Parker River Watershed
Year 5
Watershed Action Plan
(2006 – 2010)

Photo Credit: Jim Fenton

June 2005

Commonwealth of Massachusetts
Executive Office of Environmental Affairs

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December 15, 2005

Dear Friends of the Parker River Watershed:

It is with great pleasure that I present you with the 5-Year Watershed Action Plan for the Parker River Watershed. The plan will be used to guide local and state environmental efforts within the Parker River Watershed 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 Parker River Watershed Action Plan was developed with input from a steering committee including the former Parker River 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 that apply to all the subwatersheds:

- Water Quantity
- Water Quality
- Biological Data / Habitat
- Open Space, Land Use, and Growth
- Recreation
- Policy, Outreach, and 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 Parker River Watershed's restoration and protection efforts.

Sincerely,

Stephen R. Pritchard
Secretary

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List of Abbreviations

ACEC	Area of Critical Environmental Concern
ADA	Americans with Disabilities Act
APR	Agricultural Preservation Restriction
BMP	Best Management Practice
BWD	Byfield Water District
CC	Conservation Commission
cfs	cubic feet per second
cfsm	cubic feet per second per square mile
COE	US Army Corps of Engineers
CPA	Community Preservation Act
CPCC	Coastal Pollution Control Committee
CSTEV	Center for Stormwater Technology Evaluation and Verification
CZM	EOEA Office of Coastal Zone Management
DEM	Digital Elevation Model
DFA	Massachusetts Department of Food and Agriculture
DFWELE	Massachusetts Department of Fish and Game
DMF	Massachusetts Division of Marine Fisheries
DWP	MDEP Drinking Water Program
ECGA	Essex County Greenbelt Association
ECSA	Essex County Sportsmen Association
EOEA	Massachusetts Executive Office of Environmental Affairs
EPA	Environmental Protection Agency
GIS	Geographic Information Systems
gpcd	gallons per capita per day
GSE	Gomez and Sullivan Engineers, P.C.
GSG	Georgetown Sand & Gravel
GWD	Georgetown Water Department
IWD	Ipswich Water Department
LID	Low Impact Development
MassGIS	Massachusetts Geographic Information System
MBL	Marine Biological Laboratory
MBP	Massachusetts Bays Program
MDCR	Massachusetts Department of Conservation and Recreation
MDEM[1]	Massachusetts Department of Environmental Management
MDEP	Massachusetts Department of Environmental Protection
MDFW	Massachusetts Division of Fisheries and Wildlife
MDHCD	Massachusetts Department of Housing and Community Development
mgd	million gallons per day
MHD	Massachusetts Highway Department
mi^2	square miles
MVPC	Merrimack Valley Planning Commission
MWI	Massachusetts Watershed Initiative
NED	National Elevation Dataset
NFWF	National Fish and Wildlife Foundation
NHESP	Natural Heritage & Endangered Species Program

[1] MDEM is now MDCR

List of Abbreviations (continued)

NID	National Inventory of Dams
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OSC	Open Space Committee
PRCWA	Parker River Clean Water Association
PRNWR	Parker River National Wildlife Refuge
PWS	Public Water Supplier
RFR	Request for Response
RTE	Rare, Threatened, or Endangered Species
SWAP	Source Water Assessment Program
SWQS	Surface Water Quality Standards
TMDL	Total Maximum Daily Load
TTOR	The Trustees of Reservations
UMass	University of Massachusetts
UNH	University of New Hampshire
USGS	United States Geological Survey
WAP	Watershed Action Plan
WMA	Water Management Act
WTP	Water Treatment Plant
WWTF	Wastewater Treatment Facility

Glossary of Terms

Alluvium: Deposits of clay, silt, sand, gravel or other particulate rock material left by a river in a streambed, on a flood plain, delta, or at the base of a mountain.

Annual 7-day minimum flow: The lowest mean discharge for 7 consecutive days for a water year.

Aquifer: A geologic formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Base flow: Sustained, low flow in a stream; ground-water discharge is the source of base flow in most places.

Bedrock: General term for solid rock that underlies soil or other unconsolidated material.

cfs (cubic feet per second): The flow rate or discharge equal to one cubic foot (of water, usually) per second. This rate is equivalent to approximately 7.48 gallons per second. This is also referred to as a second-foot.

Consumptive Use: Water removed from the immediate aquatic environment through evaporation, transpiration, human consumption, agriculture, industry, etc.

Discharge: the volume of water that passes through a given cross section per unit time. Discharge is commonly measured in cubic feet per second (cfs) or cubic meters per second (cms). It is also referred to as *flow*.

Evapotranspiration: A collective term that includes water lost through evaporation from the soil and surface-water bodies and by plant transpiration.

Gaging Station (Gage): A particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Ground water: In general, any water that exists beneath the land surface, but more commonly applied to water in fully saturated soils and geologic formations.

Hydrology: the study of water. Hydrology generally focuses on the distribution of water and interaction with the land surface and underlying soils and rocks.

Instream use: The use of water that does not require withdrawal or diversion from its natural watercourse; for example, the use of water for navigation, recreation, and support of fish and wildlife.

Interbasin Transfer: The physical transfer of water from one watershed to another.

Median: The middle or central value in a distribution of data ranked in order of magnitude. The median is also known as the 50th percentile.

Peak flow: the point of the hydrograph that has the highest flow.

Precipitation: Any or all forms of water particles that fall from the atmosphere, such as rain, snow, hail, and sleet.

Pulsing flow: the artificial increase and decrease of flow that typically follows a daily pattern.

Reach: a segment of a stream channel.

Recharge: Water that infiltrates the ground and reaches the saturated zone.

Reservoir: A manmade facility for the storage, regulation and controlled release of water.

Runoff: That part of precipitation that flows toward the streams on the surface of the ground or within the ground. Runoff is composed of baseflow and surface runoff.

Run-of-River Operation: A reservoir is operated as a run-of-river facility when reservoir inflow instantaneously equals reservoir outflow. There is no change in the timing or magnitude of reservoir inflow or outflow.

Stormwater Discharge: Precipitation that does not infiltrate into the ground or evaporate due to impervious land surfaces but instead flows onto adjacent land or water areas and is routed into drain/sewer systems.

U.S. Geological Survey (USGS): The Federal Agency chartered in 1879 by congress to classify public lands, and to examine the geologic structure, mineral resources, and products of the national domain. As part of its mission, the USGS provides information and data on the Nation's rivers and streams that are useful for mitigation of hazards associated with floods and droughts.

Watershed: an area characterized by all direct runoff being conveyed to the same outlet. Similar terms include *basin*, *subwatershed*, *drainage basin*, *catchment*, and *catch basin*.

Wetland: An area that is regularly wet or flooded and has a water table that stands at or above the land surface for at least part of the year.

1.0 Introduction

The purpose of this section is to describe the process used to develop this Parker River Watershed Action Plan (WAP), as well as provide an overview of the project study area.

1.1 Background

The following 5-Year WAP was developed for the Parker River Watershed (watershed). It will serve as the strategic plan for the Massachusetts Executive Office of Environmental Affairs (EOEA) for calendar years 2006-2010.

This 5-Year WAP represents a broad approach to watershed management, and is the end product of an extensive planning process and the start of an ambitious implementation phase. The process incorporated input from various stakeholders throughout the watershed including municipalities, Merrimack Valley Planning Commission (MVPC), Parker River Clean Water Association (PRCWA), Eight Towns and the Bay (8T&B), federal/state agencies, land conservation groups, and numerous other entities.

This WAP will help prioritize which projects receive state and federal grants and loans, regulatory decision-making, and educational/technical assistance programs to solve the most important environmental problems affecting communities in the Parker River Watershed. In addition to describing goals and objectives and a long-term vision for the watershed, the WAP recommends numerous priority actions for the next five years. An action plan matrix recommends lead parties for each action, as well as proposed timeframes for reaching the five-year goals. The actions in this plan are structured according to five overarching goals (see below) for the Parker River Watershed, each of which includes several objectives.

1.2 Vision Statement

Stakeholders within the watershed consist of a very diverse group of individuals and organizations whose interests in watershed planning and other activities are varied. Stakeholders worked collectively to find a balance between achieving their individual goals and meeting the needs of the others. Although each member may have a different vision of the watershed's future, open dialogue and collaborative efforts to find solutions to environmental challenges are a common thread that binds them. By continuing these efforts, measurable improvements in water quality, stewardship, physical environmental characteristics, and biological health and diversity will occur.

As part of discussions with many stakeholders throughout the watershed, several overarching issues were identified for the WAP that, when undertaken as specific priority actions, can help stakeholders achieve long-term environmental quality within the watershed. The most common issues dovetail nicely with the six issues (as identified in Appendix 2 of the WAP Guidance Document) listed below, which were used throughout this document to categorize objectives and priority actions:

- Water Quantity
- Water Quality
- Biological Data/Habitat
- Open Space, Land Use, and Growth
- Recreation
- Policy, Outreach, and Education

1.3 Planning Process

By way of background, every few years a watershed assessment report of the Parker River Watershed is developed. The most recent assessment was published in 2002 under the former Massachusetts Watershed Initiative (MWI). The assessment report described the current state of the Parker River Watershed as a whole, though subwatershed assessments were also conducted. For each subwatershed assessment, a brief summary of the issues and recommendations for future actions were provided. These recommendations, along with input from a steering committee and the general public helped formulate the priority actions described later in this WAP.

The planning process began with the development of a database that included those parties having an interest in the Parker River Watershed and in the development of the WAP. For the nine communities with land in the Parker River Watershed, contact was made with the individual planning boards and conservation commissions. Similarly, other potentially interested stakeholders including land conservation organizations, numerous federal/state agencies, sportsmen associations, PRCWA, MVPC, all registered/permitted water users, and several other entities were contacted. Collectively, over 80 (the full list is provided in Appendix A) individuals or organizations were contacted by telephone as well as by direct mailing. An introductory letter was transmitted outlining the purpose and importance of developing the WAP. The letter also requested that parties indicate their desired level of participation in developing the WAP including serving on a steering committee, being advised through correspondence, or having no interest. E-mail addresses were also obtained for the stakeholders, which served as the primary means of corresponding with interested parties.

Following this outreach effort, a steering committee was developed consisting of a cross-section of interested stakeholders and agencies active in the Parker River Watershed (see Appendix C for steering committee members). The role of the steering committee was to provide overall direction and vision for this effort. Steering committee members provided reports and studies undertaken or completed since the watershed assessment report was completed in 2002. These reports were reviewed to identify potential priority actions to supplement those already identified in the 2002 watershed assessment. Collectively, the steering committee met on three occasions to help provide input, prioritize actions, and to review and comment on the Draft WAP.

In addition to the steering committee meetings, an evening public meeting was held in the watershed to further identify priority issues and concerns. This session was held with various stakeholders including the general public, environmental interest groups, local/state/federal agencies, and other interested parties in attendance. The public meeting was advertised in the Newburyport Daily News, the Georgetown Record, the Ipswich Chronicle, the 80 contacts in the database were sent letters in the mail to broadcast meeting dates, and notices were delivered to each town office.

Based on the priority issues and concerns identified through the outreach process, a series of goals and objectives were identified. The WAP was then developed with specific priority actions that can be implemented within the watershed during the next five years to address the previously identified goals and objectives. The WAP also identifies potential lead organizations and funding sources that could be used in implementing the proposed watershed projects. Figures included in the WAP document are all contained in Appendix D.

The WAP builds upon other planning efforts undertaken by concerned citizens, as well as those conducted by other local, state, and federal agencies. Priority actions listed in the WAP are not limited to

projects best suited for government action, but also identify potential actions that could be undertaken by a variety of stakeholders in the watershed.

1.4 Coordination with other Planning Groups and Processes

Over the past several years, two groups in particular, the PRCWA and the MVPC, have been particularly active in protecting and improving the quality of the watershed. Their assistance to EOEA will be valuable in coordinating and implementing many of the priority actions proposed within this WAP.

The PRCWA, established in 1994 is a non-profit organization. Mr. Don Bade, President of PRCWA, served on the steering committee for this project and has considerable knowledge of the basin. The PRCWA's mission is to preserve and protect the river and its ecosystem through the development of community based objectives and coalitions based upon individuals, groups, businesses, schools, and governments who understand their connection to the river and the watershed. The PRCWA strives to accomplish its mission by focusing efforts on a series of objectives, including: a) public outreach for education, b) volunteerism and coalition building, c) technical assessment of the river and its ecosystem, and d) organizational development of a strong watershed group.

The PRCWA develops strong volunteer programs that collect and disseminate high quality information, develop community and organizational leaders, and educate the volunteers and the larger community about the watershed. Some of their work has included the following:

- River herring counts during their spawning migration from mid April to mid May.
- Water quality monitoring throughout the watershed at over 20 sites.
- PRCWA worked with the Massachusetts Department of Environmental Protection (MDEP) to test the stormwater run-off into Pentucket Pond in Georgetown.
- PRCWA conducts neighborhood house meetings to discuss the issues facing riverfront landowners.

The MVPC, established in 1959 under Chapter 40B of the Massachusetts General Laws, is one of thirteen Regional Planning Agencies in the state. MVPC was established to provide professional planning and technical services to its 15 constituent communities on a wide range of regional and local issues, including growth management, environmental quality, and land use. To accomplish this, MVPC maintains a staff of professional planners and engineers with expertise in transportation, economic development, housing, zoning, land use, community development, natural resources protection, and geographic information systems (GIS) data development and mapping.

Constituted at the policy level by appointed municipal officials, MVPC is the largest provider of municipal services on the Upper North Shore. It serves as both the federally-designated Economic Development District and state (EOEA)-designated GIS Service Center for the region, and provides ongoing staff support to the Eight Town and the Bay Committee (8T&B), a regional partner of the Massachusetts Bays National Estuary Program. MVPC's monthly meetings for municipal leaders and decision makers provide an important forum for the exchange of information and ideas on current and pending matters of regional scope and impact (e.g., impacts of buildout, smart growth, community preservation, watershed protection.)

As the officially designated Areawide Water Quality Management Planning Agency for 15 communities in the Merrimack, Parker, Ipswich, North Coastal, and Shawsheen River watersheds, MVPC has broad expertise in watershed planning, and has spearheaded numerous water quality planning and implementation projects, including several under Sections 205(j), 604(b), and 319 of the Clean Water Act.

In 1996, MVPC authored the *1996 Comprehensive Conservation and Management Plan* for Massachusetts and Cape Cod Bays, a major watershed-based plan signed by both the Commonwealth of Massachusetts and the U.S. Environmental Protection Agency. This plan identifies a series of priority problems affecting coastal communities - e.g., chemical contamination of water and sediments, bacterial contamination of shellfish, habitat loss and modification, sea level rise - and prescribes immediate and long-range actions to address these problems.

Recent MVPC environmental initiatives in the Parker River watershed and adjoining Great Marsh region include the following:

- Non-point source pollution assessment and management in the Little River subwatershed (Newbury and Newburyport)
- Stormwater infrastructure mapping and pollution assessment in Pentucket Pond (Georgetown)
- Title 5 (septic system) data management system development (Georgetown, Newbury, Rowley)
- Stormwater pollution assessment in Small Pox Brook (Salisbury)

1.5 Recent Accomplishments

The PRCWA continues their effort of public outreach and stewardship including: a) hosting canoe trips along the Parker River; b) Little River Nature Trail Workday to clean debris; c) coordinating biodiversity days in 2005; d) continued water quality monitoring and reporting; e) river herring counts; and, f) public education through annual meetings and newsletters.

As of 2004, Mr. Mark Grgurovic, an amphibian and turtle biologist, is conducting a turtle research project in the Georgetown/Groveland/Boxford area through a grant from the MA Environmental Trust. The study includes research of rare Blanding's and spotted turtles, survey wetlands and vernal pools in the area which will help guide conservation planning in these three towns.

The continued stewardship of the fish ladders by the Essex County Sportsmen Association (ECSA) remains an important activity. Maintenance of all the fish ladders in the watershed is critical to the management of this important fishery and the work by the ECSA is critical to this. Associated with this stewardship is the annual fish count organized by the PRCWA.

Assessment of water quality has become an important activity in the watershed. With funds secured through grants from the Massachusetts Watershed Initiative, the MDEP and the Office of Coastal Zone Management (CZM), the MVPC has investigated sources of pollution to Rock and Pentucket Ponds in Georgetown and the Little River in Newburyport and Newbury. The PRCWA has continued their volunteer monitoring program at fourteen sites throughout the watershed. Water quality testing has also been conducted in association with the installation of non-point source pollution controls at a farm in Rowley, tributary to Mill River through the joint efforts of the Watershed Team, CZM, Massachusetts Department of Food and Agriculture (DFA), and the Natural Resources Conservation Service (NRCS). Also related to non-point source pollution control, the NRCS has been working with farms in the watershed to improve manure management practices.

Planning for growth and community preservation has been an active component of team activities. Through the resources made available by the Massachusetts Watershed Initiative and the EOEA several communities have been provided with build out presentations and community development products.

A watershed assessment report was completed. Conditions, relative to the focus of the Massachusetts Watershed Initiative (MWI) – Outreach and Education, Local Capacity Building, Water Quantity, Water

Quality, Habitat, Open Space and Recreation – were summarized for the watershed as a whole and for each of nine subwatersheds. The results of the watershed assessment report were presented to the nine watershed communities and to interested watershed partners. The assessment report provided much information for this WAP.

An investigation into the causes of declining low flow conditions in the Parker River was undertaken in 2003. The recommendations of that report are included herein, and have been applied to the Water Management Act (WMA) 5-year review process with the potential to greatly impact how water suppliers act in the watershed.

A region-wide leak detection program has been recently implemented with the assistance of the Metropolitan Planning Council – Northern Regional Services Consortium. While providing a valuable resource to the communities at great cost savings this program helps the communities to meet one of their general water conservation practices under their WMA permits.

2.0 Watershed Description

The purpose of this section is to provide an overview of the Parker River watershed characteristics and to describe various components of the river's course.

2.1 General Overview

The Parker River-Plum Island Sound Watershed is a coastal river system located in the northeast corner of Massachusetts. As shown in Figure 2.1-1, the watershed is situated between the Merrimack River watershed to the north and the Ipswich River watershed to the south.

The Parker River is the largest tributary to Plum Island Sound, and originates in a natural wetland, just east of Main Street in West Boxford, at the confluence of two unnamed streams. (MDEP, 2001) It flows easterly for approximately 21 miles before emptying into Plum Island Sound, near the City of Newburyport. The mainstem Parker River has a drainage area of 32.6 mi^2; 25 mi^2 comprise the freshwater portion, while the remainder is tidally influenced. The entire Parker River watershed drains a total of approximately 82 mi^2. Subwatersheds in the basin are shown in Figure 2.1-2 and are briefly summarized below.

Major tributaries to the tidal portion of the Parker River include:

- Mill River, which flows through Rowley and joins the Parker River in Newbury near the Governor Dummer Academy (18 mi^2).
- Little River, which starts in Newburyport and flows southerly through Newbury (10.7 mi^2).
- Egypt and Rowley Rivers. Tributaries of the Rowley River include Bull Brook and Dow Brook, which meet to form the Egypt River in Ipswich (9.6 mi^2).
- Plum Island and Eagle Hill Rivers, which empty into Plum Island Sound (12.0 mi^2).

Major tributaries to the freshwater section of the Parker River include:

- Penn Brook, which originates at Baldpate Pond in Boxford and converges with the Parker River below Pentucket Pond (4.2 mi^2)
- Wheeler Brook is located in the northeastern portion of Georgetown (2.4 mi^2).
- Beaver Brook flows southerly and much of the subwatershed is part of the Crane Pond Wildlife Management Area (3.8 mi^2).

There are approximately 14 lakes and ponds in the Parker River Watershed, which combine to cover approximately 295 acres of the watershed. The most prominent waterbodies in the watershed include Baldpate Pond (55 acres), Sperry's Pond (6 acres), Rock Pond (50 acres), Pentucket Pond (85 acres), Little Crane Pond (5 acres), and Crane Pond (19 acres) (EOEA, 2001).

A large portion of the marsh area is protected by organizations such as the Parker River National Wildlife Refuge (PRNWR), the Massachusetts Division of Fisheries and Wildlife (MDFW), the Trustees of Reservations, the Massachusetts Audubon Society, and Essex County Greenbelt. The PRNWR is located at the mouth of the Parker River. This refuge consists of 4,650 acres of sand dunes, salt marsh, freshwater marsh, and glacial upland. Also included in the refuge are six miles of ocean beach along the eastern side of Plum Island (MDEP, 2001).

Dams

At the outlet of Pentucket Pond in Georgetown, there is small dam that controls water level at the pond. There are an additional six low-head dams located on the mainstem of the Parker River (see Figure 2.1-3), all in the Town of Newbury (Byfield). These include two dams at River Street, due west of Main Street in the village of Byfield (River Street Dam and an unnamed dam); two dams near Main Street in the village of Byfield (Snuff Mill Dam and Blacksmith Shop Dam); one dam northwest of Larkin Road east of Interstate 95 (Larkin Road Dam); and the most downstream dam on the Parker River is located at the Central Street crossing in Newbury (Woolen Mill Dam). All dams are equipped with fish passage devices to allow anadromous fish, such as river herring, to migrate upstream to spawn in the freshwater Parker River Watershed. However, as discussed later some of the passage facilities are inadequate. All of the dams operate in a run-of-river mode (i.e., under normal conditions the dams are not operated to artificially manipulate pond and stream levels).

In downstream to upstream order the dams on the Parker River mainstem include[2]:

- Woolen Mill Dam (MA00241)
- Larkin Road Dam (MA00242)
- Snuff Mill Dam (MA00240)
- Blacksmith Shop Dam (MA01596)
- River Street Dam (MA01598)
- Unnamed dam near River Street (MA01597)
- Pentucket Pond Dam (MA00261)

In downstream to upstream order the dams on the Egypt and Rowley Rivers include[3]:

- Dow Brook Reservoir Dam (MA00165)
- Bull Brook Reservoir Dam (MA00230)

In downstream to upstream order the dams on the Mill River include:

- Jewel Mill Dam (MA01604)
- Lower Mill Pond Dam (MA00243)
- Upper Mill Pond Dam (MA00244)

Water Users

There are five water users in the basin that are registered/permitted under the MA WMA. The location of dams and registered water users is shown in Figure 2.1-3. The permitted water users include the following entities:

- Byfield Water District
- Georgetown Water Department
- Rowley Water Department
- Ipswich Water Department
- Rowley Country Club
- Turner Hill Golf Club

[2] Codes listed in parenthesis reference the National Inventory of Dams (NID) which is maintained by the US Army Corps of Engineers. The inventory was last updated in 1998.

[3] Dow Brook and Bull Brook reservoirs are used for water supply purposes for the town of Ipswich.

Parker River/Essex Bay ACEC

A significant portion of the coastal area of the Parker River watershed lies within the boundary of the Parker River/Essex Bay Area of Critical Environmental Concern, established in 1979. This area designates approximately 25,500 acres of barrier beaches, saltwater marches, and open waters stretching from Salisbury to Gloucester, including Plum Island Sound and tidally influenced portions of the Parker River, as significant natural resources. The protection and resources applied to the Parker River watershed through this designation have helped it to become one of the most studied watersheds in Massachusetts. For more information on the ACEC, visit the Massachusetts Office of Coastal Zone Management website: http://www.mass.gov/czm/prebacec.htm.

2.2 Description of River Course

The headwaters of the Parker River are formed near Sperry's Pond in Boxford, as shown in Figure 2.2-1. From the outlet of Sperry's Pond, the headwater stream flows south for 0.7 miles through a moderate gradient reach. At this point, the mainstem of the Parker River originates at the confluence of the headwater stream and an unnamed tributary just east of Main Street in Boxford. The river then flows northeasterly approximately 3.5 miles to Rock Pond via a series of low-lying wetland complexes. Approximately 1 mile upstream of Rock Pond, the Town of Georgetown maintains a series of groundwater wells for public water supply purposes. A 0.3 mile reach of the Parker River connects Rock Pond (50 acres) and Pentucket Pond (85 acres). G-Town Produce maintains a surface water withdrawal from Rock Pond.

At Pentucket Pond Dam, the Parker River flows 0.15 miles where it is joined by a tributary-Penn Brook (Baldpate Pond is located at the headwaters of Penn Brook). From this point, the river turns sharply north, flowing 2.2 miles through a low gradient reach to Crane Pond (19 acres). Georgetown Sand and Gravel previously maintained a surface water withdrawal near the river slightly less than halfway between Pentucket and Crane Ponds. At Crane Pond, the river turns sharply east flowing 2.2 miles to the Byfield United State Geological Survey (USGS) streamflow gage, just west of the Route 95 crossing. Just downstream of Crane Pond, the Beaver Brook tributary flows into the Parker River. Approximately 0.3 miles upstream of the USGS gage the river gradient increases somewhat near the dams located near River and Main Streets in Newbury. In addition, the Town of Newbury (Byfield) maintains a groundwater withdrawal for public water supply approximately 0.8 miles upstream of the Byfield USGS streamflow gage. This withdrawal is located just north of the Parker River, near Forest Street.

Newbury (Byfield) also maintains a groundwater withdrawal for public water supply approximately 0.5 miles below the USGS gage, near Larkin Road. Larkin Road Dam is also located along this segment of the Parker River. From this area, the river flows 0.9 miles to the Woolen Mill Dam located at the Central Street crossing in Newbury. Halfway between the USGS gage and the Woolen Mill Dam, Wheeler Brook and Jackman Brook join the Parker River as tributaries. The tidal reach of the Parker River begins just below the Woolen Mill Dam. From this point, the Parker River meanders 6.0 miles through salt marsh, where it meets the Mill River. The Mill River is fed by Bachelder and Ox Pasture Brooks. Approximately 1.5 miles downstream from this point the Little River tributary joins the Parker River. The Parker River then flows 2.0 miles to reach Plum Island Sound. The Rowley River also empties into Plum Island Sound approximately 2.0 miles to the south of the Parker River mouth.

2.3 Basin Topography and River Slope

Shown in Figure 2.3-1 is a topographic relief map of the Parker River watershed. The Atlantic coastal plain is typified by relatively low relief. The surficial landscape throughout the watershed is

characterized by an irregular terrain comprised of numerous small hills and narrow ridges separated by low-lying areas in many places containing wetlands and ponds. Extensive salt marshes interlaced with tidal streams and creeks comprise the easterly third of the watershed. The highest terrain, with elevations reaching approximately 300 feet, is located in the headwaters of the watershed east of Sperry's Pond. The highest point within the watershed is Baldpate Hill at elevation 353 feet located south of Rock and Pentucket Ponds. The Parker River elevation decreases from approximately 120 feet near its origins at the confluence of two unnamed tributaries just east of Main Street in Boxford, to sea level at its mouth. The average river slope is 5.7 feet/mile. The river gradient is controlled by several wetland complexes, natural ponds, and man-made dams that create slack water conditions.

2.4 Surficial Geology

A surficial geology map of the Parker River watershed is shown in Figure 2.4-1. Past glaciation is the primary mechanism responsible for the landforms in the watershed. A succession of glacial ice advances and retreats deposited detritus on an eroded bedrock surface. The deposition of the detritus occurred directly from the ice sheet or by meltwater from a retreating glacial ice sheet. The major landforms resulting from the glacial activity include drumlins, eskers, and kame terraces.

Glacial till and bedrock cover approximately 33% of the watershed. Bedrock outcroppings in the watershed are common at elevation; however, glacial till typically covers the bedrock surface in these areas. The till deposits, typically less than 20 feet thick, consist of an unsorted mixture of clay, silt, sand, and gravel.

In the easterly portion of the watershed, fine grained marine sediments, resulting from the retreat of the last glaciation, are prevalent in low-lying areas. These deposits typically consist of marine sands overlying marine clays and silts. Deposition of these sediments took place when the sea level encroached upon the present day mainland. Recent deposits of beach and dune sand blanket the Plum Island area. Documentation indicates that this area formed as a mainland beach line after the glacial episodes. During its formation, the sea level was lower than present, and subsequently began to rise over time, resulting in the formation of Plum Island. These fine grained deposits and alluvium comprise 11% and 19% of watershed area, respectively.

In the western portion of the watershed, low-lying areas are covered by glacial contact and meltwater deposits. These deposits typically consist of well sorted fine to coarse grained sediments. In locations where these deposits form significant permeable sand and gravel layers, groundwater yields of 100 gpm are attainable (Metcalf & Eddy, 1973). Overall, sand and gravel deposits blanket 37% of the watershed.

2.5 Land Use

A land use map of the Parker River watershed is shown in Figure 2.5-1, and was obtained from the Massachusetts Geographic Information System (MassGIS). Table 2.5-1 shows a detailed breakdown of land use within the watershed. Based on 1999 land use mapping, 44.0% of the watershed is forested. The next largest land use is residential (16.9%), followed by salt wetland (16.6%).

Table 2.5-1: Land Use in the Parker River Watershed for 1999

Land Use Type	Percent Breakdown	Definition
Forest	44.0%	Forest
Residential	16.9%	Residential
Salt Wetland	16.6%	Salt marsh
Cropland	5.5%	Intensive agriculture

Land Use Type	Percent Breakdown	Definition
Open Land	4.4%	Abandoned agriculture; power lines; areas of no vegetation
Wetland	3.4%	Non-forested freshwater wetland
Pasture	2.0%	Extensive agriculture
Recreation	1.7%	Golf; tennis; playgrounds; skiing; stadiums; racetracks; fairgrounds; drive-ins; beaches; marinas; swimming pools
Industrial	1.2%	Light & heavy industry
Transportation	1.1%	Airports; docks; divided highway; freight; storage; railroads
Urban Open	1.0%	Parks; cemeteries; public & institutional greenspace; vacant undeveloped land
Water	0.8%	Fresh water; coastal embayment
Commercial	0.7%	General urban; shopping center
Mining	0.3%	Sand; gravel & rock
Woody Perennial	0.3%	Orchard; nursery; cranberry bog
Waste Disposal	0.2%	Landfills; sewage lagoons

The watershed encompasses all or part of nine municipalities, which support a population of approximately 95,000 people. Major watershed population centers are located in Boxford, Georgetown, Newbury (Byfield), and Rowley.

Table 2.5-2: Population for Municipalities Located in Part of the Parker River Watershed

Community	Percent of Community in Watershed	Total Population (2000)
Boxford	24.6%	7,921
Georgetown	99.8%	7,377
Groveland	38.5%	6,038
Ipswich	38.6%	12,897
Newbury	88.8%	6,717
Newburyport	45.8%	17,189
North Andover	0.8%	27,202
Rowley	94.9%	5,500
West Newbury	26.6%	4,179

3.0 Recommended Actions (by issue)

Listed below are individual priority actions to be taken toward each goal and objective described. For more information on lead parties for implementing the following actions and potential funding sources, see the Action Plan Matrix in Chapter 5 and Potential Sources of Funding in Chapter 6, respectively. In addition, the action plan matrix (Chapter 5) describes the timeframe over the next five years for implementing each action based on its priority (e.g., a start date of 2005 would indicate a high priority).

Based on overall public input, implementation of actions to address non-point source pollution should be the primary focus within the watershed in the near term. In particular, an upcoming MDEP 604(b) funded Non-point Source Pollution Assessment study of the watershed should be the overall priority action to meet this important water quality objective.

3.1 Water Quantity

Goal: Maintain Instream Flow and Evaluate Water Use

Key Assessment Findings

The Parker River has been identified by the former Massachusetts Department of Environmental Management (MDEM), which is now part of the Massachusetts Department of Conservation and Recreation (MDCR), as exhibiting flow conditions over the past 10+ years that are lower than historic averages (GSE 2003). The Parker River watershed has also been identified as a stressed basin, exhibiting a "high" degree of stress based upon water quantity, water quality, and associated habitat factors. Water quantity metrics (median annual 7-day low flow, median annual 30-day low flow, and median of annual low pulse duration) indicate that the Parker River is potentially the most stressed river in Massachusetts based on streamflow data collected at the Byfield USGS Gage (MWRC 2001). While the Stressed Basins in Massachusetts Report focuses on an area located upstream from the Byfield USGS Gage, the effects of severe water stress are apparent along much of the freshwater mainstem of the Parker River. Table 3.1-1 illustrates the very high degree of stress for the Parker River watershed.

Table 3.1-1: Low Flow Metrics for the Parker River from the 2001 Stressed Basins in Massachusetts Report (MDEP 2001)

Metric	Value	Stress Level	Rank[4]
median annual 7-day low flow	0.02 cfsm	HIGH	2
median annual 30-day low flow	0.05 cfsm	HIGH	3
median annual low pulse duration	21 days	HIGH	1

In 1997, 0.5 miles of the Parker River near Georgetown, MA ran dry during the months of August and September. In 2003, a low flow study (GSE 2003) that identified several potential causes of low flow upstream from the Byfield USGS Gage (Gage No. 01101000) was completed. Potential causes of low flow include:

- Water withdrawals – Population increases in the Parker River watershed have led to increased water withdrawals. This problem is exacerbated because peak demand often occurs during times of low flow (e.g. summer). For the period 1990-2001, during the months of July, August, and

[4] Ranks are given out of 71 gages studied in the Stressed Basins report. A higher rank (e.g. closer to rank = 1) indicates worse flow conditions, or a higher degree of stress. The metrics compared are only for the flow quantity parameter.

September, total permitted water withdrawals upstream from the Byfield USGS Gage are 31%, 40%, and 25%, respectively, of the average monthly flow measured at the Byfield USGS gage. During dry summers such as 1997, water withdrawals for only Georgetown Water Department and Georgetown Sand & Gravel (GSG) during the months of July, August, and September were 309%, 1,526%, and 1,641% greater, respectively, than the average monthly flow measured at the Byfield USGS gage. Increasing water withdrawals in Georgetown are seen as the most significant cause of low flow conditions that are significantly lower than historic averages for the Parker River (GSE 2003).

- Well placement – Hydraulic connectivity with the Parker River is a function of location and well type. Water withdrawals taken directly from the Parker River (e.g. those previously taken by GSG[5]) have a greater effect than those taken from wells. Withdrawals from shallow wells have a greater effect upon flow in the Parker River than water withdrawals from deep wells (GSE 2003).

- Beaver activity – Beaver dam impoundments have both beneficial and detrimental effects on stream hydrology. The water surface area created by an impoundment can result in increased evaporation rates, particularly during the summer. The impoundment can be beneficial to water supply, by acting to recharge groundwater levels in adjoining aquifers, by slowing the flow rate and allowing increased infiltration to depleted aquifers. Beaver are not considered a significant cause of low flow in the Parker River (GSE 2003), though beaver dams are a cause of sediment deficit in Plum Island Sound (Personal Communication, Chuck Hopkinson).

- Other potential causes of abnormally low flows include flow alteration, increased area of paved surfaces, and changes in land use from agriculture to primarily forested (MWI 2002).

With increasing pressures from human development, the magnitude of summer low flows can diminish and persist for much longer periods than would otherwise occur naturally. As a result, habitat for aquatic biota can diminish severely, which can lead to mortality. In addition, unnatural low flow conditions can result in water quality degradation (higher temperatures, lower dissolved oxygen levels, water odor) (GSE 2003).

It is important to note that the problem of low flow is common to many coastal watersheds. Recently the town of Middleton in the Ipswich River watershed (located to the south of the Parker River watershed) passed two bylaws that will apply strict water regulations upon both public water supplies and private wells. One bylaw calls for a ban on outdoor watering during daytime hours (8a.m. – 7p.m.) from May 1 to September 30, as well as a requirement for irrigation or sprinkler systems to be fitted with sensors that cause the system to shut down during rain events. Enforcement of the watering bans will carry a maximum penalty of $100 per offense. The goal of the bylaw is to reduce redundant water usage and to limit evaporation losses which result in the loss of 80% - 90% of all water used for irrigation during summer months. The second bylaw gives the Board of Selectmen the right to take steps, including a total ban on outdoor watering, when it determines that there is a water shortage. (Laidler, 2005) It is hoped that water conservation measures will lead the public to understand the intrinsic value of water as a limited resource in stressed basins.

[5] Georgetown Sand and Gravel (GSG) ceased operations and therefore no longer withdraws water from the Parker River. A condominium complex is currently under construction at that location. (Personal Communication, G. Comiskey)

3.1.1 Instream Flows

Objectives

1. To establish minimum flow requirements below water withdrawal locations (under the WMA purview) that have a hydraulic connection to the Parker River or tributary.

Actions

1. Collect additional data to determine the frequency, duration, and spatial extent of low flow conditions and assess habitat quality as it is related to streamflow. As a result of the low flow study, staff gages[6] have been placed above and below the Georgetown Water Department withdrawal location to determine their direct impact on streamflow. Additional staff gages may be required at critical locations.
2. Establish minimum and seasonal flows below Dow & Bull Brook Reservoirs.
3. Perform an Instream Flow study for the Egypt and Rowley River including Dow and Bull Brooks, as well as for the Parker River and its major tributaries including Wheeler Brook and Penn Brook.

3.1.2 Water Withdrawals, Water Budgets, Interbasin Transfers

Objectives

1. To require water users that are subject to the WMA to identify their impacts on low flows through flow monitoring above and below their withdrawal location.
2. MDEP enforce that registered water users are: a) not exceeding permit limits; b) limiting unaccounted-for water < 10%; c) reducing residential consumption to 65 gpcd or less; d) complying with summer withdrawal caps; e) limiting non-essential outdoor water use; f) abiding by their conservation and drought management plans; and, g) in all ways complying with the Guidance Document for WMA Permitting Policy.
3. To monitor withdrawals by non-permitted businesses (such as Georgetown Country Club) to determine when/if a WMA permit is required.
4. To identify and investigate out-of-basin water transfers which result in a loss of water from the basin.

Actions

1. MDEP should consider effects of streamflow depletion within the Parker River being caused by the water withdrawals in its review and renewal of Water Management Act (WMA) permits. MDEP should also make minimum and seasonal flow recommendations.
2. Ipswich Water Department has applied for a permit to withdraw greater volumes from their sources in the Rowley River subwatershed. Prior to the permit issuance the Water Department is required to implement aggressive water conservation. Through the permitting process, determine the potential impacts of Ipswich Water Department's withdrawals on streamflow/habitat in the Egypt/Rowley River, as well as Bull Brook and Dow Brook Reservoirs.
3. G-Town Produce is required to report their annual water use to MDEP. Request and review G-Town Produce's average annual withdrawals of water from Rock Pond. Take the necessary actions to obtain and review these reports.
4. There is a sand and gravel operation upstream of the Central Street Pond. Identify if this facility has any withdrawals and/or discharges and determine the needs for appropriate permits – WMA or National Pollutant Discharge Elimination System (NPDES). Investigate the impacts from this facility on the Central Street Pond subwatershed.

[6] Staff gages are used to measure river stare (or elevation) which can be converted to flow via a stage-discharge rating curve.

5. Complete the Parker River Water Budget Study that is slated for completion between 2006 and 2007. EOEA is the lead agency on this project which will evaluate all basins in the state.
6. MDEP should require all golf courses to apply for WMA permits.

3.1.3 Water Demand/Supply

Objectives

1. To balance demand with the safe yield of the Parker River watershed and to predict how potential future development may further deplete streamflow.

Actions

1. The Massachusetts Drinking Water Regulations, 310 CMR 22.04(6), require all public water systems to install meters to record water use by 31 December 2001. When data are available from these meters, review the data to determine the potential impacts on streamflow.
2. Perform a safe yield analysis on the Parker River watershed including consideration of water withdrawals subject to high rates of evaporation.
3. Use the results of the safe yield analysis and instream flow studies to develop water withdrawal standards for communities within the Parker River watershed.
4. Establish flow-triggered restrictions on non-essential outdoor water use as stated in the Guidance Document for WMA Permitting Policy.

3.1.4 Water Conservation Measures

Objectives

1. To promote water conservation among water suppliers and watershed residents.

Actions

1. Investigate available conservation technologies and methods and make this information available to watershed residents and businesses. Focus on the repayment period (cost savings over time) for installing new technologies (e.g. low flow toilets, shower heads, washing machines, dish washers, refrigerators, etc.) or applying new concepts (LID retrofitting, green landscaping, etc.).
2. MDEP should use the WMA permit process to require water users to develop (if not completed already) and implement water conservation and drought management plans. If needed, require water users to upgrade infrastructure, rate/fee alteration, and bans on outdoor watering when river flows hit threshold flow levels (minimum flows).
3. Establish ordinances that require new large scale developments using private wells for irrigation purposes to install low flow "drip technologies." Drip technology has been shown to reduce water consumption, and greatly reduce evaporation losses.
4. All Parker River watershed towns review the water conservation bylaws (requiring private wells to adhere to the same restrictions as public wells) passed by Middleton, MA which are under review by the state attorney general, and consider these bylaws for implementation.

3.1.5 Stormwater

Objectives

1. To mitigate the effects of stormwater runoff by improving stormwater management to reduce flooding, and improve flow flows, water quality and habitat.

Actions

1. Inspections should be conducted by MDEP on facilities with general stormwater permits to determine if stormwater protection plans have been developed and implemented.
2. Review results of the MVPC stormwater assessment project, including (MVPC 2000b):

a. Encourage initiation of the Stormwater 104(b) project for Pentucket Pond. Stormwater management practices are being implemented by the town to address some of the suspected sources of the bacterial contamination at Pentucket Pond.
b. Georgetown Housing Authority, a senior housing complex, installed a new on-site wastewater treatment system. Subsequently, they are discharging a cleaner effluent into the ground than their past systems and will no longer have to pump on almost a daily basis. Determine if the installation of the new system reduces fecal coliform bacteria levels and nutrient inputs to the Pentucket Pond subwatershed.
c. Track the progress of the new storm sewer system (from catchment basins to an underground infiltration system) installation and additional landscaping at American Legion Park. Determine the effectiveness of these improvements on water quality (i.e., lower fecal coliform bacteria levels, lower suspended solids).
d. Identify and remove any and all illicit household connections.

3. Work with local groups to conduct storm drain stenciling around Rock Pond.
4. Continue stormwater outflow mapping, and increase the level of resolution of data collection.
5. Improve implementation of BMPs throughout the Parker River watershed. With the implementation of the Phase 2 stormwater management plans, there is an opportunity to encourage the use of BMPs in many areas and thus improve water quality:
    a. Agricultural areas-adjacent to the streams;
    b. Residential areas-place septic systems and lawns as far from wetland resources as possible, use vegetative buffers between lawns and water bodies;
    c. Residential/town areas-apply low impact development (LID) techniques in new development, redevelopment, and when improving town infrastructure; and,
    d. Stormwater drains-alternative stormwater treatment devices are available. The University of New Hampshire (UNH) Center for Stormwater Technology Evaluation and Verification (CSTEV) demonstrates and tests many such devices and is a good source of information.
6. Implement an ordinance that requires the outflow hydrograph of a new development to remain unchanged from its undeveloped (natural) state.
7. Explore the feasibility of establishing local stormwater utilities to finance the implementation of Phase II stormwater management plans and stormwater infrastructure improvements.
8. Focus implementation of structural stormwater BMPs towards biological remediation of stormwater runoff. UNH CSTEV tests inorganic and organic structural BMPs for stormwater treatment.
9. Investigate and develop model bylaws to limit the area of lawns as a method of reducing stormwater runoff and increasing infiltration to groundwater.

3.2 Water Quality

Goal: Protect and Improve Water Quality in the Watershed

Key Assessment Findings

The Parker River watershed has been subject to extensive water quality monitoring conducted by the PRCWA, Marine Biological Laboratory (MBL), CZM, and DMF. As such, many water quality issues – both general (point and non-point source pollution) and specific (failing septic systems) – have been identified, and work has begun to address these issues. The overall water quality in the watershed is considered good, though several areas have encountered problems with point and non-point source pollution, failing septic systems, and invasive plants.

There are four wastewater discharges (shown in Table 3.2-1) in the watershed that are permitted by the Environmental Protection Agency's (EPA) NPDES: the Governor Dummer Academy, Georgetown Water Treatment Plant (WTP), Ipswich WTP, and Hero Coatings, Inc. Governor Dummer Academy's Wastewater Treatment Facility (WWTF) was recently upgraded, though the effectiveness of these upgrades needs to be determined. Discharge from the Ipswich WTP is for backwash purposes.

Table 3.2-1: Active NPDES Permitted Facilities in the Parker River Watershed as of May 13, 2005 (Source: EPA PCS website)

NPDES	Facility Name	Permit Expire Date	Receiving Water
MA0030350	Governor Dummer Academy	9/30/2006	Mill River
MAG640048	Georgetown Water Treatment Plant	11/15/2005	Parker River
MAG640025	Ipswich Water Treatment Plant	11/15/2005	Bull Brook
MA0039985	Hero Coatings, Inc.	N/A	Little River

Non-point source pollution refers to water pollution not derived from a particular discharge, generally stormwater runoff from precipitation or snowmelt containing motor oils, debris, silt, salts, bacteria, pesticides, fertilizers, or hazardous waste spills. The two primary concerns in the Parker River watershed are bacteria levels and nitrogen/phosphorus loading. Little River, flowing through Newburyport and Newbury, exhibits high bacteria levels potentially caused by agricultural runoff, leaking septic tanks, and municipal sewage from the industrial park. The problem of leaking septic tanks has been specifically identified and acted upon in Newbury and Rowley; however, the problem must be addressed in all towns in the watershed. Agricultural runoff carrying fertilizers accounts for much of the nitrogen and phosphorus entering the Parker River watershed and eventually Plum Island Sound. Leaking septic systems cause the closure of shellfishing beds and limit recreational access to waters, while the effects of nitrogen and phosphorus loading on the salt marsh ecosystem in Plum Island Sound, currently under study by MBL, are undetermined and require more study.

MDEP checks to ensure that waters meet designated uses including Primary Recreation, Secondary Recreation, Fish Consumption, Aquatic Life, Shellfish Harvesting, Drinking Water, and Aesthetic Uses. A waterbody that fails to meet the standards[7] set for a particular designated use is considered to be impaired. Section 303(d) of the Clean Water Act[8] requires that states identify waterbodies that do not

[7] Designated uses are discussed in Massachusetts Surface Water Quality Standards, 314 CMR 4.00, 1996.

[8] Section 303(d) of the Clean Water Act requires states to submit a list of waters for which effluent limitations do not meet water quality standards. 303(d) lists must be submitted to EPA on April 1 of every even-numbered year.

meet water quality standards and require the development of Total Maximum Daily Loads[9] (TMDL) for these waterbodies. Table 3.2-2 is a list of all waterbodies within the Parker River watershed requiring a TMDL according to the Massachusetts Year 2004 Integrated List of Waters.

Table 3.2-2: Massachusetts Category 5 Waters (Water requiring a TMDL)

Water Body	Description	Reason(s) for Impairment
Baldpate Pond	Boxford	Metals, Noxious Aquatic Plants
Eagle Hill River	Headwaters near Town Farm Rd. to the mouth at Plum Island Sound, Ipswich	Pathogens
Egypt River	East of Jewett Hill, Ipswich to confluence with Muddy Run and Rowley River, Rowley/Ipswich	Pathogens
Little River	Parker St, Newbury/Newburyport to confluence with parker River, Newbury	Pathogens
Lower Mill Pond	Rowley	Noxious Aquatic Plants, Exotic Species
Mill River	Headwaters - Outlet of small unnamed pond between Route 95 and Rowley Rd, Boxford to Route 1, Rowley	Cause Unknown
Mill River	Route 1, Rowley to confluence with Parker River, Newbury	Pathogens
Paine Creek	Headwaters to confluence with Eagle Hill River, Ipswich	Pathogens
Parker River	Source in Boxford to Central Street, Newbury	Metals, Flow Alteration
Parker River	Central Street to mouth at Plum Island Sound, Newbury	Pathogens
Pentucket Pond	Georgetown	Metals, Pathogens, Exotic Species
Plum Island River	From "High Sandy" sandbar just north of the confluence with Plum Island Sound, Newbury	Pathogens
Plum Island Sound	From the mouth of both the Parker River and Plum Island River, Newbury to the Atlantic Ocean, Ipswich (includes Ipswich Bay)	Pathogens
Rock Pond	Georgetown	Metals
Rowley River	Confluence with Egypt River and Muddy Run to mouth at Plum Island Sound, Rowley/Ipswich	Pathogens

(Source: MDEP 2004)

All waters in the Parker River watershed are classified as Class B waters with the exception of Bull Brook and Dow Brook reservoirs which are Class A waters. Marine waters in the tidal portions of the Parker River watershed, including Plum Island Sound, are classified as Class SA waters, which are considered suitable for primary and secondary recreation, provide excellent habitat, and permit shellfish harvesting and consumption without depuration. Shown in Table 3.2-3 is a breakdown of the condition of shellfishing beds in tidal portions of the Parker River watershed. Though a majority of the shellfish bed

[9] A TMDL is the total amount of a pollutant that a waterbody may receive from all sources without exceeding water quality standards.

area is Approved or Conditionally Approved, much of this area is subject to periodic closures due to high levels of bacteria entering Plum Island Sound from its tributaries.

Table 3.2-3: Shellfish Use in Tidal Portions[10] of the Parker River Watershed including Plum Island Sound (Source: MDEP 2001)

DMF Classification Type	MDEP Use Support Status	DMF Area (acres)	% of total DMF acreage
Approved	Support	7,106.453	64%
Conditionally Approved	Partial Support	3,494.853	31%
Prohibited	Non-Support	536.662	5%

Water quality in Plum Island Sound is directly related to water quality in the freshwater portions of the watershed. Improving water quality throughout the Parker River watershed will positively impact shellfish resources, fisheries, wildlife, and the health of the salt marshes along Plum Island Sound. Water quality and habitat in Plum Island Sound are closely linked with health of marine fisheries because the sound is used as habitat for many juvenile marine species; an improvement in water quality in Plum Island Sound would presumably produce a corresponding improvement in marine fisheries.

3.2.1 Water Quality Assessments/Monitoring

Objectives

1. To review ongoing water quality monitoring and improvement/restoration projects and develop guidelines to measure the effectiveness of each.
2. To locate funding to support continued water quality monitoring (macro/fish, water chemistry and flow) focusing on areas identified in the EOEA watershed assessment report and the MDEP Water Quality Assessment Report.
3. To determine the effects of existing landfills on water quality through monitoring.
4. To implement a systematic, watershed-wide water quality monitoring program with pre-determined goals and measures of effectiveness.
5. To implement recommendations to be identified in the Parker River Watershed Total Phosphorous TMDL and pond Diagnostic/Feasibility studies, including performing pond watershed surveys to identify sources of impairment.
6. To address thermal pollution within the watershed.
7. To address sediment and nitrogen loading within the watershed.

Actions

1. Take action to improve water quality of Little River and Mill River. In the Little River pay special attention to the river between Hale Street and Hanover Street. This is the site of the proposed Little River Transit Village situated between Newbury and Newburyport.
2. Assess more water quality criteria so that more pond acreage will be listed as impaired or in a more enriched trophic status.
3. Conduct diurnal dissolved oxygen monitoring, nutrient and periphyton sampling to determine if impairment to the benthic community is naturally occurring in the Parker River.
4. Implement recommendations to be identified in the Parker River Watershed Total Phosphorus TMDL and pond Diagnostic/Feasibility studies, including performing pond watershed surveys to identify sources of impairment.
5. Public water suppliers should review the MDEP DWP Source Water Assessment Program (SWAP) evaluations when they are completed to develop and implement recommendations for

[10] Total area of shellfishing beds considered is 11,138 acres.

the protection of Class A waters in the Parker River Watershed, including Bull Brook and Dow Brook reservoirs and tributaries thereto.
6. Review the results from the USGS 1999 NECB Mercury Study when they are available.
7. Establish a more frequent or consistent, planned sampling schedule (difficult to interpret data that is not collected regularly) for water quality monitoring.
8. EOEA to fund the PRCWA water quality program (currently unfunded). This program has a strong history of volunteers collecting water quality data throughout the Parker River watershed; this data has been a driving force in protecting important habitat and improving water quality throughout the Parker River watershed. Other funding sources need to be identified to assist the PRCWA in funding its water quality initiatives.
9. Inventory all pollution sources in Newbury and Newbury Area of Critical Environmental Concern (ACEC), prioritize potential projects, identify funding and partners and implement projects.
10. MDEP to provide assistance remediating hot spots where monitoring consistently indicates elevated pollutants: Little River, Mill River, and Ox Pasture Brook (agricultural and industrial pollution sources).
11. Collect more data from the unlined, inactive Newburyport landfill (Crowe Lane), and the unlined Newbury landfill to assess its water quality impact.
12. Identify causes of degraded water quality during wet weather (suspected link to waterfowl).
13. Investigate the structural integrity of the sewer system in the Newburyport industrial park as a potential cause of pollution in the Little River.

3.2.2 303(d) Lists

Objectives

1. To assess Designated Uses within the Parker River watershed and to address documented impairments.

Actions

1. Conduct a preliminary analysis to prioritize the need for collecting quality assured data to fully assess all designated uses of reaches in the Parker River Watershed. Review the USGS Statewide Water-Quality Network Report for examples of the monitoring necessary to completely assess all uses (USGS 2001).
2. Conduct monitoring (e.g., fecal coliform bacteria, Secchi disk depth, etc.) to assess the Primary and Secondary Contact Recreation Uses.
3. Conduct monitoring for water chemistry data including dissolved oxygen and temperature profiles, total phosphorus and chlorophyll-a to assess the Aquatic Life Use.
4. Continue to review DMF's fecal coliform bacteria data collected from the Mill River to confirm the assessment of the Primary Contact Recreation Use.
5. Conduct bacteriological monitoring (using the indicator organism specified in the Massachusetts Surface Water Quality Standards) to assess the status of the Primary and Secondary Contact Recreation Uses in currently not assessed waters.
6. Determine if there are any bathing beaches on Baldpate Pond, Little Crane Pond, Rock Pond, and Wilson Pond. If so review data from "Beaches Bill" that required water quality testing (bacteria sampling from all formal bathing beaches) to assess the status of the recreational uses.

3.2.3 Non-Point Source Pollutants

Objectives

1. To identify and address non-point source (NPS) pollution in the Parker River watershed.

Actions

1. Identify/reduce sources of sediment inputs to Jackman Brook from road runoff.
2. Work with Massachusetts Audubon Society to complete the five tasks identified in their non-point source implementation program: septic system management; roadway runoff; agricultural runoff-stormwater management; public education; and bacteria monitoring in the Mill River.
3. Address nutrient loadings from lawn fertilizers, wastewater, and impervious surface runoff.
4. Identify causes of non-point source pollution in Cart Creek.
5. Identify agricultural runoff (e.g. expansion of Tendercrop Farm and lease of surrounding wetlands for grazing results in sediment, bacteria, and nutrient discharge) or land uses that lead to poor water quality.
6. Conduct a non-point source evaluation of the Rowley River, and Eagle Hill River to determine if land-based sources of contamination are impacting the DMF shellfish growing areas.
7. When available, review the results and recommendations from the Marine Biological Laboratory's land use and nutrient input study of Plum Island Sound.
8. Implement recommendations identified in the Town of Boxford's Three Pond Study, Nutrient Modeling Results.
9. Implement recommendations of the Baldpate TMDL currently in preparation.
10. Investigate and address high fecal coliform levels at the Georgetown town beach, in Plum Island Sound, and many waterbodies in the watershed that may be caused by bird waste.
11. Work with PRCWA to conduct an investigation of land-use practices and a non-point source (NPS) pollution survey along the main stem Parker River upstream of Woolen Mill Dam (especially in the vicinity of the impoundments in Byfield).
12. Identify and correct non-point source pollution sources on Wheeler Brook.
13. Continue to push implementation of agricultural BMPs to control non-point source pollution along the Little River.
14. Since Massachusetts Audubon Society's non-point source pollution study did not indicate any obvious reductions in fecal coliform bacteria concentrations downstream of the StormTreat™ system in Ox Pasture Brook, future monitoring is necessary to determine the sources of bacteria contamination.
15. Municipalities work with MVPC to implement their management recommendations from the NPS assessment of the Little River including:
    a. Assist farm property owners with design, cost-sharing and implementation of BMPs;
    b. Investigate structural integrity of the City of Newburyport's municipal sewer lines, particularly in the industrial park; and,
    c. Work with the City of Newburyport and the Town of Newbury to map municipal storm drainage infrastructure.
16. Coordinate with MDEP and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data for Baldpate Pond, Bull Brook Reservoir, Central Street Pond, Crane Pond, Dow Brook Reservoir, Little Crane Pond, Lower Mill Pond, Pentucket Pond, Quills Pond, Rock Pond, Sperry's Pond, State Street Pond, Upper Mill Pond, and Wilson Pond including watershed surveys to identify NPS pollution sources.

3.2.4 National Pollutant Discharge Elimination System (NPDES)

Objectives

1. To monitor NPDES facilities and work to reduce their impact upon water quality in the watershed.

Actions

1. Reissue Governor Dummer's National Pollutant Discharge Elimination System (NPDES) permit with appropriate limits and monitoring requirements.
2. Conduct fecal coliform bacteria monitoring upstream and downstream from Governor Dummer's discharge, during wet and dry weather conditions, to determine the effectiveness of the Governor Dummer Academy's wastewater treatment plant (WWTF) upgrades. If Governor Dummer continues to have problems meeting their LC50[11] and chronic no observed effect concentration (CNOEC) limits, the need for a toxicity identification and toxic reduction evaluation (TIE/TRE) should be determined.

3.2.5 Septic System Failures

Objectives

1. To assist all Parker River watershed towns in repair of failing septic and sewer systems.

Actions

1. Assist the Towns of Rowley, Newbury, Newburyport, Georgetown, and other towns in repair of suspected failing septic and sewer systems. Inspect the sewer system in the Newburyport Industrial Park for leaks/breaks and other pollution sources.
2. Review the results of the Town of Rowley's Board of Health in tracking the progress of septic system upgrades.
3. Investigate the availability of low-interest loans for upgrades to septic systems throughout the Parker River watershed.
4. Continue outreach and funding to support septic system database development and management and expand this to all watershed towns.
5. Promote local Board of Health adoption and use of Septic Manager, an MS Access-based electronic data management system developed by MVPC and CZM to enhance Title 5 information record-keeping, tracking, and analysis.

3.2.6 Streamteam

Objectives

1. To identify land-based water quality hot spots.
2. To implement a large-scale, system-wide monitoring program aimed at preserving and improving the overall health of watershed systems.
3. To centralize access to watershed studies and restoration information.

Actions

1. Stream teams conduct stream shoreline and physical habitat surveys along the Parker River and its tributaries (Penn Brook, Wheeler Brook, Little River, and Beaver Brook) and the Egypt/Rowley River and its tributaries.
2. Create a web-based watershed restoration inventory/database. This inventory should contain basic information on any potential restoration projects, location, cost, details, additional data needed, potential partners, feasibility, and if a party has already undertaken that activity (if so, include contact information). Utilize CZM's "Great Marsh Coastal Wetlands Restoration Plan", this WAP, and WAP source materials to augment the restoration project inventory.

[11] LC50 refers to the "lethal concentration" which kills 50% of a population.

3. Work with PRCWA to establish a central library of data collected and reports developed through various studies in the watershed to ensure that a thorough, easily-accessible database of watershed information is available for use in planning future studies or assessing watershed health.
4. Create a regional, salt marsh restoration site plan to help direct future actions and funding opportunities for restoration projects.
5. Invite representatives from regional networks and other organizations to join the Watershed Team.

3.2.7 Shellfish Closures/Fish Advisories

Objectives

1. To restore shellfish and fisheries resources by identifying sources of pollution that cause closures and addressing identified sources.

Actions

1. Work with DMF, CZM and local communities to identify and reduce sources of contamination (e.g., stormwater, failing septic systems, etc.) to shellfish areas. The DMF shellfish closures in the Parker River are due to elevated levels of fecal coliform bacteria. The suspected sources of these contaminants include: failed septic systems; stormwater; and, improper waste disposal from marinas and boats (Tomczyk 2001a).
2. Continue informing the public about elevated levels of mercury found in some ponds, and the associated statewide fish consumption advisory.

3.2.8 Plum Island Sound

Objectives

1. To study and improve ecosystem health in Plum Island Sound

Actions

1. Identify, prioritize, and restore tidal restrictions.
2. Work with residents, MBL researchers, and state agencies to identify areas of marsh degradation and create a monitoring plan for passively and actively managed sites.
3. Support boat pump-out programs on Plum Island Sound and on two tributaries (Pine and Grape Island Creeks) to Plum Island Sound.
4. Obtain flushing data for the embayments of the Bays at Risk of Eutrophication study. Currently, the analysis relies upon a nitrogen sensitivity index to rank embayments. Use of flushing data and mixing characteristics would reduce the uncertainty associated with this assessment. The flushing data should be internally consistent to avoid potential uncertainty associated with different methodologies.
5. Conduct a sampling program to verify the results of the Massachusetts Bay Programs (MBP), Bays at Risk of Eutrophication study and provide insights into embayment water quality. To conserve resources, MBP could focus the field sampling effort on a subset of study embayments. For a short list of embayments, the authors recommend recording embayment conditions (e.g. presence of absence of eel grass beds, fish fills, etc.) and measuring water quality parameters such as temperature, dissolved oxygen concentrations, Secchi depth, nutrient concentrations, phytoplankton stock and productivity, and chlorophyll-a.
6. Develop nitrogen loading coefficients for surface runoff.
7. Obtain the necessary data to estimate off-shore contributions of nitrogen. For coastal embayments, exchange with adjacent ocean waters can potentially supply large amounts of nitrogen.

3.2.9 Policy

Objectives

1. To develop and implement policy that facilitates watershed management and restoration.

Actions

1. Submit a 319 non-point source implementation grant[12] for the Little River in Newbury and Newburyport.
2. Work to implement and enforce growth management bylaws and regulations related to subdivision development, stormwater management, and wetlands protection to reduce non-point source pollution.
3. Promote the Ipswich Coastal Pollution Control Committee (CPCC) report and use of a planning assistant to implement water quality remediation and shellfish management.
4. Maintain and update the IPSWATCH website http://www.ipswatch.sr.unh.edu/.

[12] Each year MDEP issues a Request for Response (RFR) for competitive projects to be funded through section 319 grants.

3.3 Biological Data/Habitat

Goal: Protect and Enhance Habitat within the Watershed, and Restore and Improve Stream Continuity and Aquatic Habitat in Freshwater and Tidal Portions of the Watershed

Key Assessment Findings

Rare aquatic species and exemplary aquatic habitat are outlined by the National Heritage and Endangered Species Program (NHESP) Living Waters (Figure 3.3-1) program. Core waters in the Parker River watershed include Pentucket Pond, Rock Pond, Baldpate Pond, Crane Pond, and portions of the Mill River. The NHESP BioMap (Figure 3.3-2) program, which identifies the most viable habitat for rare species and natural communities in Massachusetts, includes all of Plum Island Sound as well as significant portions of the Parker River and its tributaries including Mill River, Wheeler Brook, Beaver Brook, Egypt and Rowley Rivers and their tributaries Bull and Down Brooks, and the tidal reaches of Little River. Table 3.3-1 lists all rare species listed for the Parker River watershed by the NHESP BioMap and Living Waters programs.

Table 3.3-1: Rare Species within the Parker River Watershed as Listed by the NHESP BioMap and Living Waters Programs

Common Name	***Scientific Name***	**Status**
Natural Communities		
Estuarine Intertidal: Brackish Tidal Marsh		Critically Imperiled
Estuarine Intertidal: Salt Marsh		Vulnerable
Maritime Dune Community		Imperiled
Plants		
Alternate-Flowered Water-Milfoil	*Myriophyllum alterniflorum*	Endangered
Estuary Arrowhead	*Sagittaria montevidensis*	Endangered
Estuary Beggar-Ticks	*Bidens hyperborean var colpophila*	Endangered
Long's Bulrush	*Scirpus longii*	Threatened
River Bulrush	*Bolboschoenus fluviatilis*	Special Concern
Seabeach Needlegrass	*Aristida tuberculosa*	Threatened
Water Marigold	*Megolodonta beckii*	Watch Listed
Invertebrates		
Coastal Marsh Snail	*Littoridinops tenuipes*	Special Concern
Coppery Emerald	*Somatochlora georgiana*	Endangered
New England Bluet	*Enallagma laterale*	Special Concern
New England Siltsnail	*Cincinnatia winkleyi*	Special Concern
Vertebrates		
American Bittern	*Botaurus lentiginosus*	Endangered
Blanding's Turtle	*Emydoidea blandingii*	Threatened
Blue-spotted Salamander	*Ambystoma laterale*	Special Concern
Common Moorhen	*Gallinula chloropus*	Special Concern
Common Tern	*Sterna hirundo*	Special Concern
Eastern Box Turtle	*Terrapene Carolina*	Special Concern
Eastern Spadefoot	*Scaphiopus holbrookii*	Threatened
Four-toed Salamander	*Hemidactylium scutatum*	Special Concern
King Rail	*Rallus elegans*	Threatened
Least Bittern	*Ixobrchus exilis*	Endangered
Least Tern	*Sterna antillarum*	Special Concern

Pied-Billed Grebe	*Podilymbus podiceps*	Endangered
Piping Plover	*Charadrius melodus*	Threatened
Roseate Tern	*Sterna dougallii*	Endangered
Spotted Turtle	*Clemmys guttata*	Special Concern
Upland Sandpiper	*Bartramia longicauda*	Endangered
Vesper Sparrow	*Pooecetes gramineus*	Threatened
Wood Turtle	*Clemmys insculpta*	Special Concern
Fishes		
Bridle Shiner	*Notropis bifrenatus*	Special Concern

To maintain aquatic habitat connectivity within the Parker River watershed adequate fish passage, either through fishway upgrades or dam removal, must be provided at each of the six dams on the Parker River (Woolen Mill Dam, Larkin Road Dam, Snuff Mill Dam, Blacksmith Shop Dam, River Street Dam, and the unnamed dam near River Street) downstream from Pentucket Pond Dam, as well as three dams on the Mill River (Jewell Dam, Lower Mill Pond Dam, and Upper Mill Pond Dam), and through undersized and partially blocked/dammed culverts. All dams along the Parker River provide fish passage, however five of the six fishways are either in fair/poor condition or provide inefficient passage. Despite the poor condition of most fish passage facilities, the Parker River has maintained a dwindling river herring population[13]. Rainbow smelt spawn in the Parker River up to Woolen Mill Dam. Along the Mill River, the Jewel Dam does not provide fish passage, so upstream reaches are not yet accessible.

Beaver have been known to dam fishways and prevent fish passage; however, current laws delay removal of these blockages when they occur. In some cases dam removal may be a preferred alternative to fishway improvement because dam removal restores not only habitat connectivity but also sediment transport and associated improvements in water quality. A sediment deficit in Plum Island Sound (i.e. a net loss of sediment) has been identified by MBL researchers as a potential future threat to habitat in Plum Island Sound.

Minimum instream flows should be determined throughout the Parker River watershed and tied closely to water conservation ordinances, particularly during summer low flow periods. At present, low flow conditions periodically lead to reaches of the Parker River running dry during August and September. Lack of flow causes habitat fragmentation and destruction, poor water quality, and wildlife mortality. Low flow represents a very significant threat to aquatic life and habitat in freshwater sections of the watershed, and the effects of low flow on Plum Island Sound need to be better understood. Because of its effects on habitat, low flow must be considered a top priority within the watershed.

Proper sizing and placement of culverts is important for a number of habitats throughout the watershed. Undersized culverts in tidal portions of the watershed prevent flushing of freshwater from saltwater marshes (leading to invasion by freshwater plant species like *Phragmites*), cause bank erosion and flooding, and prevent fish passage. In freshwater sections of the Parker River watershed, undersized culverts lead to bank erosion, prevent fish passage, are dammed by beaver, and prevent turtle passage. Turtles prefer natural lighting, wide spaces, and grass surfaces to passage through corrugated metal culverts. These preferences lead turtles, migrating between the Parker River, permanent wetlands, and vernal pools to cross busy roads, resulting in mortality.

Vernal pools are very important habitat for a variety of species including some amphibians that breed exclusively in vernal pools, or other organisms that spend their entire life cycles around vernal pool

[13] Comparison of recent fish count data collected by the PRCWA during their alewife fish counts with data collected in the 1970's indicates that alewife populations have fallen. Counts in 1998 and 1999 yielded 4,242 and 7,965 alewives, respectively, while counts by UMass students in the 1970's yielded between 6,600 and 38,000 alewives.

habitat. Certified vernal pools are offered protections under the state wetlands protection act regulations, as well as the state water quality certification, state Title 5, and forest cutting practices act regulations. During the 2001-2002 Blanding's turtle (*Emydoidea blandingii*) study, numerous vernal pools were identified, surveyed, and submitted to the NHESP for certification[14].

In freshwater portions of the watershed invasive plants have been introduced into several ponds. Ponds that suffer from invasive species include Baldpate Pond, Central Street Pond, Lower Mill Pond (*T. natans*), Pentucket Pond (*C. caroliniana*), Sperry's Pond, State Street Pond (*C. caroliniana*), Upper Mill Pond, and Wilson Pond. Invasive species are usually introduced by boaters who carry plants and seeds between ponds during recreational activities. Without natural predators or competitors, invasive plants often drive out native species. Tidal restrictions along Plum Island Sound are causing freshwater plant species (particularly, *Phragmites*) to encroach on the saltwater marshes along Plum Island Sound. It is important for state agencies such as the Massachusetts Highway Department (MHD), and NHESP to work with watershed organizations and towns to manage and control invasive species.

Habitat along and in Plum Island Sound is noted for extensive saltwater marsh, barrier beach and dune ecosystems, shellfish beds, migratory and shorebird habitat, and juvenile marine fish habitat. While much of Plum Island Sound is protected, little is known about the populations of shellfish, fish, birds, and wildlife that use this habitat. To understand the effects of restoration projects extensive, long-term bio-monitoring must be implemented.

3.3.1 Fisheries

Objectives

1. To improve fisheries resources within the Parker River watershed and in nearby coastal waters.

Actions

1. Work with the MDCR to monitor dam safety and/or removal issues including the need for fish passage facilities in the Parker River Watershed using the anadromous fish passage survey (CZM, North Shore Region) that will list all fishways in the region along with their effectiveness and recommendations for restoration. Implement the recommendations of this study.
2. Work with the Division of Marine Fisheries fish ladder maintenance program and the Great Marsh Summit Initiative to install and upgrade fishways at dams throughout the watershed.
3. Work with PRCWA to conduct anadromous fish counts to determine the effectiveness of fishway upgrades throughout the watershed.
4. Eliminate fish passage obstructions (culverts, other barriers) along Penn Brook. Removing obstructions improves habitat connectivity.
5. Work with the Town of Georgetown to complete the Pond Street Fish Ladder and to improve access for the fish count at this site.
6. Determine if there is suitable habitat for anadromous fish in Ox Pasture Brook and, if so, work with the DMF fish ladder maintenance program and the Great Marsh Summit Initiative to install and upgrade fishways.
7. Monitor status of Rainbow smelt, American eel, and anadromous fish. Make use of information being provided by the smelt population study in the Parker River to enhance ACEC management and to improve smelt habitat. Increase marine fisheries habitat by restoring tidal restrictions in salt marshes.
8. Assess the impact of beaver dams on fish passage to upstream spawning grounds and develop policy to allow for beaver management.

[14] For more information on vernal pool certification, visit the NHESP website at http://www.mass.gov/dfwele/dfw/nhesp/nhvernal.htm.

3.3.2 Shellfish

Objectives

1. To rehabilitate shellfish resources in Plum Island Sound and its tributaries.

Actions

1. Rehabilitate the shellfish resources in the tidal portion of Little River and the Parker River, and initiate a dialogue with clammers to determine if they are interested in making use of additional shellfishery resources.
2. Continue researching the establishment of shellfish hatcheries and observing experiments that are potential restoration and aquaculture models for the region. Keep tabs on pilot seeding experiments in Gloucester, Rowley, and Ipswich for the successes and failures.
3. Reduce over harvesting by limiting the number of commercial permits issued during times of high market price, or by lowering the allowable take by a harvester. Alternatively, focus on seeding programs to help maintain the resource.
4. Decrease harvesting pressures by finding viable markets for green crabs.
5. Municipalities allocate time, money, and personnel to shellfish constables to continue and improve upon the restoration work such as harvest enforcement, predator reduction, and seeding programs.
6. Develop a regional approach to shellfish harvesting to leverage lower costs for restoration materials, and to improve success of restoration programs.
7. Create a more reliable shellfish data collection system that cross-checks data from transaction cards, constables' notes, and harvesters' notes.
8. Centralize water quality testing and shellfish population sampling results conducted by Woods Hole (MBL), Salem State University, DMF, CZM, and other groups to facilitate shellfish management.

3.3.3 Birds/Wildlife

Objectives

1. To protect and improve habitat for migratory shorebirds and indigenous wildlife.

Actions

1. Continue vigilance for protection of endangered species and migratory birds on beaches.
2. Implement boating restrictions along beaches to help manage shorebirds and increase areas of essential breeding/feeding habitats.
3. Protect areas between municipal and state owned lands to reduce habitat fragmentation. By identifying corridors between these areas, protect migratory routes.
4. Consider altering the mowing schedules on town-owned land where it is not completely necessary to mow before the fledgling period for field-nesting birds such as bobolink.
5. Address the contamination of food sources (particularly mercury concentrations) and the impact such contamination has upon efforts to repopulate native Rare, Threatened, or Endangered (RTE) Species such as the bald eagle.

3.3.4 Invasive Species

Objectives

1. To monitor/control the spread of exotic aquatic and wetland vegetation.

Actions

1. Focus *Phragmites* management on control rather than elimination. Total elimination is not likely and perhaps not even desirable from a wildlife management perspective. The best way to control this invasive species is to eliminate tidal restrictions; the need to periodically repair bridges and culverts provides an opportunity to make incremental changes over time.
2. Control noxious plant populations for Baldpate Pond, Central Street Pond, Lower Mill Pond (*T. natans*), Pentucket Pond (*C. caroliniana*), Sperry's Pond, State Street Pond (*C. caroliniana*), Upper Mill Pond, and Wilson Pond:
    a. For exotic aquatic plant species that are isolated to one or a few location(s), quick action is advisable to manage these populations in order to alleviate the need for costly and potentially fruitless efforts to do so in the future. Two courses of action should be pursued concurrently. More extensive surveys need to be conducted, particularly downstream from recorded locations, to determine the extent of the infestation. And, "spot" treatments (refer to the draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts [MDEP and MDEM 1998] for advantages and disadvantages) should be undertaken to control populations at these sites before they spread further. These treatments may be in the form of carefully hand-pulling individual plants in small areas. In larger areas, other techniques such as selective herbicide application may be necessary. In either case, the treatments should be undertaken prior to fruit formation and with a minimum of fragmentation of the individual plants. These cautions will minimize the spreading of the populations. This draft aquatic plant report (MDEP and MDEM 1998) should be consulted prior to the development of any pond management plan to control exotic aquatic plant species.
    b. To manage aquatic plant populations additional monitoring should be conducted to determine the extent of the problem. The draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (MDEP and MDEM 1998) should be consulted prior to the development of any pond management plan to control noxious aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should be discouraged because of the propensity for these plants to reproduce and spread vegetatively (from cuttings).
    c. Another important component of a management plan is prevention of further spreading of certain invasive plant species. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations occurring in unaffected areas (of this pond and to other ponds) and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert pond-users to the problem and responsibility of spreading these species.
    d. Educate the public as to the proper use of fertilizers, methods of yard waste disposal, etc. to minimize nutrient inputs that may contribute to excessive plant growth.
3. Determine the effectiveness of the herbicide treatment on the *C. caroliniana* infestation in Pentucket Pond. Prevent the further spread of *C. caroliniana* to unaffected areas (of this pond and to other ponds).
4. Institute a practice of long-term post-project monitoring to track the effectiveness of projects and site vegetation.
5. Promote the use of native species – rather than invasive species – for landscaping purposes in new developments. Native species do not use as much water as non-native species.

3.3.5 Bioassessments

Objectives

1. To identify suitable locations for habitat restoration.

Actions

1. Conduct benthic macroinvertebrate surveys to address the potential impacts of groundwater withdrawals on the aquatic community in this (freshwater) portion of the Parker River. Develop macroinvertebrate sampling methodologies that accurately assess biological conditions in low gradient, wetland-dominated stream systems.
2. Monitor Jackman Brook (macroinvertebrates and fish), in part to determine the long-term impacts from NPS pollution.
3. Conduct instream biological monitoring on the Egypt River, Rowley River, Mill River, and Parker River to determine the effects of water withdrawals on habitat and aquatic life.
4. Conduct aquatic habitat surveys along Penn Brook, the Parker River freshwater main stem, and Beaver Brook.
5. Conduct fish and macroinvertebrate sampling in Ox Pasture Brook.
6. Fish and birds need to be sampled frequently to relate population change to restoration activities.
7. Institute a practice of long-term post-project monitoring to track the effectiveness of projects and site vegetation.

3.3.6 Priority Habitats

Objectives

1. To identify, expand, and protect priority habitats within the Parker River watershed.

Actions

1. Certify vernal pools throughout the watershed. Vernal pools are a seasonal habitat for many species, including the Blanding's turtle. Certifying vernal pools may also help in land protection efforts.
2. Develop "green corridors" to connect wildlife management areas, state forests, and parcels owned by land trusts.
3. Engage the public in using yard space as habitat.
4. Review NHESP BioMap and Living Waters core habitats and focus protection efforts on these locations.
5. Use shoreline surveys to target riparian areas in need of restoration. Special attention should be paid to maintaining tributary spawning habitats.

3.3.7 Habitat/Species Restoration

Objectives

1. To improve degraded habitat and promote the development of sustainable natural communities within the Parker River watershed.

Actions

1. Continue studies on turtle habitat in the Parker River watershed. The 2nd largest population of Blanding's turtle is located in the Parker River watershed. Additional study on turtle passage (through culverts/tunnels) to ensure that turtles are not endangered by attempts to cross roads.

Cars are the primary reason for adult turtle mortality. Public awareness needs to be raised, and signage should be in place to warn drivers at known turtle crossing sites (particularly Route 97).
2. Plant submerged vegetation such as eelgrass to improve/restore shoreline habitat.
3. Reference marshes that serve as controls for natural year to year variation need to be included in the design of a watershed-wide monitoring program.
4. Remove granite blocks in the Egypt/Rowley River upstream from Route 1A, as these act as an obstruction during low and medium flows.

3.3.8 Plum Island Sound

Objectives

1. To monitor and restore salt marsh habitat in Plum Island Sound.

Actions

1. Institute a practice of long-term monitoring of tidal flux, and vegetative change at widened tidal restrictions.
2. Identify, prioritize, and implement projects to restore normal flow to tidal restrictions (such as undersized culverts or poorly designed bridges) in conjunction with the wetlands restoration group. Focus on high priority areas.
3. Monitor and manage invasions of *Phragmites* throughout the saltwater marsh.

3.3.9 Policy

Objectives

1. To facilitate habitat restoration and protection in the Parker River watershed, including Plum Island Sound.

Actions

1. Work with the Town of Rowley to reduce the number of domestic ducks on Central Street pond through sign posting and public education.
2. Increase volunteer opportunities for waterfowl monitoring and habitat restoration projects,
3. Promote the use of 300 foot wetland buffers for local conservation commission jurisdiction.
4. Consider movement of the 300 foot setback currently in the Board of Health Regulations in the Newbury zoning bylaws.
5. Extend the 300 foot setback to estuarine waters (it currently applies to only freshwater areas).
6. Review and implement updated Army Corps of Engineers stream crossing standards as a method of improving habitat connectivity in the watershed.

3.4 Open Space, Land Use, and Growth

Goal: Protect Open Space and Maintain Rural Landscape

Key Assessment Findings

The watershed is heavily forested with extensive salt marsh typifying the eastern portion. Land use in the watershed (shown in Figure 2.5-1) comprises 44 % forest, 16.9 % residential, 7.5 % agriculture, 1.9 % industrial/commercial, 3.4 % freshwater wetland, and 16.6 % saltwater wetland[15]. Large portions of the eastern salt marsh have been protected from further development, though this is not the case for much of the remaining undeveloped land in the watershed.

The MDCR manages six properties including Georgetown Rowley State Park (1,150 acres), Rowley State Forest (10 acres), Prospect Hill Recreation Area (90 acres), Baldpate Pond Sate Park (77 acres), Willowdale State Forest (800 acres), and Sandy Point State Reservation (73 acres). The USFWS operates the PRNWR (4,662 acres). The Trustees of Reservation (TTOR), a private land trust, owns Crane Beach (1,400 acres). Of the total 52,000 acres in the Parker River watershed there are approximately 15,000 acres (roughly 29% of the watershed) protected through public ownership or deed restriction. Nearly the entire Parker River watershed lies within the boundary of the Great Marsh Open Space Focus Area, and much of the coastal portion of the watershed is included in the Parker River/Essex Bay ACEC. The goal of designations is to foster innovative land conservation practices and to foster land conservation on a regional scale with an overarching goal of protecting and preserving some of the most pristine salt marsh habitat remaining in Massachusetts.

A primary regional concern is the effect of growth in the watershed. Between the years of 1991 and 1999, population in the watershed rose from 32,287 to 36,243 (a 15% increase, though Boxford experienced nearly a 44% growth over the same period). During this time, residential land use increased an average of 34% (increases of 25% to 60% occurred in 6 of 9 subwatersheds) while undeveloped land decreased an average of 2.5%[16]. Concerns over growth are compounded by the high water stress already evident in the watershed that will surely become worse as the watershed population increases. As shown in Table 3.4-1, considerable growth has occurred within the watershed, and additional growth is likely given the proximity of the watershed to Boston.

Table 3.4-1: Past and Expected Growth within the Parker River Watershed by Community

Community	Estimated Watershed Population 1991	Estimated Watershed Population 1999	Estimated Watershed Population Buildout	Growth from 1991 to 1999 (%)	Potential Growth to Buildout (%)
Georgetown	6,371	7,369	11,118	15.7	50.9
Rowley	4,225	5,071	10,963	20.0	116.2
Newbury	4,993	5,477	11,976	9.7	118.6
Newburyport	7,473	7,698	8,832	3.0	14.7
Ipswich	4,583	4,885	8,912	6.6	82.4
Groveland	2,007	2,249	3,653	12.0	62.5
West Newbury	910	1,070	3,268	17.5	205.5

[15] Land Use percentages derived from MassGIS 1999 Land Use coverage.

[16] Despite the apparent differences in percent change a review of data indicates that nearly all new residential land is converted undeveloped land. 1,107 acres of 2,572 acres of new residential land derived directly from undeveloped land lost from 1991 to 1999.

Community	Estimated Watershed Population 1991	Estimated Watershed Population 1999	Estimated Watershed Population Buildout	Growth from 1991 to 1999 (%)	Potential Growth to Buildout (%)
Boxford	1,541	2,224	3,394	44.3	52.6
North Andover	182	201	272	10.0	35.8

(Sources: EOEA 2005, MWI 2002, and UMass 2000)

To control growth and preserve open space, communities use a variety of planning tools such as local bylaws and ordinances. Other tools provided by the NHESP Living Waters and BioMap programs may be used by municipalities and private land trusts and non-profit organizations to identify the most important areas for land protection.

3.4.1 Open Space Plans

Objectives

1. To implement municipal open space plans and develop regional open space plans.

Actions

1. Inventory and prioritize open space needed for recreational use.
2. Integrate the separate Preservation and Water Quality strategies for Georgetown into a single prioritized control plan. Land of high resource value, which also impact on the quality of the water supply must be given highest priority for protection.
3. Consider passage of the Community Preservation Act (CPA) in order to aid protection of historical resources, protect additional open space, and create additional affordable housing.
4. Establish contacts to 61A property owners to allow discussion between boards when property becomes available.
5. Continue the planning for growth activities, including open space protection on a regional basis with an emphasis on the Great Marsh focus area. Watershed Open Space Committees (OSCs) need to establish joint open space protection projects.
6. Work with the Town of Rowley and OSC Network to identify and protect open space.
7. Work to implement open space protection strategies in the Parker River tidal subwatershed.
8. Investigate "green corridors" with limited use for development such as 1) the undeveloped land closest to I-95 and 2) greenway between Boxford State Forest and Georgetown-Rowley State Forest. Develop "green corridors" to connect wildlife management areas, state forests, and parcels owned by land trusts.
9. Support land protection and conservation efforts in the Common Pasture.
10. Develop a Parker River Open Space plan using prioritized NHESP BioMap and Living Waters Core Habitats, and continue to use Core Habitats in Open Space and Growth Plans at the town level.
11. Assess the potential threats to NHESP Living Waters Core Habitats, using NHESP's Critical Supporting Watershed Threats Assessment and site or species-specific information.
12. Adopt the Open Space Residential Bylaw developed and promoted by the MVPC and Audubon Society and extend it to all towns in the watershed.

3.4.2 Land Protection/Land Trusts

Objectives

1. To identify, acquire, and protect key parcels of land or easements.

Actions

1. Municipalities develop capacity to purchase land for conservation/recreational purposes and/or foster relationships with local non-profits – the Essex County Greenbelt Association (ECGA), TTOR, ECSA – so that protection priorities are known.
2. Identify and work to protect open space in Egypt/Rowley River subwatershed through conservation restriction and land acquisition.
3. Coordinate with open space committees, CZM Open Space Network, and Audubon Society to identify and protect open space land parcels in Beaver Brook sub-watershed.
4. Note that Wheeler Brook subwatershed is a good candidate for open space protection.
5. Develop public support to fund land banks.
6. PRCWA work with local non-profits (TTOR, ECGA, Mass Audubon, etc.) to identify key parcels of land for priority protection due to habitat, water supply and quality such as the Common Pasture, Little River, and "Turtleland" (Blanding's turtle population between Groveland, Georgetown, and Boxford).

3.4.3 Smart Growth

Objectives

1. To limit the adverse impacts of growth on the watershed.

Actions

1. Promote the use of native plants to reduce water consumption and to reduce the risk of introducing invasive species.
2. Promote Open Space Residential Development (OSRD) as a method of protecting habitat and open space in new residential developments.
3. Incorporate smart growth technologies (particularly Low Impact Development BMPs) in local development/redevelopment policies, plans, and regulations.

3.4.4 Policy

Objectives

1. To create incentives and use existing programs to preserve open space and farms.

Actions

1. MVPC and Mass Audubon work with Planning Boards and Master Plan Committees to integrate preservation strategy with zoning by-laws. Educate boards about overlay zoning, subdivision control and regulations, trade-offs and scenic or historic districts, etc.
2. Promote the use of a Regional Open Space and Planning Circuit Rider.
3. Assign liaisons to attend meetings of other boards, and to speak on behalf of the conservation commission.
4. Continue to draft, implement and uphold local wetlands regulations in support of the wetland by-laws.
5. Work with watershed Conservation Commissions to ensure that yearly budgets have adequate funding for access improvements.
6. Consider development of a regional Agricultural Commission similar in function to the agricultural commission in Rowley.

3.5 Recreation

Goal: Provide Safe Recreation and Public Access

Key Assessment Findings
The Parker River watershed, particularly Plum Island Sound, hosts a multitude of recreational activities including boating and sailing, angling, shellfishing, swimming, sunbathing, bird watching, kayaking and canoeing, hiking and walking, picnicking, hunting, site-seeing, and foliage watching. With many recreational activities available it is important to ensure that recreational users in the watershed protect the landscape and habitat.

3.5.1 Public Access Board Sites

Objectives
1. To improve public access to the freshwater and tidal portions of the Parker River, its tributaries, and Plum Island Sound.

Actions
1. Improve public access by creating additional canoe/kayak put-ins, particularly at the Route 1A Bridge overpassing the parker River in Newbury, and at Central Street in Byfield.
2. Post boat access points with signs to inform and alert pond-users to the problem and responsibility of spreading this exotic species.
3. Post the results of water quality monitoring for use by recreational bathers.
4. Formalize access points such as at Route 1 over the Mill River where access is currently down a steep slope.

3.5.2 Greenway Trails

Objectives
1. To develop trails in and interpretive materials for the Parker River watershed.

Actions
1. Rank trails for degree of difficulty based on pitch and substrate for use by wheelchairs, and walking aids.
2. Investigate the feasibility of using Youth Corp work programs to build and maintain trails, structures, and facilities on conservation lands.
3. Create and make available, trails maps for all trails within the Parker River watershed.
4. Work with Americans with Disabilities Act (ADA) representatives to ensure all ADA laws are being met.
5. Make a list of areas needing ADA accessibility and initiate a strategy to create ADA accessibility for designated areas.
6. Develop a written Trail Plan, defining available trails, trail expansion, and trail maintenance requirements. Draft and publish an "Interpretive Trail Map" for public use.

3.5.3 Policy

Objectives
1. To engage recreational users of the Parker River watershed in watershed stewardship.

Action

1. Support boat pump-out programs on Plum Island Sound and on two tributaries (Pine and Grape Island Creeks) to Plum Island Sound to reduce impacts from increased boat usage.
2. Improve enforcement and education of the "no wake zone" to reduce recreational boating impacts. Enforcement efforts can be implemented and improved by advocating for a full time harbormaster and staff in each town while an education brochure would increase the public's awareness and understanding of this designated area.
3. Develop a website to inform recreational users of current activities and conditions in the watershed including fish stocking, status updates on shellfishing beds, events, boat launch locations, trail maps, weather updates, and links to local companies.

3.6 Policy, Outreach, and Education

Goal: Raise Public Consciousness through Public Outreach and Coordinate Policy to Enhance Watershed Restoration/Improvement

Key Assessment Findings

While many studies and restoration projects have been undertaken by municipalities, PRCWA, MBL, UNH, CZM, DMF, MDEP, and private organizations, there is no coordinator directing protection and restoration projects in the Parker River watershed. Parker River watershed studies have been abundant during the development of this WAP; however, they are spread across many agencies, municipalities, and private organizations. Lack of coordination and regional watershed planning involving active parties in the watershed inhibits long-term monitoring, local planning, and future studies. Standardization and centralization of watershed data collected during monitoring and restoration projects may promote a better regional understanding of the watershed and better interpretation of data collected during long-term monitoring. Additionally, centralization of monitoring and enforcement activities may produce some cost savings.

To further policy objectives will require that residents of the watershed understand and support policy directed at conservation and protection of watershed resources. Unfortunately, public outreach and education are difficult to implement on a local scale, requiring a degree of regional standardization to ensure that residents and users are not confused (i.e. employ similar signage directed at recreational users in all watershed towns). Because outreach can also be difficult to sustain or even fund, it may be beneficial to direct outreach towards providing benefits (i.e. cost savings) to watershed residents. In coordination with public outreach, a regional program of education for youth and municipal officials will give rise to a long-lasting public consciousness regarding conservation issues.

3.6.1 Policy

Objectives

1. To promote effective communication between parties in the watershed and to increase the efficiency of watershed restoration and protection activities.
2. To provide continuity, coordination, and leadership for the Parker River watershed in implementing the actions of this WAP.

Actions

1. Plum Island Sound receives the flow from the waters in the Parker River Watershed (e.g., Plum Island, Little, Parker, Mill, Rowley, Egypt, and Eagle Hill rivers). Therefore, in the next review of the SWQS (Surface Water Quality Standards), classify the Plum Island Sound as a waterbody in the Parker River Watershed, not the Merrimack River Basin.
2. Set up an "adaptive management system" with input from multiple sources (MBL, residents, State agencies, municipal boards). The best way to do this would be to convene a regional symposium each year or two where recent research can be presented and the implications to management practices discussed.
3. Review the PRNWR Habitat Management Plan when released and consider applying similar management practices throughout the watershed, if applicable.
4. Take full advantage of the Scenic Roads Act. The Scenic Roads Act gives local planning boards more power to protect the "scenic quality and character of Town roads". (Office of the Attorney General of Massachusetts website).

5. Consider the creation of an Estuarine Plan Coordinator (part time) to assist in implementation of recommended actions of the management plan, and the development of an ACEC-wide management plan.
6. Improve coordination of restoration partners for permit review, enforcement, monitoring, and translation of monitoring results to local officials. The relationship between restoration partners and regulators can be improved by better articulation of project expectations and outcomes.
7. Hire additional staff to implement and enforce conservation/restoration bylaws and ordinances.
8. Work to implement and enforce growth management bylaws and regulations related to subdivision development, stormwater management, and wetlands protection to reduce non-point source pollution.
9. Develop an ACEC Estuary Management Plan.
10. Continue to regularly convene meetings of the ACEC steering committee (Newbury) and expand to other watershed towns. This will maintain momentum generated by the assembly of the management plan.
11. All groups with data and studies pertaining to the Parker River watershed should present these works to the PRCWA for the purpose of developing a centralized and current library for use in planning and implementing future restoration efforts.
12. CCs and OSCs for all Parker River watershed towns should work to develop ties with the PRCWA, and, insomuch as possible, aid the PRCWA in fundraising to cover costs for its water quality monitoring and public outreach programs.

3.6.2 Academic Involvement

Objectives

1. To improve monitoring and analytical resources available to study the Parker River watershed.

Actions

1. Academic involvement in salt marsh research needs to be strengthened. Currently, MBL and UNH are the primary academic institutions doing comprehensive studies in the marsh. One way to increase academic research is to promote the salt marsh ecosystem as a site for graduate student studies.
2. Improve communication and coordination between MBL, towns, agencies, and residents.

3.6.3 Economic Issues

Objectives

1. To improve the economic resources available for watershed protection and restoration activities.

Actions

1. Buying locally can make farms more prosperous reducing the amount of land needed for farming… get the public involved in buying locally. (Agriculture Sustainability for Essex County website www.buyfresh.org).
2. Apply for grants from the Essex National Heritage Commission for implementation of protection of historic, cultural, scenic and archaeological resources. Explore the possibility of developing a strong relationship between the Essex National Heritage Commission and the PRCWA.
3. Promote agricultural preservation with the Agricultural Preservation Restriction (APR) program.
4. Allocate funding to implement the hydrology and hydraulics study of the Little River for the purpose of investigating and correcting flooding problems in the Industrial Park. Flooding is costly to businesses located in the Industrial Park and is also a water quality hazard.

5. Promote formation of a regional Agricultural Commission to serve as a liaison between the farming community and local boards and regulatory agencies.

3.6.4 Public Outreach/Discussion

Objectives

1. To involve watershed residents in restoration activities, and to promote stewardship of watershed resources.

Actions

1. Initiate Public Outreach to a variety of targeted audiences (schools, business communities, local officials, homeowners, recreational users, etc.) through presentations, handouts, signage, hikes and tours that address the following issues:
    a. The dependence of juvenile fish on salt marsh habitats, and the effects of eutrophication on spawning habitats;
    b. The connection between inshore and offshore fisheries (e.g. estuary acts as a nursery for offshore species). Relate the impact to a larger system (e.g. marine fisheries) if inshore waters are properly managed and restored;
    c. How to minimize attraction of flocks of birds and other wildlife so as to decrease fecal coliform levels;
    d. The use of backyards as wildlife habitat (e.g. manicured lawns are not as good as native plants, how to protect nesting birds, etc.);
    e. The problems caused by invasive plant species and the need to properly clean boats to avoid infestations;
    f. The effects of riparian buffer disturbance;
    g. Septic system maintenance and its relationship to larger issues (bacteria) in Plum Island Sound;
    h. Boat waste management and the importance of using pumpout facilities;
    i. The effects of kayaking/canoeing in shallow channels bordering Plum Island Sound;
    j. The proper use of fertilizers, methods of yard waste disposal, etc. to minimize nutrient inputs that may contribute to excessive plant growth;
    k. Home water conservation methods, low flow technologies, and the pay-back period for investing in these methods and products; and,
    l. Use of low impact techniques such as LID, green/native landscaping, etc. to decrease water use, improve water quality, and prevent spread of invasive species.
2. PRCWA address public outreach activities towards municipal officials relative to water use, land conservation, planning, etc.
3. Use existing restoration sites such as Newman Rd. (removal of tidal restriction by TTOR) for educational viewing, tours, hikes, etc.
4. Work with the PRCWA to identify causes and sources of contamination, conduct stream cleanups, and encourage/strengthen local stewardship.

4.0 Action Matrix

This matrix lists the goals, objectives, and action strategies described in Section 3.0 that are most critical to the watershed. . In addition to actions, goals and objectives, the proposed lead parties for each action, a potential funding source, the priority level, and the timeframe over the next 5 years for implementing each action are described. More information on potential funding sources is listed in Section 5.0. In some cases, the agency or entity proposed as the lead party is likely to be able to conduct the action as part of its operating budget and/or through volunteers; in such cases the funding source is listed as "General Fund". Also, note that all actions listed throughout this watershed action plan are eligible for an EOEA Watershed Improvement Grant.

It is important to understand that while priority ratings of HIGH, MODERATE, and LOW are indicated for actions in the matrix, all of the actions contained in this section were selected by Steering Committee members as high priority actions. Priority ratings of HIGH indicate that actions: 1) have a great potential effect, 2) are not possible without considerable funding, or 3) need to be completed before other important actions can take place. Priority ratings of MEDIUM (MED) and LOW indicate that actions: 1) may be undertaken without substantial monetary input, 2) affect a limited area of the watershed, or 3) must have other actions completed to be undertaken properly.

The Start Date indicates the time period when an action is likely to begin through its completion. This column may also indicate that an action is likely to be ongoing throughout this 5-year cycle and into the next (particularly for outreach activities). Many actions slated to begin in 2008 and 2009 require other priority actions to be completed before these can be successfully implemented. For example, shoreline surveys must be undertaken before shoreline restoration, and tidal restrictions must be identified before they may be corrected. The Start Date given in the Action Matrix is tentative, depending upon the availability of funding and action by the lead party.

Action Strategy	Lead Party	Funding Source	Priority	Start Date				
				2006	2007	2008	2009	2010
Goal: Maintain Instream Flow and Evaluate Water Use								
Objective: To establish minimum flow requirements below water withdrawal locations (under the WMA purview) that have a hydraulic connection to the Parker River or tributary.								
Perform an Instream Flow study for freshwater portions of the Egypt/Rowley River and the Parker River including its major tributaries.	EOEA, MDEP	MDEP Section 319, 604(b)	HIGH					
Objective: To require water users that are subject to the WMA to identify their impacts on low flows through flow monitoring above and below their withdrawal location.								

Action Strategy	Lead Party	Funding Source	Priority	Start Date
MDEP should consider effects of streamflow depletion caused by water withdrawals in its review and renewal of WMA permits, and should recommend minimum and seasonal flows.	MDEP	General Fund	MED	
MDEP should use the WMA permit process to require water users to develop and implement water conservation and drought management plans.	MDEP	General Fund	MED	
Through the permitting process for IWD's proposed withdrawal from the Rowley River subwatershed, determine the potential impacts on streamflow/habitat.	MDEP, IWD	General Fund	HIGH	
MDEP should require all golf courses to apply for WMA permits.	MDEP	General Fund	LOW	
Objective: To identify and investigate out-of-basin water transfers which result in a loss of water from the basin.				
Complete the Parker River Water Budget Study that is slated for completion between 2006 and 2007.	EOEA	General Fund	HIGH	
Objective: To balance demand with the safe yield of the Parker River watershed and to predict how potential future development may further deplete streamflow.				
Perform a safe yield analysis on the Parker River watershed including consideration of water withdrawals subject to high rates of evaporation.	EOEA, PRCWA	EPA – Targeted Watershed Initiative	HIGH	
Objective: To promote water conservation among water suppliers and watershed residents.				
Investigate available conservation technologies and methods and make this information available to watershed residents and businesses.	Municipality, CC, PRCWA	NRCS – RC&D Program, Watershed Surveys and Planning	LOW	
All Parker River watershed towns review the water conservation bylaws (requiring private wells to adhere to the same restrictions as public wells) passed by Middleton, MA and consider these bylaws for implementation.	Municipality, CC	General Fund	MED	
Objective: To mitigate the effects of stormwater runoff.				
MDEP should conduct inspections on facilities with general stormwater permits to determine if stormwater protection plans have been developed and implemented.	MDEP	MDEP – Section 319, Section 604(b)	HIGH	
Improve implementation of stormwater BMPs throughout the Parker River watershed. With the implementation of the Phase II stormwater management plans, there is an opportunity to encourage the use of BMPs in many areas and thus improve water quality.	MDEP, EPA	MDEP – Section 319, Section 604(b)	MED	

Action Strategy	Lead Party	Funding Source	Priority	Start Date
Implement an ordinance that requires the outflow hydrograph of a new development to remain unchanged from its undeveloped (natural) state.	MDEP, Municipality, CC	MDEP – Section 319, Section 604(b), General Fund	MED	
Goal: Protect and Improve Water Quality in the Watershed				
Objective: To locate funding to support continued water quality monitoring (macro/fish, water chemistry and flow) focusing on areas identified in the EOEA watershed assessment report and the MDEP Water Quality Assessment Report.				
Objective: To address sediment and nitrogen loading within the watershed.				
Take action to improve water quality of Little River and Mill River. In the Little River pay special attention to the proposed Little River Transit Village situated between Newbury and Newburyport.	PRCWA, MDEP, Municipality, CC	MDEP –Clean Water Revolving Fund, Section 604(b), 104(b), Section 319	MED	
Public water suppliers should review the MDEP DWP Source Water Assessment Program (SWAP) evaluations when they are completed to develop and implement recommendations for the protection of Class A waters in the Parker River Watershed, including Bull Brook and Dow Brook reservoirs and tributaries thereto.	PWS, PRCWA	MDEP –Drinking Water Revolving Fund, Source Water Protection Program, Well Head Protection Grant, Section 319	LOW	
MDEP should provide assistance remediating hot spots where monitoring consistently indicates elevated pollutants: Little River, Mill River, Ox Pasture Brook (agricultural and industrial pollution sources) as well as Governor Dummer Academy WWTF.	MDEP	MDEP –Clean Water Revolving Fund, Water Quality Management Planning Grant, Section 319, MDAR – Agr. Env. Enhancement Program	HIGH	
Help fund the PRCWA water quality program (currently unfunded). Other funding sources need to be identified to assist the PRCWA in funding its water quality initiatives.	MDEP, EOEA	MDEP –Clean Water Revolving Fund, 104(b)	HIGH	
Objective: To assess Designated Uses within the Parker River watershed and to address documented impairments.				
Conduct a preliminary analysis to prioritize the need for collecting quality assured data to fully assess all designated uses of reaches in the Parker River Watershed.	PRCWA, MDEP	MDEP – Section 319	MED	
Objective: To identify and address non-point source (NPS) pollution in the Parker River watershed.				
Municipalities work with MVPC to implement their management recommendations from the NPS assessment of the Little River.	Municipality, CC	CZM – Coastal Pollutant Remediation Grant, Coastal NPS Pollution Grant, MDEP – Sec. 319	HIGH	
Objective: To identify land-based water quality hot spots.				

Action Strategy	Lead Party	Funding Source	Priority	Start Date
Stream teams conduct stream shoreline and physical habitat surveys along the Parker River and its tributaries (Penn Brook, Wheeler Brook, Little River, and Beaver Brook) and the Egypt/Rowley River and its tributaries.	PRCWA, Local Volunteers	NRCS – Watershed Operations (Small Watershed Program)	MED	
Objective: To centralize access to watershed studies and restoration information.				
Create a web-based watershed restoration inventory containing basic information on any potential restoration projects as well as all available data and studies.	PRCWA	NOAA – CRP	MED	
Objective: To assist all Parker River watershed towns in repair of failing septic and sewer systems.				
Assist the Towns of Rowley, Newbury, Newburyport, and other towns in repair of suspected failing septic and sewer systems. Inspect the sewer system in the Newburyport Industrial Park for leaks/breaks and other pollution sources.	MDEP	Community Septic Management Program, Watershed Project Financing and Construction, MDEP – Section 319	MED	
Investigate the availability of low-interest loans for upgrades to septic systems throughout the Parker River watershed.	Municipality, Health Dept., MDEP	Community Septic Management Program, MHFA – Homeowner Septic Repair Loan Program	MED	
Promote local Board of Health adoption and use of Septic Manager, an MS Access-based electronic data management system developed by MVPC and CZM to enhance Title 5 information record-keeping, tracking, and analysis.	CZM, MVPC	Community Septic Management Program	LOW	
Objective: To study and improve ecosystem health in Plum Island Sound.				
Work with residents, MBL researchers, and state agencies to identify areas of marsh degradation and create a monitoring plan for passively and actively managed sites.	MBL, CZM, Private Groups	NOAA – CRP	MED	
Objective: To develop and implement policy that facilitates watershed management and restoration.				
Submit a 319 non-point source implementation grant for the Little River in Newbury and Newburyport.	MVPC, PRCWA, Municipality, CC	MDEP – Section 319	HIGH	
Goal: Protect and Enhance Habitat within the Watershed, and Restore and Improve Stream Continuity and Aquatic Habitat in Freshwater and Tidal Portions of the Watershed				
Objective: To improve fisheries resources within the Parker River watershed and in nearby coastal waters.				
Monitor status of Rainbow smelt, American eel, and anadromous fish to enhance ACEC management and to improve smelt habitat.	CZM, PRCWA, MDEP, DFWELE	General Fund	LOW	

Action Strategy	Lead Party	Funding Source	Priority	Start Date
Work with the MDCR to monitor dam safety and/or removal issues including the need for fish passage facilities in the Parker River Watershed.	MDCR, PRCWA, CZM, DFWELE	NRCS – WHIP, NOAA – CRP, NOAA Partnerships, Direct Solicitation, USFWS – Fish Passage Funding	HIGH	
Objective: To rehabilitate shellfish resources in Plum Island Sound and its tributaries.				
Reduce over harvesting by limiting the number of commercial permits issued during times of high market price, or by lowering the allowable take by a harvester. Alternatively, focus on seeding programs to help maintain the resource.	CZM, MDEP, DFWELE	NRCS – Watershed Operations (Small Watershed Program), NOAA - CRP	MED	
Develop a regional approach to shellfish harvesting to leverage lower costs for restoration materials, and to improve success of restoration programs.	Municipality, CZM	NRCS – Watershed Operations (Small Watershed Program)	LOW	
Objective: To protect and improve habitat for migratory shorebirds and indigenous wildlife.				
Implement boating restrictions along beaches to help manage shorebirds and increase areas of essential breeding/feeding habitats.	Municipality, CC, CZM	NOAA – CRP	MED	
Protect areas between municipal and state owned lands to reduce habitat fragmentation. By identifying corridors between these areas, protect migratory routes.	Municipality, OSC, MDEP, Private Land Trusts, CC, PRCWA	NOAA – CRP, NRCS – RC&D Program	HIGH	
Objective: To monitor/control the spread of exotic aquatic and wetland vegetation.				
Focus *Phragmites* management on control rather than elimination. The best way to control this invasive species is to eliminate tidal restrictions.	MDEP, EOEA, PRCWA, CC	CWRP, CZM – Wetlands Restoration Prog., NRCS – Watershed Operations MDCR – Lake and Pond Grant, MDEP – Sec. 319, 104(b)	MED	
Control noxious plant populations for Baldpate Pond, Central Street Pond, Lower Mill Pond (*T. natans*), Pentucket Pond (*C. caroliniana*), Sperry's Pond, State Street Pond (*C. caroliniana*), Upper Mill Pond, and Wilson Pond.	MDCR, MDEP, Municipality, CC	CWRP, CZM – Wetlands Restoration Prog., NRCS – Watershed Operations MDCR – Lake and Pond Grant, MDEP – Sec. 319, 104(b)	LOW	
Objective: To identify, expand, and protect priority habitats within the Parker River watershed.				
Certify vernal pools throughout the watershed. Vernal pools are a seasonal habitat for many species, including the Blanding's turtle. Certifying vernal pools may also help in land protection efforts.	Municipality, CC, PRCWA, Mass Audubon	NOAA – CRP, MDEP – Sec. 104(b)	MED	

Action Strategy	Lead Party	Funding Source	Priority	Start Date
Review NHESP BioMap and Living Waters core habitats and focus habitat protection efforts on these locations.	NHESP, PRCWA, CC, Private Land Trusts	General Fund	LOW	
Objective: To improve degraded habitat and promote the development of sustainable natural communities within the Parker River watershed..				
Continue studies on turtle habitat in the Parker River watershed. Public awareness needs to be raised, and signage should be in place to warn drivers at known turtle crossing sites (particularly Route 97).	PRCWA, Municipality, CC, NHESP	NOAA – CRP	LOW	
Plant submerged vegetation such as eelgrass to improve/restore shoreline habitat.	PRCWA, MDEP, CZM	NOAA – CRP, CWRP, NFWF Five-Star Restoration Grants, MDEP – Sec. 104(b)	MED	
Objective: To monitor and restore salt marsh habitat in Plum Island Sound..				
Identify, prioritize, and implement projects to restore normal flow to tidal restrictions (such as undersized culverts or poorly designed bridges) in conjunction with the wetlands restoration group. Focus on high priority areas.	MDEP, EOEA, CZM, NHESP, Municipality, MHD	CWRP, CZM – Wetlands Restoration Prog., NRCS – Watershed Operations	HIGH	
Goal: Protect Open Space and Maintain Rural Landscape				
Objective: To implement municipal open space plans and develop regional open space plans.				
Consider passage of the Community Preservation Act (CPA) in order to aid protection of historical resources, protect additional open space, and create additional affordable housing.	Municipality, MDAR, Private Land Trusts, Audubon Society	General Fund	LOW	
Continue the planning for growth activities, including open space protection on a regional basis with an emphasis on the Great Marsh focus area. Watershed Open Space Committees (OSCs) need to establish joint open space protection projects.	Municipality, OSC, PRCWA	EOEA – Planning for Growth Grants, Self Help Program, Urban Self Help Program	MED	
Objective: To identify, acquire, and protect key parcels of land or easements.				
PRCWA work with local non-profits (TTOR, ECGA, Mass Audubon, etc.) to identify key parcels of land for priority protection.	PRCWA, CC, OSC, Private Land Trusts	NRCS – RC&D Program, APR, Env. Enhancement Program	LOW	
Objective: To limit the adverse impacts of growth on the watershed.				
Promote Open Space Residential Development (OSRD) as a method of protecting habitat and open space in new residential developments.	Municipality, OS Network, OSC, CC	General Fund	HIGH	

Action Strategy	Lead Party	Funding Source	Priority	Start Date
Incorporate smart growth technologies in local development/redevelopment policies, plans, and regulations.	Municipality, CC, OSC, PRCWA, MVPC	NRCS – Watershed Operations, RC&D Program	HIGH	
Objective: To create incentives and use existing programs to preserve open space and farms.				
MVPC and Mass Audubon work with Planning Boards and Master Plan Committees to integrate preservation strategy with zoning by-laws.	MVPC, Mass Audubon, CC, Municipality	General Fund	MED	
Goal: Provide Safe Recreation and Public Access				
Objective: To improve public access to the freshwater and tidal portions of the Parker River, its tributaries, and Plum Island Sound.				
Improve public access by creating additional canoe/kayak put-ins.	PRCWA, MDCR, Municipality	NRCS – Watershed Operations	LOW	
Objective: To develop trails in and interpretive materials for the Parker River watershed.				
Develop a written Trail Plan, defining available trails, trail expansion, and trail maintenance requirements. Draft and publish an "Interpretive Trail Map" for public use.	PRCWA, MDCR, OSC, Municipality	MDCR – Rec. Trails Program, Greenways and Trails Demo Grants, MDCR – Urban Forest Planning and Ed. Grants, NRCS – Watershed Operations	LOW	
Objective: To engage recreational users of the Parker River watershed in watershed stewardship.				
Support boat pump-out programs on Plum Island Sound and on two tributaries (Pine and Grape Island Creeks) to Plum Island Sound to reduce boating impacts.	PRCWA, CZM, Municipality	NRCS – Watershed Operations, MDEP – Sec. 319	MED	
Goal: Raise Public Consciousness through Public Outreach and Coordinate Policy to Enhance Watershed Restoration/Improvement				
Objective: To promote effective communication between parties in the watershed and to increase the efficiency of watershed restoration and protection activities.				
Consider the creation of an Estuarine Plan Coordinator (part time) to assist in implementation of recommended actions of the estuarine management plan, and the development of an ACEC-wide management plan.	CZM, Municipality, CC, OSC	General Fund	MED	
Develop an ACEC Estuary Management Plan.	CZM, Municipality, CC	General Fund	LOW	

Action Strategy	Lead Party	Funding Source	Priority	Start Date
Work to implement and enforce growth management bylaws and regulations related to subdivision development, stormwater management, and wetlands protection to reduce non-point source pollution.	MVPC, Municipality, CC, OSC, PRCWA	General Fund	HIGH	
Objective: To improve the economic resources available for watershed protection and restoration activities.				
Promote formation of a regional Agricultural Commission to serve as liaison between farming community and local boards and regulatory agencies.	Municipality, CC, OSC, MDAR	General Fund	LOW	
Allocate funding to implement the hydrology and hydraulics study of the Little River for the purpose of investigating and correcting flooding problems in the Industrial Park. Flooding is costly to businesses located in the Industrial Park and is also a water quality hazard.	PRCWA, MDEP, EOEA, Newbury, Newburyport	MDEP – Sec. 104(b), Demo Project Grant, MDHCD – CDAG Program, MA Revolving Loan Program – Watershed Project Financing and Construction	HIGH	
Initiate Public Outreach to a variety of targeted audiences (schools, business communities, local officials, homeowners, recreational users, etc.) through presentations, handouts, signage, hikes and tours.	PRCWA, MDEP, CZM, MBL, Municipality, CC, OSC	Mass Env. Trust – Env. Grants, MDCR – Urban Forest Planning and Ed. Grants	LOW	
Objective: To involve watershed residents in restoration activities, and to promote stewardship of watershed resources.				
PRCWA address public outreach activities towards municipal officials relative to water use, land conservation, planning, etc.	PRCWA	MDHCD – Municipal Incentive Grant Program	MED	

5.0 Potential Funding Sources

The funding sources presented herein represent a selection of some of the more common grants and funding opportunities available to agencies, municipalities, citizen groups, and individuals for restoration and conservation projects. Many more funding opportunities exist and may be located easily via an internet search, or by visiting some of the websites listed within the section. Funding availability is not guaranteed for those programs listed in this Section as this may change year-to-year. All projects listed in the Parker River WAP are eligible for EOEA's Watershed Improvement Grant, so it is presented first; all other grants and funding opportunities are presented alphabetically.

EOEA – Watershed Improvement Grants
Contact: Vandana Rao, (617) 626-1248, vandana.rao@state.ma.us
Summary: EOEA provides funding through this grant to complete projects designed to achieve the restoration and preservation of water and/or land resources, consistent with EOEA Watershed Action Plans.
Eligibility: Open to public and private entities, but projects must have been cited in an EOEA-accepted Watershed Action Plan.

American Sportfishing Association's FishAmerica Restoration Grants
NOAA partners with FishAmerica to fund marine and anadromous fish habitat restoration projects which benefit recreationally fished species around the coastal U.S. During open announcements, applications should be directed to the FishAmerica Foundation. FishAmerica requests that applicants strive for a 1:1 non-federal match (cash or in-kind) on project proposals.
Contact: Johanna Laderman
http://www.fishamerica.org/faf/grants/index.html
Closing February 25, 2005

Boat U.S. Foundation – Clean Water Grants
Contact: Joni Turken, Grant Administrator, e-mail: JoniT@BoatUS.com
Summary: In 1998, the Foundation launched the Clean Water Grants Program to support community-based boater education and hands-on efforts aimed at cleaning up our waterways. Emphasis will be placed upon funding innovative ways to reach boaters and anglers with positive messages about preventing pollution before it starts. The Clean Water Grants Program is designed to fund projects that educate boaters about environmental stewardship, or that inform the public of related events or programs. Projects should reflect a unique and repeatable way to reach the public with clean water messages. Allowable expenses may include artwork, printing, mailing, educational materials, construction materials, etc.
$ Range: Grants up to $2,000 are awarded to groups nationwide for one-year projects. The grant recipient is not required to provide matching funds. However, the Foundation requires that its grant represent at least 50% of a project's budget. Proposals that include in-kind donations of product and/or time are encouraged. A grantee must keep accurate accounting records and must maintain the reporting schedule as specified in the grant agreement. Surplus funds are to be returned to the Foundation unless otherwise authorized.
Eligibility: Volunteer boating groups, clubs, and associations, local non-profit/tax-exempt organizations, including chapters of national organizations
Schedule: Check the following website for updates: http://www.boatus.com/cleanwater/grants/

Community Septic Management Program
Contact: Central Regional Office:
Joanne Kasper-Dunn (508) 792-7653 x3763, e-mail: joanne.kasper@state.ma.us
Western Regional Office:

Deirdre Cabral (413) 784-1100 x2148, e-mail: deirdre.cabral@state.ma.us
Summary: Loans for septic system planning and improvements.
Eligibility: Municipalities
Match: None
$ Range: This program has already undergone two rounds of funding. Every community was given a chance to participate during the years 1996-1998. Currently available option: possible grant (up to $15,000) to develop a regional or watershed based septic system management plan. Upon completion of the plan the municipality would receive a minimum $200,000 loan for upgrades. If the community is already participating in the program, and can demonstrate a need for additional funds, then the Regional Coordinator must be contacted through an "Expression of Interest".
Schedule: For new applicants: A two page "Expression of Interest" is required. Call the Regional coordinator for the current schedule.

Cooperative Institute for Coastal and Estuarine Environmental Technology
The Cooperative Institute for Coastal and Estuarine Environmental Technology supports the scientific development of innovative technologies for understanding and reversing the impacts of coastal and estuarine contamination and degradation.
See CICEET web site for information on 2005 funding availability. http://ciceet.unh.edu/

Corporate Wetlands Restoration Program (CWRP)
Contact: Susan Redlich, CWRP Manager, (617) 287-5568, susan.redlich@umb.edu
Summary: The Massachusetts Corporate Wetlands Restoration Partnership (CWRP) is a voluntary public-private partnership to restore degraded freshwater and coastal wetlands in Massachusetts. Under the direction of the MA-CWRP Board, private contributions of funds and technical services are targeted for the restoration of wetland sites and aquatic habitats that have been degraded by fill, restricted water supply, non-point source pollution, and dams. Donated funds and services can often attract matching federal and/or state funds at a favorable ratio. Massachusetts CWRP Partners include private sector firms, the Massachusetts Executive Office of Environmental Affairs (EOEA), the federal office of the Coastal America Partnership (representing 13 federal departments and agencies), non-profit organizations, and academia.
Eligibility: Typically, environmental agencies bring priority restoration project options before the CWRP Board. The Board approves projects for contributions of funding and/or services to the Coastal America Foundation, a 501 (c) (3) organization.
http://www.mass.gov/envir/mwrp/cwrp

CZM – Coastal Nonpoint Source Pollution Grant Program
Contact: Julie Conroy, CPR Coordinator, (617) 626-1235 or julie.conroy@state.ma.us
Summary: Grants issued under the Coastal NPS Grant Program serve to implement portions of the Massachusetts Coastal Nonpoint Source Control Plan. The Plan includes measures to address nonpoint source pollution problems from each of the following sources: urban areas, marinas and recreational boating, agriculture, forestry, hydromodification, wetlands, and riparian areas. The RFR will be posted on Comm-PASS, located at http://www.comm-pass.com/. Municipalities are strongly encouraged to solicit input from CZM on proposal development prior to the release of applications.
Eligibility: The Coastal NPS grant program is open to Massachusetts public or 501(c)(3) certified non-profit organizations, including, but not limited to: cities and towns, regional planning agencies, watershed organizations, and public schools. Projects must be located within the boundaries of the Massachusetts coastal watershed.
$ Range: Not currently funded. Typical project awards range from $5,000 to $50,000.
Schedule: CZM will issue a Request for Response (RFR) for Coastal NPS during the late spring of each year. When issued, the RFR, with an enclosed application, is posted on the Commonwealth of Massachusetts Procurement Access & Solicitation System, at www.comm-pass.com. In addition, pre-

RFR informational meetings are held prior to the issuance of the RFR (typically in May) to discuss potential proposals. Potential respondents are encouraged to attend the Pre-RFR meeting, particularly since CZM can only offer general information to respondents while the RFR is posted.

CZM – Coastal Pollutant Remediation Grant Program
Contact: Julie Conroy, CPR Coordinator, (617) 626-1235 or julie.conroy@state.ma.us
Summary: The Coastal Pollutant Remediation (CPR) grant program, which is administered by the Massachusetts Office of Coastal Zone Management (CZM), allows the Commonwealth to assist communities in their coastal nonpoint source (NPS) pollution control efforts. Established by the State Legislature and funded through the Environmental Bond Bill, the CPR grant program serves to implement portions of the Massachusetts Coastal Nonpoint Source Control Plan. In addition, the CPR grant program complements the Commonwealth's Stormwater Management Policy, serving as a significant source of funding available to communities. The RFR will be posted on Comm-PASS, located at http://www.comm-pass.com/. Municipalities are strongly encouraged to solicit input from CZM on proposal development prior to the release of applications.
Eligibility: Eligible municipalities are those located in the Greater Massachusetts Coastal Watershed, which encompasses 220 cities and towns in eastern Massachusetts.
$ Range: 75% of total project cost
Schedule: Each spring, eligible municipalities will receive an announcement of the next grant round. Proposals are due to CZM in mid-spring, and grants are awarded in the summer.

CZM – Wetlands Restoration Program Grants for Priority Projects
Contact: Bruce Carlisle, (617)626-1205, bruce.carlisle@state.ma.us
Summary: The mission of the Wetlands Restoration Program is to help people voluntarily restore the state's degraded and former coastal wetlands and the invaluable services they provide. Working with many federal, state, and local partners, WRP pursues this mission with activities in the following core program areas: partnerships, project implementation, restoration planning, education and outreach, and monitoring.
Eligibility: Open to any Massachusetts public or 501(c)(3) certified non-profit organization, including, but not limited to state agencies, cities and towns, regional planning agencies, watershed organizations, and public schools.
Criteria: The proposed work must be done on Wetlands Restoration Program Priority Projects—these have been designated through an annual open and competitive call for nominations.
www.mass.gov/czm/wrp/projects_pages/priority_projects.htm or www.mass.gov/czm/wrp/index.htm

EOEA-Massachusetts Executive Order 418-Community Development Planning
On January 21, 2000, Governor Paul Cellucci and Lieutenant Governor Jane Swift issued Executive Order 418, a measure designed to help communities plan for new housing opportunities while balancing economic development, transportation infrastructure improvements and open space preservation. Executive Order 418 directs the Department of Housing and Community Development, the Executive Office of Environmental Affairs, the Executive Office of Transportation and Construction and the Department of Economic Development to provide assistance to cities and towns for community planning. The order makes available up to $30,000 in planning services to each of the 351 cities and towns in Massachusetts for the creation of a Community Development Plan.

EOEA-Planning for Growth Grants
Contact: Kurt Gaertner: (617) 626-1154 or kurt.gaertner@state.ma.us
Summary: Comprehensive growth planning for cities and towns and development of regional policy plans.
Eligibility: Municipalities and regional planning agencies.
Match: 25%, can be cash or in-kind.

$ Range: Up to $100,000.
Examples: $80,000 to the towns of Buckland and Shelburne for the completion of an inter-municipal comprehensive plan. $50,000 to the Berkshire Regional Planning Commission and the Towns of Lee and Lenox for development of a sub-regional growth policy plan.
Schedule: Call for more information.

EOEA-Self Help Program
Contact: Jennifer Soper: (617) 626-1015 or jennifer.soper@state.ma.us
Summary: Funds for acquiring land for conservation and passive recreation purposes.
Eligibility: Municipal Conservation Commissions (A town must have a state approved Open Space and Recreation Plan to be eligible).
Match: 52% - 70% grant of total project cost: level of funding dependent upon the equalized valuation per capita decile ranking of the community. Please note that this is a reimbursement program, not a matching grants program.
$ Range: The Secretary of EOEA announces Maximum Grant award amount at the onset of each grant round.
Examples: Award to Falmouth to purchase coastal pond property adjacent to larger conservation area.
Schedule: The application process begins in the spring with an application deadline of June 1. A new rolling grant round is in development and will be announced by the Secretary of EOEA. Call for more information.

EOEA-Urban Self Help Program
Contact: Joan Robes: (617) 626-1014 or joan.robes@state.ma.us
Summary: Funds for acquiring land for public outdoor recreation and/or the renovation or development of public outdoor park and recreation facilities.
Eligibility: Municipalities: Town and cities must have a state approved Open Space and Recreation Plan to be eligible.
Match: 52% - 70% grant of total project cost: level of funding dependent upon the equalized valuation per capita decile ranking of the community. Please note that this is a reimbursement program, not a matching grants program.
$ Range: The Secretary of EOEA announces Maximum Grant award amount at the onset of each grant round.
Examples: Funds to the City of Cambridge to convert Danehy Park from a 50 acre landfill to playing fields and open space.
Schedule: The application process begins in the spring with an application deadline of June 1. A new rolling grant round is in development and will be announced by the Secretary of EOEA. Call for more information

EPA-Brownfields Economic Redevelopment Initiative
One Congress St, Boston, MA 02114
617-573-9681 - www.epa.gov/swerosps/bf/html-doc/region01.htm
Provides $200,000 over 2 years for a project involving site assessment, site identification, or remediation planning for Brownfields. Activities can include administration, outreach to stakeholders, and field work.

EPA on-line catalog of Federal funding sources for watershed protection
(http://www.epa.gov/ogd/index.htm)
The Catalog of Federal Funding Sources for Watershed Protection Web site is a searchable database of financial assistance sources (grants, loans, cost-sharing) available to fund a variety of watershed protection projects.

EPA-Sustainable Development Challenge
One Congress St, Boston, MA 02114
888-372-7341- www.epa.gov/region01/eco/grants/sustaing.html
Aims to encourage communities to work with businesses and government to develop flexible, locally-oriented approaches that link environmental quality management with sustainable development and revitalization. An example is working with local businesses to develop a comprehensive system for solid waste reduction/reuse/recycling in conjunction with rehabilitating buildings, facades, streetscapes, etc.

EPA – Targeted Watershed Initiative
Contact: Rick Hopkins, 802-241-3770 rickh@dec.anr.state.vt.us
http://www.epa.gov/owow/watershed/initiative/2005/2005grantsolicit.html
Summary: The Targeted Watersheds Grant Program is a relatively new EPA program designed to encourage successful community-based approaches and management techniques to protect and restore the nation's waters. The watershed organizations receiving grants this year exhibited strong partnerships with a wide variety of support; creative, socio-economic approaches to water restoration and protection; and explicit monitoring and environmentally-based performance measures.
Eligibility: Nominations must be submitted by a governor or tribal leader. States and tribes may prepare or solicit watershed nominations in a manner most appropriate to their state and submit the best to EPA. Watershed organizations interested in pursuing a Targeted Watersheds grant should contact their state or tribe as soon as possible to ascertain its internal procedures. Governors and tribal leaders are limited to two watershed nominations within their jurisdiction. However, to encourage interstate efforts, they may nominate an unlimited number of watersheds that cross state, tribal, or national boundaries.
$ Range: usually $600,000 - $900,000 (25% non-federal match required)
Schedule: Applications due May 12, 2005.

Fish America Foundation
Contact: (703) 519-9691 or fishamerica@asafishing.org
Summary: Provides funding to non-profit organizations such as sporting clubs, civic associations, conservation groups, and state agencies.
Eligibility: The applicant must be a non-profit organization.
$ Range: $7,500 (Conservation), $15,000 (Research)
Schedule: Grant Applications are due on July 31.

FWS National Fish Passage Program
Contact: David Perkins (413)253-8405 david_perkins@fws.gov
The Fish Passage is a voluntary program that reconnects fish species to historic habitats. Project funding is for fish passage restoration by removing or bypassing barriers to fish movement. Primary project types include dam removal, culvert renovation, designing and installing fishways, installing fish screens and barrier inventories to identify additional fish passage impediments. Proposals requesting between $1,000 and $50,000 are most attractive. There is no required match; however a 50 percent cost-share is highly encouraged. Open Ongoing

FWS Private Stewardship Grant Program
Summary: FWS announced on Jan. 18 that its regional offices are accepting proposals for private lands conservation funding through its Private Stewardship Grants Program. About $6.5 million is available in FY 2005 to support on-the-ground conservation efforts on private lands. As envisioned by President Bush, this program provides Federal grants on a competitive basis to individuals and groups engaged in voluntary conservation efforts on private lands that benefit imperiled species including federally listed endangered or threatened species as well as proposed, candidate and other at-risk species. Landowners

and their partners may submit proposals directly to the Service for funding to support those efforts. http://endangered.fws.gov/grants/private_stewardship/index.html
Schedule: Proposals due March 21, 2005

Gulf of Maine Council for the Environment Implementation Grants
Contact: Jon Kachmar
Summary: NOAA partners with the Gulf of Maine Council to fund habitat restoration projects located within the United States portion of the Gulf of Maine watershed within Maine, Massachusetts, and New Hampshire. During open announcements, applications should be directed to the Gulf of Maine Council.
http://www.gulfofmaine.org
Schedule: Closed November 12, 2004

Local Government Environmental Assistance Network (LGEAN)
The Local Government Environmental Assistance Network (LGEAN) is a "first-stop shop" providing environmental management, planning, funding, and regulatory information for local government elected and appointed officials, managers and staff. Links to several funding opportunities are available.
See LGEAN website for specific funding deadlines: **http://www.lgean.org/html/whatsnew.cfm**

Massachusetts Drinking Water State Revolving Fund Program
Contact: Steven McCurdy (617) 292-5779, e-mail: steven.mccurdy@state.ma.us or Donovan Bowley (617) 292-5523, e-mail: donovan.bowley@state.ma.us
Summary: In an effort to provide incentive to communities to undertake projects with meaningful public health benefits, this program provides financial assistance to help municipalities and public water suppliers to comply with federal and state Safe Drinking Water Act requirements. The Program provides low-interest loans to finance construction or improvement of water treatment facilities, as well as enhancement to distribution systems.
Eligibility: Massachusetts municipalities and community water systems with at least 15 residential connections.
Match: None
$ Range: For calendar years 1998-2003, up to $400 million may be available through the loan program.
Examples: Projects include: New and upgraded drinking water treatment facilities; projects to replace contaminated sources, new water treatment, or storage facilities; consolidation or restructuring of water systems: project and system activities that provide treatment, or effective alternatives to treatment, for compliance with regulated health standards, such as the Surface Water Treatment Rule, installation or replacement of transmission or distribution systems.
Schedule: Applications are accepted annually in the late summer / early fall. Call for more information.

Massachusetts Environmental Trust Environmental Grants
Contact: Robin Peach: (617) 727-0249
Summary: The Trust funds projects that: (1) encourage cooperative efforts to raise environmental awareness, and (2) support innovative approaches that can protect and preserve our natural resources, with a special focus on water and related land resources.
Eligibility: Non-profit, community associations, civic groups, schools and institutions for higher education, municipalities, and state agencies.
Match: See individual program guidelines.
$ Range: See individual program guidelines.
Examples: Recipients have included the Coalition for Buzzards Bay, Springfield Science Museum, Pioneer Valley Planning Commission, Association for the Preservation of Cape Cod, and many others.
Schedule: Annual Request for Response is available on October and Letters of Inquiry are due in December. All program guidelines are available on the Trust's web site. http://www.agmconnect.org/maenvtr1.html.

Mass Riverways-Urban Rivers Small Grants
Contact: Joan Kimball: (617) 626-1544 or joan.kimball@state.ma.us
Summary: For projects that seek to restore urban rivers.
Eligibility: Municipalities and non-profit groups located in urbanized areas.
Match: No match requirement.
$ Range: $3,000 - $8,000
Examples: First year grants.
Schedule: Call for more information.

MDAR-Agricultural Preservation Restriction Program
Contact: Richard M. Chandler: (413) 577-0459, e-mail: rchandler@umext.umass.edu
Summary: The APR Program is a voluntary program which is intended to offer a non-development alternative to farmers and other owners or "prime" and "state important" agricultural land who are faced with a decision regarding future use and disposition of their farms. Towards this end, the program offers to pay farmers the difference between the "fair market value" and the "agricultural value" of their farmland in exchange for a permanent deed restriction which precludes any use of the property that will have a negative impact on its agricultural viability. The state's investment in the APR Program benefits farmers, the state's agricultural industry, the state and local economies, consumers and the general populace in a number of important ways.

- The program works to bolster the state's $532,000,000 agricultural industry by helping to keep farms in active commercial use, and by sending an important signal to the industry and its farmers that Massachusetts is serious about encouraging a strong and viable agricultural economy.

- Farmers whose land is accepted into the program are able to realize equity from their land without being forced to sell their farms for development purposes. The equity is often reinvested back into the protected farm by way of the purchase of more land, equipment or buildings and through the retirement of farm debt.

- A major portion of APR participants spend all or most of their APR funds locally, thereby creating a link between private and public benefit, and adding credence to the assertion that APR monies benefit more than just individual farmers and, in reality, work to stimulate local and state economies.

- The APR Program often represents the only means by which farmers are able to plan their estates to allow for the transfer of ownership of their farms to their children. By reducing the value of restricted farmland to its agricultural value, gift or inheritance taxes can be greatly reduced, thereby eliminating the need for second generation farmers to sell their farmland in order to pay taxes.

- APR restricted farmland represents an opportunity for young farmers just entering the business and other farmers in need of additional land to purchase affordable farmland. The program serves to stabilize farmland values and guarantee the long-term availability of farmland. This factor is especially important in areas with escalating land values and is critical for farmers who rent a large percentage of the land that they farm.

- By protecting farmland, the APR Program works to secure a continued high quality of life for Massachusetts residents. Farmland not only contributes to the scenic beauty of the state, but it provides for clean air and water, wildlife habitat, and recreational opportunities.

Eligibility: Farm must be at least five (5) acres in size. Land has to have been actively devoted to agriculture for the two (2) immediately preceding tax years. At least $500 in gross sales per year plus $5

for each additional acre or 50 cents per each additional acre of woodland and/or wetland. Other criteria staff weigh when considering potential APRs include: Suitability and productivity of land for agricultural use based on soil classification, physical features, location; The degree of threat to the continuation of agriculture on the land due to circumstances such as owner's death, retirement, financial difficulties, development pressure, or insecurity due to rental agreements; and The degree to which the land is of a size or composition to be economically viable for agricultural purposes and the likelihood that it will remain in agriculture for the foreseeable future.
Examples: Since 1980, deed restrictions have been placed on 468 farms totaling approximately 42,000 acres in 130 towns.
Schedule: The program is a rolling application process. If a farmer is interested, the APR Program should be contacted.

MDAR-Agriculture Environmental Enhancement Program
Contact: Susan Phinney, Boston (617) 626-1772, e-mail: susan.phinney@state.ma.us
Summary: This program is open to producers and growers who farm 5 acres or more in the state of Massachusetts and have the potential to impact water resources. This program reimburses farmers for the cost of their materials for projects that aim to improve water quality. The farmer is responsible for the cost of installing and maintaining the practice.
Eligibility: Farmers owning farms 5 acres or larger. All applicants must have either an updated USDA Natural Resource Plan or a plan from an approved source such as the one in the "On-Farm Strategies to Protect Water Quality" workbook which can be obtained by calling the Massachusetts Department of Agriculture.
$ Range: The maximum award per project is $20,000. Up to 75% of the cost will be reimbursed prior to the project's completion for projects over $5,000.
Schedule: Annual Request for Response (RFR) is issued in August. Please call for more information.

MDAR-Farm Viability Enhancement Program
Contact: Craig Richov, (617) 626-1725, e-mail: Craig.Richov@state.ma.us
Summary: This program's purpose is to improve the economic bottom lines and environmental integrity of participating farms through the development and implementation of Farm Viability Plans. These comprehensive, yet focused farm plans, which are to be developed by teams comprised of farmers and other agricultural, economic and environmental consultants, will be aimed at suggesting ways for farmers to increase their on-farm income through such methods as improved management practices, diversification, direct marketing, value-added initiatives and agritourism. In addition, the Plans will make recommendations concerning environmental and resource conservation concerns on participating farms. Financial agreements are made with participating farms upon the completion of such a plan which may include either the purchase of an agricultural covenant by the state for a term of 5 or 10 years, or payment for the implementation of the developed Farm Viability Plan.
$ Range: Technical assistance and the development of business plans are provided at no cost to the farmer. Farmers who are then willing to sign a non-development restriction covenant are eligible to receive funding. Up to $20,000 is available for farmers willing to agree to a covenant for a period of five years. Up to $40,000 is available to farmers willing to agree to a ten year covenant. An award of up to $60,000 may go to farmers with at least 135 acres, agreeing to a ten year covenant, and meeting certain criteria in their business plans regarding the potential to increase net farm income and to retain or increase the number of farm jobs.
Eligibility: To be eligible for participation in the Program, an applicant must own, or be a co-applicant with the owner of, at least 5 acres of land in agricultural use.
Schedule: Applications are accepted in the spring. Call for more information.

MDCR-Forest Stewardship Program
Contact: Susan Campbell (413) 256-1201 or susan.campbell@state.ma.us

Summary: Grants to private forest landowners to protect forest ecosystems. Landowners, with assistance of MDCR foresters, develop a forest stewardship plan for their property, which makes them eligible for Federal cost sharing funds to help carry out the plan.
Eligibility: Any forest landowner in Massachusetts, who meets the following criteria: ownership must be private, non-industrial, and non-profit; and forest land must be less than 1,000 acres in total size in the State.
Examples: Forest stewardship plans and implementation can include any project which meets one of the 9 main goals, such as wildlife habitat management, erosion reduction, protection of endangered species, trail creation/maintenance, and timber quality improvement.
Schedule: Applications were due in March of past years.

MDCR-Greenways and Trails Demonstration Grants
Contact: Jennifer Howard: (413) 586-8706 X18; email jennifer.howard@state.ma.us
Summary: Innovative projects that advance the creation and promotion of greenway and trail networks throughout Massachusetts.
Eligibility: Municipalities, regional planning agencies, and non-profit organizations.
Match: None required, although encouraged, including in-kind contributions.
$ Range: $1,000 - $5,000; up to $10,000 available for multi-town projects.
Examples: Improving access to rivers and trails, producing greenway and trail brochures, maps, signs, and curricula, and involving community members in greenway and trail planning and implementation.
Schedule: Applications are due in fall/winter each year - call for more information.

MDCR-Lake and Pond Grant Program
Contact: Steve Asen: (617) 626-1353 or steve.asen@state.ma.us
Summary: Lake and Pond protection, preservation, enhancement, and public access.
Eligibility: Municipalities; co-applications are encouraged from Lake and Pond Associations or Districts, and Watershed Associations.
Match: 50% cash match.
$ Range: $1,000-$10,000
Examples: Controlling non-point pollution; eradicating non-native aquatic plant species, developing lake and watershed management plans.
Schedule: In past years, applications were mailed in October and the deadline was December 31. Call for more information.

MDCR-Recreational Trails Program
Contact: Peter Brandenburg: (617) 626-1453 or peter.brandenburg@state.ma.us
Summary: Construction and improvement of publicly accessible recreational trails.
Eligibility: Municipalities, non-profit groups, and regional and state agencies.
Match: 20% minimum, in-kind permitted.
$ **Range:** $2000-$20,000, exceptions considered.
Examples: Trail building materials; support of volunteer trail maintenance activities.
Schedule: Call for more information.

MDCR-Urban Forest Planning and Education Grants
Contact: Edith Makra: (617) 626-1466 or edith.makra@state.ma.us
Summary: Funds to build support for the protection and management of community trees and forest ecosystems.
Eligibility: Municipalities and nonprofit groups.
Match: 100%, in-kind allowed.
$ Range: Up to $10,000

Examples: Tree inventories that involve residents in data collection; hands on training to students to observe, plant and care for trees; workshops and public awareness campaigns; urban environmental analysis (GIS).
Schedule: Applications are due in mid-April. Call for more information.

MDEP-Massachusetts Clean Water State Revolving Fund Program
Contact: Steven McCurdy (617) 292-5779, e-mail: steven.mccurdy@state.ma.us
Summary: In an effort to provide incentive to communities to undertake projects with meaningful water quality and public health benefits, this program provides financial assistance to help municipalities and wastewater districts to comply with federal and state water quality requirements. The Program provides subsidized, low-interest loans to finance water quality improvement projects, with particular emphasis on watershed management priorities.
Eligibility: Massachusetts municipalities and waste water districts.
Match: None
$ Range: Maximum applicants limited to 15-20% of annual program capacity. Annual capacity is approximately $150 to $200 million dollars.
Examples: Planning and construction of eligible projects, including new wastewater treatment facilities and upgrades of existing facilities; infiltration/inflow correction; wastewater collection systems; control of combined sewer overflows; and non-point source pollution abatement projects, such as landfill capping, community programs for upgrading septic systems (Title 5), and stormwater remediation.
Schedule: Solicitation annually during the summer.

MDEP-Section 319 Non-point Source Pollution Grants
Contact: Jane Peirce: (508) 767-2792, e-mail: jane.peirce@state.ma.us
Summary: To control non-point sources of water pollution, particularly from urban runoff, paved surfaces, and other areas where rainwater collects pollutants as it runs over the land.
Eligibility: Any interested public or private organization.
Match: 40% non-federal match of total project cost. In-kind services eligible for match.
$ Range: $20,000 to $200,000
Examples: This program funds: sub-watershed and in-lake projects that address all major non-point sources affecting water quality in a waterbody; demonstrations of new or innovative best management practices (BMP's), technologies or institutional approaches to controlling non-point source pollution; groundwater projects that target high priority non-point source groundwater problems; and watershed resource restoration projects that restore vegetated wetlands, lakes, rivers, streams, estuaries, shorelines, riparian areas, seagrass beds and other aquatic habitats.
Schedule: An annual Request for Response (RFR) for project solicitation is issued around March 1, with proposals due to MDEP around May 1.

MDEP-Section 604(b) Water Quality Management Planning Grants
Contact: Gary Gonyea: (617) 556-1152, e-mail: gary.gonyea@state.ma.us
Summary: Water quality assessment and management planning.
Eligibility: Regional public comprehensive planning organizations such as: regional planning agencies, councils of government, conservation districts, counties, and cities and towns.
Match: Match not required but proposals are enhanced by demonstration of local support.
$ Range: $30,000 to $60,000
Examples: Provide technical assistance to communities for water supply protection and assist local officials in comprehensive water resource planning.
Schedule: Request for Response is issued by MDEP each October for competitive projects with proposals due approximately six weeks later. Proposals are evaluated and funding is announced within

two months of the proposal submission deadline. Generally, projects are expected to begin approximately eight months after the date of their selection by the MDEP.

MDEP-Source Water Protection Program
Contact: Kathleen Romero (617) 292-5727, e-mail: kathleen.romero@state.ma.us
Summary: This grant program provides funds to third party technical assistance organizations that assist public water suppliers in protecting local and regional ground and surface water supplies.
Eligibility: 1. Eligible applicants are third party organizations that have experience providing technical assistance related to drinking water protection. 2. Proposed work must benefit active drinking water sources. 3. The third party must submit letter(s) of support from the public water supplier(s) with the application.
Schedule: Request for Response is issued by MDEP each May for competitive projects with proposals due approximately eight weeks later.

MDEP-Well Head Protection Grant Program
Contact: Catherine Sarafinas (617) 556-1070, e-mail: catherine.sarafinas@state.ma.us
Summary: This grant program provides funds to assist public water suppliers in addressing wellhead protection through local projects and education.
Eligibility: Eligible applicants include all community public water systems, as well as non-transient non-community systems that serve schools. The grant recipient must be a public water system or municipality, and the grant must target an active public water supply source.
Examples: Zone I: Removal or upgrade of potential sources of contamination (for example, underground storage tanks, septic systems, salt storage), wellhead protection signs, and fencing in a pump house. Zone II: Interim wellhead Protection Area (IWPA): Land must be owned and controlled by water supplier or the municipality. Containment and improvement projects (secondary containment of liquid hazardous materials, salt/deicing storage, municipal waste management, drainage improvements and hazardous materials storage). Local town-wide inspection programs for floor drains, underground storage tanks, and hazardous materials.
Schedule: Request for Response is issued by MDEP each May for competitive projects with proposals due approximately eight weeks later.

MDEP-Wetlands and Water Quality Grant Program 104(b)(3)
Contact: Gary Gonyea: (617) 556-1152, e-mail: gary.gonyea@state.ma.us
Summary: This grant program is authorized under Section 104(b) (3) of the federal Clean Water Act. The goal of this program is to fund projects that address MDEP's water quality and wetland protection goals.
Eligibility: All Massachusetts Environmental Affairs agencies or other organizations with a co-sponsor are eligible. Non-profit organizations such as watershed associations, regional planning agencies, and universities are eligible to submit proposals but only through an EOEA sponsoring agency.
Match: Proposals submitted must identify a 25% non-federal match (25% of Total Project Cost).
Schedule: Request for Response is issued by MDEP each January for competitive projects with proposals due approximately eight weeks later.

MDHCD-Community Development Action Grant (CDAG) Program
Contact: Carol Harper, Program Manager: (617) 727 7001 x483
Summary: This program provides primarily infrastructure support for projects promoting economic development. Project must demonstrate public benefit. CDAG funding limited to 50% of the total project cost; applicant must demonstrate financing commitments of public and private sources. CDAG funds the "minimum amount necessary to make the project feasible." All matching funds must be in place before CDAG funds can be expended.
Match: For each CDAG dollars, you need $.50 local; and $2.50 private.

$ Range: $100,000 to $1,000,000.
Examples: Extension of water and/or sewer service to an industrial park. Road construction/improvement in industrial/commercial area with best management practices.
Eligibility: Municipalities only. These funds are to be utilized on public infrastructure projects and are intended to address substandard or blighted conditions. Land to be improved must be publicly owned. Pre application process, followed by full application.
Schedule: Rolling admission program. Call for more information.

MDHCD-Community Development Block Grant Program
Contact: Toni Hall, Community Development Specialist: (617) 727 7001, x428 Robert Shumeyko, Program Manager, (617) 727 7001, x 435
Summary: Support of community and economic development projects that benefit low and moderate income persons.
Funding: U.S. Department of Housing and Urban Development. DHCD administers competitive grant program for state's non entitlement communities (e.g., under 50,000 population).
Eligibility: Municipalities under 50,000 population, either individually or in regional arrangements. Contact DHCD for application.
Examples: Use rehabilitation (includes septic system repairs), water and sewer improvements, public facilities construction and improvements, e.g., parks and playgrounds, planning, economic development, neighborhood revitalization. List of eligible projects is extensive. Call for details.
Schedule: Application for Community Development Fund I and II were due on or before August 1 in past years. (Community Development Fund usually has one competitive round annually).

MDHCD-Municipal Incentive Grant Program
Contact: Don Martin, Program Coordinator: (617) 727 7001, x 404
Summary: The Municipal Incentive Grant Program (MIG) is designed to assist local government officials in the planning, management and operation of cities and towns, and in the training of local officials. The program provides grants to pay for consultant assistance and, in some cases, hardware and software. MIG funds enable communities, individually or working together, to address particular issues, define solutions and implement improvements in service delivery. Nonpoint source related plans may be eligible.
Eligibility: Must be a municipality, county government, or Regional Planning Agency. Maximum grants are $35,000 for local and $60,000 for regional projects.
Examples: Growth management strategies, affordable housing strategies, design of regional arrangements for service delivery, creation or enhancement of fiscal management practices, development of Geographic Information Systems (GIS).
Schedule: Call for more information.

MDR-Underground Storage Tank Program
Contact: Stuart Glass, Grant Manager (617) 887 5978 or stuart.glass@state.ma.us
Summary: This program, administered by the Massachusetts Department of Revenue and funded annually (up to 2 million dollars) by the Underground Storage Tank Petroleum Cleanup Fund (MGL c21J), provides municipal grants for the removal and installation of underground storage tanks.
Eligibility: Municipalities.
$ Range: Grants can be up to 50% of eligible costs
Schedule: Applications are accepted annually in the early Fall. Call for more information or visit www.state.ma.us/ust.

MHD-Transportation Enhancement Funds
Contact: Linda Walsh: (617) 973 8052 or linda.walsh@state.ma.us

Summary: Funds for environmental remediation of transportation impacts; transportation improvements including pedestrian and bicycle pathways.
Eligibility: Municipalities apply through regional planning agencies.
Examples: Barnstable Walkway to the Sea (land acquisition for harbor access); stormwater remediation, best management practices, in Mashpee.
Schedule: Call for more information.

MHFA-Homeowner Septic Repair Loan Program
Contact: (617) 854-1020 or (617) 854-1333
Summary: Through a combined effort of the MDEP, the Massachusetts Department of Revenue, and the Massachusetts Housing Finance Agency, this program provides below market rates to homeowners upgrading septic systems.
Eligibility: Homeowner septic repair loans are available to eligible homeowners at low interest rates of 0%, 3%, and 5%, depending on income.
$ Range: Homeowner loans range in size from $1,000 to a maximum of $25,000.
Schedule: Call for more information.

Municipal Recycling Grant Program
Contact: Brooke Nash: (617) 292 5984, e-mail: brooke.nash@state.ma.us or
Peggy Harlow (617) 292 5861, e-mail: peggy.harlow@state.ma.us
Summary: Recycling equipment, educational materials, and technical assistance grants
Eligibility: Municipalities and regional groups - must provide recycling data sheet and have municipal "Buy Recycled" policy.
Match: Recycling trucks ($20,000 or trade in of old truck requested)
Replacement curbside set-out containers (50% match required)
Recycled paint (50% match required)
$ Range: No restrictions: During FY 99 grants ranged from $7- $112,654
Examples: Recycling grant items include public education information, set out containers, roll off containers, recycling trucks, transfer trailers, hazardous household products equipment, recycled products, and technical assistance. New FY99 grant opportunities include storage sheds for collecting mercury-containing products, grants to pay for the recycling of electronics and mercury-containing products, technical assistance to increase participation in recycling programs.
Schedule: The application process begins in July and the submission deadline is in September.

Municipal Recycling Incentive Program (MRIP)
Contact: Brooke Nash: (617) 292 5984, e-mail: brooke.nash@state.ma.us or
Joseph Lambert: (617) 574-6875, e-mail: joseph.lambert@state.ma.us
Summary: Performance based grant that awards a per ton payment for primary recyclables collected through municipal programs.
Eligibility: Municipalities and regional groups - must meet minimum recycling criteria and elective criteria every 6 months (criteria are cumulative and increase every 6 months).
Match: None
$ Range: During FY 98 payments ranged from $76-$124,649 (Based upon $4/ton for drop-off programs and $8/ton for curbside programs.)
Examples: During FY 99 minimum criteria included: establish a municipal "Buy Recycled" policy and tracking system; establish equal or "parallel" access to both solid waste and recycling collection services; expand recycling access to unserved residents. During FY 98 elective criteria included: Multiple choices in the areas of recycling access, recycling participation, and recycled product procurement.
Schedule: For past fiscal years, the first phase eligibility deadline was December and the second phase eligibility deadline was May. Call for more information.

NFWF Five-Star Restoration Challenge Grants

NOAA partners with the National Fish and Wildlife Foundation's (NFWF) Five-Star Restoration Challenge Grants Program to fund community-based wetland, riparian and coastal habitat restoration projects around the coastal U.S. During open announcements, applications are directed to NFWF. The individual grant awards range from $5,000 - $20,000. Successful projects funded by Five-Star include mangrove restoration and exotic species removal, clam and scallop restoration, riparian planting, oyster reef restoration and fish passage improvement projects.

http://www.nfwf.org/programs/5star-rfp.htm

Applications due March 1, 2005

NFWF General Challenge Grant Program

NOAA partners with The National Fish and Wildlife Foundation (NFWF) to fund many types of projects that benefit living marine resources, including fishery habitat restoration projects. During open announcements, applications should be directed to NFWF.

http://www.nfwf.org/programs/guidelines.htm

Pre-Proposals due annually June and October

NFWF Grant Programs

The National Fish and Wildlife Foundation administers a number of special grant programs with specific guidelines and time-lines. For more information on a variety of grants view the NFWF website at http://nfwf.org/programs/grant_apply.htm

Status: Multiple grants are currently open

NOAA/American Rivers Partnership

Contact: Jim Turek, (401) 782-3338 or James.G.Turek@noaa.gov
Laura Wildman, (860) 652-9911 or lwildman@amrivers.org

Summary: NOAA partners with American Rivers to fund projects that restore migratory fish habitat through dam removal and fish passage construction in California, the Northwest, the Northeast, and Mid-Atlantic regions. Project solicitation cycles are scheduled for April and November. Organizations that have project ideas are encouraged to contact American Rivers to discuss potential projects prior to submitting an application.

$ Range: Up to $25,000

Schedule: American Rivers conducts a project solicitation and competitive selection process twice annually. Grant Applications are due in November 2005.

NOAA/Fish America Partnership

Contact: Jim Turek, (401) 782-3338 or James.G.Turek@noaa.gov

Summary: NOAA partners with The Nature Conservancy (TNC) to fund marine and anadromous fish habitat restoration projects *around the coastal U.S. The applicant must be a TNC local chapter*. Organizations that have project ideas should contact their local TNC chapter to discuss forming a partnership to apply for project funds under this request for proposals.

Eligibility: The applicant must be a local TNC Chapter and projects must be linked to a TNC priority conservation area as identified in TNC's ecoregional planning process or identified as a high priority by the state or territorial TNC chapter.

$ Range: $25,000 - $85,000

Schedule: Grant Applications are due in March.

NOAA/The Nature Conservancy Partnership

Contact: Jim Turek, (401) 782-3338 or James.G.Turek@noaa.gov
Rob Brumbaugh,

Summary: NOAA partners with The Nature Conservancy (TNC) to fund marine and anadromous fish habitat restoration projects *around the coastal U.S. The applicant must be a TNC local chapter*. Organizations that have project ideas should contact their local TNC chapter to discuss forming a partnership to apply for project funds under this request for proposals.
Eligibility: The applicant must be a local TNC Chapter and projects must be linked to a TNC priority conservation area as identified in TNC's ecoregional planning process or identified as a high priority by the state or territorial TNC chapter.
$ Range: $25,000 - $85,000
Schedule: Grant Applications are due in March.

NOAA Coastal Services Center
The NOAA Coastal Services Center annually issues a Broad Area Announcement detailing the availability of competitive funding from the Center. This announcement consists of several independent opportunities to provide the coastal management community with a clear overview of grants from the Center. The most recent Broad Area Announcement was published in the Federal Register on June 10, 2002.
http://www.csc.noaa.gov/funding/
Closed March 15, 2004

NOAA Community-based Restoration Program Individual Project Grants
The CRP provides funds for individual grass-roots marine habitat restoration projects that will benefit living marine resources including anadromous fish species, commercial and recreational resources, and endangered and threatened species. Proposals undergo a competitive review, and projects are selected based on their technical merit, level of community involvement, ecological benefits to marine and anadromous fish habitat, and coast-effectiveness. During open announcements, applications are directed to the NOAA Restoration Center.
Next anticipated deadline September 14, 2005

NOAA Community-based Habitat Restoration National and Regional Partnership Grants
Partnerships are a key element in community efforts to accomplish significant, on-the-ground habitat restoration. Partnerships established under the Community-based Restoration Program in 2001 have helped NOAA amplify financial resources and reach a larger, more diverse array of communities with strong vested interests in fishery habitat restoration. Partnerships have significantly leveraged available NOAA funds through cash match and local contributions, including land, volunteer support, and other in-kind services such as technical assistance, earthmoving activities and local knowledge. NOAA Restoration Center regional staff take an active role in partnership projects as needed, providing one-on-one technical and permitting assistance in restoring habitats required by marine and anadromous fish, endangered species, and other living marine resources. Restoring and protecting natural resources would be greatly limited without the advantages of partnerships.
Next anticipated deadline June 2006

NOAA Direct Solicitation
Contact: Jim Turek, (401) 782-3338 or James.G.Turek@noaa.gov
$ Range: Up to $300,000/project

NRCS-Conservation Reserve Program (CRP)
The Conservation Reserve Program reduces soil erosion, protects the Nation's ability to produce food and fiber, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filter-strips, or riparian buffers. Farmers receive an annual rental payment for the term of the multi-

year contract. Cost sharing is provided to establish the vegetative cover practices. For additional information contact the USDA Natural Resources Conservation Service office serving your county.

NRCS-Emergency Watershed Program (EWP)

The purpose of the Emergency Watershed Protection program is to undertake emergency measures, including the purchase of flood plain easements, for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood or any other natural occurrence is causing or has caused a sudden impairment of the watershed. It is not necessary for a national emergency to be declared for an area to be eligible for assistance. The program objective is to assist sponsors and individuals in implementing emergency measures to relieve imminent hazards to life and property created by a natural disaster. Activities include providing financial and technical assistance to remove debris from streams, protect destabilized streambanks, establish cover on critically eroding lands, repairing conservation practices, and the purchase of flood plain easements. The program is designed for installation of recovery measures. For additional information contact the USDA Natural Resources Conservation Service office serving your county.

NRCS-Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program provides technical, educational, and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. The program provides assistance to farmers and ranchers in complying with Federal, State, and tribal environmental laws, and encourages environmental enhancement. The program is funded through the Commodity Credit Corporation. The purposes of the program are achieved through the implementation of a conservation plan which includes structural, vegetative, and land management practices on eligible land. Five- to ten year contracts are made with eligible producers. Cost-share payments may be made to implement one or more eligible structural or vegetative practices, such as animal waste management facilities, terraces, filter strips, tree planting, and permanent wildlife habitat. Incentive payments can be made to implement one or more land management practices, such as nutrient management, pest management, and grazing land management. Fifty percent of the funding available for the program will be targeted at natural resource concerns relating to livestock production. The program is carried-out primarily in priority areas that may be watersheds, regions, or multi-state areas, and for significant statewide natural resource concerns that are outside of geographic priority areas. For additional information contact the USDA Natural Resources Conservation Service office serving your county.

NRCS-Flood Risk Reduction Program (FRR)

The Flood Risk Reduction Program was established to allow farmers who voluntarily enter into contracts to receive payments on lands with high flood potential. In return, participants agree to forego certain USDA program benefits. These contract payments provide incentives to move farming operations from frequently flooded land. For additional information contact the USDA Natural Resources Conservation Service office serving your county.

NRCS- Forest Land Enhancement Program (FLEP)

The Forest Land Enhancement Program (FLEP) is part of Title VIII of the 2002 Farm Bill. FLEP replaces the Stewardship Incentives Program (SIP) and the Forestry Incentives Program (FIP). FLEP is optional in each State and is a voluntary program for non-industrial private forest (NIPF) landowners. It provides for technical, educational, and cost-share assistance to promote sustainability of the NIPF forests FLEP is designed to benefit the environment while meeting future demands for wood products. Eligible practices are tree planting, timber stand improvement, site preparation for natural regeneration, and other related activities. Interested landowners can contact any consulting forester or Steve Anderson (Forest Stewardship Program) at 413-256-1201 or steve.anderson@state.ma.us.

NRCS-Resource Conservation & Development Program (RC&D)

The purpose of the Resource Conservation and Development (RC&D) program is to accelerate the conservation, development and utilization of natural resources, improve the general level of economic activity, and to enhance the environment and standard of living in authorized RC&D areas. It improves the capability of State, tribal and local units of government and local nonprofit organizations in rural areas to plan, develop and carry out programs for resource conservation and development. The program also establishes or improves coordination systems in rural areas. Current program objectives focus on improvement of quality of life achieved through natural resources conservation and community development which leads to sustainable communities, prudent use (development), and the management and conservation of natural resources. Authorized RC&D areas are locally sponsored areas designated by the Secretary of Agriculture for RC&D technical and financial assistance program funds. NRCS can provide grants for land conservation, water management, community development, and environmental needs in authorized RC&D areas. For additional information contact the USDA Natural Resources Conservation Service office serving your county.

NRCS-Watershed Operations --Small Watershed Program and Flood Prevention Program (WF 08 or P03)

The Small Watershed Program works through local government sponsors and helps participants solve natural resource and related economic problems on a watershed basis. Projects include watershed protection, flood prevention, erosion and sediment control, water supply, water quality, fish and wildlife habitat enhancement, wetlands creation and restoration, and public recreation in watersheds of 250,000 or fewer acres. Both technical and financial assistance is available. For additional information contact the USDA Natural Resources Conservation Service office serving your county.

NRCS-Watershed Surveys and Planning

The purpose of the program is to assist Federal, State, and local agencies and tribal governments to protect watersheds from damage caused by erosion, floodwater, and sediment and to conserve and develop water and land resources. Resource concerns addressed by the program include water quality, opportunities for water conservation, wetland and water storage capacity, agricultural drought problems, rural development, municipal and industrial water needs, upstream flood damages, and water needs for fish, wildlife, and forest-based industries. Types of surveys and plans include watershed plans, river basin surveys and studies, flood hazard analyses, and flood plain management assistance. The focus of these plans is to identify solutions that use land treatment and nonstructural measures to solve resource problems. For additional information contact the USDA Natural Resources Conservation Service office serving your county.

NRCS-Wetlands Reserve Program (WRP)

The Wetlands Reserve Program is a voluntary program to restore wetlands. Participating landowners can establish conservation easements of either permanent or 30-year duration, or can enter into restoration cost-share agreements where no easement is involved. In exchange for establishing a permanent easement, the landowner receives payment up to the agricultural value of the land and 100 percent of the restoration costs for restoring the wetlands. The 30-year easement payment is 75 percent of what would be provided for a permanent easement on the same site and 75 percent of the restoration cost. The voluntary agreements are for a minimum 10-year duration and provide for 75 percent of the cost of restoring the involved wetlands. Easements and restoration cost-share agreements establish wetland protection and restoration as the primary land use for the duration of the easement or agreement. In all instances, landowners continue to control access to their land. For additional information contact the USDA Natural Resources Conservation Service office serving your county.

NRCS-Wildlife Habitat Incentives Program (WHIP)
Contact: Toby Alexander
Schedule: Applications are due in October 2005 for FY 2006.
Summary: The Wildlife Habitat Incentives Program provides financial incentives to develop habitat for fish and wildlife on private lands. Participants agree to implement a wildlife habitat development plan and USDA agrees to provide cost-share assistance for the initial implementation of wildlife habitat development practices. For example, cost-sharing for fish passage structures may be available from the WHIP in addition to habitat improvements such as invasive plant control, streambank stabilization and water cooling. USDA and program participants enter into a cost-share agreement for wildlife habitat development. This agreement generally lasts a minimum of 10 years from the date that the contract is signed. For additional information contact the USDA Natural Resources Conservation Service office serving your county.

Ocean Trust/National Fisheries Institute - Fisheries & Habitat Funding
NOAA partners with Ocean Trust to fund habitat restoration projects that enhance living marine resources around the coastal U.S. The applicant must be an individual, association or company in the fish and seafood industry. Organizations that have project ideas should contact members of their local seafood industry to discuss forming a partnership to apply for project funds under this request for proposals. During open announcements, applications should be directed to Ocean Trust.
Proposals due July 15 and November 30, 2005

Research and Demonstration Grant Program
Contact: Arthur Screpetis (617) 767-2875, e-mail: arthur.screpetis@state.ma.us
Summary: This grant program enables the MDEP to conduct a program of study and research and demonstration relating to water pollution control and other scientific and engineering studies" so as to insure cleaner waters in the coastal waters, rivers, streams, lakes and ponds of the Commonwealth."
Eligibility: Unsolicited proposals may be submitted at any time to the MDEP, by any interested Massachusetts public or private organization.
Schedule: Unsolicited proposals are accepted anytime. Call for more information.

Trout Unlimited Embrace-A-Stream Grants
Contact: Rob Roberts (406)543-1192 rroberts@tu.org
Greg Ponte (207) 724-2861
Summary: NOAA partners with Trout Unlimited (TU) to fund coastal projects around the U.S. that benefit anadromous fish submitted to TU's Embrace-A-Stream program. The applicant must be a TU local chapter. Organizations that have project ideas should contact their local TU chapter to discuss forming a partnership to apply for project funds under this RFP. http://www.tu.org/index.asp
$ Range: $10,000
Schedule: Proposals due December 20, 2004

USFWS – Funding for Fish Passage
Contact: Jan Rowan, CT River Coordinator
Summary: The Fish Passage Program is a voluntary, non-regulatory program that provides assistance to work with partners to remove or bypass barriers to fish movement. Types of project assistance include providing information on habitat needs and methods for fish to bypass barriers, and technical engineering support for reviewing project designs and recommending the most cost-effective techniques.
$ Range: $75,000 - $150,000 (no match required, but 50% match is encouraged)
Schedule: Applications are accepted continuously, and proposals are held in a FWS database until funded or no longer viable.

USFWS – Partners for Fish and Wildlife

Contact: Chris Smith, (802)872-0629 (ext. 20). – VT
Eric Derleth (603)223-2541 (ext. 14) – MA, NH
Ron Joseph (207)827-5938 – ME

Summary: The Partners for Fish and Wildlife Program provides technical and financial assistance to private landowners for habitat restoration on their lands. A variety of habitats can be restored to benefit Federal trust species (for example, migratory birds and fish and threatened and endangered species.) Normally the cost share is 50 percent (the Service and the landowner each pay half of the project costs), but the percentage is flexible. Services or labor can qualify for cost-sharing.

Eligibility: Any privately-owned land is potentially eligible for restoration. "Privately-owned", for the purposes of this Program, generally means lands not owned by a State or the Federal government.

$ Range: usually $5,000 - $10,000 (maximum award is $25,000)

Schedule: Applications are accepted continuously.

Watershed Project Financing and Construction

Contact: Central Regional Contact:
Gustav Swanquist (617) 556-1083, e-mail: gustav.swanquist@state.ma.us or
Paul Anderson (508) 792-7692, e-mail: paul.anderson@state.ma.us
Western Regional Contact:
Stanley Linda (617) 292-5736, e-mail: stanley.linda@state.ma.us or
Deirdre Cabral (413) 784-1100 x2148, e-mail: deirdre.cabral@state.ma.us

Summary: State Revolving Loan Program.

Eligibility: Massachusetts municipalities and wastewater districts.

Match: Loans are subsidized, currently at 50% grant equivalency. (Approximately a no-interest loan.)

$ Range: In recent years the program has operated at an annual capacity of $150 to $200 million per year, representing the financing of 40-50 projects annually.

Examples: Project / Design / Construction of municipal water pollution abatement activities, including wastewater treatment facilities, correction of combined sewer overflows, wastewater collection and transmission facilities, nonpoint source projects (including Title 5), and infiltration/inflow removal. Design and construction of projects to protect or improve public drinking water systems, including filtration, disinfection, and distribution.

Schedule: Calendar Year Basis; applications due October 15.

6.0 References

This section provides a list of documents that were consulted for the development of the issues, objectives, and priority actions in Sections 3.1 – 3.6, as well as background information presented in Sections 2.1 – 2.5. The documents listed below were not necessarily all used to develop actions and objectives; however, the documents on this list will provide a wealth of information about the Parker River watershed and its many issues that require action.

Photographs on the document cover were taken on Plum Island and in Plum Island Sound by Jim Fenton of Haverhill, MA.

Geographic Information Systems (GIS) data layers were obtained from the "Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs". Data layers employed include 1999 Land Use, Community Boundaries (Town), Hydrography (1:25,000), Major Basins, Massachusetts Highway Department Roads, NHESP BioMap Core Habitat, NHESP Living Waters Core Habitat, NHESP Living Waters Critical Supporting Watersheds, Public Water Suppliers, and Surficial Geology. The Digital Elevation Model (DEM) was obtained from the USGS National Elevation Dataset (NED). The Subwatersheds layer was digitized from the MassGIS Drainage Sub-basins layer based upon Figure 1 in the Parker River Watershed Year-3 Watershed Assessment Report (MWI, 2002).

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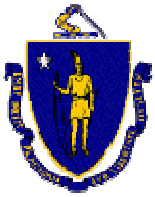

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Governor

Kerry Healey
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