWTS, emphasizing that proper management increases system longevity as well as protection water quality.
- Promote the wise use of water softeners that discharge to OWTS due to impacts of chloride laden backwash on system functioning and groundwater quality: promote disconnecting discharge from the OWTS and ensuring water softeners are only used where necessary.
- Ensure OWTS identified as failing are promptly repaired or replaced.

Policy: Local government wastewater programs facilitate proper OWTS operation and maintenance. Actions:

- Develop and implement local onsite wastewater management programs in communities that rely in whole or in part on OWTS.
- Support participation in the Community Septic System Loan Program (CSSLP).
- Provide funding for CSSLP to meet the needs of the local onsite programs with respect to providing financial assistance to homeowners for repair and replacement of OWTS.
- Require updated local Onsite Wastewater Management Plans in order to continue to be eligible for CSSLP.
- Improve data management systems to facilitate data sharing among the state agencies and local government programs.

Policy: Ensure that OWTS are protective of public health and the environment. Actions:

- Continue implementation of denitrification requirements in the Salt Pond and Narrow River critical resource areas.
- Expand denitrification requirement to other poorly flushed coastal embayments that are documented to have nutrient caused water quality impairments due in part to OWTS.
- Evaluate technologies/strategies for phosphorus reduction in areas documented to have nutrient caused water quality impairments due in part to OWTS.
- Develop an approach for assessing and responding to cumulative impacts of OWTS.

- Further investigate impacts of OWTS on private wells in densely developed areas and develop appropriate strategies to mitigate impacts, e.g., requiring advanced treatment when nitrogen exceeds one-half the drinking water standard.
- Continue to evaluate the performance of OWTS on treating emerging contaminants of concern.

Policy: Ensure wastewater management planning for OWTS and sewered areas is coordinated. (*This topic will also be addressed under the Wastewater Treatment/Sewering discussion)*
Actions:

- Ensure that facilities planning for municipal/public sewer systems properly assesses areas for OWTS suitability.
- Require extension of sewers to areas currently served by OWTS where it is shown to be necessary to mitigate an existing water quality impairment caused in part by OWTS or to eliminate a threat to public health.
- Require connection to sewer systems where access exists.

Policy: Eliminate use of cesspools. Actions:

- Complete 2007 Cesspool Phaseout requirements.
- Eliminate continued 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 residence or apartment building) as required by state and federal rules.
- Develop and implement strategies for further reduction of cesspool use at single family homes (e.g., point of sale).

Highlight Box – Integrate Sewer and OWTS planning and management

- Provide incentives for communities to prepare one wastewater plan addressing elements from Facilities Planning in Section xx and Onsite Management in Section xx

Stormwater

Pollutants: Sediment, pathogens, nutrients, metals, petroleum, thermal

Issue Highlights:

- Local financing and capacity
- Need to address existing impervious cover
- Promotion of LID as long-term mechanism to manage stormwater

Stormwater discharges are a major, widespread source of water quality degradation in RI with xx% of our water quality impairments known or suspected to be caused in part by stormwater. *(maybe xx% of TMDLs have specified stormwater as a source of the impairment – some quantifying statement.).* Stormwater impacts include: pathogen contamination resulting in beach closures and closure of shellfish growing areas and , nutrient enrichment of waterbodies resulting in algal blooms, including toxic cyanobacteria, and streambank erosion from high flows. The

degree to which stormwater impacts water quality in any particular watershed is primarily a function of the amount of impervious cover in that watershed and how that stormwater generated from the impervious cover is managed. (See discussion on impervious cover in section xx Land Use Planning. This section will focus on stormwater management.)

Management of stormwater from impervious surfaces and from land disturbances (e.g., site construction, earth removal) is a multi-faceted approach at both the state and local levels that includes:

- Managing the existing stormwater systems: identification of the components of the system and maintaining the system, including repairs and upgrades.
- Managing new construction: managing construction activity runoff and post construction runoff with appropriate BMPs; and
- Controlling sources of pollution that can enter stormwater. Many of the sources of pollution discussed in other sections of this Plan adversely impact water quality due to stormwater conveying the pollutants into our surface waters and to a lesser degree groundwater. See discussions on combined sewer overflows, road salt and sand, agriculture, lawn care, pet waste, atmospheric deposition, surface mining.

DEM and CRMC updated the RI Stormwater Design and Installation Standards Manual (effective January 2011) to include the following requirements for development permitted by state programs as specified in the Smart Development for a Cleaner Bay Act of 2007 (RIGL 45-61.2-2):

> (1) Maintain pre-development groundwater recharge and infiltration on site to the maximum extent practicable;
> (2) Demonstrate that post-construction stormwater runoff is controlled, and that post-development peak discharge rates do not exceed pre-development peak discharge rates; and
> (3) Use low impact-design techniques as the primary method of stormwater control to the maximum extent practicable.

Stormwater management in RI has four principal components – the state regulatory programs listed below and local government management of development.

- State project permitting: DEM and CRMC have been implementing the amended Stormwater Manual since January 2011 for new development and redevelopment projects requiring state permits. The requirements of the Manual have to be met for applications to: DEM and CRMC Freshwater Wetlands Programs, DEM Water Quality Certification Program, DEM Groundwater Discharge Program, DEM RI Pollutant Discharge Elimination System Program, and CRMC Coastal Management Program. This includes implementation of the updated Erosion and Sediment Control Handbook (2014) *(currently in approval process)*
- Implementation of the federally required Phase II MS4 Program (Municipal Separate Storm Sewer System). Pursuant to DEM regulations and general permit, municipalities, DOT, Universities *and others* must comply with 6 minimum measures in managing stormwater: public education and outreach, public involvement/participation, illicit discharge detection and elimination, construction site runoff control, post construction runoff control, and pollution prevention/good housekeeping.

- DEM Industrial Activity Multi-Sector General Permit that establishes standards for listed activities to minimize impacts from stormwater -- activities, such as material handling and storage, equipment maintenance and cleaning, industrial processing or other operations that occur at industrial facilities are often exposed to stormwater.

Local governments must assume an active role in implementing their local land use authorities and administering the Phase II Program above if stormwater is to be effectively managed. Local planning ordinances need to be amended in order to allow application of innovative land use controls, including conservation development and LID. Implementation of LID will also reduce the burden on combined sewer overflow systems (see section xx) by significantly reducing the flows. To support local efforts, DEM and CRMC prepared the "RI Low Impact Development Site Planning and Design Guidance Manual (2011)," which provides information on different LID strategies from roadway design to conservation development and examples of how to improve local ordinances.

Current practice at the local level varies widely with many municipalities lacking the financial resources, staff or expertise to implement a local stormwater program to fully meet the Phase II requirements (see discussion of local capacity in section xx). State bond funds (2004 and 2012) have been and will be used to distribute state grants to enhance local capacity to implement stormwater management through equipment purchases, support for illicit detection work, and construction of BMPs. Additional local needs include, among other, improved guidance on BMPs, training and technical assistance related to Phase II, and continued financial assistance to build and implement local stormwater programs. RIDEM is working with partners, including RIDOT, URI, and others, to expand technical assistance as resources allow.

Highlight Box

Stormwater management at the local level is an essential service that must be integrated into all relevant aspects of local government, including planning, engineering and public works.

Maintenance of the existing stormwater infrastructure is a glaring weakness at both the state and local level. Stormwater management BMPs for improving water quality must be maintained or the water quality benefits of the BMP will largely be lost. The root of this problem, like many others is a lack of resources.

Managing stormwater from new development and redevelopment only is not going to result in achieving our water quality goals for waters impaired by stormwater. Many of the completed TMDL's identify the need to retrofit existing stormwater systems to reduce pollutant loadings to surface waters. DEM has linked its TMDL programs and stormwater management programs to require local actions to abate stormwater discharges. The responsibility for upgrading stormwater infrastructure rests largely with municipal governments and the Rhode Island Department of Transportation.

The major obstacle to abating stormwater pollution is the lack of a reliable source of funding. DEM has been able to utilize certain state bond funds and limited federal funds to provide matching grants to municipalities and others, but the funding sources are variable. In order to

address the funding shortfalls at the local level, DEM has been advocating the establishment of a sustainable local (or regional) funding source, such as a stormwater utility. A stormwater utility is a revenue generating program that allows municipalities to better manage stormwater with a designated funding source. Like a water or sewer utility, a stormwater utility generates revenue through user fees that are based upon the amount of stormwater generated on a property. These fees are assessed by measuring the amount of impervious cover within a parcel, are determined by the financial needs of the municipality and can be adjusted over time to continually meet those needs. Feasibility reports have been completed for three communities and discussions are underway for an Upper Narragansett Bay Regional Stormwater Utility. A stormwater utility provides a vehicle for:

- Consolidating or coordinating responsibilities that were previously dispersed among several departments and divisions;
- Generating funding that is adequate, stable, equitable and dedicated solely to managing stormwater; and
- Developing programs that are comprehensive, cohesive and consistent year-to-year

Highlight Box

Stormwater management is the 3rd leg of the water management infrastructure: drinking water, wastewater and stormwater. It therefore must be financed and managed to an equivalent level.

Climate change is projected to lead to wetter and more variable precipitation conditions in the decades ahead with an increase frequency of intense storms with large amounts of precipitation in shorter periods. Stormwater management systems are designed based on the average of storms in the recent past. The performance of these systems when faced with changing conditions will be an issue to closely evaluate.

Goal: Stormwater is managed to protect and restore the state's water resources.

Policy: Ensure stormwater is managed to meet water quality goals.

Actions:

- Implement the requirements of the 2010 RI Stormwater Design and Installation Standards Manual and the updated Erosion and Sediment Control Handbook (2013/14) by means of the regulatory programs that have incorporated these standards. Programs include the DEM and CRMC Freshwater Wetlands Programs, CRMC Coastal Management Program, DEM Water Quality Certification Program, DEM Groundwater Discharge Program, and the DEM RI Pollutant Discharge Elimination Program.
- Update the RI Stormwater Manual and the Erosion and Sediment Control Handbook as appropriate.
- Continue management of the DEM Multi-Sector General Permit for Stormwater Discharge Associated with Industrial Activity.
- Require self-certification of compliance with the construction site requirements issued by the stormwater permitting programs.

- Evaluate the performance of approved stormwater BMPs, as necessary.
- Support the development of new technologies/BMPs for stormwater management.
- Investigate strategies for source reduction, e.g., improve/increase street sweeping, prohibit coal tar based pavement sealants.

Policy: Use low impact planning and design techniques and associated BMPs (including "green infrastructure") as the primary method of stormwater management to maintain and restore pre-development hydrology of the state's watersheds.

Actions:

- Evaluate and implement strategies to more fully implement LID in state and local programs.
- Provide training and education opportunities for design professionals (engineers, landscape architects, contractors). Consider development of training/certification program.
- Provide training and technical assistance to municipalities on updating local ordinances to incorporate LID techniques in the RI LID Site Planning and Design Guidance Manual.
- Municipalities adopt local ordinances to implement LID.

Policy: Reduce impervious Cover:

- Evaluate the utility and practicality of establishing goals for reducing effective impervious cover by watershed *(and/or by municipality??)*.
  Water 2030 Big River and Scituate Actions: Develop average municipal IC percentage standards.
- Track impervious cover (disconnected v effective)
- Develop a strategy to protect high quality waters from degradation by limiting effective impervious cover in these watersheds (e.g., increased emphasis on LID, more stringent standards)
- Identify water resources warranting further protection than currently in place under existing regulatory programs. Coordinate with other state planning efforts, including the urban services boundary in Land Use 2025 and the development of RhodeMap RI.

Policy: State and local governments must effectively manage, maintain and upgrade their stormwater systems to minimize adverse impacts to water resources.

Actions:

- Continue implementation of DEM MS4 General Permit Program -- evaluate compliance and effectiveness. Place increasing emphasis on requiring municipalities to adopt LID ordinances.
- Incorporate TMDL implementation actions into the Stormwater Management Plan and implement priority actions.
- Establish regional stormwater management approaches where practical.
- System operators adequately maintain their systems to increase longevity and maximize performance.
- Provide technical assistance and training to municipal governments for stormwater management.
- Prioritize drainage systems for retrofitting (coordinate with TMDLs).
- Strengthen/enforce requirements for retrofitting under TMDL implementation.

- Incorporate green infrastructure into state funded projects.
- State agencies and quasi-state agencies demonstrate leadership in adopting effective and innovative stormwater management.
- Manage our stormwater systems where state and local systems are connected as a single system. Consider town and state collaboration on system maintenance, e.g., state reimburses the town for town maintaining key state system components and the town receives credit for this under the MS4 program.
- Evaluate opportunities to integrate management of wastewater and stormwater systems.

Policy: Ongoing training of public officials and private contractors is an important element to ensure proper stormwater management to protect and restore water resources.

Action:

- Establish an integrated and continual training program for stormwater management public officials and private contractors that addresses LID, BMP design and installation, road salting and other aspects of stormwater management.

Policy: Ensure that stormwater from significant areas of existing impervious surface on private properties is properly managed on-site.

Actions:

- Develop effective tools to encourage and incentivize management of stormwater from existing private property.
- Evaluate regulatory options for requiring management of stormwater from exisiting development on private property; including potential requirements for stormwater management at times of changes of ownership or changes of use.

Policy: Support the development of dedicated and sustainable funding mechanisms to manage local, regional and state stormwater programs.

Actions:

- Provide technical and financial assistance to local governments to establish the appropriate mechanisms.
- Local governments establish stormwater utilities.
- Investigate the potential for establishing stormwater credit markets and trading.

Policy: Stormwater management must adapt to climate change impacts.

Actions:

- Evaluate the impact on existing stormwater management systems of increased intensity of precipitation events, rising sea level and rising water tables.
- Evaluate stormwater management design standards to ensure that they incorporate new data on climate change in order to adequately protect water resources.

Road Salt and Sand Application

Pollutants: salt (sodium and chloride), sediment

White stained pavement and layers of sand at the edge of the road are ample evidence of our efforts to maintain the safety of our roadways in winter. But there is a water quality cost for the application of salt and sand. Salt and sand can be washed into surface waters impacting aquatic life, and salt can enter groundwater and contaminate drinking water wells

Salt and sand is 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 just sand. Weather conditions ultimately determine how much is applied. Municipal data is not 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.

Steps can be taken to reduce the amount of salt and sand applied to roads without compromising winter travel safety. The following actions are being taken by DOT:

Anti-Icing (Brine) -- Liquid brine (23.3% salt-water solution) applied before or early in a snowfall prevents the formation of frost and bonding between snow and ice and pavement. This practice has only been in wide use since February of 2012. The pavement appears wet temporarily, but as the water evaporates, a layer of salt bonds to the semi-porous road surface, preventing the snow from bonding to the road. The use of brine is effective in reducing the total amount of salt used during snow storms.

Pre-wetting -- Pre-wetting adds chemical solutions to the salt and sand mixture, causing the mixture to stick to the road instead of bouncing and blowing off to the shoulder.

Spreader Technology -- Sixty-nine of DOTs fleet of 100 snow plow/spreader trucks are equipped with "closed loop spreader control systems". These automated additions allow the operators to accurately administer and monitor the exact amount of salt applied. DOT has seen a significant reduction in pounds per lane mile of salt applied with the use of closed loop system.

Road Temperatures -- DOT uses real-time information systems capable of monitoring road temperatures. This technology is especially useful in spots such as the Newport Bridge where air temperatures may significantly vary from road surface temperatures.

Reduced Salt Zones – DOT uses an alternative mixture of sodium chloride and calcium chloride in the Scituate Reservoir watershed at 170 pounds per lane mile.

The technology and practices utilized by DOT is much more advanced than that used by municipal governments and the private contractors. For example, no vehicles other than DOT use the advanced spreader technology and only one other community is know to apply a brine solution. 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 depending on the severity of the winter.

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

The sand and salt must be stored in a manner to reduce impacts to water quality, primarily 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. All but 5 of the 20 state salt piles are under cover in a permanent structure. *(Include updated numbers on local salt storage facilities?)*

Policy: Minimize adverse impacts to water resources from road salt and sand application on state and local roads, private paved areas and from product storage areas as much as practicable and still maintain public safety.

Actions:

- Upgrade RIDOT and town equipment (e.g., install closed loop system technology) to efficiently and safely reduce the amount of sand and salt applied.
- Adopt new and innovative techniques for more effective control of snow and ice on roadways at the state and local level, e.g., brine applications and pre-wettng.
- Evaluate economically feasible alternatives to sodium chloride that show promise of being effective and environmentally safe.
- Consider establishing training and certification mechanisms for road salt/sand applicators, including private contractors used by RIDOT and municipalities
- Establish minimal equipment standards for use by road salt/sand applicators, including private contractors used by RIDOT and municipalities
- Identify areas that should be designated as reduced salt zones – focusing on locations near drinking water sources and in watersheds of chloride impaired waters. These areas should be determined on a case-by-case basis with input from state and local officials and water suppliers.
- Ensure that all salt and sand storage areas are properly maintained and the salt piles are covered (public and private). Strengthen rules for salt storage facility management and require covering of all piles except those immediately adjacent to the coast.
- Properly dispose of accumulated snow in accordance with the DEM snow disposal policy

Groundwater Discharges (Non-OWTS)

Pollutants: Chemical wastes, petroleum, metals as well as nutrients and pathogens from stormwater.

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. Just about any type of land use activity may have such a discharge into a floor drain, piped into a subsurface system (dry well, leaching chambers, 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 (VOCs), 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).

The Groundwater Discharge Program has records on 1623 sites. 513 are closed discharges and 959 have been approved for discharge with 50 discharges regularly monitored. However, it is estimated that there are likely hundreds of 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.

As described in Section xx Stormwater Management, infiltration is one of the primary principles of stormwater management in RI in order to decrease flow volumes and pollutants to surface water. Stormwater infiltration uses engineered BMPs and the natural groundwater flow system 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 require registration of stormwater discharges that are placed below the ground surface (trenches or drywells) and those that infiltrate at the surface without an engineered filter media (infiltration basin). This stormwater infiltration is reviewed to ensure that it is done in accordance with the standards in the Stormwater Manual, which specify approved BMPs and design specifications for these BMPs in order to protect groundwater quality.

Policy: Ensure that groundwater discharges are properly designed, sited, constructed and monitored to protect groundwater quality and public health.
Actions:

- Implement the Groundwater Discharge Rules for permitting, monitoring and closure of groundwater discharges.
- Continue to maintain state primacy for the Underground Injection Control Program (UIC) as delegated by EPA pursuant to the Safe Drinking Water Act.
- Provide an effective level of oversight of permitted facilities to ensure that these facility discharges are monitored and that they meet standards to prevent impacts to groundwater quality.
- Increase public understanding of the types of discharges subject to the Groundwater Discharge Program.
- Identify facilities with unauthorized discharges that are subject to the Rules and require permitting or closure as appropriate. Prioritize efforts based on pollution threat and the sensitivity of the resource potentially impacted.

Agriculture

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

Rhode Island's farms contribute to the state's economic development and provide Rhode Islanders with local food and farm vistas, as well as tourism opportunities and wildlife habitat. But the nature of farming in RI has changed significantly over the past 20 years. There are less of the larger farms (particularly dairy) but more smaller and specialized farms. The smaller farms are producing more farm products that are consumed locally. Farming operations will continue to take place in Rhode Island, and thus it is important to ensure that these operations continue to be conducted in a manner that will avoid water quality impacts.

US Department of Agriculture 2012 Census of Agriculture shows there are 1,243 farms in RI using 69,589 acres. A farm is defined by USDA as "Any place from which $1,000 of agricultural products were produced and sold, or normally, would have been sold, during the Census year." These latest numbers show essentially a doubling of the number of farms and acres in farmland from 1990 (580 farms, 33,000 acres) to today. The average size of a farm is 56 acres with the median 24 acres. Farms with 9 acres or less increased from the last census in 2007, and now account for 35% of all farms.

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. In addition, water withdrawals are an issue of increasing concern. The need for irrigation water can place high demands on local groundwater or surface water supplies which, in turn, can cause a low flow condition in streams potentially resulting in dramatic negative impacts on stream ecology. (See water withdrawal section)

Well managed farms can operate with minimal adverse impacts on water resources. However, instances of contamination of surface water and groundwater have occurred, such as:

- Concentrations of Aldicarb (Temik) exceeding health standards in South County wells in the 1980s from applications of the pesticide to potato fields.
- Livestock having direct access to streams resulting in elevated levels of bacteria.
- Groundwater in monitoring wells near turf farms with exceedances of nitrate drinking water standards and detectable levels of the pesticide Dacthal.
- Soil erosion into wetlands and physical disturbances of significant areas of wetlands.

An important step to minimize the impact of agricultural operations is for a farm to develop and implement a Conservation Plan that addresses water quality issues. This plan describes the schedule of implementation practices needed to solve natural resource concerns and may include multiple components to address particular resource issues, such as nutrient management, irrigation management, integrated pest management, wildlife management, forest management and others. However, the only requirements for farms to have such plans is if they participate in the Farm, Forest Open Space Program, which is a state program to allow eligible properties to be assessed at its current use, not its value for development. Conservation plans are developed in conjunction with USDS Natural Resources Conservation Service (NRCS) and the local conservation districts.

There are no state regulations that establish standards for specific farm management practices to control or prevent water pollution. However, DEM has created standards and specifications for agricultural best management practices which aim to prevent or minimize pollution of surface waters and groundwater. These standards and specifications are guidelines only. The guidelines are designed so that farmers may understand and identify on-farm sources of water pollution and implement effective strategies to address them.

In those instances, where farmers have contributed to degradation of water quality and decide to take actions to prevent contamination or upgrade their existing structural or management practices, DEM Agriculture and the USDA Natural Resources Conservation Service (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). This 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 75% cost share on projects built in accordance with the NRCS standards. Since the adoption of the 2008 USDA Farm Bill, 284 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. NRCS estimates that for each watershed (HUC-12), farmers representing only 2-10% of the total farmland acreage in that watershed have participated in the EQIP Program. (E. Boettger 3-11-14)

Policy: Farms have updated Conservation Plans. Actions:

- Investigate opportunities to encourage or require farmers to prepare Conservation Plans.
- Require farmers participating in the Purchase of Farmland Development Rights Program to prepare Conservation Plans.
- Regularly inspect farms with required Plans (e.g., farms enrolled in Farm, Forest, Open Space Program) for compliance.

Policy: Ensure farm practices are conducted in a manner to minimize water quality impacts.

- DEM and NRCS continue to collaborate on implementing the National Water Quality Initiative.
- Investigate means to encourage farmers to participate in NRCS cost-sharing programs.
- DEM selectively monitor groundwater and surface water quality near agricultural operations.
- Encourage farmers to establish and maintain effective riparian buffers (see Section on Habitat Management)
- Respond to instances of contamination suspected to be caused by farms.
- Close unauthorized floor drains in areas used for farm machinery repair.
- As necessary, consider the need to adopt regulations to address specific agricultural threats to water quality (e.g. covering manure storage, limit animal access to water resources).
- Ensure that any process wastewater (e.g., milk waste) on farms is properly regulated.

<u>Pesticide Management</u>

The DEM Division of Agriculture is responsible for enforcing state laws and regulations developed to protect people from poisonings and 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 level of competence in the pesticide application industry.

Anyone who applies pesticides for hire on other people's property must have a commercial pesticide applicator's license to apply general use (over the counter) 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 certificate. Dealers who sell restricted use pesticides and state limited use pesticides to certified applicators must have a pesticide dealer's license.

Pesticides that are applied by a licensed applicator in accordance with the EPA approved label directions are considered protective of environmental quality, and such application is not reviewed by DEM. The only specific applications reviewed by DEM are herbicides applied directly to surface waters and wetlands to control nuisance and invasive aquatic species. This

use of herbicides has increased over the years as these species have becomes more of a problem for users of the state's waters and have had dramatic adverse impacts on aquatic habitat. (See section on Aquatic Habitat Management). *(Permit numbers available?)* Applications to apply herbicides to control aquatic nuisance species are reviewed for their impacts to the receiving waters and nearby drinking water wells.

Policy: Ensure pesticides are used in RI in a manner to minimize impacts to water quality.
Actions:

- Implement the current Rules and Regulations Relating to Pesticides and continually evaluate the effectiveness of these Rules.
- Encourage farmers to incorporate an integrated pest management component into their farm Conservation Plan.
- Ensure herbicide applications to lakes include accurate identification of the plant species being targeted for treatment.
- Evaluate, as needed, the threat to surface water and groundwater from particular pesticides used in sensitive areas.

Lawn and Grounds Management

Pollutants: Nutrients (nitrogen and phosphorus), pesticides

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. Turf 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.

Turf is often referred to as the largest "crop" in the United States. (*3/10 PJordan stated data will be available in a couple months on urban turfgrass.)* 22,073 tons of fertilizer (including lime) was sold in RI from July 2012 to June 2013. This data is broken down by amount sold by bag, bulk and liquid. Bag sales represented 18,516 tons of the total (84%). If one assumes that bags are generally for the consumer market, whereas bulk and liquid shipments are for farmers, and that most of the bagged materials are for lawns – we can see a picture forming of the relative potential impact of turf grass management on our water resources.

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 soil characteristics. However, the area of turf in the high intensity uses is a small fraction of the residential lawn area and these athletic fields, golf courses, etc. are usually professionally managed. In contrast, 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 has no state law to

address fertilizer use. Furthermore, local government actions to address fertilizer use have been limited resolutions, ordinances requiring the use of sustainable vegetation and placing conditions on permit approvals. Strategies for managing fertilizer and pesticide use on turf are focused on education and training. The URI Cooperative Extension Program, including the Master Gardener Program, and other associations have produced public information and provided onsite 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. Proper lawn and management to reduce nutrient loss to our waters as presented in the a New England Interstate Water Pollution Control Commission "Regional Clean Water Guidelines for Fertilization of Urban Turf" (2014) can be summarized as:

- Use the right formulation (e.g., slow release nitrogen...
- Apply the right amount (based on soil test)
- Apply at the right time (season and weather)...
- Apply in the right place (not near water).

Lawn watering is the primary use of our water resources in the summer -- the time when water levels in streams and groundwater are at its lowest. This water use stresses public supplies, jeopardizing public safety (water for fire suppression) and the resulting low stream flows have devastating effects on stream ecology (See section on Watershed Hydrology). 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.

Policy: Minimize and prevent where practicable, adverse water quality impacts from lawn care and turf management. Actions:

- Continue to develop and implement homeowner outreach programs. These programs should adopt a consistent message, such as the New England Interstate Water Pollution Control Commission "Regional Clean Water Guidelines for Fertilization of Urban Turf" (2014).
- Develop and implement green certification programs for industries engaged in lawn care and turf management, e.g., golf courses, landscapers, etc.
- Consider establishing training and certification requirements for lawn care professionals.
- Municipalities adopt ordinances to reduce areas of disturbance that would become turf and encourage xeriscaping strategies.
- Municipalities and water suppliers enact strategies to limit lawn watering.
- Consider adopting state law as in other New England states to minimize pollution from the overuse and misuse of fertilizer on turf grass.

Boating and Marinas

Pollutants: Pathogens, nutrients, petroleum waste, chemicals

No Discharge Program/Pumpouts

Boating is a major recreational activity and economic generator in RI. There were approximately 37,889 boats registered in RI in 2013 (over the last 5 years, the highest number was 41,584 in 2010). The primary water quality concern from boating is the illegal discharge of sanitary waste (pathogens and nutrients). Under the federal Clean Water Act it is illegal to discharge untreated (raw) sewage from a vessel within 3 miles of shore, including all of Narragansett Bay. In 1998, Rhode Island became the first state in the country to receive the US Environmental Protection Agency's No Discharge Area designation for all of its marine waters. A No Discharge Area is a designated body of water in which the discharge of treated *and* untreated boat sewage is prohibited (this does not include greywater or sink water).

To maintain the No Discharge Area designation for the state's marine waters, DEM must assure that there are pumpout facilities available to RI boaters and that the pumpout facility infrastructure is in sound operating condition. As of 2012, 59 marine sanitation pumpout facilities were operating in RI waters -- 48 dockside pumpout facilities and 11 pumpout boats (*2012 data from web page map --2013 data??).* From xx to xx DEM has awarded xx grants to towns and private marinas totalling $xx for the development and maintenance of the waste disposal facilities. This public-private partnership has successfully reduced a significant source of pathogen contamination to the state's coastal waters.

In 2007, the RI No Discharge Law (RIGL 46-12-39.1) went into effect requiring all boats with permanently installed marine toilets to be inspected and certified that they have taken the steps necessary to prevent overboard discharges of sewage when operating or moored in Rhode Island waters. All boats subject to the program must obtain and display a no discharge certificate decal valid for four years issued by a DEM authorized certification agent (typically a harbor master or marina/boatyard staff).

Actions:

- Ensure RI has an adequate number of pumpout facilities.
- Ensure pumpout facilities are maintained.
- Ensure all required boats have valid inspection stickers certifying compliance with RI No Discharge Law.
- Ensure compliance with the No Discharge Area designation.

Marinas

There are over 140 marinas located in the tidal waters of RI. Although not one of the leading sources of water pollution, being located on the water's edge there is always the potential to release pollutants directly into the water, thus causing a localized impact on water quality. Water

quality concerns from marinas include vessel maintenance, handling of petroleum products, and sewage (see above regarding pumpouts) and stormwater management. Boats require a great deal of maintenance over the course of a year: Engines must be tuned and lubricated; hulls must be washed, sanded and painted; and vessels must be prepped to withstand the cold of winter. Each of these tasks—along with a myriad of other vessel maintenance activities—has the potential to release pollutants onto land and into the water and air.

The RI Clean Marina Program was developed by CRMC, DEM, Rhode Island Marine Trades Association, and Save the Bay in 2006 (??) to support and encourage the efforts of marina owners to better manage their facilities to prevent water pollution. This is a voluntary, incentive-based program designed to recognize and promote environmentally responsible marinas, boatyards, and yacht clubs that employ water quality best management strategies to prevent pollution and conserve resources. The State developed a the RI Clean Marina Guidebook Guidebook to aid marina operators in their efforts to obtain a Clean Marina designation. While all marina facilities need to be at a minimum compliant with any federal and state regulatory issues to receive a Clean Marina designation, it is the employment and implementation of BMPs for the issue areas present at a marina that earns the designation.

The Program encourages cooperation between marinas, the boating public and the state's regulatory agencies. In fact, the final recommendation for a marina to receive the Clean Marina designation comes from a review delegation consisting of CRMC, DEM and a representative of the Rhode Island Marine Trades Association. *(How long has the program been in implementation and how many designations have been made.)* Marinas that participate in the Clean Marina Program are recognized for their environmental stewardship and once certified as a Clean Marina facility can expect positive publicity and will likely attract new, environmentally responsible boaters.

Need more input from CRMC on policies and actions.

Policy: Foster relationship with RIMTA to ensure that state's marinas are fully aware of and capable of pursuing Clean Marina designation
Actions:

- Attend RIMTA annual meeting to educate, inform and encourage marina participation as well as disseminate and discuss current marina regulatory issues.
- Annually secure formal RIMTA representation for Clean Marina site visits.

Hazardous Materials

Pollutants: petroleum products, chemicals
Key Issues Highlight:

- Above ground storage tanks need more proactive regulation and inspection.
- Close the regulatory gap by addressing above ground storage tanks for non-petroleum based products.

Highlight Box Hazardous material v hazardous waste

In very simple terms, hazardous materials are chemicals in their virgin form that are defined by certain state and federal lists as "hazardous," that is of a quantity, concentration, or of certain physical or chemical characteristics, that may cause or significantly contribute to an increase in mortality or an increase in serious illness; or pose a substantial present or potential hazard to human health or the environment.

Once the "material" is no longer needed or capable of being used for its intended use, and it is to be disposed of or has been released to the environment, it is a "waste."

Effective hazardous materials management requires a multi-phase approach to ensure that water resources and the environment and public health and safety are protected:

- Ability to respond to accidents and leaks in timely and effective manner to limit the environmental impact;
- Proper storage and handling to prevent accidents and leaks;
- Proper disposal of waste generated in the use of the hazardous materials (see section xx on Waste Management); and
- Strategy to clean-up the environmental impacts from any accidental or illegal releases (see also Section xx Contaminated Site Clean-up)

Emergency Response

It could be a grounded oil barge on our coast leaking oil, a tanker truck accident on Interstate 95 or it could be a small spill or leak from a home heating oil tank – accidents can and will happen. These inadvertent releases of a hazardous materials or petroleum products present the potential for impacting groundwater and surface water. RI DEM's Office of Emergency Response is the first line of defense in protecting public health and safety and environmental quality in the event of such a release through implementation of actions pursuant to the RI Emergency Response Plan. Emergency responders are prepared to limit the risks from oil and chemical spills, failed tanks or pipelines, fires or fumes, overturned trucks, sunken vessels, litter, weapons of mass destruction, abandoned drums, and the like. This Office responds to more approximately 600-1000 incidents each year.

Industrial and commercial facilities that exceed certain volume thresholds for the storage of hazardous materials are required to prepare emergency response plans that are shared with the local and state officials. These plans are required to outline clear areas of responsibilities and actions to be taken in the event of a chemical release caused by accident, fire or other natural disaster.

The most common spills are spills of petroleum products. Data from the DEM Office of Emergency Response for the past ten years on the category of oil spills in RI is presented in Table XX. Residential fuel oil spills from problems with delivery and storage are consistently the largest or next to largest category of oil spills. Few homeowners know that insurance policies often exclude coverage for damage and cleanup from heating oil spills and leaks.

HIGHLIGHT BOX –

"Once of Prevention Equals a Pound of Cure"

It is an old saying that still drives the point home about many of the water quality issues we deal with today, none more so than dealing with hazardous materials.

Storage and Handling

The goal is obviously to prevent leaks and spills from occurring. Although they can not be completely prevented, the number of spills and leaks can be decreased and the size and impact of these events can be decreased by ensuring proper use, storage and handling of the stored materials. Underground storage tanks (USTs) and above-ground storage tanks (ASTs) are used throughout Rhode Island to store petroleum products such as motor fuels and heating oils and to a lesser degree other types of chemicals. Both UST and AST facilities have potential to cause significant pollution of groundwater and surface waters should a leak or spill occur. The programs described below have been established to prevent and respond to such events.

Underground Storage Tank Facilities

Leaking underground storage tank (UST) systems (tanks, piping and dispensers) were for many years considered the major threat to groundwater quality in RI. Leaking USTs have caused significant impacts, including the contamination of numerous private wells, temporary and permanent disruption in the use of public wells, explosions and fires at construction sites, explosion hazards within buildings, and the leaching of petroleum into surface waters.

However, this threat has decreased dramatically since the first DEM UST Program regulations were enacted in 1984. Since the DEM Program was established, 15,184 of the 17,737 regulated tanks in RI have been removed (as of January 2013). The remaining 2,553 active tanks, must comply with the comprehensive DEM "Rules and Regulations for Underground Storage Facilities Used for Petroleum Products and Hazardous Materials" (UST Rules).

The UST Rules incorporate federal minimum requirements with additional state standards to register facilities, test for leakage, DEM facility inspections, training of onsite operators, response to leaks, mechanisms to clean-up leaking tank sites. The next major required upgrade for UST facilities (except heating oil systems) is a state requirement that all single walled tank systems be removed by December 2017. USTs are prohibited within the wellhead protection area of community water supply wells.

DEM regulates all USTs except home heating oil tanks less than 1,100 gallons in capacity that are located at residences and on farms. The standard requirements for heating oil systems are less stringent…. Although most heating oil tanks less than 1100 gallons are likely above ground (outside or in a basement), an unknown, but suspected large number of heating oil tanks, are buried. At some time, these tanks will leak. RI state statute 46-12.1 enables municipalities to adopt ordinances providing for the regulation and control of underground storage tanks and

establishing procedures for the registration, testing and removal of such underground tanks. DEM has encouraged municipalities to use this authority to prohibit USTs in sensitive areas and focus their efforts on encouraging removal of home heating oil tanks.

When tanks do leak, soil and groundwater may be impacted. 1365 leaking underground storage tank (LUST) cases have been investigated since 1984. As of October 31, 2013 DEM had 159 active LUST cases. Leaks/spills may result from equipment failure or operator error at the tank, in the piping, or at the dispenser. The number of annual LUST cases has been dropping …….need to compile numbers. The RI Underground Storage Tank Financial Responsibility Fund provides clean-up funds for eligible applicants (See discussion in Section XX). First established in XXX, the fund has provided $XX to XX UST owners.

Above Ground Storage Tank Facilities

Above-ground storage tanks (ASTs) for petroleum products and other chemicals are also located throughout the state. They range in size from small ASTs for heating oil, of which there are thought to be thousands, to bulk oil storage facilities. Releases from the operation of AST facilities have been associated with extensive soil and groundwater contamination, as well as surface water impacts.

The RI "Oil Pollution Control Regulations" establish standards to prevent release of material from those facilities with a combined above ground storage capacity of greater than 500 gallons of oil, gasoline or any other substance refined from petroleum. As of XXX, DEM has identified ~300 facilities, many of which have more than one tank subject to the regulations. These regulations include provisions for secondary containment, facility inspections, tank closure, groundwater monitoring and spill response. Unlike the UST Program that is driven by federal environmental protection standards and generously supported by federal funding, the AST Program is supported solely by state resources. As a result, DEM's ability to manage this program has been compromised by the lack of resources, more so than other DEM regulatory programs. The regulated AST facilities must comply with the provisions of the regulations, including monthly inspections, but there is little opportunity for oversight and onsite DEM inspections on a regular basis that would ensure an adequate level of environmental protection.

When looking at the universe of hazardous materials storage, there is a clear gap in the regulatory net in regards to above ground storage of products that are not subject to the "Oil Pollution Control Regulations" -- these are the non-petroleum based chemicals. In comparison, the UST program regulates the underground storage of petroleum products and hazardous materials. Measures have to be in place to meet fire and safety standards for the above ground storage of non-petroleum based hazardous materials, but there are no additional requirements stipulating procedures for environmental protection, such as secondary containment, facility inspections for tank integrity, etc. that are required for petroleum products.

Policies and Actions for Section x Hazardous Materials

Policy – Prevent or minimize impacts to RI's water resources from spills of hazardous materials and petroleum products. Actions:

- Ensure adequate capacity at the state and local levels to respond to spills of hazardous materials and petroleum products in a safe, timely and effective manner.
-- Implement and update as necessary the RI Emergency Response Plan.
-- Ensure facilities have updated emergency plans and test such plans appropriately.
-- Inspect facilities for hazardous material and oil spill preparedness.
-- Target source water areas in some way???

Policy – Prevent or minimize impacts to RI's water resources from leaks and spills at above ground storage and underground storage tank facilities. Actions:

- Implement the DEM "Rules and Regulations for Underground Storage Facilities Used for Petroleum Products and Hazardous Materials.
- Effectively upgrade all existing single wall tank UST systems by December 22, 2017.
- Ensure resources are available for state inspections of facilities and to enforce violations.
- UST Loan Fund.
- Municipalities consider adopting more stringent standards for siting and operation of Storage facilities.
- Update and revise the Oil Pollution Control Regulations to improve the effectiveness of the state program regulate AST facilities. Consider siting restrictions on certain new facilities and development of a program that parallels the UST program, with inventories, regular inspections and compliance reviews, and ensuring that spill response plans are acceptable.
- Initial efforts to upgrade the AST Program should target inspection and compliance activities in sensitive areas, e.g., on the shores of coastal waters, wellhead protection areas, etc.
- Establish procedures to prevent or minimize impacts to water resources from the above ground storage of non-petroleum based hazardous materials.

Policy: Minimize threat posed by home heating oil tanks.

- Provide education on the threat to water quality from home heating oil tanks and the potential financial consequences for homeowners.
- Towns adopt ordinances prohibiting new heating oil USTs [maybe just in areas dependent on private wells and wellhead protection areas].
- Implement strategies for removing existing heating oil USTs, e.g., state or local requirement for removal at point of sale or transfer or at the time of building expansion. [maybe just in areas dependent on private wells and wellhead protection areas]

Waste Management

Pollutants: chemicals, metals

Solid Waste

For decades, solid waste was disposed of in community run disposal sites that were not properly managed to prevent environmental impacts. These disposal sites contain a vast array of

contaminants that have the potential to pollute groundwater and surface water. 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.

At present, the Tiverton Landfill, which accepts only solid waste from Tiverton residents (*any plans for closure??)* is the only community facility in operation. All other solid waste in RI is disposed of at the RI Resource Recovery Corporation Central Landfill in Johnston. Operations of this facility are subject to stringent oversight for compliance with state environmental laws and regulations. (See also State Guide Plan Element 171, RI Comprehensive Solid Waste Management Plan (April 2007) which is currently being updated.)

The DEM Office of Waste Management Solid Waste Regulations ensures that solid waste management facilities are designed and operated to protect surface water and groundwater quality at such facilities as landfills, transfer stations, incinerators, waste tire storage, petroleum contaminated soil processing, construction and demolition debris, and waste composting (including yard and leaf)

(Do we have numbers of these types of facilities?)

Hazardous Waste

Hazardous waste can cause a water quality problem at generation, transport, treatment, storage and disposal/ disposal stage due to spills, accidents or improper management. DEM Office of Waste Management "Rules and Regulations for Hazardous Waste Management" are in place to manage this waste at all steps in the process. Water quality issues from hazardous waste have historically resulted from the illegal disposal of these materials. The clean-up of these sites is addressed in the following section on Contaminated Site Clean-Up.

Confirm numbers on HW storage, treatment and disposal facilities in RI

As part of the DEM pollution prevention efforts, the Office of Customer and Technical Assistance has produced manuals and other materials regarding hazardous waste compliance (as well as other issues) for autobody shops, used oil recycling, and auto salvage facilities.

Household hazardous waste, such as pesticides, oven cleaner, pool chemicals, nail polish remover, oil based paints, and many others presents a different set of management challenges. Improper disposal of these materials into an OWTS or into the sewer (or just dumped on the land surface) can contaminate our waters. The RI Resource Recovery Corporation has managed the Eco-Depot for many years as a free service for Rhode Island residents who wish to dispose of their household hazardous waste safely and properly. Collection dates are set for Saturdays at the Central Landfill and at community locations across the state (e.g., 42 dates set for 2014).

Actions for Waste Management:

- Continue to enforce DEM Solid Waste and Hazardous Waste Rules.
- Ensure complete and proper closure of former solid waste disposal sites.
- Ensure that siting of any new waste management facilities consider the sensitivity and value of the groundwater and surface water resources.

- Take all practical steps to decrease the volume of waste generated so as to limit the needs for siting of future solid waste management facilities.
- Expand efforts working with selected industries to reduce and properly manage hazardous waste (see section xx on Pollution Prevention)
- Promote increased understanding of household hazardous materials and continue to annually provide adequate opportunities for household hazardous waste disposal.

Contaminated Site Clean-Up

(Note Leaking Underground Storage Tanks are addressed separately above)

Pollutants: Chemicals, metals

Discovery of active and former commercial and industrial sites that have contamination of soil, groundwater and river sediments due to hazardous materials and petroleum products are unfortunately a fairly common occurrence in RI. Most of the contamination that is discovered is a result of activities that predated the comprehensive environmental regulations that have been in place for the past few decades. ***(True??)*** However, spills and leaks, as well as illegal management of wastes that are not immediately addressed at the time of incident (see Emergency Response discussion) will always be a factor to address. Restoration of these sites is essential to assure long-term water quality goals in a watershed are met.

Water quality issues at these sites are typically:

- Contaminated groundwater that can impact drinking water wells and flow to and impact downgradient surface waters. ***(Estimate of the percentage of sites that have contaminated groundwater v. just soil)***; and
- Contaminated sediment in water bodies from historical discharges of waste into these waters. Although discharges of toxic pollutants to our waters have been reduced and eliminated, persistent high concentrations of contaminants in bottom sediments of rivers and bays continue to degrade aquatic habitat in localized areas, particularly the urban core.

State Site Remediation Program

The DEM Office of Waste Management administers this Program to oversee the investigation and remediation of sites contaminated with hazardous wastes and petroleum products that are not subject to the federal Superfund Program described below. The ensures that investigations and remedial activities are conducted in a consistent manner that adequately protects human health and the environment. The DEM Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases define the process to accomplish these objectives.

(number of sites, summary info about the sites?)

This program also supports the redevelopment and reuse of contaminated property, referred to as "brownfields." Cleaning up Brownfields for redevelopment is a critical component to the future

community revitalization and economic growth of the State's urban areas. It has been estimated that for every acre of redeveloped Brownfield property, 4.5 acres of greenspace are spared (EPA Report cited on DEM webpage). Funding to finance the cleanup of Brownfields has been limited. The Rhode Island Economic Development Corporation (RIEDC) in conjunction with the DEM manage the Rhode Island Brownfields Cleanup Revolving Loan Fund. Loans with below market fixed interest rates and flexible repayment terms are made to qualified Brownfield owners/developers to finance eligible site cleanup costs. ***(numbers on funding $?)*** In addition to the revolving loan fund, DEM has administered a competitive grant program using federal funds for brownfield site assessments. As of 20xx, $xx has been awarded for site assessments.

Superfund and Department of Defense Program

The DEM Office of Waste Management oversees the cleanup of federally designated "superfund sites", the evaluation of sites on EPA's list of potential superfund sites, and the clean-up of former Department of Defense sites. The purpose of these Programs is to ensure that the environmental impacts associated with the past and present activities at these sites are thoroughly investigated and to ensure that the appropriate Remedial Action is taken to protect human health and the environment. These sites do not include the sites addressed by the state site remediation program discussed above. There are:

- xx sites designated as Superfund sites (also referred to as National Priority List sites);
- xx sites are listed on the federal inventory as suspected sites; and
- xx Department of Defense sites under investigation

Actions for Contaminated Site Clean-up:

- Continue to implement state site remediation program and the federal Superfund program to clean-up sites that are impacting water quality.
- Evaluate innovative technologies and strategies to address soil and water contamination.
- Evaluate models and methods for risk assessment to ensure proper levels of clean-up are attained.

Dredging and Dredge Material Management

Pollutants: sediment, metals, chemicals

In a state with a dependence on boating and shipping, dredging of our waterways is a necessary activity to maintain ship access to harbors and marinas. Sediment that is carried off the landscape by stormwater is deposited in our waterways and builds up to levels that impede ship and boat traffic. Unfortunately, due to our long industrial history, much of this sediment that must be removed has the potential to contain a variety of pollutants, such as metals and hydrocarbons.

Permitting is required for dredging since it can impact water quality 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.
- 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. One of the goals of dredge management in RI is to encourage 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. 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.

Dredging projects in the northern half of the state mainly uses the Confined Aquatic Disposal cells that are located in the upper Providence River. These sediments are typically contaminated, but the cells are required to be capped with clean material once they are almost full.

Dredging projects in the southern half of the state will typically dispose of sediments as beach nourishment. There are some marinas that will reuse material on-site and then larger projects where the sediment does not meet beach nourishment criteria will opt to dispose of the material offshore at a location called 69B. Dredging also occurs in the coastal ponds. Coastal storms wash away beaches and transport sediment into the ponds, requiring dredging to increase flushing to the ponds and restore sand to the beaches.

Actions:

- Continue to implement the "Rules and Regulations for Dredging and the Management of Dredged Material".
- Develop a general dredge permit for small projects and restoration projects.
-- Further develop the concept of using clean dredge material for salt marsh restoration to assist with climate change adaptation.

Pet Waste

Pollutants: pathogens, nutrients

Pet waste can be a significant contributor of bacteria and other pathogens to surface waters. The issue is dog waste, although other backyard pets (horses, goats, etc.) can cause localized problems. It is the dog waste in urban and suburban areas that is left on the sidewalk, or on grass near the street, that can then be washed into the stormwater drainage systems and cause downstream water quality impairments. 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

bacteria, nitrogen, and phosphorus to temporarily close a bay to swimming and shellfishing (USEPA website Water: CZA, Pollution Prevention Management Measures).

Dog waste can harbor a host of different bacteria, parasites and viruses that can cause human illness. One gram of dog waste contains 23 million fecal coliform bacteria, almost twice as much as human waste (Pacific Shellfish Institute, cited in Pawcatuck TMDL). In Rhode Island, there are approximately 200,000 dogs (footnote for calculation) and it is generally estimated that dogs produce one-half pound of feces per dog per day (RIDEM Bacteria TMDL, Pawcatuck TMDL),which means 100,000 pounds of dog waste is generated per day in RI

All of our waters, particularly those identified as impaired due to bacteria (Section xx), 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 (NRDC 3-4-14). Pet waste can be flushed, buried, or sealed in bags and put in the trash.

(DOH Scoop the Poop poster picture)

Actions:

- Towns adopt and enforce local ordinances requiring owners to pick up after their pets on public property or on other people's property.
- Improve public understanding of the impact of pet waste on water quality.
- State and town facilities adopt strategies for controlling pet waste, such as, specially designated dog parks, provision of pet waste stations (plastic bags and receptacles).
- Pet owner's act responsibly – pick up after their pet.
- Encourage backyard livestock owners to properly control animal wastes, e.g., cover manure piles.

Waterfowl

Pollutants: pathogens and nutrients

Despite our desire for feeding the ducks, we must realize that ducks and geese can indeed 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 unnatural concentrations of waterfowl in some locations. Recent concern has focused on the large numbers of resident Canada geese. A single Canada goose can eat up to 4 pounds of grass and produce up to 2 pounds of fecal waste a day *(in SRI 319 Grant Ag)*. Whether by direct deposition into waterbodies or via transport by stormwater, the bacteria 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 generally 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. *(Do we have any numbers?)*

Effort to control waterfowl to minimize water quality degradation that have been attempted in RI include:

- Stopping the feeding of waterfowl;
- Modifying habitat. Waterfowl, especially grazers like geese, prefer easy access to water. Maintaining an uncut vegetated buffer along the shore will make the habitat less desirable to geese.
- Controlling goose populations with hunting and nest disruption.

Policy: Ensure that populations of waterfowl in RI, particularly Canada geese, are at appropriate numbers for the habitat and ensure that steps are taken to minimize the water quality impacts from waterfowl.

Actions:

-Discourage the feeding of ducks and other waterfowl, particularly in critical areas.

- Increase public understanding of the means to properly landscape waterfront properties to deter geese.
- Encourage hunting of Canada geese.
- Establish a state carrying capacity for Canada geese. (Done so for Mute Swans – 300).
- Implement a sustainable statewide, multi-faceted strategy, that includes utilization of trained volunteers to control goose populations.

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 operating in RI on a regular basis. 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, or by failing to limit the areas of disturbance. 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 and 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.

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 revegetating. 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.

Sand and gravel mining and dimension and crushed stone activities must adhere to the conditions of the DEM Multi-Sector General Permit for Stormwater Discharge Associated with Industrial Activity if there is a discharge to waters of the state from the site. In cases where the excavation is below grade or entirely bermed, there may not be a discharge. If there is a discharge, the DEM multi-sector permit requires a stormwater management plan for the operations that identify BMPs to control stormwater, including site stabilization at the conclusion of activities. Many local governments have earth removal ordinances that address these facilities and protect water quality by specifying operational and reclamation standards. Sand and gravel excavation also occurs on a temporary basis as a site is prepared for other future uses. As discussed in section xx on Stormwater, this activity that exceeds one acre is subject to the RIPDES Construction General Permit.

Policy: Minimize adverse impacts to surface water and groundwaters from pollutants associated with resource extraction operations.

Actions:

- Continue to implement and enforce conditions of the DEM Multi-Sector General Permit for Stormwater Discharges for surface mining operations.
- Towns adopt local earth removal ordinances that include requirements for water resources protection and site reclamation.
- Research appropriate best management practices to reduce potential water quality problems associated with sand and gravel operations, with an emphasis on reclamation strategies.
- Provide information on preventing water pollution to operators.

Silviculture

Pollutants: sediment

While timber harvesting can contribute to water quality degradation due to increases in soil erosion and sedimentation, the utilization of BMPs and the generally small scale of activities limits the overall impacts to water quality in RI to infrequent localized instances. With the exception of clearing for development (subject to stormwater permitting), the harvesting operations that do take place in RI generally involve selective cutting in localized areas. Commercial wood-cutting 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 and comply with BMPs to prevent impacts to water quality. Preserving forested riparian buffers provides many water quality benefits that are discussed in section xx. The Rhode Island Forest Resources Management Plan (March 2005), State Guide Plan Element 161 points out the benefits of forest land to water quality and the need to ensure that BMPs are adhered to prevent impacts to water quality.

Policy: Protect water quality during forest harvesting operations.

Actions *(from Forest Management Plan 2005):*

- Continue to require the use of BMPs for all timber-harvesting operations.
- Continue to provide training to foresters and loggers on the use of BMP's. DEM/DFE, SNEFCI, and RIFCO OG

- Continue to provide a coordinated review of timber-harvesting operations involving wetlands. DEM/DFE, WRB and OIC OG
- Continue to work with other groups to educate landowners on proper land management practices. DEM/DFE, SNEFCI, RITF and RIFCO OG

Aquaculture

Pollutants: Nutrients, organic wastes, (potential for pharmaceuticals, e.g., antibiotics)

Aquaculture is a growing industry in RI with 50 active farms growing shellfish over 173 acres at the end of 2012 (CRMC 2012). This is an increase from 43 farms in 2011. Oysters remain the number one aquaculture product with over 4 million sold for consumption, far exceeding the number of hard shell clams and blue mussels also being grown. Water quality is improved by the filter feeding actions of these shellfish operations, however there have been many discussions regarding the effect of these operations on the use of the state's waters. *(What more should be said on "use"?)*

Finfish aquaculture operations are essentially limited to the three state fish hatcheries – Lafayette, Carolina and Perryville – for the stocking of ponds and rivers for fisherman. These facilities have caused downstream water quality impacts due to the release of excessive levels of phosphorus. Discharges from these facilities are permitted by the RIPDES Program, and each facility is working to ensure compliance with their effluent limitations. Use of any medications or other drugs in the raising of the fish is to be reported to the RIPDES Program, but no such use has been reported to date. Smaller facilities raising finfish – research facilities, small farm ponds – fall below the RIPDES program regulatory threshold.

Currently there are no operations in open waters to grow finfish in pens for commercial purposes. Should these operations be proposed, they are required to obtain a permit from the RIPDES Program. Nutrients, organic wastes and antibiotics from this type of operation have generated water quality concerns in other locations.

Actions:
- In anticipation of requests for commercial finfish aquaculture in RI in the future, develop a strategy for managing finfish aquaculture to mitigate water quality impacts.
- Ensure state fish hatcheries are in compliance with discharge limits established to protect downstream waters.

Atmospheric Deposition

Pollutants: mercury, nitrogen, phosphorus, acidity

The atmosphere is a significant pathway for some pollutants that enter our waters. These pollutants -- primarily mercury, nitrogen and phosphorus -- are deposited directly into our waterbodies and onto the landscape from which they are carried by stormwater into RI's waters. They can be deposited in both wet (in precipitation) and dry (natural fallout) conditions.

Fish consumption advisories are in place for freshwaters across the state due to elevated levels of mercury. The vast majority of this mercury in our waters (98%) is a result of atmospheric deposition and 75% of the mercury in the atmosphere is from human sources primarily generated by coal-fired power plants, municipal waste combustors, sewage sludge incinerators, and residential heating. (The Northeast Regional Mercury TMDL (2007)). Mercury is a potent neurotoxin that poses risks to human health. Exposure to this toxic metal occurs when humans consume fish that contain mercury's most toxic form, methylmercury.

Meeting water quality standards for mercury will require reductions from mercury sources within the Northeast region, U.S. states outside of the region, and global sources. The Northeast states have all moved forward with management to reduce mercury emissions and releases through emission limits on incinerators and coal-fired utilities. With the reductions being achieved locally, the New England state are now interested in collaborating on region-wide fish tissue sampling to evaluate progress toward reducing fish tissue concentrations of mercury. Based on calculations in the TMDL, atmospheric deposition of mercury needs to be reduced by xxx *(NEIWPCC page says 98% ??)* percent in order to meet desired fish tissue concentrations. (The Northeast Regional Mercury TMDL (2007))

Nitrogen is another significant pollutant deposited from the atmosphere (see discussion of nitrogen in section xx). Combustion (motor vehicles, power plants) provides the high temperatures necessary to convert stable nitrogen gas into the reactive nitrogen oxides. These nitrogen oxides are then converted to nitric acid vapor and particulate nitrates that are removed by precipitation from the air. A large amount of nitrogen is lost to the atmosphere as ammonia from fertilizer applications and livestock primarily in the Midwest that can be carried to the northeast. *(Need to say something about relative load of N from atm dep compared to other sources……)*

Atmospheric deposition of phosphorus has been identified in the TMDLs for ponds exhibiting signs of eutrophication, albeit as a minor source, compared to wildlife.

Atmospheric deposition of mercury, nitrogen and phosphorus that is not deposited directly onto our waters, is carried by stormwater into our water resources, which must be properly managed to minimize this threat to water quality (see stormwater section xx)

In addition to the specific impacts of mercury, nitrogen and phosphorus on our waters, precipitation in RI is generally acidic. Due to our geology, there is very little buffering capacity in our soils and our freshwaters resulting in a gradual increase in acidity. This acidification can have adverse impacts on aquatic life. *[Need to check on this, can't seem to find much on this…]*

Actions:

- Participate in regional initiatives to reduce air pollution contributing mercury, nitrogen, phosphorus and acidity.
- Manage stormwater as effectively as possible to capture pollutants before discharge to surface waters.

Marine Debris

Pollutants: solid waste (plastic)

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 marine debris is not just a visual litter or waste issue. It is a water quality issue. Trash in our waters can (from (Ocean Conservancy):

- Injure swimmers and beach goers;
- Kill and injure wildlife: many species accidentally ingest trash, mistaking it for food. Abandoned fishing nets and gear, discarded fishing line and other forms of debris can entangle marine wildlife – sea turtles, sea birds, and fish.
- Threatens tourism and recreation, and the critical dollars they add to our local economies by limiting people's enjoyment of beach and water related activities.
- Complicates shipping and transportation by causing navigational hazards; and generates steep bills for retrieval and removal.

Estimates indicate that 90% of waterway debris comes from land-based sources[1] -- blown into the Bay or ocean or most commonly washed off our streets and into our waters by means of storm drains. Debris also comes from recreational and commercial boaters. Annual coastal cleanups have been conducted in RI every year since 1986. In 2012, 19,034 pounds of debris were collected along 72.8 miles of shoreline in RI. The primary items collected in descending order by number collected: cigarette butts, food wrappers/containers, caps/lids, plastic bottles, plastic bags, straws, cups/plates/plastic dinnerware, glass bottles, beverage cans, rope/fishing line and nets. (Ocean Conservancy)

Human behaviors and actions – accidental or intentional – are the sources of this debris.

Policy: Decrease the amount of human generated debris in our waters.
Actions:

- Increase public understanding of marine debris issues and change behaviors to reduce marine debris in RI.
- Ensure human generated debris is properly contained on land and on boats to minimize release to the environment.
- Increase coordination among the organizations involved in preventing and removing marine debris.
- Develop source reduction strategies for items most often found in the marine environment.

[1] U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Public and Constituent Affairs, "Turning to the Sea: America's Ocean Future" (1999): 56.

Pharmaceutiacals and Personal Care Products and Other Contaminants of Emerging Concern

Pharmaceuticals and personal care products (PPCPs) as a subgroup of contaminants of emerging concern, 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 anti-bacterial soaps, fragrances, cosmetics, and sun-screen agents. PPCPs include a broad array of synthetic and naturally occurring compounds that are not commonly monitored or regulated in our waters.

PPCPs enter RI's waters primarily by means of wastewater treatment facility effluent, combined sewer overflows and onsite wastewater treatment systems, but may also originate from animal feed lots, land application of biosolids and manure, and aquaculture. They are being detected in groundwater and surface water of the Northeast at very low concentrations. New and improved analytical detection methods have enabled the detection of these chemicals in our waters at lower concentrations, often found in the parts per trillion ranges or less.

Currently there are no US EPA/state ambient water quality criteria, water quality standards, or drinking water standards for most of these individual chemicals. These compounds are not routinely monitored for as part of federal or state monitoring programs, and much of the monitoring to date has depended on specific research projects. 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 from PPCPs in the environment.

Recent efforts to control the pharmaceuticals in our environment have focused on proper disposal of un-used drugs by promoting use of drug disposal designated locations (e.g., police stations), federal drug take-back days and encouraging the public not to flush these drugs into our sewer systems or into onsite wastewater treatment systems. However, most of the drugs that enter the environment do so as a result of human excretion of the unmetabolized drug.

While PPCPs have gained most of the public's attention, there are other contaminants of emerging concern that are being found in low concentrations and which are not routinely monitored for. These include flame retardants in fabric, chemicals for non-stick surfaces, plastic additives.....*need more*

Nanomaterials effect on water quality ….

Expecting wastewater treatment systems to treat our waters to remove these chemicals and other yet to be determined chemicals and materials that will undoubtedly become a routine part of the products we purchase in the future is not realistic. The long-term solution is to consider the

environmental and public health consequences of drugs and other chemicals/materials when the formulations are being developed ("green chemistry").

Actions:

- Develop and implement a strategy to inform the public and the health care community on proper disposal of un-used drugs, with emphasis on “no-flush” and drug take-back locations.
- Support research projects to quantify the impacts of PPCPs and other emerging contaminants in RI's waters.
- Increase monitoring in drinking water supplies… will go with overall monitoring
- Continue to evaluate strategies to reduce threats/impacts to water resources from PPCPs and other emerging contaminants, including advocating for a "green chemistry" approach to product formulation.

Rhode Island:
Coastal Resources Management Council
Department of Environmental Management
Division of Planning, Statewide Planning Program

RI State Guide Plan Update:
Water Quality Management Plan Advisory Committee Meeting

Tuesday, April 8, 2014

10:00 AM – 12:00 PM

Room 300
Department of Environmental Management
235 Promenade Street, Providence

Meeting Notes

Committee Members in attendance were: Eric Boettger (NRCS), Tom Borden (NBEP) Rachel Calabro (RIRC/Save the Bay), Ames Colt (BRWCT), Clay Commons (RIDOH), David Everett (Providence), Peter Healey (RIDOT), Alicia Lehrer (WRWC), Eugenia Marks (Audubon), Vin Murray (South Kingstown), Margherita Pryor (EPA), Judith Swift (URI). DEM/CRMC/Statewide Planning staff in attendance included: Sue Kiernan, Ernie Panciera, and Nancy Hess and Paul Gonsalves of Statewide Planning.

Agenda Overview

Sue Kiernan started the meeting with a brief overview of the agenda, including a call for comments on the draft goals and policies for Aquatic Invasives.

Feedback on Goals & Policies: Aquatic Invasives

The group first discussed a balance of concerns needed to protect water quality. Ernie touched upon the process of obtaining a permit from DEM to use herbicides to battle invasives. Eric asked is there is a threshold for dealing with phragmite issues. Ames suggested that phragmite might need to be addressed in its own section of the chapter.

Water Quality Management framework (continuation from 3.11.14)

Sue began the discussion by speaking summarizing the "roles and responsibilities" section of the framework. Implementation is a shared responsibility between federal, state, local and private where partners should not be passive in their approaches. Eugenia gave the example of the work done with the Branch River, where non-government agencies have assisted in identifying issues that RIDEM staff may have not have the time to do, while not overstepping their bounds. There was consensus that specific guidance needs to be developed by NGO's. It was suggested that the Rivers Council for example, could provide direct technical assistance to various watershed groups, pending funding.

In discussing the stages of Project Implementation, the following outline was proposed:

- Initial Planning- This issue deals with what authority is granted to the involved partners. It includes building interest and momentum among participants.
- Feasibility- This is the process that you need to go through to find out exactly what you are going to build. This is the chance to refine conceptual designs.
- Design- Rule out places that you cannot build. Permitting and design requiring technical expertise.
- Project Management/ Construction- Coordinate partners, manage funds and contracts. Direction and oversight, and solve problems that may arise
- Evaluation- Assessment of results

Projects will range from the very simple to the much more complex. An example of a "simple" project may be a small rain garden. An example is an increasingly complex project is a large rain garden in an urban setting. A multi-faceted retrofit of public stormwater infrastructure is an example of a complicated/Most complex project.

Understanding that NGOs come in different sizes, there must be a distinction made between them. Some will be able to do more than others. These groups will be the "eyes and ears in the field". They will need the proper technical assistance to deal with projects.

Discussion Questions

Regarding capacity and resources, there was talk of creating a sustainable funding source through general funds. Regionalization was also mentioned. Sue mentioned that the plan will have a section discussing resources, as it could be a place to capture more, such as the discussion of sustainable funding sources. Municipal capital improvement plans can be tied into the funding discussion. Also, municipalities may be able to share equipment (i.e. sand vaccums) in order to control costs. Going forward, the mention of any type of fees in a State Guide Plan needs to be thoroughly vetted before going forward.

In looking at what action the state can take, members thought that capital improvement bond monies on a schedule will be needed. Judith pointed out that Rhode Islanders want choice, rather than just one system as a network will be perceived as more user friendly. In wrapping up the discussion, the group talked about the importance of the overall clarity that the plan must contain. Simple steps like bolding the keywords seem to be an effective strategy in creating a useful document. The plan also has to be clear on who the audience is.

Next Meeting Date

The group agreed upon a date of May 20th for the next meeting.