# 2004 Mount Hope and Narragansett Bay Watershed Five-Year Action Plan

**November 2004**

***Prepared For:***

Massachusetts Executive Office of Environmental Affairs
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# The Commonwealth of Massachusetts

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November 23, 2004

Dear Friends of the Mt. Hope/Narragansett Bay Watersheds:

It is with great pleasure that I present you with the 5-Year Watershed Action Plan for the Mt. Hope/Narragansett Bay Watersheds. The plan will be used to guide local and state environmental efforts within the Mt. Hope/Narragansett Bay Watersheds over the next five years. The plan expresses some of the overall goals of the Executive Office of Environmental Affairs, such as improving water quality, restoring natural flows to rivers, protecting and restoring biodiversity and habitats, improving public access and balanced resource use, improving local capacity, and promoting a shared responsibility for watershed protection and management.

The Mt. Hope/Narragansett Bay Watershed Action Plan was developed with input from the former Mt. Hope/Narragansett Bay Watershed Team and multiple stakeholders including watershed groups, state and federal agencies, municipal officials, Regional Planning Agencies and, of course, the general public from across the Watershed. We appreciate the opportunity to engage such a wide group of expertise and experience as it allows the state to focus on the issues and challenges that might otherwise not be easily characterized. From your input we have identified the following priorities:

- Water Quality Improvement and Protection
- Open Space, Land Use & Growth
- Wildlife Habitat / Watershed Ecology
- Recreation and Access
- Public Outreach & Education

I commend everyone involved in this endeavor. Thank you for your dedication and expertise. If you are not currently a participant, I strongly encourage you to become active in the Mt. Hope/Narragansett Bay Watersheds' restoration and protection efforts.

Regards,

Ellen Roy Herzfelder

Ellen Roy Herzfelder

# TABLE OF CONTENTS

# SECTION 1: INTRODUCTION

## 1.1 PROJECT PURPOSE

GeoSyntec Consultants was contracted in 2004 by the Massachusetts Executive Office of Environmental Affairs (EOEA) to work with local communities to develop a Five-Year Watershed Action Plan for the Massachusetts portion of the Mount Hope and Narragansett Bay Watershed (*Figure 1*).

Eight Massachusetts communities and five Rhode Island communities are located partially within this portion of the greater Mount Hope and Narragansett Bay Watershed. The Massachusetts communities consist of Attleboro, Seekonk, Rehoboth, Swansea, Dighton, Somerset, Fall River and Westport. The Rhode Island communities consist of East Providence, Barrington, Warren, Bristol and Tiverton. This project provided a unique opportunity for watershed communities to cooperatively prioritize goals and set a course for the future of the watershed. The recommendations of this locally developed Five Year Action Plan will receive prioritization for funding from state grant programs and other funding sources.

As described below in Section 1.2, GeoSyntec served as technical consultant and facilitator for a watershed planning process that was structured around local participation and input from a Watershed Advisory Committee (WAC) and other public participants. The three primary goals of this watershed planning project are described below:

### FIVE-YEAR WATERSHED ACTION PLAN GOALS:

- **Promote Watershed-wide Planning, Cooperation and Consistency:** By emphasizing local involvement and inter-municipal collaboration in development of the Five-Year Action Plan, a strong focus this project was to foster consistency and a regional perspective in the planning goals of the watershed communities.

- **Synthesize and Prioritize Existing Information From a Variety of Sources:** The Five Year Action Plan reflects the review, synthesis, and prioritization of a variety of previous assessments and studies of the Mount Hope & Narragansett Bay Watershed.

- **Develop a Five Year Action Plan That is Relevant, Focused and Achievable:** The recommendations of this Action Plan are intended to be (1) *relevant* to the communities of the Mount Hope & Narragansett Bay Watershed, (2) *focused* on the issues of greatest concern and/or greatest potential benefit to the Watershed, and (3) *achievable* within a five-year timeframe given existing and realistically anticipated resources.

## 1.2 WATERSHED ACTION PLANNING PROCESS

In cooperation with EOEA staff, GeoSyntec conducted outreach to municipalities and other stakeholders in the Mount Hope/Narragansett Bay Watershed, inviting representatives from the watershed to participate on a Watershed Advisory Committee (WAC). Andrea Langhauser of the Massachusetts Department of Environmental Protection (former EOEA Watershed Team Leader) played an important role in identifying potential local representatives for participation in the WAC.

To begin the process of forming the WAC, a letter was sent to municipal leaders, local environmental organizations and other key watershed stakeholders, which described the project and solicited participation in this watershed planning process. To ensure representation from all watershed communities, each town was requested to appoint at least two members to the WAC. Participation by additional representatives was encouraged. Committee participation was also directly requested of other key watershed stakeholder organizations, including the Rhode Island Department of Environmental management, Save the Bay, regional academic institutions, and the Southeastern Regional Planning and Economic Development District (SRPEDD).

A project website (http://projects.geosyntec.com/bw0028/) was established by GeoSyntec to provide a convenient means of posting draft project reports, WAC contact information and other documents related to the project.

After the community representatives to the WAC were appointed, a series of three public planning forums were held at the SRPEDD office between March 23, 2004 and April 28, 2004. GeoSyntec facilitated these meetings, during which the Watershed Advisory Committee and other public participants developed the priorities and watershed action items described in Section 3 of this Five-Year Watershed Action Plan.

| Mt. Hope & Narragansett Bay 5-Year Watershed Action Plan Public Forums |
|---|
| March 23, 2004 |
| April 7, 2004 |
| April 28, 2004 |

A contact list of Watershed Advisory Committee members and other key watershed planning contacts is provided as Appendix 1 to this report.

# SECTION 2: OVERVIEW OF WATERSHED INFORMATION

## 2.1 WATERSHED BACKGROUND INFORMATION

A variety of previous studies, planning documents and other information sources related to the Mount Hope/Narragansett Bay Watershed were reviewed by GeoSyntec in developing this Watershed Action Plan. These information sources are listed in a table on page 14. A brief overview of the Watershed and related planning issues is provided below, as excerpted from several of these information sources.

### 2.1.1 Overview of the Mount Hope/Narragansett Bay Watershed

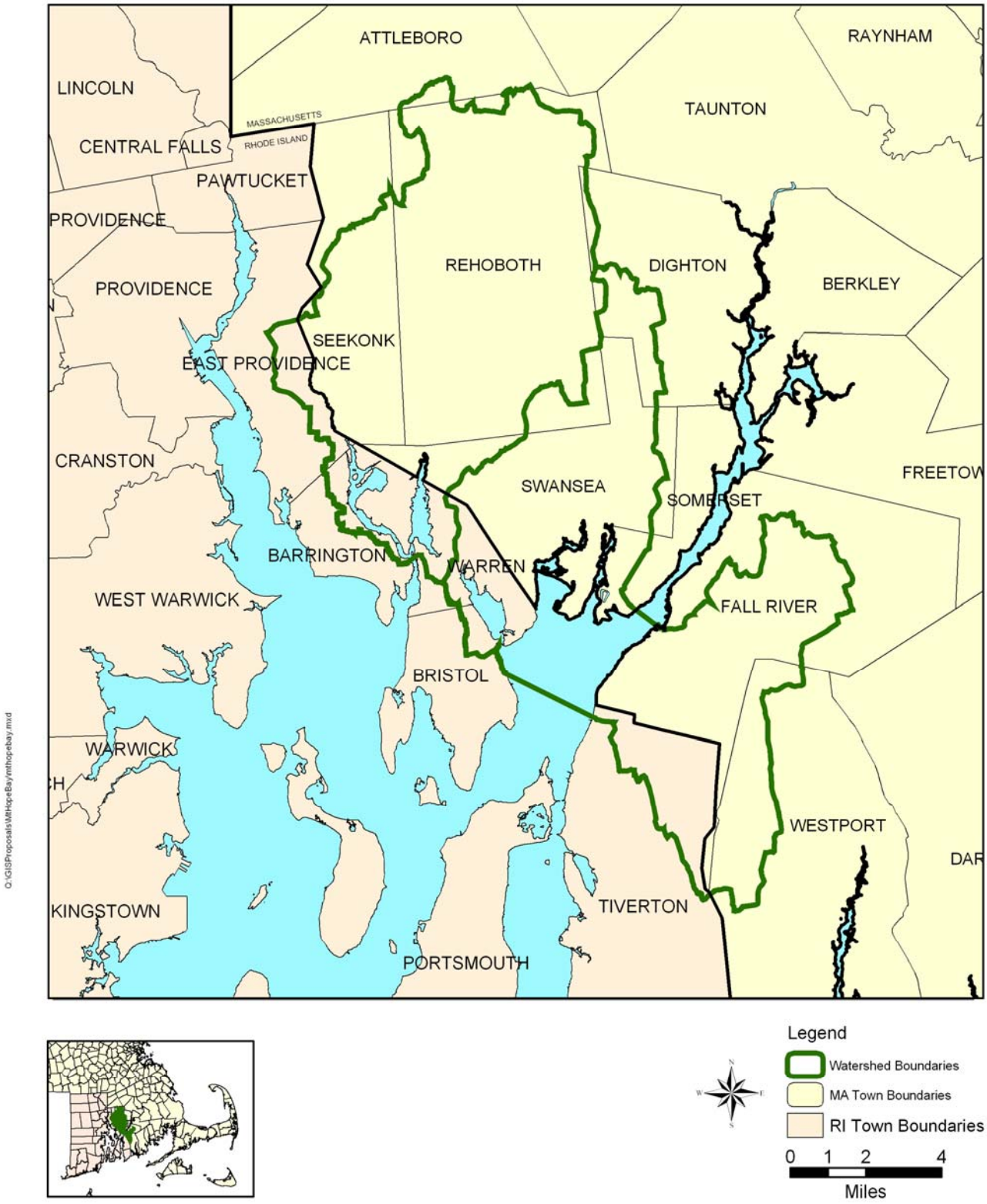
Adapted from the *Mount Hope Bay Shores and Narragansett Bay Watershed Team, FY 2001 Workplan* (MA-EOEA)

The Mount Hope Bay and Narragansett Bay Watershed is located in southeastern Massachusetts and a small portion of eastern Rhode Island. The Mount Hope/Narragansett Bay Watershed has an area of 112 square miles within Massachusetts. This coastal watershed includes subwatershed areas that drain into Mount Hope Bay and five smaller rivers. Proceeding in a westerly direction from Mount Hope Bay, these five rivers are the Lees, Cole, Kickamuit, Palmer, and Runnins Rivers. These rivers flow in a generally southern direction through Rhode Island, eventually emptying into the greater Narragansett Bay. Of the many lakes and ponds found within the watershed, the largest are North Wattupa Reservoir (1,750 acres) in Fall River, and South Wattupa Pond (1,660 acres) in Fall River and Westport. The Narragansett Bay Estuary, designated an Estuary of National Significance by the Environmental Protection Agency in 1987, supports numerous wildlife and marine species, including the federally endangered Kemp's Ridley Sea Turtle.

Palmer River

Figure 1 on the following page shows the eight Massachusetts municipalities and five Rhode Island municipalities that are located partially within the watershed as it is defined by MA-EOEA.

**Figure 1: Communities within the Mount Hope and Narragansett Bay Watersheds**



### 2.1.3 Summary of Major Watershed Information Sources

To provide an overview of current water quality and watershed planning issues facing the Mount Hope/Narragansett Bay Watershed, this section provides excerpts from the major sources of existing information listed on page 14. Several of the source documents summarized below include detailed lists of action items that are too lengthy to include in this report. The key watershed issues identified in these documents are listed below.

#### Narragansett/Mt. Hope Bay Watershed-1999 Water Quality Assessment Report (MA DEP)

- All or portions of the Runnins, Palmer and Cole Rivers, and Mt. Hope Bay (in MA) are on the 1998 **303(d) list of impaired waters**. The Lee River was identified on the 1998 303(d) list as "needing confirmation" to determine if a TMDL is warranted. Many small and/or unnamed rivers and ponds in the watershed are currently *unassessed*; the status of their designated uses has never been reported to EPA.
- Where assessed, the river and estuaries in the in the Narragansett/Mt. Hope Bay Watershed do not support the ***Aquatic Life Use***. The entire length of the Runnins River (in MA), due to unknown causes (nutrients suspected), is assessed as non-support. Less than one mile of the Quequechan River is impaired by habitat alteration from river channelization. The Palmer River has an "Alert Status" due to low flows. 4 square miles of Mt. Hope Bay estuary are assessed as non-support for the *Aquatic Life Use*. Due to organic enrichment/low dissolved oxygen, effluent toxicity and thermal modifications. The source of impairment is discharge of heated effluent from Brayton Point Station.
- MA-DPH issued a **fish consumption advisory** for Burrs Pond (Seekonk) due to elevated mercury concentrations in fishes (MDPH 2001a). This pond is a 5-acre impoundment of the Runnins River. The *Fish Consumption Use* is, therefore, assessed as non-support for the 0.14 miles of the Runnins River that flows through this impoundment. A fish consumption advisory was also issued for Lewin Brook Pond, an 11-acre impoundment, due to elevated mercury levels in fish tissues. No other river miles or estuarine segments were assessed for the *Fish Consumption Use*.
- Information on **drinking water** protection and water quality is available at http://www.state.ma.us/dep/brp/dws/dwshome.htm.
- Of the 11,138 acres of **shellfishing beds** assessed by MA-DMF, 64% are approved for shellfishing, 31% are conditionally approved and 5% are prohibited.
- The Runnins River was the only freshwater river assessed for ***Primary Contact Recreational Use***. The upper 0.4 miles (above Grist Mill and Burrs ponds) and the lower 2.0 miles are assessed as non-support due to elevated bacteria levels. The bacteria source is suspected to be failing septic systems. The middle reach of the Runnins River (1.3 river miles) supports the *Primary Contact Recreational Use*. 96% of the assessed estuarine area (the Lee and Cole rivers and Mt. Hope Bay) support the *Primary Contact Recreational Use*. The estuarine length of the Palmer River is non-support due to elevated bacteria levels. Agriculture/livestock are the suspected contamination sources.
- The majority (62%) of the rivers in the Narragansett/Mt. Hope Bay watershed are not assessed for the ***Secondary Contact Recreational Use***. 20% of the total river miles assessed, including the entire length of the Cole River and the middle 1.3 river miles of the Runnins River,

support this use. The upper 0.4 miles (above Grist Mill and Burrs ponds) and the lower 2.0 miles (downstream from the confluence with Cemetery Stream) of the Runnins River are assessed as non-support due to elevated bacteria levels. 97% percent of assessed estuarine areas (Palmer River from Shad Factory Pond Dam to the Route 6 Bridge in Rehoboth, the Lee River, Cole River and Mt. Hope Bay) support the *Secondary Contact Recreational Use*. The Palmer River, from the Route 6 Bridge in Rehoboth to its confluence with Mt. Hope Bay, does not support this use due to bacteria (sources unknown).

- The ***Aesthetics Use*** of the Palmer River is assessed as support for its entire length in Massachusetts of 5.3 miles (Figure 4). The entire length of the Runnins River is assessed as partial support due to objectionable deposits (trash and debris) from urban runoff. 32% of the river miles in this watershed are not assessed for the *Aesthetics Use*.

  Where assessed, Mt. Hope Bay (1.6 square miles) supports the *Aesthetics Use*. The Lee River from the Route 6 Bridge in Swansea/Somerset to its mouth at Mt Hope Bay is assessed as partial support due to trash and debris. The Cole River from the Route 6 Bridge (Swansea) to the mouth is assessed as partial support due to sewage odors and trash/debris. The cause of impairment, when known, is urban runoff. Approximately half the estuarine area (2.61 square miles) in the watershed is not assessed for the *Aesthetics Use*.

- **MA-DEP Recommendations for Rivers, Estuaries/Coastal Embayments, and Lakes**
  - Collect data to determine the frequency, duration, and extent of low flow conditions in the Palmer River watershed. Assess habitat as it relates to streamflow.
  - Complete the Water Management Act (WMA) 5-year reviews for permits in the watershed and continue to evaluate compliance with WMA registration and/or permit limits. Work with water suppliers to optimize water withdrawal and reservoir management practices to maintain minimum streamflow.
  - Work with local residents and watershed associations to remove trash/debris and prevent future dumping to the Narragansett/Mt. Hope Bay Watershed.
  - Conduct a preliminary analysis to prioritize the need for collecting quality-assured data to fully assess all designated uses of segments in the watershed. Follow the strategy presented in the USGS Statewide Water-Quality Network Report for examples of the monitoring necessary to completely assess all uses (USGS 2001).
  - Conduct inspections of facilities with general storm water permits (i.e., Phase II) to determine if storm water protection plans have been developed and implemented.
  - In cooperation with RIDEM (to the degree possible), identify and remediate sources of bacterial contamination to the Narragansett/Mt. Hope Bay Watershed.
  - Conduct bacteriological monitoring to assess the status of the *Primary* and *Secondary Contact Recreational* uses in currently not assessed waters (i.e., freshwater rivers).
  - Conduct lake monitoring to assess the *Primary* and *Secondary Contact Recreational* uses and collect water chemistry data to assess the *Aquatic Life Use*.
  - As part of lake water quality evaluations, include mapping of macrophyte cover in order to evaluate the status of the *Aquatic Life*, *Recreational* and *Aesthetic* uses.

## Mt. Hope/Narragansett Bay Watershed Executive Summary, FY '99 and '00 (MA EOEA)

- The major goal identified by the Team is to **slow the fisheries decline** in Mt. Hope Bay.
- A focus of upcoming efforts will be the Palmer River watershed, where the team will identify and minimize pollution from nonpoint sources, restore a 20-acre salt marsh, and develop TMDLs for pathogens and nutrients to complement similar efforts by RIDEM.
- **Priority projects** selected for funding in Fiscal Year 2000 include:
  - Water quality sampling in Mt. Hope Bay (CZM)
  - Riverfront land protection (Interagency Land Council, DCS)
  - Develop Palmer River TMDL (DEP)
  - Install agricultural BMPs (DFA, NRCS)
  - Wetland Restoration at Barneyville Dikes, Palmer River

## Mt. Hope/Narragansett Bay Watershed Team, Workplan for FY '01(MA-EOEA)

- Summary of top five issues for the watershed:
  - ***Restore water quality*** for rivers, ponds and estuaries through the identification and minimization of pollution from nonpoint sources.
  - ***Articulate a clear vision of open space protection*** with accompanying action plan to protect significant natural resources, target growth and develop a regional greenbelt.
  - ***Stabilize fish populations*** that are at historically low levels in Mt. Hope bay due to hypoxic levels of dissolved oxygen and large volume discharges from (1) Fall River sewer overflows and (2) Brayton Point Power Station heated industrial wastewater.
  - ***Address long-term water supply problems*** through active engagement of Bristol County Water Authority, water conservation, protection of existing sources and assessment and development of future sources

## Mt. Hope/Narragansett Bay Watershed FY '02 Annual Workplan (MA-EOEA)

- Priority projects for funding in Fiscal Year 2002:
  - ***Open Space Plan Implementation*** (Greenway Coordinator): Fund the salary of a greenway coordinator for one year to transition the regional Open Space Committee into implementation measures.
  - ***Phase 2 of Comprehensive Water Supply Study***: Conduct assessment of Phase 1 data, conduct at least 4 public meetings, coordinate with water suppliers.
  - ***Barneyville Wetland Restoration:*** Assess viability and restore a 20-acre brackish wetland near the Palmer River.
  - ***Watershed Action Plan:*** Develop GIS analysis of the watershed using the GIS Watershed Tool model and the Center for Watershed Protection Rapid Watershed Assessment.
  - ***Nutrient sampling for Palmer River***: Sample 10-20 sites within the Palmer River to determine if the main stem segment should remain on the 303(d) list for nutrients.

## Mt. Hope/Narragansett Bay Watershed FY '03 Annual Workplan (MA-EOEA)

- Priority projects for funding in Fiscal Year 2003:
  - ***Shad Factory Pond Fish Ladder Repairs:*** Install a concrete fish ladder at the base of Shad Factory Pond dam to replace existing ladder. Repair/revegetate bank erosion. Realign and limit pedestrian trails.
  - ***Phase 3 of Comprehensive Water Supply***: In coordination with municipal water suppliers and state agencies, a consultant should be hired to develop an implementation plan for recommendations developed in Phases 1and 2.
  - ***Swansea and Rehoboth Health Records***: Prepare an updated needs analysis to prioritize mitigation efforts in 22 areas in Rehoboth and Swansea that were previously identified (in the 1980's) as having significant septic failure.

## Mt. Hope/Narragansett Bay Watershed FY '04 Annual Workplan (MA-EOEA)

- Priority projects selected for funding in Fiscal Year 2004:
  - ***Stormwater outfall identification***: Develop an inventory of storm drains discharging directly to the river and major tributaries of the Palmer, Runnins, Kickemuit, Coles and Lees.
  - ***Daylighting the Quequechan River***: Conduct a feasibility study for restoring the falls of the Quequechan River and a greenway for the upper river.
  - ***Vernal pool certification project***: Hire a contractor to conduct fieldwork and file necessary forms to increase certified vernal pools in the Ten Mile River watershed.
  - ***Wastewater management district presentations:*** Contract with a consultant to conduct a series of public seminars to educate municipal officials and the public about the environmental and economic benefits of establishing wastewater management districts. The seminars will also discuss alternatives to individual on-site septic systems such as small package treatment plants.

## Draft Bacteria TMDL for the Palmer River Basin (MA-DEP, 2003)

- Of the 88 Palmer River watershed sample stations included in the NPS study, water quality at 33 stations violated Massachusetts bacteria standards. The most severe violations, listed in order of severity, occurred at:
  - Fullers Brook (FB02, FB03)
  - Clear Run Brook (CR03)
  - Torrey Creek (TC01)
  - Rumney Marsh Brook (RB02)
  - Clear Run Brook (CR02)
  - Rocky Run (RR05)
  - Palmer Mainstem downstream of Shad Factory Pond (PM08, PM26, PM10, PM11, PM25)
- To address bacterial contamination problems in the Palmer River watershed, recommended mitigation measures include correction of failing septic systems, agricultural BMPs, and wildfowl control measures.

## The Greenwich Bay Fish Kill - August 2003: Causes, Impacts, Responses (RI-DEM, 2003)

- Summary of Recommendations:

1. **Conduct a public workshop on the fish kill within one month.** The workshop is an opportunity to debrief experts and interested parties on the fish kill, and to discuss follow-up strategies with a focus on Greenwich Bay. The workshop should be conducted by CRMC and DEM jointly
2. ***Consider new bond funding to revitalize assistance programs:*** Technical/financial assistance is critical to implementation of many state programs. Previously, programs like Aquafund were available for this purpose and served as a catalyst for many successful water quality improvement projects. Limited state funding could also leverage significant contributions from other sources. Bond funding for these programs has essentially dried up and a new bond issue is needed.
3. ***Accelerate nutrient upgrades at sewage treatment facilities*:** Nitrogen is the key nutrient for excessive algae blooms and low oxygen conditions in marine waters, and steps should be taken to control of known sources of nitrogen loading. Denitrification upgrades at wastewater treatment facilities are needed to reduce loading to Narragansett Bay and its tributaries. RIDEM has identified 11 RI facilities and 3 MA facilities for such upgrades. RIDEM and the communities should evaluate current schedules to see if any acceleration is possible.
4. ***Improve septic system management:*** More properties on septic systems should use systems that remove nitrogen. In problem areas, towns should consider making tie-ins mandatory. More towns need to take or share responsibility for septic system management, and take advantage of tools like management districts. State legislation or regulations should be adopted to phase out cesspools. Technical/financial assistance programs should be revitalized and better funded. Financial incentives are necessary to get cooperation and participation, and that such assistance needs to be a mix of grants and loans.
5. ***Improve storm water management:*** New EPA/RIDEM regulations require towns to develop stormwater management plans. DEM made grants available for this purpose and also expects to issue a general permit providing additional guidance. Cities and towns should take advantage of legislation allowing them to establish and raise funds though stormwater management districts.
6. **Improve monitoring and assessment:** Specific recommendations include:
   - Repeat the shellfish survey/beach seine survey conducted before the fish kill.
   - Adopt standard field methods to assess losses of fish and bottom (benthic) organisms lost in these types of kill incidents to ensure good estimates.
   - Develop a Bay-wide comprehensive monitoring plan, based on work and information from the recent 'Ecological Indicators" workshop.
   - Acquire a small undulating platform mounted with a fast-response SeaBird oxygen-CTD sensor and integrated GPS to allow for rapid mapping of hypoxic zones during fish kills and for baseline work.

- Acquire a towable sled-mounted submersible video camera with integrated GPS and VCR/TV and marine electronic cable, and develop a transect design for the Bay to see and map the condition of the benthic community.
- Communicate the need for better monitoring and response capacity, as well as nutrient removal capabilities to and through the congressional delegation.
- Develop a monitoring/modeling program to assess the impact of new nutrient controls at sewage treatment facilities and if additional modifications are necessary. Coordinate and direct federal, state and university resources toward development of a single water quality model for the Bay.
- Institutionalize, through Memoranda of Understanding, collaboration with the Coastal Institute and Sea Grant program towards the establishment of a consortium that can bring in local, regional and national expertise when needed to assess and respond to challenges we face in Narragansett Bay.
- Invite the Coastal Institute to take the lead on development of a rapid assessment program that can quickly mobilize relatively small teams of scientific experts to assess and respond to a variety of circumstances and incidents affecting the health of Narragansett Bay.
- Develop a separate assessment and response protocol to investigate problems leading to beach closings.

7. **Improve Bay Planning:** Improved MA and RI cooperation by developing an overall plan and process to protect/restore Narragansett Bay and its watershed. Produce a formal agreement between Rhode Island and Massachusetts that clearly communicates what must be done to ensure a more healthy future for Narragansett Bay. Our recommendation is that the Coastal Institute serve as a neutral venue for this process, and that a Narragansett Bay Science Advisory Committee be created to provide technical guidance.

**Regional Open Space and Recreation Plan for the Ten Mile River & Narragansett/Mt. Hope Bay Watersheds, Action Agenda (MA-EOEA, June 2000)**, http://www.srpedd.org/regopensplanIX.htm

- Summary of major goals (*please refer to web link above for a list of specific action items*):
  - **Goal 1**: Improve the water quality of the region's rivers, streams and waterbodies.
  - **Goal 2**: Increase the amount of permanently protected open space, particularly within focus areas, water resource areas and along river and stream corridors.
  - **Goal 3**: Plan for and develop regional "through trails," including walking, biking and canoeing.
  - **Goal 4:** Develop, and, where feasible, employ regionally consistent zoning, land use and conservation strategies and regulations.
  - **Goal 5:** Create a permanent Regional Open Space Committee.
  - **Goal 6**: Create a singular geographic watershed identity for the municipalities in the Ten Mile River and Narragansett/Mount Hope Bay Watersheds.

## Draft Palmer Watershed Action Plan (Save the Bay/Eastern RI Conservation District, undated)

- Summary of goals and objectives:
  - ***Goal 1: Restore and Protect Water Quality***
    - Objective 1: Implement recommendations of Palmer TMDLs from MADEP/RIDEM
    - Objective 2: Re-issuance of permit for Warren WWTF.
    - Objective 3: Bracketed monitoring of potential non-point sources in particular tributaries identified by volunteer and state monitoring efforts
    - Objective 5: Advocate for passage of Community Septic Management Program at Town meeting in Rehoboth
    - Objective 6: Encourage use of agricultural best management practices
    - Objective 7: Habitat Restoration
    - Objective 8: Implement recommendations of ESS Non-point assessment
  - ***Goal 2: Reduce Impacts of Growth in the Watershed***
    - Objective 1: Provided technical assistance tools to planning officials
    - Objective 2: Built community support for local programs to improve water quality (e.g. Community Septic Management Program, Community Preservation Act)
    - Objective 3: Assist RI-SWAP program with identification of high intensity land use in Palmer watershed
    - Objective 4: Conduct CWP Rapid Watershed Assessment to determine % impervious cover of each sub-basin. Interpret these results and their impacts on stream quality
    - Objective 5: Assist Swansea with EO418 analyses
  - ***Goal 3: Protect Open Space***
    - Objective 1: Increased GIS capacity of local and municipal officials
    - Objective 2: Increase amount of working farmland under agricultural preservation restriction
    - Objective 3: Advocate passage of Smart Growth Initiatives at Swansea Town meeting
  - ***Build Community Stewardship/Watershed Action Team***
    - Objective 1: Involve community and stakeholders in plan development

## 2.2 WATERSHED PLANNING MAPS

GeoSyntec produced a series of maps to assist the Watershed Advisory Committee in identifying the watershed planning priorities and action items discussed in Section 3. Each of the maps described below are included as appendices to this report.

**A. Watershed Land Uses:** This map identifies land uses throughout the watershed, as obtained from MassGIS and Rhode Island GIS. Based on these land uses, GeoSyntec developed a subwatershed pollutant loading model which is discussed in Section 2.3.

**B. Water Resources**: This map consists of water resources features readily available from MassGIS and Rhode Island GIS, including:

- Major river basin and sub-basin watershed boundaries
- Rivers and streams
- Lakes and ponds
- Wetlands
- Public water supplies and their Zone II wellhead protection areas
- Flood zones (100-year and Velocity Zone)
- Outstanding Resource Waters

**C. Wildlife Habitat / Ecological Resources**: This map consists of wildlife habitat and ecological resources features readily available from MassGIS, including:

- Certified and Potential Vernal Pools
- Anadromous Fish Runs
- Priority/Estimated Habitat for Rare Wildlife
- Areas of Critical Environmental Concern
- BioMap and Living Waters Core Habitat/Supporting Natural Landscapes
- 100-foot Undisturbed Riparian Zones

## Mount Hope & Narragansett Bay Watershed - Information Sources

- Meeting Minutes, Narragansett/Mt. Hope Bay Watershed Team, December 6, 2001 (review of GIS maps for comprehensive watershed assessment).
- Narragansett/Mt. Hope Bay Watershed FY'04 Annual Workplan (MA-EOEA)
- Narragansett/Mt. Hope Bay Watershed FY'03 Annual Workplan (MA-EOEA)
- Narragansett/Mt. Hope Bay Watershed FY'02 Annual Workplan (MA-EOEA)
- Narragansett/Mt. Hope Bay Watershed FY'01 Annual Workplan (MA-EOEA)
- Draft Palmer Watershed Action Plan (Warren and Barrington, RI; Swansea and Rehoboth, MA)
- Draft Bacteria TMDL for the Palmer River Basin (November 2003)
- Nonpoint Source Pollution Management Plan - Ten Mile/Narragansett and Mount Hope Bays Watershed NPS Assessment Project (February 2002)
- Draft Action Plan for the Runnins River Steering Committee, March 2000
- The Greenwich Bay Fish Kill – August 2003 (RI DEM, September 2003)
- 1999 Narragansett/Mt. Hope Bay Watershed Water Quality Assessment (MA-DEP, Jan. 2002)
- This link includes the final drafts of the Runnins River, Palmer River, and Barrington River TMDL documents. http://www.state.ri.us/dem/programs/benviron/water/quality/rest/index.htm
- Regional Open Space and Recreation Plan for the Ten Mile River and Narragansett/Mt. Hope Bay Watersheds, MA-EOEA, June 2000. http://www.srpedd.org/regopensplanIX.htm

## Website Links

- Save the Bay http://www.savebay.org/index_next.asp
- Narragansett Bay Information http://www.narrbay.org/
- The Partnership for Narragansett Bay http://www.ci.uri.edu/Projects/PNB/default.html
- Massachusetts Riverways Programs http://www.mass.gov/dfwele/river/riv_toc.htm
- Rhode Island Rivers Council http://www.planning.state.ri.us/rivers/default.htm
- UMass-Mt. Hope Bay Natural Laboratory Project http://www.smast.umassd.edu/MHBNL/index.html
- Green Futures http://www.greenfutures.org/
- City of Fall River http://www.fallriverma.org/
- Town of Rehoboth http://www.town.rehoboth.ma.us/
- Town of Seekonk http://www.ci.seekonk.ma.us/
- Town of Somerset http://www.somersetmass.com/government.html
- Town of Swansea http://www.swanseamass.org/
- Town of Barrington http://www.ci.barrington.ri.us/

## 2.3 LAND USE AND POLLUTANT LOADING ANALYSIS

To assess estimated nutrient and sediment loading from the major subwatersheds within the Mount Hope and Narragansett Bay Watershed, GeoSyntec created a land-use map based on MassGIS and Rhode Island GIS land-use coverages (Appendix 3). For this analysis, the watershed was divided into the following four primary subwatersheds:

- **Palmer River**
- **Kickemuit, Cole and Lees Rivers**
- **Wattupa Ponds Complex and Quequechan River**
- **Runnins River**

Using watershed land-use information from MassGIS and Rhode Island GIS, GeoSyntec developed an analysis of estimated loadings of phosphorus, nitrogen and total suspended sediment (TSS), based on a land-use export coefficient model (see modeling results in Appendix 2). This analysis provides an additional planning tool for prioritizing watershed survey areas and estimating the impacts of land use activities on water quality. The modeling results are summarized as follows:

| SUBWATERSHED | Total Acres | Estimated Annual Phosphorus Load (lbs/year) | | Estimated Annual Nitrogen Load (lbs/year) | | Estimated Annual TSS Load (lbs/year) | |
|---|---|---|---|---|---|---|---|
| | | Total | Per Acre | Total | Per Acre | Total | Per Acre |
| **Palmer River** | 220.3 | 99.8 | 0.45 | 763.7 | 3.47 | 21099.6 | 95.8 |
| **Kickemuit, Cole and Lees Rivers** | 1186.8 | 273.5 | 0.23 | 3658.1 | 3.08 | 69365.5 | 58.4 |
| **Wattupa Ponds Complex and Quequechan River** | 220.9 | 30.7 | 0.14 | 593.1 | 2.68 | 8208.4 | 37.2 |
| **Runnins River** | 233.6 | 29.8 | 0.13 | 621.3 | 2.66 | 8094.0 | 34.6 |

# SECTION 3: WATERSHED ACTION PLAN

## 3.1 WATERSHED ACTION PLANNING CATEGORIES

At the kickoff meeting of the WAC on March 23, 2004, the Committee discussed the process of developing a Watershed Action Plan and debated the establishment of action planning priorities. The Committee reached consensus on working within the framework of the five planning categories listed below. The three highest priority categories are noted with a ☆ star symbol.

**WATERSHED ACTION PLANNING CATEGORIES**

*Priority actions for the Mount Hope & Narragansett Bay Watershed for:*

- ☆ **A. Water Quality Improvement and Protection (*Top Priority*)**
- ☆ **B. Open Space, Land Use & Growth (*High Priority*)**
- **C. Recreation and Access**
- ☆ **D. Wildlife Habitat / Watershed Ecology* (*High Priority*)**
- **E. Public Outreach & Education**

* ***Note:*** *The WAC originally selected "Water Quantity/Streamflow Protection" as a planning category, but decided during the first planning session to include this as part of the "Wildlife Habitat/Watershed Ecology" category.*

## 3.2 WATERSHED ACTION PLAN

The Committee and public participants worked over the course of three public forums toward reaching consensus on priority goals and actions for the 5-year Watershed Action Plan. After reviewing watershed maps prepared by GeoSyntec and summaries of previous watershed assessments, discussion was organized around the five categories listed above. The Committee initially worked to establish a regional consensus on broad goals and actions, and then worked toward specific prioritized recommendations described on pages 17-28.

High priority action items within each of the five planning categories are identified throughout the Action Plan by the star symbols below:


#1 Priority Action Item for the Planning Category

High Priority Action Item (top 3 for the Planning Category)

# MOUNT HOPE & NARRAGANSETT BAY WATERSHED – FIVE YEAR ACTION PLAN

## A. WATER QUALITY IMPROVEMENT AND PROTECTION

**OBJECTIVE #1: Develop a formal agreement between RI and MA state agencies to guide improved water quality planning for Narragansett Bay.**

### ACTION ITEMS

1. Develop a Memorandum of Understanding to formalize state agency collaboration with SeaGrant and the Coastal Institute, for convening of national expert "consortium" when needed to address issues.

   **Responsible Parties:** RI-DEM, MA-EOEA, US-EPA,, SeaGrant, Coastal Institute

2. Use the Governors Narragansett Bay Report process as a model for future inter-state collaboration

   **Responsible Party:** *same as above*

**OBJECTIVE #2: Accelerate nutrient upgrades at sewage treatment facilities.**

### ACTION ITEMS

1. Develop monitoring/modeling program to assess impact of nutrient upgrades at wastewater treatment facilities. The model should include inputs from onsite wastewater systems.

   **Responsible Party:** MA-DEP, RI-DEM, Save the Bay, Adopt-A-Stream groups

**OBJECTIVE #3: Develop a comprehensive inventory of storm drains discharging directly to the river and major tributaries of the Palmer, Runnins, Kickemuit, Cole and Lees.**

### ACTION ITEMS

1. Complete assessment of Stream #2 (Runnins River) and obtain funding for recommended remediation efforts.

   **Responsible Party:** MA-DEP, RI-DEM

2. Implement remediation of NPS pollution to Runnins River (Seekonk) assessed through 604(b) grant project.

   **Responsible Party:** Town of Seekonk, MA-DEP (via s.319 program)

## OBJECTIVE #4: Implement recommendations from Phase 2 of Palmer River TMDL

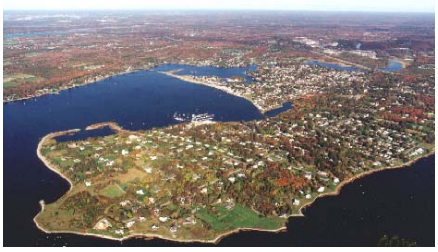
1. Focus Palmer River NPS abatement efforts on the following subwatersheds:
   - Fullers Brook,
   - Rumney Marsh Brook
   - Beaver Dam Brook
   - Clear Run Brook
   - Torrey Creek
   - Rocky Run

**Responsible Party:** municipalities, MA-DEP and RI-DEM (via s.319 program)

## OBJECTIVE #5: Assess and implement the most effective measures for managing wastewater disposal throughout the watershed.

1. Specifically target areas adjacent to waterways in Swansea, including:
   - Smokerise and Ocean Grove subdivisions (Swansea)
   - Eliminate dry weather flow at Compton Corner storm drains (Swansea)

**Responsible Party:** Town of Swansea, MA-DEP



Swansea, MA

## OTHER ACTIONS:

1. Provide support to Save the Bay for ongoing nutrient monitoring.
2. Develop a bay-wide comprehensive monitoring plan based on "ecological indicators", such as shellfish surveys, fish, macroinvertebrates, etc. Ongoing surveys conducted by RIDEM, USGen and consultants for the Swansea desalinization plant already include trawl and seine surveys, the scope of which could potentially be extended by volunteer efforts.
3. Conduct water quality sampling and vegetation mapping for South Wattupa Pond and the Upper Quequechan River (Fall River)
4. Implement recommendations from MA-DEP 1999 Narragansett/Mt. Hope Bay Watershed Water Quality Assessment Report (http://www.mass.gov/dep/brp/wm/wqassess.htm).

Macroinvertebrate sampling with a kick

# B. Open Space, Land Use and Growth

## OBJECTIVE #1: Pursue Open Space Acquisition Priorities

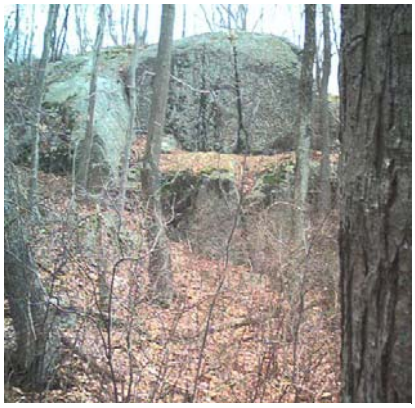
### ACTION ITEMS

1. Develop and implement a greenbelt plan for the Upper Quequechan River in Fall River: Identify and acquire parcels to establish a greenbelt adjacent to the historic river route. Parcel identification should be accomplished through an Army Corps of Engineers (ACOE) feasibility study.

   **Responsible Party:** City of Fall River, ACOE

2. Focus open space acquisition on target areas identified in the Regional Open Space Plan.

   **Responsible Party:** municipalities, land trusts



The Anawan Rock
Rehoboth, MA

3. Protect priority habitat areas at the headwaters of the Lees River by acquisition, conservation restrictions, etc.

   **Responsible Party:** Town of Swansea, land trusts, etc.

4. The Town of Swansea should protect land at the Swansea Reservoir outlet via conservation restrictions, etc.

   **Responsible Party:** Town of Swansea, MA-DEP

*What's a Conservation Restriction?* A conservation restriction is a legally binding agreement between a landowner (grantor) and a holder (grantee) - usually a public agency or a private land trust; whereby the grantor agrees to limit the use of his/her property for the purpose of protecting certain conservation values. The conservation restriction may run for a period of years or in perpetuity and is recorded at the Registry of Deeds (it runs with the title). Certain income, estate or real estate tax benefits may be available to the grantor of a conservation restriction.

The Massachusetts Division of Conservation Services (MA-DCS) provides assistance to landowners, municipalities, and land trusts regarding conservation restrictions and has produced The Massachusetts Conservation Restriction Handbook as a guide to drafting conservation restrictions and to obtaining Secretariat approval. (*Source:* MA-DCS website, www.mass.gov/envir/dcs/restrictions/default.htm)

5. The northeast corner of the Coles, Lee & Kickemuit watershed (in Dighton) is a priority area for greenway development that coincides with BioMap habitat (area known as Two Mile Purchase).

   **Responsible Party:** Town of Dighton, land trusts

6. All Massachusetts towns in the watershed should have a current Open Space Plan that is approved by the MA-DCS. Guidelines for developing an Open Space Plan can be found at http://www.mass.gov/envir/dcs/openspace/default.htm.

   **Responsible Party:** municipalities

## OBJECTIVE #2: Growth Management /Sustainable Growth

### ACTION ITEMS

1. Promote **Low Impact Development (LID)** and **Conservation Development** pilot projects in each town and in each major subwatershed, providing local examples to foster greater application of these techniques.

    - The Birch Stevens Farm project in Swansea can serve as a good local example of a conservation subdivision as a model for other developments.
    - Information on LID techniques can be found at the non-profit Low Impact Development Center at www.lowimpactdevelopment.org.

    **Responsible Party:** municipal Planning Boards and Conservation Commissions, MA-EOEA, RI-DEM

Coastal Marsh – Palmer River
(photo credit: *Save the Bay*)

2. Promote/encourage Conservation Restrictions in riverfront areas

    **Responsible Party:** Planning Boards, Conservation Commissions

3. Facilitate and promote adaptive re-use of existing infrastructure (mill redevelopment, etc) through tax credits and Brownfields programs. Specific target areas include:

    - Swan Finishing Company site
    - Capaldi's Asphalt Plant area (Swansea)

    **Responsible Party:** MA and RI state agencies

4. In the Palmer River watershed, focus growth management efforts on the upper Palmer River watershed, to avoid degradation of areas that are in relatively good ecological condition.

    **Responsible Party:** municipalities, SRPEDD

## OBJECTIVE #3: Support and Protect Existing Agriculture in the Watershed

Maintaining working farms in the Mount Hope and Narragansett Bay watershed is important to preserving both community character and the quality of life within the region…not to mention an important local source of fresh produce and other foods.

As development pressures increase, it is important to maintain a prioritized list of farmsteads in the watershed that can guide efforts to protect (by acquisition or other means) these farms if they are either put up for sale or proposed for development. Many farmlands (and other types of open spaces) operate under time-limited conservation restrictions where uses are restricted under Chapter 61, 61A and 61B of the Massachusetts General Laws. Massachusetts law provides for a reduction in property tax assessments for land that is voluntarily

maintained in active forestry (Chapter 61), productive agriculture or horticulture (Chapter 61A), or open space and recreational (Chapter 61B) uses. Communities should be mobilized with the information and funding mechanisms necessary to protect priority farmlands as they become available for sale or come out of Chapter 61A protection.

## ACTION ITEMS

1. Protect targeted farmsteads throughout the watershed Increase the amount of working farmland in the watershed under agricultural preservation restriction.

   **Responsible Party:** town boards and commissions, SRPEDD

2. Conduct Chapter 61 analysis to identify priority parcels for protection, acquisition, etc.

   **Responsible Party:** town boards and commissions, SRPEDD

3. The Town of Rehoboth can serve as a good local model, based on successful cooperative efforts between the Town and farmers through the Agricultural Commission. Efforts include grant identification, education on Chapter 61 options for land protection, assistance on 2002 Farm Bill programs, etc.

## OTHER ACTIONS:

1. Promote watershed-wide adoption of appropriate conservation bylaws, planning and zoning regulations. Model bylaws can be obtained from the online bylaw library of the Southeastern Regional Planning and Economic Development District (http://www.srpedd.org/bylaw.htm) or the Citizen Planner Training Collaborative (http://www.umass.edu/masscptc/examplebylaws.html).

2. Promote the passage of Smart Growth initiatives in the watershed:

   - Community Preservation Act
   - Open Space and Residential Subdivision bylaws

3. Conduct a watershed-wide Buildout Study project to assess for each town (1) the potential positive impacts of controls (bylaws, CPA, etc.) and (2) the potential negative impacts based on full Buildout.

**Responsible Party:** municipal boards and commissions, SRPEDD

Aerial view of the Palmer River
(photo credit: Rick Riley)

# C. Recreation and Access

## OBJECTIVE #1: Increase/improve walking/hiking trails for passive recreation and alternative transportation

### ACTION ITEMS

1. **Develop a greenbelt plan for the Upper Quequechan River in Fall River:** Construct a walking trail that will connect the waterfront along Mt. Hope Bay with the falls, the upper river and the Southeastern Massachusetts BioReserve.

   **Responsible Party:** Fall River, MA-EOEA

2. **Increase recreational opportunities along the Runnins River** through implementation of the East Providence Comprehensive Plan.

   **Responsible Party:** East Providence, RI-DEM

Railroad bridge along the proposed Quequechan River Regional Bike Path (photo from *GreenFutures.org*)

3. **Develop a north-south trail through the watershed** with a connection to the Warner Trail in Wrentham.

   **Responsible Party:** MA-DCR, municipalities, land trusts

4. **Sidewalk alternatives:** Towns in the watershed should explore/promote the development and application of town regulations requiring walking/hiking trails (with public easements) as an alternative to required sidewalks.

   **Responsible Party:** municipalities

## OBJECTIVE #2: Increase and Improve Public Access to Water

### ACTION ITEMS

1. **Canoe and boat access:** Priority improvements include:
   - Install canoe access on the Runnins River north of Barrington.
   - Develop a structured, limited parking area for the Palmer River canoe access at Old Providence Road. The first step should be to conduct a study to assess feasibility, handicapped access, etc.
   - Access points along the Kickemuit River in Warren and Bristol, RI

2. **Responsible Party:** municipalities, RI-DEM, Public Access Board (MA)

Bad Luck Pond, Rehoboth

3. **Public access parking issues:** Identify and eliminate "illegal" no-parking areas and signage near public access facilities and easements.

   **Responsible Party:** municipal Traffic/Highway Departments

4. **Improve/promote more public access to coastal and freshwater beaches**
   - Identify potential rights-of-way along coastline and riverfront areas for potential public access improvements through easements, acquisition, etc.
   - Create a digitized map of walking and hiking paths in all towns of the watershed to generate ideas for inter-town connections

   **Responsible Party:** SRPEDD

## OBJECTIVE #3: Promote Multi-use / Bike Trails

### ACTION ITEMS

1. Develop a multi-use path through Fall River, connecting to Westport and over Brightman Street bridge (partly using the Quequechan River corridor). This trail will also connect to Somerset and Swansea as part of a regional bikeway as described in the Regional Transportation Plan (SRPEDD). As stated by SRPEDD, "*the Brightman Street Bridge is arguably the key link in a regional bicycle plan. The approved bridge design has both a sidewalk and AASHTO standard bicycle lane. Construction on the new Brightman Street Bridge began in 1999 with a completion projected in five to six years.*"

   **Responsible Party:** City of Fall River

Rendering of Brightman Street Bridge replacement in Fall River.
(*image from HNTB Architecture*)

2. Implement the Swansea Bike Path, which will link Fall River (from the Brightman Street bridge as described above), Somerset and Swansea with the East Bay Trail via Warren, RI (which will bridge Bristol, RI with Swansea, MA). The bike path, when completed, will link Swansea and Warren at Old Warren Road and travel along Maple Avenue, then down Wood, Oak, Locust and Plain Streets, to Milford Road and then down Hortonville Road. The route will continue along Main Street, Stevens Road, Bark Street, Chace Street and into Somerset. Part of the route will also go along Elm Street into Somerset.

   **Responsible Party:** Town of Swanea

## OBJECTIVE #4: Promote Environmental Tours and Guided Canoe/Boat Trips

### ACTION ITEMS

1. **Guided programs:** Promote the educational programs offered by Save the Bay, which include a variety of classroom and public programs, including outdoor classrooms, canoe/kayak tours, seal watch cruises, coastal field trips, and shipboard outings. More information on these programs can be found at the Save the Bay website (http://www.savebay.org/explorethebay/index.asp).

   **Responsible Party:** Save the Bay, municipal school systems

A *Save the Bay* coastal field trip.

2. **Self-guided and interpretive trails (land and water-based):** Identify target trail sections for self guided/interpretive trails and coordinate development of signage and interpretive maps with local Land Trusts. A good example in Seekonk is the Martin Trail Conservation Project.

   **Responsible Party:** municipal Conservation Commissions, land trusts

## Other Recreation and Access Improvements

1. Towns should work with the state Public Access Board (PAB) to identify sites (town can identify potential sites, PAB will survey, rate and evaluate for needed improvements)

   **Responsible Party:** MA-PAB, municipalities

2. Improve/increase public access area signage.

   **Responsible Party:** MA-PAB, RI-DEM, municipalities

3. Implement public access recommendations at sites identified in Regional and Municipal Open Space Plans.

   **Responsible Party:** municipalities, MA-DCR, RI-DEM

4. Identify and promote (though open space planning process) formalized access to "unofficial open spaces" (privately owned, but used by public for access, e.g. utility corridor) via land donation, public access easements, etc.

   **Responsible Party:** municipalities, land trusts

5. To guide the development of active recreational open spaces (ballfields, etc) municipalities should develop policy statements (with inter-town coordination) on siting, management, fertilizers, etc. ("active recreation planning standards"). SRPEDD could guide development of model standards.

   **Responsible Party:** SRPEDD, municipalities

# D. WILDLIFE HABITAT / WATERSHED ECOLOGY

## ACTION ITEMS

1. **Fisheries Restoration:** Restore naturally occurring fish species, including installation of fish runs, removal of migration barriers, etc.). Priority sites include:

Blueback Herring

   - **Shad Factory Pond** (Rehoboth): Install a fish ladder to restore a shad and herring run, and provide public access improvements
   - **Coles River**: A new fish ladder on the Coles River is not being used by fish. This section of the river is impacted by cooling water discharges from the Montaup Station power plant (Somerset) and stormwater runoff from a nearby shopping center. Funding should be a prioritized for a study of these issues and a feasibility/cost assessment of mitigation and restoration alternatives.
   - **Kickemuit River**: Implementation of the herring run fish ladder planned for the Kickemuit Reservoir in Warren, RI.

   **Responsible Party:** MA-DFW (Riverways Programs)

2. Conduct a feasibility study to **(1) identify/assess alternatives for daylighting the Quequechan River.**

   **Responsible Party:** Fall River, ACOE, MA-EOEA

3. Conduct a **vernal pool field verification** and NHESP certification project, based on aerial photo survey and targeted field verification. A pilot project of this type would also have a public education benefit.

   **Responsible Party:** MA-DEP, RI-DEM

Kemp's Ridley Sea turtle

4. Priority **Wetland Restoration Projects**
   - Conduct restoration of Barneyville Marsh (Swansea)
   - Ripley Street Marsh remediation

5. Use ***BioMap*** (http://www.mass.gov/dfwele/dfw/nhesp/nhbiomap.htm), and ***Living Waters*** (http://www.mass.gov/dfwele/dfw/nhesp/nhaqua.htm) to guide efforts to (1) restore and protect the populations and habitats of rare/endangered species, such as the diamondback terrapin, and (2) pursue acquisition of high priority wetlands and other sensitive areas with high habitat value. Areas prioritized in municipal open space plans should also be incorporated into these efforts.
   - Priority habitat at the headwaters of the Lees River is not protected

   **Responsible Party:** MA-EOEA, RI-DEM, municipalities, land trusts

6. Coordinate efforts of MA-DEP programs (Water Management Act, Source Water Acquisition and Protection Program) and RI-DEM to identify best methods for managing water supply sources for public water supply ***and*** fishery/aquatic habitat.

   **Responsible Party:** MA-DEP, RI-DEM

**7.** Prioritize and implement identified opportunities to **restore eelgrass and salt marshes** (e.g. remove tidal restrictions, replace standard tide gates with self-regulating tidegates, etc.) Priority locations include the following:

- Bunk Town Bridge (Swansea) – salt marsh, tidal flow restoration
- Mobil Dam restriction (Runnins River) – assess benefits and feasibility of natural flow restoration. This is a potential MA-RI joint state project.

**Responsible Party:** MA-CZM, US-EPA, NOAA, RI Coastal Resources Management Council

A coastal salt marsh

**8.** Restore **native crab and crustacean species** that have experienced population declines to due habitat loss and water quality impacts. Specific sites include:

- The Kickemuit River, downstream of discharges from the Brayton Point Power station.

Blue Crab
*(Callinectes sapidus)*

**9. Water Quantity/Habitat Issues**

- Support the ongoing efforts of the Massachusetts Water Resources Commission-Streamflow Standards Task Force, and other related efforts to establish minimum streamflow standards for aquatic habitat protection.
- Focus in-stream monitoring and assessment efforts on developing minimum flow standards for the protection of aquatic habitat.
- Complete initial phase of the Comprehensive Water Supply Plan and begin assessment.
- The Bristol County Water Authority (BCWA) should report calculated water withdrawal rates from sources in MA to the DEP. If BCWA installs the proposed pipelines from the Kickamuit reservoirs to Swansea, a WMA permit will be required. The same applies for a new pipeline from Shad Factory Pond to Swansea Reservoir.
- Review BCWA's annual water use reports and determine potential impacts of their water withdrawals on streamflow/habitat in the Palmer River subwatershed.

**Responsible Party:** MA-EOEA, RI-DEM

# E. PUBLIC EDUCATION AND OUTREACH

## ACTION ITEMS

1. Create a **single geographic watershed identity** for the Ten Mile River and Mount Hope/Narragansett Bay watersheds, to simplify watershed planning and unify the region around a common "watershed address".

   **Responsible Party:** MA-EOEA

2. **Wastewater Management District Presentation:** Contract with a consultant to conduct a series of public seminars to educate municipal officials and the public about the environmental and economic benefits of establishing wastewater management districts. The seminars will also discuss alternatives to individual on-site septic systems such as small package treatment plants.

   **Responsible Party:** MA-EOEA

3. Conduct **Phase 2 of the Palmer River TMDL** – identify bacteria pollution sources through ribotyping and citizen outreach.

   **Responsible Party:** MA-DEP

4.

5. Assist **Kickemuit TMDL efforts** through public education and identification of potential pollutant sources.

   **Responsible Party:** MA-DEP, Save the Bay, MA-Riverways

Waterfowl can be a significant source of bacteria at public beaches and parks.

6. Conduct public outreach and education on the **Quequechan River** (Fall River) and implementation of the Urban River Vision.

   - The Urban Ecology Institute is currently conducting outreach based on charettes and surveys

   **Responsible Party:** Fall River, MA-Riverways, MA Environmental Trust

7. **School Environmental Education Programs:** Encourage/promote incorporation of hands-on river/watershed ecosystem education into school curriculums. Examples include:

   - Encourage Barrington, E. Providence and Seekonk high schools to incorporate programs on the Runnins River ecosystem
   - Save the Bay offers a variety of environmental education programs that should be promoted/incorporated into local schools

   **Responsible Party:** municipal school systems, Save the Bay, MA-EOEA

8. Maintain and promote **public outreach programs** such as storm drain stenciling, Adopt-a-Street (NEI) and Adopt-a-Stream (MA-Riverways), lawn care seminars, etc. Some aspects of these outreach (storm drain stenciling, etc.) should be conducted as part of NPDES Phase II permit requirements.

- Explore development of Adopt-a-Stream groups (or similar volunteer monitoring organization) for the following hot spots identified in the Palmer River subwatershed:
  - Fullers Brook
  - Clear Run Brook
  - Torrey Brook
  - Rumney Marsh Brook
  - Rock Run Brook
  - Mother's Brook (Coastal Fall River subwatershed)

**Responsible Party:** municipalities, MA-Riverways, NEI

9. Develop regular media articles, press releases, etc to promote success stories and general public awareness of watershed issues. The Bristol Phoenix and Warren Times have an excellent track record of providing publicity and support for environmental issues.

   **Responsible Party:** Save the Bay, SRPEDD, municipalities

10. Develop and install **watershed-wide river-crossing signage** to promote public awareness of river local river systems.

    **Responsible Party:** MA-Riverways Programs, RI-DEM

# APPENDIX 1:

## Watershed Advisory Committee
## Contact List

# APPENDIX 1:
# MOUNT HOPE & NARRAGANSETT BAY WATERSHED CONTACT LIST

- **GEOSYNTEC CONSULTANTS:** **Bob Hartzel**, (978) 263-9588, rhartzel@geosyntec.com
- **MASSACHUSETTS EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS:**
  **Vandana Rao**, 617-626-1248, vandana.rao@state.ma.us
- **MASSACHUSETTS RIVERWAYS PROGRAMS:** **Cindy Delpapa** (617) 626-1543, cindy.delpapa@state.ma.us
- **RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (Office of Water Resources):**
  **Heidi Travers**, (401) 222-4700, ext. 7613, heidi.travers@dem.ri.gov
  **Fred Presley**, Supervising Environmental Planner, (401)222-3434 x-4417, fred.presley@dem.ri.gov
- **MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION:**
  **Andrea Langhauser**, (DEP-DWM), andrea.langhauser@state.ma.us
  **David DeLorenzo**, Deputy Regional Director (DEP-SERO), dave.delorenzo@state.ma.us
- **CITY OF FALL RIVER:** **Priscilla Chapman**, (508) 324-2340, pchapman@fallriver.org
- **TOWN OF REHOBOTH:** **Erika Ueberbacher**, Conservation Agent (508) 252-6891, eueberbacher@town.rehoboth.ma.us
- **TOWN OF SWANSEA:** **Colleen Brown**, Conservation Agent, swanseaconcom@aol.com
- **TOWN OF SEEKONK:** **Bernadette DeBlander**, Conservation Agent, bdeblander@ci.seekonk.ma.us
- **TOWN OF SOMERSET:** **Christina Wordell**, Conservation Agent, (508) 646-2806
- **SOUTHEAST REGION PLANNING AND ECONOMIC DEVELOPMENT DISTRICT:** **Bill Napolitano**, Environmental Planner, bnap@srpedd.org
- **SAVE THE BAY:** **Marci Cole**, Watershed Coordinator, mcole@savethebay.org
- **RHODE ISLAND WATER RESOURCES BOARD:** **Juan Mariscal**, 401-222-5627, juanm@cox.net
- **RHODE ISLAND RIVERS COUNCIL:** **Meg Kerr** (Council Chair), megkerr@cox.net
- **NARRAGANSETT BAY ESTUARY PROGRAM:** **Meg Kerr** (Council Chair), megkerr@cox.net
- **KICKEMUIT RIVER COUNCIL:** **Ann Morrill**, annmorrill@holter.com
- **EASTERN RI CONSERVATION DISTRICT:** **Justine Calcina**, justinecalcina@ri.nacdnet.org

# APPENDIX 2:

## Land-use Export Coefficient Model Results for Mount Hope & Narragansett Bay Watershed

**Table 1:**
**Runnins River Subwatershed**
**Land Use/Pollutant Loading Model**

| MassGIS Landuse Category | Landuse Type | Percent Imperviousness | Nitrogen (lbs/ac/yr) | Phosphorous (lbs/ac/yr) | TSS (lbs/ac/yr) | SumOfAREA | Acres | Nitrogen (lbs/yr) | Phosphorous (lbs/yr) | TSS (lbs/yr) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 1% | 3.35 | 0.647 | 257.5 | 1,273,728 | 315 | 1,054 | 204 | 81,047 |
| 2 | Pasture | 1% | 3.35 | 0.647 | 104 | 259,455 | 64 | 215 | 41 | 6,668 |
| 3 | Forest | 1% | 2.59 | 0.095 | 21 | 9,255,549 | 2287 | 5,924 | 217 | 48,029 |
| 4 | Wetland | 1% | 3.99 | 0.2 | 47 | 1,328,690 | 328 | 1,310 | 66 | 15,431 |
| 5 | Mining | 1% | 1.14 | 0.057 | 13 | 224,268 | 55 | 63 | 3 | 720 |
| 6 | Open Land | 1% | 2.885 | 0.226 | 65.5 | 1,535,003 | 379 | 1,094 | 86 | 24,845 |
| 7 | Participant Recreation | 2% | 4.47 | 0.895 | 266 | 559,281 | 138 | 618 | 124 | 36,761 |
| 8 | Spectator Recreation | 2% | 16.1 | 1.25 | 40 | 413,749 | 102 | 1,646 | 128 | 4,090 |
| 9 | Water Recreation | 2% | 1.14 | 0.057 | 13 | 0 | 0 | 0 | 0 | 0 |
| 10 | Residential Multi-Family | 80% | 15.4 | 3.09 | 732 | 14,636 | 4 | 56 | 11 | 2,647 |
| 11 | Resdiential High Density | 57% | 13.75 | 2.75 | 666 | 1,217,756 | 301 | 4,138 | 828 | 200,408 |
| 12 | Residential Medium Density | 13% | 9.84 | 1.87 | 466 | 2,160,821 | 534 | 5,254 | 998 | 248,820 |
| 13 | Residential Low Density | 10% | 8.835 | 1.72 | 406 | 2,042,629 | 505 | 4,459 | 868 | 204,925 |
| 14 | Salt Wetland | 1% | 4 | 0.2 | 46 | 0 | 0 | 0 | 0 | 0 |
| 15 | Commercial | 90% | 9.01 | 1.69 | 606 | 2,443,546 | 604 | 5,440 | 1,020 | 365,909 |
| 16 | Industrial | 75% | 11 | 1.86 | 563 | 802,592 | 198 | 2,182 | 369 | 111,656 |
| 17 | Urban Open | 1% | 5.59 | 0.809 | 266 | 491,098 | 121 | 678 | 98 | 32,280 |
| 18 | Transport | 75% | 11 | 2.72 | 866 | 1,055,676 | 261 | 2,869 | 710 | 225,907 |
| 19 | Waste Disposal | 1% | 4.47 | 0.895 | 266 | 68,604 | 17 | 76 | 15 | 4,509 |
| 20 | Water | 1% | 0 | 0 | 0 | 108,569 | 27 | 0 | 0 | 0 |
| 21 | Woody Perennial | 1% | 2.59 | 0.647 | 104 | 220,561 | 55 | 141 | 35 | 5,668 |
| | | | | | | **Totals:** | **6295** | **37,217** | **5,821** | **1,620,321** |

**Table 2:**
**Wattupa Ponds Complex and Quequechan River Subwatershed**
**Land Use/Pollutant Loading Model**

| MassGIS Landuse Category | Landuse Type | Percent Imperviousness | Nitrogen (lbs/ac/yr) | Phosphorous (lbs/ac/yr) | TSS (lbs/ac/yr) | Acres | Nitrogen (lbs/yr) | Phosphorous (lbs/yr) | TSS (lbs/yr) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 1% | 3.35 | 0.647 | 257.5 | 601 | 2,013 | 389 | 154,707 |
| 2 | Pasture | 1% | 3.35 | 0.647 | 104 | 166 | 555 | 107 | 17,234 |
| 3 | Forest | 1% | 2.59 | 0.095 | 21 | 7064 | 18,297 | 671 | 148,354 |
| 4 | Wetland | 1% | 3.99 | 0.2 | 47 | 1090 | 4,351 | 218 | 51,249 |
| 5 | Mining | 1% | 1.14 | 0.057 | 13 | 3 | 4 | 0 | 45 |
| 6 | Open Land | 1% | 2.885 | 0.226 | 65.5 | 462 | 1,333 | 104 | 30,257 |
| 7 | Participant Recreation | 2% | 4.47 | 0.895 | 266 | 221 | 987 | 198 | 58,741 |
| 8 | Spectator Recreation | 2% | 16.1 | 1.25 | 40 | 80 | 1,288 | 100 | 3,200 |
| 9 | Water Recreation | 2% | 1.14 | 0.057 | 13 | 8 | 9 | 0 | 101 |
| 10 | Residential Multi-Family | 80% | 15.4 | 3.09 | 732 | 117 | 1,806 | 362 | 85,829 |
| 11 | Resdiential High Density | 57% | 13.75 | 2.75 | 666 | 2080 | 28,607 | 5,721 | 1,385,602 |
| 12 | Residential Medium Density | 13% | 9.84 | 1.87 | 466 | 1993 | 19,613 | 3,727 | 928,822 |
| 13 | Residential Low Density | 10% | 8.835 | 1.72 | 406 | 581 | 5,136 | 1,000 | 236,004 |
| 14 | Salt Wetland | 1% | 4 | 0.2 | 46 | 0 | 0 | 0 | 0 |
| 15 | Commercial | 90% | 9.01 | 1.69 | 606 | 833 | 7,509 | 1,408 | 505,023 |
| 16 | Industrial | 75% | 11 | 1.86 | 563 | 715 | 7,867 | 1,330 | 402,651 |
| 17 | Urban Open | 1% | 5.59 | 0.809 | 266 | 604 | 3,377 | 489 | 160,681 |
| 18 | Transport | 75% | 11 | 2.72 | 866 | 569 | 6,260 | 1,548 | 492,814 |
| 19 | Waste Disposal | 1% | 4.47 | 0.895 | 266 | 65 | 289 | 58 | 17,168 |
| 20 | Water | 1% | 0 | 0 | 0 | 4489 | 0 | 0 | 0 |
| 21 | Woody Perennial | 1% | 2.59 | 0.647 | 104 | 17 | 44 | 11 | 1,766 |
| | | | | | **Totals:** | **21760** | **109,342** | **17,442** | **4,680,248** |

**Table 3:**
**Palmer River Subwatershed**
**Land Use/Pollutant Loading Model**

| MassGIS Landuse Category | Landuse Type | Percent Imperviousness | Nitrogen (lbs/ac/yr) | Phosphorous (lbs/ac/yr) | TSS (lbs/ac/yr) | Acres | | Nitrogen (lbs/yr) | Phosphorous (lbs/yr) | TSS (lbs/yr) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 1% | 3.35 | 0.647 | 257.5 | 3478 | | 11,652 | 2,250 | 895,637 |
| 2 | Pasture | 1% | 3.35 | 0.647 | 104 | 841 | | 2,816 | 544 | 87,419 |
| 3 | Forest | 1% | 2.59 | 0.095 | 21 | 19025 | | 49,274 | 1,807 | 399,519 |
| 4 | Wetland | 1% | 3.99 | 0.2 | 47 | 1499 | | 5,981 | 300 | 70,453 |
| 5 | Mining | 1% | 1.14 | 0.057 | 13 | 46 | | 53 | 3 | 602 |
| 6 | Open Land | 1% | 2.885 | 0.226 | 65.5 | 875 | | 2,524 | 198 | 57,310 |
| 7 | Participant Recreation | 2% | 4.47 | 0.895 | 266 | 891 | | 3,983 | 798 | 237,023 |
| 8 | Spectator Recreation | 2% | 16.1 | 1.25 | 40 | 232 | | 3,737 | 290 | 9,285 |
| 9 | Water Recreation | 2% | 1.14 | 0.057 | 13 | 0 | | 0 | 0 | 0 |
| 10 | Residential Multi-Family | 80% | 15.4 | 3.09 | 732 | 0 | | 0 | 0 | 0 |
| 11 | Resdiential High Density | 57% | 13.75 | 2.75 | 666 | 912 | | 12,541 | 2,508 | 607,420 |
| 12 | Residential Medium Density | 13% | 9.84 | 1.87 | 466 | 1296 | | 12,754 | 2,424 | 604,014 |
| 13 | Residential Low Density | 10% | 8.835 | 1.72 | 406 | 4737 | | 41,854 | 8,148 | 1,923,338 |
| 14 | Salt Wetland | 1% | 4 | 0.2 | 46 | 120 | | 481 | 24 | 5,534 |
| 15 | Commercial | 90% | 9.01 | 1.69 | 606 | 390 | | 3,510 | 658 | 236,081 |
| 16 | Industrial | 75% | 11 | 1.86 | 563 | 240 | | 2,645 | 447 | 135,369 |
| 17 | Urban Open | 1% | 5.59 | 0.809 | 266 | 265 | | 1,479 | 214 | 70,358 |
| 18 | Transport | 75% | 11 | 2.72 | 866 | 306 | | 3,368 | 833 | 265,160 |
| 19 | Waste Disposal | 1% | 4.47 | 0.895 | 266 | 40 | | 179 | 36 | 10,634 |
| 20 | Water | 1% | 0 | 0 | 0 | 350 | | 0 | 0 | 0 |
| 21 | Woody Perennial | 1% | 2.59 | 0.647 | 104 | 233 | | 603 | 151 | 24,231 |
| | | | | | **Totals:** | **35776** | | **159,434** | **21,633** | **5,639,391** |

**Table 4:**
**Kickimuit, Cole and Lees Rivers Subwatershed**
**Land Use/Pollutant Loading Model**

| MassGIS Landuse Category | Landuse Type | Percent Imperviousness | Nitrogen (lbs/ac/yr) | Phosphorous (lbs/ac/yr) | TSS (lbs/ac/yr) | Acres | | Nitrogen (lbs/yr) | Phosphorous (lbs/yr) | TSS (lbs/yr) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 1% | 3.35 | 0.647 | 257.5 | 1736 | | 5,817 | 1,123 | 447,134 |
| 2 | Pasture | 1% | 3.35 | 0.647 | 104 | 664 | | 2,225 | 430 | 69,067 |
| 3 | Forest | 1% | 2.59 | 0.095 | 21 | 8987 | | 23,276 | 854 | 188,721 |
| 4 | Wetland | 1% | 3.99 | 0.2 | 47 | 735 | | 2,931 | 147 | 34,529 |
| 5 | Mining | 1% | 1.14 | 0.057 | 13 | 65 | | 74 | 4 | 841 |
| 6 | Open Land | 1% | 2.885 | 0.226 | 65.5 | 1194 | | 3,443 | 270 | 78,180 |
| 7 | Participant Recreation | 2% | 4.47 | 0.895 | 266 | 174 | | 778 | 156 | 46,308 |
| 8 | Spectator Recreation | 2% | 16.1 | 1.25 | 40 | 78 | | 1,259 | 98 | 3,127 |
| 9 | Water Recreation | 2% | 1.14 | 0.057 | 13 | 34 | | 38 | 2 | 437 |
| 10 | Residential Multi-Family | 80% | 15.4 | 3.09 | 732 | 16 | | 241 | 48 | 11,443 |
| 11 | Resdiential High Density | 57% | 13.75 | 2.75 | 666 | 1256 | | 17,265 | 3,453 | 836,235 |
| 12 | Residential Medium Density | 13% | 9.84 | 1.87 | 466 | 1845 | | 18,158 | 3,451 | 859,899 |
| 13 | Residential Low Density | 10% | 8.835 | 1.72 | 406 | 1506 | | 13,309 | 2,591 | 611,607 |
| 14 | Salt Wetland | 1% | 4 | 0.2 | 46 | 57 | | 230 | 11 | 2,642 |
| 15 | Commercial | 90% | 9.01 | 1.69 | 606 | 436 | | 3,931 | 737 | 264,391 |
| 16 | Industrial | 75% | 11 | 1.86 | 563 | 83 | | 916 | 155 | 46,880 |
| 17 | Urban Open | 1% | 5.59 | 0.809 | 266 | 155 | | 865 | 125 | 41,178 |
| 18 | Transport | 75% | 11 | 2.72 | 866 | 261 | | 2,869 | 710 | 225,902 |
| 19 | Waste Disposal | 1% | 4.47 | 0.895 | 266 | 41 | | 185 | 37 | 11,003 |
| 20 | Water | 1% | 0 | 0 | 0 | 247 | | 0 | 0 | 0 |
| 21 | Woody Perennial | 1% | 2.59 | 0.647 | 104 | 65 | | 167 | 42 | 6,725 |
| | | | | | **Totals:** | **19635** | | **97,977** | **14,443** | **3,786,250** |

# APPENDIX 3:

## Land Use Map

Runnins River Subwatershed

Palmer River Subwatershed

Kickimuit, Cole and Lees Rivers Subwatershed

Wattupa Ponds Complex and Quequechan River Subwatershed

MASSACHUSETTS

RHODE ISLAND

# Mt. Hope and Narragansett Bay Watersheds Land Use

GIS Data Provided by MassGIS and RIGIS

Legend

- Bay_Water
- Subbasins
- Transportation
- Industrial
- Commercial
- High Density Residential
- Low Density Residential
- Agriculture
- Open Land
- Other
- Water

Feet

0 4,000 8,000 16,000

N W E S

**GeoSyntec Consultants**

ACTON, MASSACHUSETTS

| | |
|---|---|
| DATE: 07/08/04 | 1 inch equals 3,781 feet |
| PROJECT NO. BW0028 | FIGURE NO. 01 |
| DOCUMENT NO. | mthopebay-landuse.mxd |

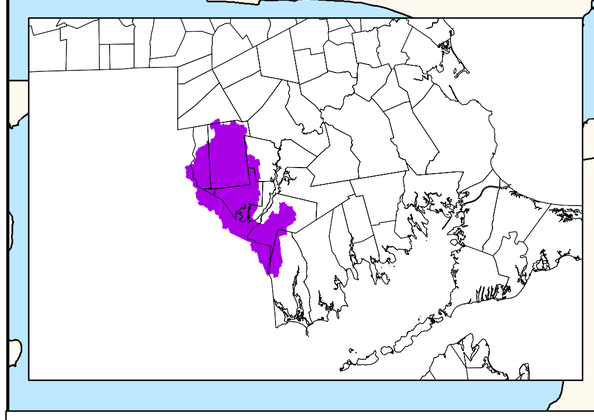
Q:\GISProjects\BW0028-MtHopeBay\mthopebay-landuse.mxd

# APPENDIX 4:

# Water Resources Map

# Mt. Hope and Narragansett Bay Watersheds Water Resources

GIS Data Provided by MassGIS and RIGIS



## Legend

- Watershed Boundaries
- Subbasins
- Rivers and Streams
- Wetlands
- Major Rivers
- Zone A - Areas subject to 100 year flood
- Public Water Supplies (MA only)
- Outstanding Resource Waters
- DEP Approved Zone II
- Surface Water

0 4,000 8,000 16,000 Feet

N W E S

**GeoSyntec Consultants**

ACTON, MASSACHUSETTS

| | | | |
|---|---|---|---|
| DATE: | 07/08/04 | 1 inch equals 3,789 feet | |
| PROJECT NO. | BW0028 | FIGURE NO. | 02 |
| DOCUMENT NO. | | Hope-Water.mxd | |

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# APPENDIX 5:

# Wildlife Habitat Map

# Mt. Hope and Narragansett Bay Watersheds Habitat

GIS Data Provided by MassGIS and RIGIS

**Legend**

- Watershed Boundaries
- Subbasins
- Rivers and Streams
- Wetlands
- Major Rivers
- Certified Vernal Pools
- Priority Habitat
- Living Waters Core Habitat
- Living Water Critical Supporting Watersheds
- Surface Water
- Biomap Core Habitat
- Biomap Supporting Natural Landscapes

0 4,000 8,000 16,000 Feet

N W E S

GeoSyntec Consultants
ACTON, MASSACHUSETTS

| | | | |
|---|---|---|---|
| DATE: | 07/08/04 | 1 inch equals 3,783 feet | |
| PROJECT NO. | BW0028 | FIGURE NO. | 03 |
| DOCUMENT NO. | | Hope-Habitat.mxd | |

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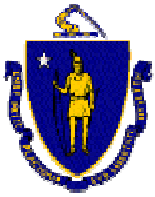

***Mitt Romney***
*Governor*

***Kerry Healey***
*Lt. Governor*

***Ellen Roy Herzfelder***
*Secretary*

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