

Section 1. Plan Summary



Photo by Jeff Thibodeau

Section 1. Plan Summary

The purpose of this summary is to provide a brief overview of the contents and key highlights of the *Town of Chatham 2010 Open Space and Recreation Plan (OSRP)*.

Section 2. Introduction

Chatham today is a vibrant seaside community with extensive and varied coastal landscapes and natural resources. Over the past quarter century the Town has been successful in saving open space and developing recreational facilities to meeting the needs of a growing and changing population. Highlights of these efforts include:

- Land Bank acquisition of 18 properties totaling 180.49 acres, for a total purchase price of nearly \$15 million;
- Large town acquisitions including 75 acres at Forest Beach and adjacent upland, and 11.38 acres of land and buildings at the former wireless station at Ryder's Cove;
- Continued protection of open space by the non-profit Chatham Conservation Foundation through private acquisitions and conservation restrictions now totaling 563 acres and 54 acres, respectively;
- Conversion of the historic former Main Street School into a three level multi-generational Community Center with new gymnasium;
- Creation of the Old Colony Rail Trail spurs into Chatham Center and Volunteer Park in South Chatham;
- Development of playing fields and a playground at Volunteer Park in South Chatham;
- Installation of facilities at Kate Gould Park, and public access areas at White Pond and Oyster Pond Park.

However, local stewardship of open space and recreational resources faces increasingly complex management issues. The purchase and on-going maintenance of open space and recreational resources must compete for limited town funds with other land uses and with other community needs. Accordingly, the on-going health and vitality of the Town's open space resources cannot be assumed and must be planned for and new strategies continuously explored.

The purposes of the OSRP are to:

- Report progress, identify existing or emerging needs based on community dynamics, and set forth a plan of action to meet open space and recreation needs;
- Provide a blueprint for open space planning, acquisition, site development and management;
- Fulfill the Open Space and Recreational Plan requirements set forth by the Executive Office of Environmental Affairs, Division of Conservation Services (DCS), to qualify the Town to compete for land acquisition and recreation facility reimbursement funding through such programs as the LAND and PARC grants and Federal Land and Water Conservation Funds.

Section 3. Community Setting

Like other Cape Cod towns Chatham has experienced significant changes that warrant a review of its open space protection strategies. These changes include rapid land development and redevelopment, a growing and changing population that includes an annual influx of seasonal residents and a relatively older population. The dominance of services in the local economy lends a degree of economic variability that has placed a strain on municipal resources. However, the Town is fortunate to have a high percentage of retirement income flowing into the community, and high residential property values, which support local tax revenues.

The Town has completed several comprehensive regional resource planning efforts with emphasis on eliminating threats to resource health posed by land use development, and on promoting public access to and use of its waterways and coastal resources. The comprehensive and regional approach to resource protection, including protection of open space, will continue to be stressed in the Town's on-going efforts.

Section 4. Environmental Inventory and Analysis

Within its borders Chatham has an astonishing array of cultural and natural resources that are vital to community character, ecological diversity and residents' well-being. Surrounded on three sides by ocean waters, Chatham's 66 miles of shoreline encompass extensive scenic landscapes and environmentally significant coastal landforms and wetlands. Freshwater ponds throughout town filter pollutants before reaching the groundwater and support biodiversity, including over 30 rare plants and animals species. The Town's cultural resources include vast scenic landscapes and numerous sites of historical significances. In sum, Chatham is richly endowed with natural and cultural resources that are crucial to the environmental and economic vitality of the Town.

These resources also face threats that can be addressed to a degree by the community's choices regarding open space protection. These threats include:

- Problems associated with nutrient loading into estuaries, ponds and groundwater, which call for wastewater and stormwater Management;
- A number of underground storage tanks that pose threats to groundwater;
- Coastal Flooding and Coastal Erosion which threatens public beaches and access points, as well as private property;
- Habitat Fragmentation, and the Intrusion of Invasive species, which threatens biodiversity;
- Clear-cutting and loss of important Shade Trees which alter habitat and community character;
- Tidally-restricted Wetlands which can lead to water quality degradation and loss of habitat.

Section 5. Inventory of Lands of Conservation and Recreation

The Town of Chatham consists of 10,182 land acres of which a total of 5,092 acres or 50% is protected open space, recreation lands or lands dedicated to private recreation or agriculture. If Monomoy Island is excluded, these land uses account for 3,323 acres or 33% of the total land area in the Town.

Approximately 46% (4,727 acres), or 29% (2,958 acres) if Monomoy Island is excluded, are protected open space. In this OSRP protected open space is defined as land on which development is prohibited or restricted by governmental regulation, deed restriction, conservation restriction or other requirements of acquisition.

An overview of the inventory is provided in Table S1.

Table S1 Public and Private Conservation and Recreation Land

	Acres
Protected Open Space	
Municipal Open Space	2,034
Watershed/Wellsite Properties	85
Private Open Space	563
Private Conservation Restrictions	54
Monomoy National Wildlife Refuge	1,839
Cape Cod National Seashore	152
Sub Total	4,727
Other Town Lands	
Recreation Lands	221
General Municipal	357
Sub Total	578
Private Agricultural/Recreational Lands	
Chapter 61A	8
Chapter 61B	136
Sub Total	144

Source: Chatham Community Development Department

Section 6. Community Vision

The community vision, as articulated through meetings with key stakeholder groups and the results of the community survey stress:

- Protecting open space as a means to protecting natural resources and public water supply, while limit development and protecting community character;
- Augmenting recreational facilities to provide more opportunities for people with access limitations, and also older and younger residents;
- Protecting and maintaining existing town facilities that the community has invested in; and
- Doing all that is possible to protect public beaches and water access and to expand these opportunities if possible.

Section 7. Analysis of Needs

In view of the inventories and analyses provided in the foregoing sections of the OSRP, Section 7 provides a summary of open space and recreation needs. The needs are categorized in three areas: resource protection, recreation, and management.

Summary of Resource Protection Needs

Resource protection needs include:

Creative Protection Tools - Chatham's prior open space and recreation planning efforts placed on land acquisition, with impressive results. However, high property values and limited municipal financial resources call for evaluation and use of other regulatory (e.g. zoning) or non-regulatory (e.g. conservation restrictions) land protection tools. On-going, the Town should develop a Priority Parcel Acquisition List to direct its land acquisition efforts. The list should focus on (1) preserving the remaining high priority parcels for conservation and recreation; (2) lands that are adjacent to existing protected open space or provide links to larger open space and conservation parcels; and (3) lands that can be "undeveloped" and reclaimed as open space and view corridors.

Groundwater Supply Protection - Well field protection needs have thus far been met through intelligent land acquisition, primarily in the western portions of the Town, and through Board of Health and Zoning regulations. Continued land acquisition to protect these and other potential water supply areas remains important. Exploration of regional initiatives and land purchases, such as the Fratus property in Harwich, should be encouraged. These groundwater supply measures will be augmented by the continued Board of Health regulation of on-site sewage disposal and the implementation of a Comprehensive Wastewater/Nutrient Management Plan.

Surface Water Quality Protection - Land protection around surface water bodies in an ongoing need. Open space around fresh and marine surface water bodies limits run-off of nutrients or other pollutants that would diminish water quality essential to the ecology of these resources. Management of the public's use of surface waters, including provision of the appropriate level of parking and facilities, also are critical to the health of surface water resources.

Biodiversity and Habitat Protection - With the exception of a few large protected open spaces, much of the Town's wildlife habitat has been largely fragmented by the extent of development. There is a need for wildlife inventories and habitat management plans in the larger conservation areas in town. There is also a need to ensure the adequate protection of estimated and priority habitats identified by the NHESP.

Protection of Vulnerable Coastal Resources - Much of Chatham's charm and appeal derives from its being surrounded on three sides by water. However this also means the Town's shoreline is subject to dynamic tidal and wave impacts and storm-induced erosion. Continued monitoring and careful management (on a regional basis as needed) of Chatham's coastal resources will be essentially to the long-term public enjoyment of these resources.

Summary of Community Recreation Needs

Chatham's recreation resources compare favorably with the state average, given differences in demographics between Chatham and the state. According to the Parks and Recreation Department, there currently seems to be a sufficient supply of field space, swimming areas and programs for children. The new Community Center, which opened in 2007, addresses the need for space to house programs and services. The need for additional hiking trails should be addressed by recent land acquisitions and the construction of the new bike trail. Needs that require attention by the Park and Recreation Department include:

- Development of additional programs and services to serve the adult and senior populations;
- Greater feedback from the community regarding their specific desires for programs and services;
- Improved public education regarding the Parks and Recreation Department services and facilities; and
- Improved access for people with disabilities.

According to the community survey the types of facilities that respondents want to see improved and expanded include:

- Conservation areas;
- Public access to water bodies;
- Bike trails;
- Children's play areas;
- Hiking trails.

Summary of Management Needs

The following management and coordination needs have been identified as being significant to the success of efforts to address resource protection and community needs for open space protection and recreation.

- Coordination among town agencies with jurisdiction or management oversight of open space and recreation resources, including municipal bodies that administer financial resources;
- Greater outreach and public dialogue about the adequacy of existing open space and recreation needs;
- New partnerships within the Town and between the Town and other municipal and local entities. These could include public private partnerships and inter-municipal agreements;
- Development of management and use guidelines for all public recreation and open space facilities.

Section 8. Goals and Objectives

The community vision, and the inventory and analysis of resources, challenges and needs set forth in the OSRP provide the basis for defining open space and recreation goals and objectives. The goals are an articulation of conceptual achievements and the objectives reflect the areas of activity that can help achieve the goals. A summary of goals and objectives is provided below.

Goal: Acquire, preserve and protect a maximum amount of open space for environmental protection, community character and recreational needs, in balance with other community needs such as affordable housing.

Among the objectives for accomplishing this goal would be:

- Continuing to seek public and private funds for acquisition of new open space;
- Expanding use of creative non-regulatory and regulatory land protection tools; and
- Expanding use of regional and public-private partnerships to protect open space.

Goal: Provide adequate public access to and safe enjoyment of Chatham's open space and recreational resources, particularly its shoreline areas and fresh and marine waterways. Access should be provided in balance with resource sustainability.

Among the objectives for accomplishing this goal would be:

- Taking steps to protect the health of fresh and marine surface waters and associated natural resources, such as implementation of stormwater and nutrient management plans and projects;
- Providing public education regarding public access opportunities and responsibilities; and
- Ensuring that adequate resources are available for the maintenance of properties and access points.

Goal: Protect the Town's Groundwater Supply for Current and Future Needs.

Among the objectives for accomplishing this goal would be:

- Identify and protect future wellfield areas through zoning or acquisition; and
- Identify and pursue opportunities for regional initiatives to protect and manage shared water resources, including acquisition partnerships.

Goal: Promote greater coordination and communication about community open space and recreation needs within government and among stakeholder groups in the Town.

Among the objectives for accomplishing this goal would be:

- Encouraging greater coordination and cooperation among town departments and private stakeholder groups regarding open space and recreation planning and initiatives; and
- Promoting stewardship of open space and recreation facilities as a community-wide priority.

Goal: Protect and Enhance Chatham's Unique Community Character, Scenic Beauty, Historic Areas and Unique Habitats.

Among the objectives for accomplishing this goal would be:

- Promoting stewardship of open space and recreation facilities as a community-wide priority;
- Identifying and implementing regulatory and non-regulatory strategies to protect significant natural and cultural resources.

Goal: Provide diverse recreational opportunities and access throughout Chatham and ensure that the current and future needs of all user groups are met appropriately.

Among the objectives for accomplishing this goal would be:

- Assessing the condition of existing recreational facilities and develop and fund a program for repairs, improvements and rehabilitation of the facilities to meet current needs and state or national standards;
- Achieving ADA compliance for all public open space and recreation facilities to the extent practical; and

- Exploring alternative strategies to alleviate pressure at heavily used recreational facilities such as public beaches and landings, to allow access without compromising environmental sustainability.

Goal: Promote open space as a means of protecting and enhancing animal and plant biodiversity.

Among the objectives for accomplishing this goal would be:

- Conduct and regularly update a town-wide inventory and prioritization of wildlife habitats and species; and
- Use regulatory and non-regulatory strategies to protect and enhance wildlife and habitats.

Section 9. Action Plan

The OSRP sets forth a five-year action plan to accomplish the communities open space and recreation goals. The detailed action plan, found in Section 9, provides a list of actions associated with each goal and objective, and the parties responsible and resources needed to accomplish each action.

The top ten priority actions are:

- Regularly revise and revisit open space and recreation priorities to make sure they are consistent with community needs;
- Expand use of regional and public/private partnerships;
- Continue to seek public and private funds for the acquisition of new open space acquisition of new open space;
- Protect health of fresh and marine surface waters and associated natural resources;
- Identify and protect future wellfield areas through zoning or acquisition;
- Pursue projects that will foster inclusiveness and build stewardship of open space and recreation facilities as a community-wide priority;
- Implement management strategies to protect Chatham's beaches and shoreline in balance with the natural processes of erosion and deposition;
- Manage all town open space and recreation properties for their intended public benefit and to protect open space and recreational resources;
- Use regulatory and non-regulatory strategies to protect and enhance wildlife and habitat;
- Promote public education about and appropriate use of recreational facilities and programs through outreach, signage and other methods. Ensure that all stakeholder groups are included.

Section 2. Introduction



Photo by Jeff Thibideau

2. Introduction

2.1 Introduction

Open space and recreational facilities reflect and define a community's character and aspirations, and contribute to the well-being of residents and the vibrancy of the local economy.

For the past two decades, Chatham has made the acquisition, protection and maintenance of open space and recreational facilities a community priority. In 1985 the Town adopted its first open space plan, "1985 Town of Chatham Open Space and Recreation Plan." The 1985 plan recognized the importance of open space protection for the purposes of groundwater and habitat protection, passive recreation, and of preserving community character.

2.2 Progress Since the 1985 Open Space Plan

Following the adoption of the 1985 plan, the Town made major strides in the protection of open space and development of varied recreational facilities. The Town's efforts were significantly enhanced by the creation of the Cape Cod Land Bank and subsequently the adoption of the Community Preservation Act (CPA). Both programs provided major funding resources for open space purchases. The plan, coupled with Land Bank and CPA activities, accounted for a number of significant accomplishments during this period:

- Land Bank acquisition of 18 properties totaling 180.49 acres, for a total purchase price of nearly \$15 million;
- Large town acquisitions including 75 acres at Forest Beach and adjacent upland, and 11.38 acres of land and buildings at the former wireless station at Ryder's Cove;
- Continued protection of open space by the non-profit Chatham Conservation Foundation through private acquisitions and conservation restrictions now totaling 563 acres and 54 acres, respectively;
- Conversion of the historic former Main Street School into a three level multi-generational Community Center with new gymnasium.
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- Development of playing fields and a playground at Volunteer Park in South Chatham;
- Installation of facilities at Kate Gould Park, and public access areas at White Pond and Oyster Pond Park.

In addition to these achievements, the Town has completed several comprehensive regional resource planning efforts with emphasis on eliminating threats to resource health posed by land use development, and on promoting public access to and use of its waterways and coastal resources.

Coastal resource management planning efforts provide management guidance for all of Chatham's coastal waters, including the:

- *Pleasant Bay Resource Management Plan* (adopted in 1998 and updated in 2003 and 2008), which incorporates Chatham's northern coastline within the Pleasant Bay Area of Critical

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Environmental Concern and Chatham Harbor. The plan is implemented through an Alliance with the Towns of Orleans, Harwich and Brewster which share Pleasant Bay and its watershed; and

- *South Coastal Harbor Management Plan* (adopted in 2005), a locally and state approved harbor management plan encompassing the Stage Harbor Complex, Nantucket Sound and the Southway.
- North Beach Management Plan which guides local management of this portion of the Nauset barrier beach system lying within the Cape Cod National Seashore management boundary.

Through development and adoption of its *Comprehensive Wastewater Management Plan* and its *Comprehensive Plan*, the Town has made progress in addressing the significant threats to open space and natural resource conditions posed by watershed nutrient loading and encroachment from land uses.

The Town also has undertaken significant land management planning including completion of the *Chatham Conservation Land Management Project* (2007), the *Captain George N. Harding Conservation Area Land Management Plan* (2008) and the *Forest Beach Conservation Area Land Management Plan* (2008). Wildfire preparedness plans have been developed for *Goose Pond Complex* (2007) and *Chatham Town Forest and Harwich Water Department Lands* (2007).

The Town has made tremendous strides over the last quarter century in the acquisition and protection of open space resources to meet a variety of local needs. However, it is widely acknowledged that local stewardship of open space and recreational resources faces increasingly complex management issues. The purchase and on-going maintenance of open space and recreational resources must compete for limited town funds with other land uses and with other community needs. Accordingly, the on-going health and vitality of open space resources cannot be assumed and must be planned for and new strategies continuously explored.

2.3 Purposes of the 2010 Open Space and Recreation Plan

In light of the progress to date and the challenges ahead, the purposes of the *Town of Chatham 2010 Open Space and Recreation Plan* (OSRP) are to:

- Update 1985 plan, report progress, identify existing or emerging needs based on community dynamics, and set forth a plan of action to meet open space and recreation needs;
- Provide a blueprint for open space planning, acquisition, site development and management;
- Fulfill the Open Space and Recreational Plan requirements set forth by the Executive Office of Environmental Affairs, Division of Conservation Services (DCS), to qualify the Town to compete for land acquisition and recreation facility reimbursement funding through such programs as the LAND and PARC grants and Federal Land and Water Conservation Funds.

2.4 Summary of the Planning Process

Development of the 2010 OSRP has been a years long process:

- Fall 2006 – The Land Bank and Open Space Committee began to discuss the need for an updated Open Space and Recreation Plan that would reflect the Town's current identity and vision.
- Spring 2007 – Funding was approved at Annual Town Meeting, through an appropriation under the Community Preservation Act, for the Town to begin an updated Open Space and Recreation Plan.

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- Summer 2007 - public input about open space protection and recreation issues was sought through distribution of a survey. This survey was mailed directly to a sample of Chatham households, made available at Town Hall and the Town Hall Annex and also posted on the Town's website for respondents to submit responses.
- Winter 2007 - a kick-off meeting was held with representatives from Town departments invited to serve as Ad Hoc Open Space and Recreation Planning Workgroup members.
- Fall 2007 / Winter 2008 – Initial data collection commenced and research was undertaken.
- Winter 2008 / Spring 2009 – Public Review Draft was distributed to Boards and Committees, and the report was made available for public comment. Hardcopies of the Public Review Draft were available for viewing/loan at public locations including Town Hall, Town Hall Annex, and the Eldredge Public Library. Additionally the entire document and corresponding maps were posted on the Town's website.
- Summer 2009 / Spring 2010 - Additional research, responses to comments and mapping updates were compiled into a Final Draft OSRP for public comment and review.
- Spring 2010 - Final Draft OSRP was released. A public meeting was held to solicit public comment on the final draft OSRP. The final draft was submitted to the Board of Selectmen, Planning Board, Conservation Commission, Parks & Recreation Commission, Land Bank and Open Space Committee and the Cape Cod Commission (Regional Planning Agency) for letters of support.
- Spring 2010 – the final draft OSRP was submitted to the Massachusetts Division of Conservation Services (DCS) for acceptance.

The Executive Office of Environmental Affairs' *Open Space and Recreation Plan Requirements* and the *Open Space Planner's Workbook - Companion to the 1990 Open Space and Recreation Plan Requirements*, were used as guides for preparing the OSRP.

Section 3. Community Setting



Photo by Jeff Thibodeau

3. Community Setting

3.1 Introduction

Chatham today is a vibrant seaside community with extensive and varied coastal and natural resources. Over the past quarter century the Town has been active in saving open space and developing recreational facilities to meeting the needs of a growing and changing population. Like other Cape Cod towns Chatham has experienced significant changes that warrant a review of its open space protection strategies. These changes include rapid land development and redevelopment, a growing and changing population that includes an annual influx of seasonal residents, and economic variability that has placed a strain on municipal resources.

3.2 General Background

Located at the elbow of Cape Cod, Chatham is one of the fifteen towns that make up Barnstable County. Most major thoroughfares that connect the Cape bypass Chatham and, as a result, the Town has avoided much of the large-scale commercial development that characterizes sections of many other towns. Chatham has a Town Meeting/Board of Selectmen form of government.

Chatham covers an area of 16 square miles and is bordered by the Town of Harwich to the west. On its remaining three sides Chatham is surrounded by water—Pleasant Bay and Chatham Harbor to the north the Atlantic Ocean to the east, and Nantucket Sound to the South—with 66 miles of coastal shoreline.

Based on its location, extensive coastline and historical patterns of development, Chatham today is predominantly a residential community with a relatively large number of high value seasonal homes.

Chatham is within the Cape Cod watershed as defined by the Massachusetts Executive Office of Energy and Environmental Affairs. The Cape Cod watershed contains the watersheds of numerous estuaries. Of these, the entire watershed of the Stage Harbor estuarine system is within the Town of Chatham. Chatham shares the Pleasant Bay watershed with Orleans, Harwich and Brewster, and the Town also is within the Nantucket Sound watershed. Chatham is a leader among Cape Cod towns in addressing watershed nutrient loading, and is an active participant in regional wastewater management planning, through the Cape Cod Water Protection Collaborative and the Pleasant Bay Alliance.

3.3 Regional Context

Barnstable County is a robust regional government governed by three County Commissioners and an Assembly of Delegates with weighted representation by the 15 member towns. The County has a regional planning agency, the Cape Cod Commission, which provides technical support to the towns and administers a regulatory Regional Policy Plan. With respect to open space protection, Chatham also collaborates through the Cape Cod Compact of Conservation Trusts. This regional non-profit organization provides technical support, negotiations strategies and grantwriting support to municipal and private land conservation organizations.

Amidst mounting financial strains and increasingly complex issues, all towns on Cape Cod are under increasing pressure to seek out regional solutions that promise greater efficiency and effectiveness at lower

cost. Some opportunities for regional collaboration are within the County framework of 15 towns, while others involve neighboring towns with which Chatham shares resources. Chatham is engaged in regional discussions regarding wastewater planning and public education. The Town also has participated in or contributed to regional land purchases for conservation and water supply protection.

Chatham's regional context is shown on Map 1 found in Appendix E.

3.4 History

Understanding Chatham's past provides a helpful context for planning its future. Chatham's physical development and history of settlement underscore the influence human habitation has on the character and condition of the landscape and how that landscape is used and enjoyed by residents and visitors. The Town's many historical sites of interest including the Chatham Lighthouse, Railroad Museum, historic homes in Chatham Village, and Atwood House Museum, among others are charming reminders of the Town's rich past. However, Chatham's history of development reveals some unintended effects that include clear-cutting of vegetation, loss of habitat, degradation of some natural resources, and emergence of nutrient loading as a significant threat to water resources.

Chatham is in a region of Cape Cod formed by the advancing, retreating and subsequent melting of glacial ice that occurred near the end of the Pleistocene Era some 600,000 to 10,000 years ago. The glacial action sculpted the region's topography including formation of numerous kettle ponds and coastal plain ponds. The barrier beaches and salt marshes throughout the region were largely the result of wind action on glacial deposits from the Sandwich Moraine and the Harwich Outwash Plains.

The post-glacial landscape evolved through a process of natural succession. First, pioneer species took hold and helped to stabilize shifting sediments, forming marshlands and tidal creeks. As the soil became enriched and new habitats created in the shady under-story of these early plant communities, secondary successor species began to infiltrate and ultimately dominate. As the ecosystem developed, more complex species including hardwoods emerged and thrived. The result was a richly diverse ecosystem with a varied species and plant communities populated by varied wildlife

It is known based on archeological artifacts found in Chatham that habitation by Native Americans may have been as early as 8,000 to 10,000 years ago. Most of Chatham was within the Monomoyik Tribal lands, which extended from Chatham north to Orleans and west to encompass portions of Harwich and Brewster. While historians have theorized that Vikings may have visited the region in the first century, the earliest recorded visits by Western Europeans began in the 17th century.¹

Settlement by Europeans began in earnest in the mid-17th century, and new residents used the land markedly differently than their Native American predecessors. As a result, the rapid pace of European settlement brought significant changes to the landscape. Extensive clear-cutting was undertaken to make way for farming. Residential development was scattered and it was not until fishing emerged as a commercial activity that villages began to form. Within a century most of the virgin forest was cleared to make way for farms and provide timber for homes and businesses, and decades of intense farming had depleted the region's topsoil.

¹ Pleasant Bay Resource Management Plan, 1998.

By the late 18th century, seafaring and fishing had replaced agriculture as the Town's primary source of commerce. Villages thrived and infrastructure was developed for building, repairing and offloading ships. In the late 19th century another major shift in land use and economy occurred with the arrival of the railroad in Chatham, which carried visitors and seasonal residents to enjoy the Town for recreation. By the early 20th century hotels, inns, resorts and camps catering to seasonal visitors were emerging.

The 20th century also brought a considerable development boom to the Town. Housing construction after World War II began consuming land at an unprecedented rate. The rapid pace of development from the 1950's through the 1970's raised awareness of the threat to drinking water posed by on-site septic disposal. A second housing boom in the 1990's solidified Chatham's position as an affluent seasonal and retirement home community.

3.5 Demographics

Chatham has an older and less racially and ethnically diverse population than the state and some other Cape Cod towns and according to MassGIS, the Town does not have any Environmental Justice populations. For the past several years the size of Chatham's population has held fairly stable at around 6,700 year round residents. Chatham's population did not grow as rapidly as the region's over the past two decades during which time the Barnstable County was the second fastest growing county in the state. From 1980-1990 Chatham's population rose 8.4% compared to 26.1% for the county. From 1990-2000 Chatham's populations grew only .7% while the county continued to grow at 20.8%. The slower growth may be due to Chatham's relatively fewer affordable housing choices and limited career opportunities for young adults.

The age characteristics of Chatham's population influence needs for recreational facilities. Chatham has an older population than the state and even the region. Chatham has the second highest median age, 53.9, among Cape Cod towns, and is well above the state median age of 36.5. From 1990 to 2000 the Town lost population in all age categories age 14 and under, and among young adults 25-34. In 2008-2009 there were only 687 children enrolled in Chatham's three public schools. The Town gained population in older groups with the largest increases among 45-54 year olds, 55-59 year olds and 65-74 year olds.

Although Chatham has a high number of affluent second homeowners, the Town's year-round population is not as financially well off. In 2000, Chatham ranked 272nd out of 351 Massachusetts towns in terms of median income, and 6th highest among towns in Barnstable County.

Like most Cape Cod towns, Chatham's population swells in the summertime. It is estimated the population of year-round residents swells to 25,000 during the summer. The addition of summer residents puts pressure on virtually all of Chatham's recreational facilities, particularly public beaches and water access points. Kate Gould Park hosts Chatham's regionally famous Friday night band concerts, and Veterans Park and playground serve as home field for the Chatham Angler's Cape League team. These recreational resources are heavily used all summer long.

3.6 Growth and Development

Chatham has adopted a locally adopted Comprehensive Plan, which articulates the Town's growth management vision and the policies necessary to achieve that vision. According to the Comprehensive Plan the primary long term growth management challenge facing the Town is *preserving the unique*

character of each neighborhood, maintaining and minimizing commercial development, conserving open space, protecting embayments, ponds and other sensitive areas, while providing an economic base for Chatham's year-round residents.

Chatham's zoning districts are shown on Map 2 found in Appendix E. Chatham is a predominantly residential community. Most residential development consists of single-family grid style subdivisions. Chatham was among the last towns on Cape Cod to develop an Open Space Residential Subdivision bylaw. The bylaw requires a minimum parcel size of five acres and, to date, no subdivisions have been developed in a cluster layout as a result of the bylaw. This may be due in part to the small number of large undeveloped land parcels. Over the past decade most residential subdivisions have been ten or fewer lots and many have involved the tearing down of existing built structures to create parcel size.

Commercial development in Chatham is focused in the Downtown, West, North and South Chatham Centers, and the Cornfield and Crowell Road areas. The Downtown is a vibrant town center and regional tourist attraction. The other commercial areas vary in their intensity of development and mixed-use character. The Town is seeking to contain commercial activity within these areas, and has reduced the potential for commercial growth along Route 28 to the prevent area from becoming a sprawling strip of commercial businesses.

Industrial development is focused in two industrials parks; Commerce Park located in South Chatham and Enterprise Drive located in North Chatham, and the Town's Comprehensive Plan seeks to contain this land use category rather than see it expand.

Chatham is a mature community that is approaching build out under current zoning. However there is potential for additional growth through development of raw land and redevelopment of existing built properties. Analysis conducted for the Comprehensive Wastewater Management Plan estimated that the number of residential properties could reach 7,758 and commercial properties could reach 1,379 at full build out under existing zoning.

Additional development could result in population growth and increased or different demands for open space and recreational resources. However, development also could create opportunities to enhance open space protection through enhanced clustering of development and use of other smart growth techniques. Redevelopment also provides opportunities to reclaim open space and scenic views.

Like all Cape Cod towns, Chatham is actively seeking to increase its supply of affordable housing. This effort is being led by Chatham's Board of Selectmen, Housing Authority and Affordable Housing Committee. An increase in affordable housing options, particularly rental housing, is acutely needed and is important to the Town's socio-economic diversity. However, the needs of housing and open space protection are periodically viewed as being at odds, particularly when proposals for either are in competition for use of town-owned parcels, or for access to Community Preservation Act funds.

Chatham's efforts to protect open space and community character have been greatly aided by the adoption of the Land Bank and Community Preservation Act (CPA). In 2002, the Town adopted the CPA, which establishes a surcharge amounting to 3% of the annual property tax levy to be used for open space, historic preservation and affordable housing. Since its adoption Chatham's CPA fund has generated more than \$500,000 annually for these purposes.

3.7 Water and Wastewater Infrastructure

Chatham has a public water system that services approximately 98% of the land area in the town. The water distribution system has over 100 miles of water mains and over 1,000 hydrants. 85% of residences are on town water and the remaining properties are on private wells. There are two standpipes with over 2.1 million gallons of storage capacity. There are nine wells located across the Town with a total combined capacity of approximately 5,250 GPM. There is also a new well being developed near the South Chatham/South Harwich town line that is expected to have a capacity of 1 million gallons per day. Chatham's public water supply areas are shown on Map 6A in Appendix E.

Town-owned land for public water supply protection includes 85 acres for watershed protection and well sites. The Town has established a goal of ensuring that an adequate supply of public water is provided to meet needs for the next 20-year period, based on a minimum level of service of 75 gallons per person per day. Accordingly, protecting existing water supply infrastructure and wellhead protection areas and developing new capacity are ongoing management objectives. Purchase of open space to protect the health of the public water supply is among the Town's management strategies. The Town is committed to exploring all options to safeguarding an adequate public water supply to meet current and projected future needs, including the possibility of regional initiatives for wellhead protection.

The treatment of wastewater is a major management issue for the Town. Nitrogen loading from watershed land uses, particularly from onsite wastewater disposal, poses a major threat to the health of estuaries across Cape Cod. Chatham is one of only four towns on Cape Cod with any form of centralized wastewater treatment (i.e. sewerage.) Downtown Chatham is served by sewer and treatment occurs at the Chatham Wastewater Treatment Facility in South Chatham. Chatham also is among the first towns on Cape Cod to adopt a Comprehensive Wastewater/Nutrient management Plan (CW/NMP), which provides a 30-year plan for addressing nitrogen from wastewater. Construction has started on Phase I of the CW/NMP, which calls for sewerage along Route 28 and areas needed to meet total maximum daily loads (TMDLs) over a period of twenty years. Phase II extends the project ten years to connect sewerage to other areas of town. The plan calls for enlarging the existing treatment facility to handle additional effluent. The CW/NMP will help to restore healthy habitat conditions to estuaries and safeguard their long-term health.

Chatham also was among the first towns to adopt a *flow neutral* sewer policy. The flow neutral policy, which is implemented through the Town's sewer connection regulations, is intended to ensure that the installation of sewers does not enable development that otherwise would not be allowed under existing zoning and wastewater permitting regulations and, if allowed, could alter natural resources and community character.

3.8 Transportation Infrastructure

Major roadways running through Chatham include Route 28 (a state highway) and Route 137 (a state roadway.) There are approximately 125 miles of roadway in town, approximately 9 miles of which are state highway and 40 miles are private. The Town maintains 70 miles of public roadway, and approximately 11 miles of sidewalk. The vast majority of town roads are paved.

Chatham is a member of the Cape Cod Regional Transit Authority (CCRTA), which provides Cape Cod's only public transportation. Chatham is served by three CCRTA bus lines: the H2O which provides services

from Hyannis to Orleans, the Flex, which provides service from Provincetown to Harwich (and connects with the H2O) and the b-bus, which provides scheduled on-demand service.

Chatham's first and only bicycle path, the Old Colony Rail Trail, connects downtown Chatham with the Cape Cod Rail Trail via a spur from Harwich center. Recently the Town added a spur from the rail trail to Volunteer Park in South Chatham. The rail trail is heavily used during the spring, summer and fall seasons and perceived as a major public recreational asset.

Chatham has a municipal airport, which accommodates small aircraft. There is no scheduled air service provided from this location. Scheduled air service is provided elsewhere on Cape Cod at Provincetown Municipal Airport and Barnstable Municipal Airport.

3.9 Chatham's Local Economy

According to the Chatham Comprehensive Plan, Chatham has a serviced- based economy that benefits from high-valued residential property, and from a relatively high percentage of households with retirement income from off-Cape sources.

Chatham's high percentage of households with retirement income and its high percentages of persons employed in retail trade and services are comparable to the region. However, Chatham has twice the Cape Cod average of self-employed persons, a higher-than-regional average number of fishermen, and more highly valued residential properties.

The percentage of Chatham households with income from social security is twice the state-wide average, and a far higher percentage have income from pensions. The high percentage of retirement households in Chatham is an economic strength since their income brings funds to Chatham from outside sources.

Chatham is among the Cape Cod towns with active commercial fisheries. Chatham fish landings reported in 2000 were almost \$15 million, and the Town's 2001 shellfish harvest was \$5.6 million. It is estimated that Chatham finfish landings could account for as much as half of the value of all Cape finfish landings.

Of concern is that Chatham's median family income is lower than state and county averages, reflecting heavy employment in service and retail jobs characterized by low wages. On the other hand, the median house value in Chatham, at \$273,900², is well above county median value of \$178,800 or state median value of \$185,700. The mismatch between home values and income is at the root of the affordable housing problem. The housing values are buoyed by Chatham's desirability as a seasonal home location.

The Town's seasonal homeowners are an economic asset to the community. Residences account for more than 90 percent of local tax revenues, and more than half of the houses in town are owned by seasonal residents. In 2002 \$46 million was injected into the local economy through construction of new homes and home renovations.

² Barnstable County Comprehensive Economic Development Strategy, 2009.

4. Environmental Inventory & Analysis



Photo by Jeff Thibodeau

4. Environmental Inventory and Analysis

4.1 Introduction

4.2 Geology and Soils (See Maps 3 and 4 in Appendix E)

Chatham soils are primarily glacial outwash deposits, which can be divided into three segments: the Chatham Kame deposits (Great Hill ridge) and the Harwich outwash plain deposits, both derived from the Cape Cod Bay lobe of the glacier and the Nauset Heights outwash deposits derived from the South Channel lobe that occupied a position to the east of the Chatham quadrangle. These glacial deposits overlay a thick section of coarse to clayey silt underlain by a compact till. The till rests on a base of crystalline rock 250 to 550 feet below sea level.

Valleys or furrows in the Harwich outwash plain, created by melting glaciers, formed the courses of the Red River, Cockle Cove Creek, Muddy Creek and the Oyster Pond River. Later, as the postglacial sea level rose, marine erosion formed the sea cliffs, or scarps. Waves and currents have transported and re-deposited these materials to form the spits of Nauset and Harding's Beaches and Monomoy Island. Salt marsh and tidal flat deposits formed behind the spits, and onshore winds have transported and re-deposited some of the beach sand to form dunes.

Soils on the mainland of Chatham are predominantly of the Carver Series and cause little impediment for development. For the most part they permit easy excavation and good drainage.

Soil types for the Town of Chatham have been mapped and described by the U.S. Department of Agriculture Soil Conservation Service now part of federal Natural Resources Conservation Service (NRCS) in the Soil Survey of Barnstable County. MassGIS has also mapped soils across the state. According to Mass GIS data, 32 naturally occurring soil types (including Water, Urban Land, Dumps, etc.) are described for the Town, classified according to composition (relative amounts of stone, sand, loam and silt), degree of slope, and other factors affecting their use and management. Map 3, *Soils* shows the distribution of these soils in Chatham. Visual observation of this map indicates that Carver Coarse Sands dominate followed by Ipswich, Pawcatuck and Matanuck peats, associated with lower elevations in and around wetlands.

4.3 Topography and Landscape

Chatham's landscapes vary from wooded upland areas covered by oaks and pines to seashore habitats of salt marshes, beach grasses and dunes. Notable are the barrier beach system that lies between the Atlantic and the mainland and the significant salt marsh systems on Nantucket Sound, within the Stage Harbor Complex and within Pleasant Bay.

Also significant are the inland wetland areas, including pond and lakeshore areas, cranberry bogs and associated swamps. There are numerous wetlands throughout the Town because of low elevations and high groundwater levels. A town-owned White Atlantic Cedar Swamp is located southwest of the main village. With relatively little undisturbed upland remaining, there is a greater pressure to develop remaining parcels adjacent to sensitive wetland areas. Numerous streams provide rich wetland habitat and fresh water for a variety of wildlife, including two herring runs in the Pleasant Bay System.

Chatham's location at the elbow of Cape Cod and its eastern and southern ocean exposure provide for spectacular coastal vistas. The geographic orientation also renders the Town's shoreline vulnerable to intense storm activity.

Though most of the Town has been subdivided into housing lots, there are still large tracts of undeveloped land, particularly associated with protected or semi-protected lands including the Water Resource Protection District, wetland resource areas, and town-owned conservation and recreation lands. The largest portion of undeveloped land is in west central Chatham in the area of the Town's public water supply wells and numerous ponds.

Topography does not present any significant limiting factor to development. The steepest slopes, some in excess of 15 percent, generally are found in a broad band extending from East Harwich easterly to Great Hill. Within this area are found most of the largest fresh water ponds and many have relatively steep abutting slopes.

4.4 Groundwater Resources

Chatham's groundwater resources are part of the *Monomoy Lens*, an aquifer extending to five towns: Chatham, Orleans, Harwich, Brewster and Dennis. The thickness of the aquifer is 40 to 230 feet. Groundwater elevations range from 0 to 20 feet above mean sea level, with the highest elevations located through the center of Chatham. The quantity of available groundwater within the Town appears to be adequate to meet drinking water needs for the foreseeable future.

The major threat to the aquifer is from contamination due to land use impacts, including nutrient loading from on-site sewage systems, as well as contamination from underground tanks. As noted above, the installation of centralized wastewater treatment as proposed by the CWNMP will provide significant protection against nutrient and other wastewater impacts that could reach groundwater and potentially impair public drinking water supplies.

Additional protection is provided by the Town's Water Resources Protection District (WRPD.) The WRPD which augments state restrictions on development that can occur within Zones of Contribution, or areas from which town wells draw their water. The WRPD encompasses specifically designated Zone I and Zone II recharge areas for the municipal wells of the Town of Chatham and Harwich and professionally estimated Zone I and Zone II recharge areas to potential future municipal wells of the Towns of Chatham and Harwich. The WRPD also includes the entire area of any lots intersected by the Zone II boundaries, and except in the industrial zoning districts, includes lots located in the two hundred (200) foot Zone II buffer for existing wells. Map 6A, Surface & Estuarine Watersheds / Public Water Supply, shows the WRPD. The WRPD prohibits certain land uses, which may contribute contaminants to the groundwater and requires best management practices for others. It also requires treatment of stormwater from paved surfaces and roofs. Approximately 60% of the WRPD is zoned for residential use. Approximately 50% of the WRPD is currently open space and contributes to the long-term protection of water resources.

4.5 Freshwater Ponds and Lakes

Ponds provide many ecological functions: they are lenses into the groundwater supply and they also take up nitrogen and provide critical habitat and are scenic amenities. There are twenty-nine freshwater ponds and two salt ponds located throughout Chatham. In size, they range in size from the 1.2-acre Pinkwink Pond to the 41-acre Goose Pond. Chatham ponds are shown on Map 6A found in Appendix E.

Seven of the Town's freshwater ponds are designated by the state as great ponds because they are ten acres or more in size. Five of these ponds have public access and support recreational activities, as described in Table1 below.

Table 1. Great Ponds (>10 acres) in Chatham

Great Pond	Acres	Public Access
Mill Pond	23	Trail to pond on town-owned McCoy Tree Farm conservation area, fishing, no parking
Goose Pond	41	Fishing landing, parking area
Schoolhouse	22	Town Beach, permit parking, fishing
Lovers Lake	37	Trail to pond over Old Comers Woodland conservation area, kayak/canoe, fishing
Stillwater Pond	18	No public access, herring run
Emery Pond	14	No public access
White Pond	40	Boat ramp, parking, picnic area, swimming (no lifeguard), kayak/canoe

Source: Town of Chatham Conservation Department

Table 2. Ponds (<10 acres) in Chatham

Trout Pond	Little Pond	Black Pond (near Bridge St and Mill Pond)
Pickeral Pond	Bearse's Pond	Fox Pond
Barclays Pond	Meadowview Pond	Duggans Pond
Mary's Pond	Pinkwink Pond	Blue Pond
Perch Pond (Newty Pond)	Ministers Pond	Un-named Pond on South Beach
Black Pond (near golf course)	Duane Pond	Un-named Pond on South Beach
Black Pond (near White Pond)	South Pond	Un-named Pond off Scatteree Rd (Salt)
Black Pond (West Chatham)	Archie's Pond	Un-named Pond off Whidah Rd (Salt)

Source: Town of Chatham Conservation Department

Many other ponds are smaller, privately-owned and do not provide public access opportunities. However they do provide important plant and animal habitat and support ecological functions that include attenuation of nitrogen from groundwater, and filtration of runoff prior to reaching groundwater.

All but five ponds have been classified as Class B under state regulations (314 CMR 4.06), the highest classification for surface waters not used as a drinking water source. Five freshwater ponds, Stillwater Pond, Lovers Lake, Mill Pond, Fox Pond and Minister's Pond, are included within the boundary of the Pleasant Bay Area of Critical Environmental Concern (ACEC) because they have a perennial hydrological connection to Pleasant Bay. For this reason the ponds are classified as class SA Outstanding Resource Waters (314 CMR 4.06). The shoreline around Mill Pond was found to exhibit characteristics of coastal plain pond shore habitat.

State classifications reflect conditions the waters could support, not their current condition. Many ponds are showing signs of nutrient enrichment. While nitrogen is the limiting nutrient in marine waters, phosphorus plays that role in freshwater bodies. As phosphorus enters a freshwater system from various sources, plant growth is stimulated, and if excessive, eutrophication occurs. Based on 2001 data collected for seventeen ponds, sixteen were impacted by Chlorophyll, fifteen by total Nitrogen and fifteen by total Phosphorous levels³. Mary's Pond was considered to be at risk due to high levels of chlorophyll and Goose Pond and Schoolhouse Pond at high risk due to total Nitrogen. Goose Pond was the only pond that was not impaired by phosphorous.

The CW/NMP includes outreach and public education to homeowners regarding use of household products and fertilizers, which contain phosphates, which may help to mitigate this pollution source. Maintenance of adequate vegetated buffers is enforced through local wetland protection regulations administered by the Conservation Commission. Recently the Town initiated permitting for a phosphorous inactivation project using alum treatments at Stillwater Pond and Lovers Lake. As part of the permitting for this project the Town is required to develop a watershed plan that includes public education to homeowners on practices that may contribute nutrients to the ponds.

In addition to eutrophication caused by nutrient loading from surrounding land uses, ponds also face threats due to overgrowth of invasive species. The Chatham Conservation Commission has reviewed numerous applications for management of invasive species through use of herbicides. Another management issue for these resources is loss of bordering vegetated wetlands due to erosion or encroachment from surrounding land uses.

4.6 Coastal and Estuarine Resources

For planning purposes, Chatham's coastal resources are generally identified as being part of several larger systems possessing distinct features that drive management issues and strategies. Chatham's coastal resources are shown on Maps 6A and 6B found in Appendix E.

4.6.1 Pleasant Bay and Chatham Harbor

Chatham's northside coastal waters—Pleasant Bay and Chatham Harbor—are within the study area of the locally and state approved Pleasant Bay Resource Management Plan. The plan was developed to provide a framework for coordinated management of resource areas within the Pleasant Bay Area of Critical Environmental Concern (ACEC), designated by the state in 1987. The boundary of the ACEC is shown on Map 5 – in Appendix E. Although the ACEC boundary does not include Chatham Harbor, it was determined at the time the plan was developed that the management area also should include Chatham Harbor and South Inlet (1987), since those features help to influence the system's flushing rate and resource health.

Chatham participates in an inter-municipal agreement along with the Pleasant Bay watershed towns of Orleans, Harwich and Brewster, which establishes the regional Pleasant Bay Alliance to implement the resource management plan and coordinate management activities. The Alliance undertakes scientific research, develops policy recommendations and provides public education and outreach on a range of

³ Cape Cod Commission, PALS

management topics. The Alliance's programs include a comprehensive water quality monitoring program, coordination of local wastewater management activities, and on-going study of the dynamic evolution of the Nauset barrier beach and inlet system.

Chatham accounts for 43% of the estuarine surface water area in Pleasant Bay and 24% of the system's watershed land area. Chatham has 840 moorings in Pleasant Bay and Chatham Harbor. The Town also has fifteen town landings and public access points in the study area. Chatham's portion of the shoreline also includes a private boat yard at Ryder's Cove.

Natural resource features in the study area include extensive eelgrass beds and fringe salt marsh on the backside of Nauset barrier beach and along portions of the mainland shoreline. The Chatham has two islands in Pleasant Bay and Chatham Harbor. Strong Island is owned in part by CCF and in part by the Town. The island has one residence, and conservation areas are open to the public. Tern Island is an undeveloped wildlife sanctuary owned by the Massachusetts Audubon Society.

Resource conditions and navigation within Pleasant Bay and Chatham Harbor are greatly influenced by the dynamic barrier beach system, which includes North (Nauset) and South Beaches, and ultimately extends to Monomoy Island. A long-term cycle (about 150 years) of dramatic coastal change in Chatham's beaches has been identified and studied by coastal geologists, including Dr. Graham Giese. North Beach is continuously receiving sand from the coastline to the north. As sand moves slowly southward through the action of wind and waves, North Beach lengthens. Eventually, the barrier beach experiences a break, usually during a storm. Such a break occurred in 1987, forming South Inlet across from Chatham Light. As in previous cycles, the break exposed the inner coastline of Chatham Harbor to the Atlantic Ocean. A second breach of North Beach occurred in April 2007 during a nor'easter due east of Minister's Point. The resulting creation of North Inlet has resulted in the formation of "North Beach Island" and the destruction of all camps on the Chatham portion of the remaining southern tip of North Beach. The effects of the 2007 breach with respect to navigation, shoreline erosion and water quality are still being evaluated by the Town and the Pleasant Bay Alliance.

4.6.2 South Coastal Harbor Management Study Area

The South Coastal planning area encompasses all waterways, filled tidelands and shoreline within the following areas:

- Stage Harbor Complex encompassing Stage Harbor, Oyster Pond, Oyster Pond River, Mill Pond, Little Mill Pond, and Mitchell River;
- Southway Complex encompassing the area between North Monomoy and South Beach, including Outermost Harbor and the Morris Island Cut; and
- Nantucket Sound Complex encompassing the near-shore waters of Nantucket Sound and Taylor's Pond, Mill Creek, Buck's Creek/Cockle Cove Creek/Sulphur Springs, Cockle Cove Beach, Forest Beach, Pleasant Street Beach, Ridgevale Beach, and Hardings Beach.

The Stage Harbor Complex encompasses one of the Town's premier recreational boating areas, critical offloading capacity for the Town's commercial fishing fleet, and significant shellfishing areas. There are sixteen town-owned public access locations in the Complex including five of the Town's eight key saltwater access facilities (Old Mill Boatyard, Barn Hill landing, Oyster Pond Furlong, Morris Island Road, Bridget Street Boat Ramp.)

Nantucket Sound encompasses the Town's most heavily-used public beach areas. These include Hardings, Ridgevale, Cockle Cove, Pleasant Street and Forest Beaches. Nantucket Sound beaches face severe erosion pressure due to a decline in sediment flow. The construction of jetties and groins along the Cape's south coast over the years has significantly reduced the natural west to east flow of sand and along the shoreline. As a result, Chatham's Nantucket Sound beaches are experiencing a net loss of sediment and overall beach width. Aerial photos and maps of this area of the shoreline show a marked recession of the shoreline over time. By the late 1990s, the Town's parking lot at Cockle Cove was being undermined, and sand was brought in periodically to protect the parking lot. A beach nourishment project was undertaken by the Town in 2002 using the dredge material removed from the Stage Harbor channel which was deposited on private property immediately to the west as a feeder beach. The sand served to maintain Cockle Cove beach for a period of years but is recently showing signs of erosion. The Town also has experimented with some success with dune reconstruction using mounded sea grass on some of the beaches.

The Nantucket Sound portion of the system also includes extensive salt marsh and estuarine habitat found in Buck's Creek, Cockle Cove Creek, Taylor's Pond, and Mill Creek.

The Southway includes several areas with distinct identities.

- Morris Island and Stage Island are the landmasses that separate Stage Harbor from the Southway. In the 1950's the islands were connected to the mainland by a causeway built from material dredged from Stage Harbor channel.
- South Beach is the southern portion of Nauset barrier beach separated from the remainder of Nauset Beach (called North Beach in Chatham) by the formation of the 1987 inlet. South Beach is within the Cape Cod National Seashore but is owned and managed by the Town.
- Outermost Harbor is a small waterway located at the upper reaches of the Southway. Outermost Harbor was considered part of Chatham harbor until separated by the formation of the depositional landmass referred to as the tombolo.
- Monomoy Islands were formed when severe winter storms separated Monomoy Point from the mainland in the late 1950's. In the late 1970's the Monomoy spit was severed by storms to create North and South Monomoy Islands. The Monomoy Wildlife Refuge was established in 1944 and consists of both islands and 40 acres on the mainland at Morris Island. The total size of the refuge, 7604 acres, includes upland, intertidal and deep-water habitats. Congress designated both islands as the Monomoy Wilderness Area in the 1970's. The Wildlife Refuge and Wilderness area is owned and managed by the US Fish and Wildlife Service.

4.7 Wetlands and Vegetation

4.7.1 Coastal Wetlands and Vegetation

4.7.1.1 Salt Marsh

The largest salt marshes in Chatham are found along the Nantucket Sound shores, and are located behind the barrier beaches of Stage Harbor, Harding's Beach, Cockle Cove Beach and Red River Beach. The Town's salt marshes are delicately balanced, productive and protective habitats which are dependent largely on barrier beaches to protect them from the open ocean. It has become generally understood that about two thirds of the value of the commercial catch of fish and shellfish landed on the East Coast of the United States comes from species that live at least part of their life cycles in marshy estuaries. In addition to their importance as habitat, salt marshes act as buffers against storm surges and wave action, and they filter nutrients and other pollutants from coastal run-off prior to entering an estuary.

4.7.1.2 Coastal Landforms

Given its expansive 66 miles of shoreline, Chatham has extensive coastal landforms including barrier beaches, dunes, bluffs and beaches. The coastal landforms help to protect shoreline from through storm and flood damage. Beach grass and other xerophytes (plants adapted to living in drying conditions) are of prime importance to the stabilization of coastal landforms.

4.7.1.3 Eelgrass

Eelgrass is considered an indicator species which is an indicator species for the overall health and water quality of a coastal system. Eelgrass beds are widespread with specific concentration at Bassing Harbor, Crow's Pond and Ryder Cove on the north side and Cockle Cove, Oyster Pond River, Stage Harbor and in the cut between Amos Point and South Beach on the south side. The Massachusetts Estuaries project documented a decline in eelgrass coverage in the Pleasant Bay system overall (24%), Bassing Harbor system within Pleasant Bay (46%) and the Stage Harbor system (51%) over the past fifty years. The decline is linked to water quality issues caused by nutrient loading.

4.7.2 Freshwater Wetlands

4.7.2.1 Extensive Bordering Vegetated Wetlands (BVW)

Chatham has extensive BVW surrounding its twenty-five freshwater ponds. (BVW) are freshwater wetlands which border creeks, rivers, streams, lakes and ponds⁴. BVW are areas where soils are saturated or inundated such that they support a predominance of wetland indicator plants. The boundary of BVW is the line within which 50% or more of the vegetation consists of wetland indicator plants and saturated or inundated conditions exist.⁵ BVW are probably the Commonwealth's most important inland habitat for wildlife. BVW are likely to be significant to public or private water supply, ground water supply, flood control, storm damage prevention, prevention of pollution, and protection of fisheries and wildlife habitat (310 CMR 10.55(1).)

4.7.2.2 Vernal Pools

Vernal pools are temporary bodies of water found in low spots in woodland areas. Vernal pools fill in the early spring and provide important habitat for the hatching and nursery stages of species such as fairy shrimp, spotted salamanders, wood frogs and a variety of insects. Vernal pools are also important recharge areas for our aquifer. The locations of the five certified vernal pools in Chatham are shown on Map 6C. It is likely that additional, uncertified vernal pools exist in Chatham.

⁴ 310 CMR 10.55(2)(a)

⁵ 310 CMR 10.55 (2)(c)

4.7.3 Significant Communities

4.7.3.1 Coastal Plain Ponds

Coastal plain pond shores also are considered a globally rare ecosystem occurring only in Southeastern Massachusetts. The Coastal Plain Pondshore communities are characterized by gradually sloping shorelines and are, because they are directly linked to the groundwater aquifer, “specially adapted to the desiccation –inundation effects of the seasonal hydrological cycles...” As a result, pond levels fluctuate considerably from year to year. According to NHESP, “coastal plain pond shores and ponds provide habitat for at least 43 rare animal and plant species. Coastal plain pond shores are important habitat for over 45 species of dragonflies and damselflies. They are also important habitat for painted, musk, spotted, snapping, and the federally endangered Plymouth red belly turtles. Larger ponds are used by migrating and wintering waterfowl...” Mill Pond in Chatham is documented as having characteristics of coastal plain pond shores.⁶

4.7.3.2 Pine Pitch/Scrub Oak

The Pitch Pine/Scrub Oak plant community, like the dune, beach and marsh communities, is a typical Cape Cod ecosystem. This seemingly ubiquitous ecosystem is now quickly disappearing under the pressures of development and population growth and also due to natural succession. The loss of this plant community in its natural state is conspicuous in Chatham. The once quite abundant Mayflower and Pink Lady Slipper are becoming scarce, their habitats replaced with houses. As a significant plant community, prime examples of pine barrens locally should be preserved for watershed, passive recreation and scientific study/research. These areas are invaluable as water recharge areas for Chatham's water supply.

4.7.3.3 White Cedar Swamp

Atlantic White Cedar Swamp communities are forested wetland communities characterized by a dense, primarily evergreen canopy, a deciduous shrub layer, and a sparse herb layer dominated by mosses. These areas provide important forested wetlands habitat, including amphibian habitat, and can function as vernal pool habitat under certain conditions. One example is Cedar Swamp located off Cedar Street in Chatham.

According to NHESP, coastal plain pond shores and Atlantic white cedar swamp communities are both ranked S2, meaning they are state imperiled with only 6-20 occurrences statewide. Atlantic White Cedar natural community also exists in Chatham. There is a good quality cedar swamp south of Cedar Street and north and west of Champlain Road. According to the MANESHP, cedar swamps have declined considerably in Massachusetts due to conversion to cranberry bogs or reservoirs, and filling for agriculture or development. Only a few remain on outer Cape Cod.

4.8 Rare Plant and Animal Species

NHESP maintains the Natural Heritage Atlas, which identifies statewide areas of Priority Habitat and Estimated Habitat for state-listed species data in a GIS format. Priority and Estimated Habitats are shown on Map 7 found in Appendix E. NHESP is responsible for the conservation and protection of

⁶ A Qualitative Survey of Pond Shoreline Vegetation and Anthropogenic Threats at Eleven Freshwater Ponds in the Pleasant Bay Area of Critical Environmental Concern. Report prepared by Horsley & Witten, Inc. for the Pleasant Bay Alliance. 2003.

Massachusetts' biodiversity, with particular focus on the approximately 178 species of vertebrate and invertebrate animals and 264 species of native plants and their habitats that are officially listed as Endangered, Threatened (T) or of Special Concern (SC) under the Massachusetts Endangered Species Act. **Endangered** species are in danger of extinction throughout all or a significant portion of their range or are in danger of extirpation from Massachusetts. **Threatened** species are likely to become endangered in Massachusetts in the foreseeable future throughout all or a significant portion of their range. **Special Concern** species have suffered a decline that could threaten the species if allowed to continue unchecked or occur in such small numbers or with such restricted distribution or specialized habitat requirements that they could easily become threatened in Massachusetts. These species found in Chatham are listed in Tables 3 and 4.

These species depend upon a specific habitat makeup for their survival. Thus protection of this habitat is the first and most important step towards ensuring the long-term success of these species. The majority of Chatham's most important habitat is located in and around wetland resource areas, including open water, shorelines, marshes, beaches, rivers and ponds.

Table 3. Rare Plants in Chatham

Taxonomic Group	Scientific Name	Common Name	MESA Status	Most Recent Observation
Vascular Plant	<i>Ophioglossum pusillum</i>	Adder's-tongue Fern	T	1918
Vascular Plant	<i>Sagittaria teres</i>	Terete Arrowhead	SC	2002
Vascular Plant	<i>Polygonum puritanorum</i>	Pondshore Knotweed	SC	1985
Vascular Plant	<i>Persicaria setacea</i>	Strigose Knotweed	T	1981
Vascular Plant	<i>Polygonum glaucum</i>	Sea-beach Knotweed	SC	1983
Vascular Plant	<i>Rhexia mariana</i>	Maryland Meadow Beauty	E	2000
Vascular Plant	<i>Sabatia kennedyana</i>	Plymouth Gentian	SC	2004
Vascular Plant	<i>Helianthemum dumosum</i>	Bushy Rockrose	SC	1990
Vascular Plant	<i>Suaeda calceoliformis</i>	American Sea-blite	SC	1989
Vascular Plant	<i>Mertensia maritima</i>	Oysterleaf	E	1999
Vascular Plant	<i>Liatris scariosa</i> var. <i>novae-angliae</i>	New England Blazing Star	SC	1993

Source: MNHESP website @ <http://www.mass.gov/dfwele/dfw/nhESP/nhSpecies.htm>

T=Threatened, SC=Special Concern, E=Endangered

Table 4. Rare Animals in Chatham

Taxonomic Group	Scientific Name	Common Name	MESA Status	Most Recent Observation
Amphibian	<i>Hemidactylum scutatum</i>	Four-toed Salamander	SC	1970
Bird	<i>Podilymbus podiceps</i>	Pied-billed Grebe	E	1987
Bird	<i>Botaurus lentiginosus</i>	American Bittern	E	1965
Bird	<i>Circus cyaneus</i>	Northern Harrier	T	1994
Bird	<i>Gallinula chloropus</i>	Common Moorhen	SC	1984
Bird	<i>Charadrius melodus</i>	Piping Plover	T	2002
Bird	<i>Sterna dougallii</i>	Roseate Tern	E	2004
Bird	<i>Sterna hirundo</i>	Common Tern	SC	2004
Bird	<i>Sterna paradisaea</i>	Arctic Tern	SC	1990

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Taxonomic Group	Scientific Name	Common Name	MESA Status	Most Recent Observation
Bird	<i>Sterna antillarum</i>	Least Tern	SC	2005
Bird	<i>Tyto alba</i>	Barn Owl	SC	1962
Bird	<i>Asio flammeus</i>	Short-eared Owl	E	1985
Butterfly/Moth	<i>Hemileuca maia</i>	Barrens Buckmoth	SC	1928
Butterfly/Moth	<i>Catocala herodias gerhardi</i>	Gerhard's Underwing Moth	SC	1910
Butterfly/Moth	<i>Abagrotis nefascia</i>	Coastal Heathland Cutworm	SC	1982
Dragonfly/Damselfly	<i>Anax longipes</i>	Comet Darner	SC	2003
Dragonfly/Damselfly	<i>Enallagma laterale</i>	New England Bluet	SC	2000
Dragonfly/Damselfly	<i>Enallagma recurvatum</i>	Pine Barrens Bluet	T	2000
Dragonfly/Damselfly	<i>Enallagma pictum</i>	Scarlet Bluet	T	2004
Fish	<i>Notropis bifrenatus</i>	Bridle Shiner	SC	1952
Reptile	<i>Terrapene carolina</i>	Eastern Box Turtle	SC	2002

Source: Adapted from the MNHESP website @ <http://www.mass.gov/dfwele/dfw/nhosp/nhspecies.htm>

T=Threatened, SC=Special Concern, E=Endangered

4.9 Fisheries and Wildlife

4.9.1 Fish Runs

There are three Alewife (Herring) runs in Chatham. In all locations, the culverts under the state highway are in need of repair and could be improved to better facilitate the herrings' passage.

- Muddy Creek from the culverts under Route 28 at Pleasant Bay up to the headwaters at Old Queen Anne Road. There are not many herring due to restrictions in passage. This is also an eel passage.
- Frost Fish Creek, at one time a cranberry bog, with a dike still in place used by the Cape Cod Mosquito Control Project.
- Ryder's Cove is the entrance to the most productive herring run and is the only run closely regulated by the Town. The source of the run is Lover's Lake. Two sides of the lake are now developed, but the Chatham Conservation commission protects along the lake's western shore. The run has been periodically closed for the taking of herring due to depleted stocks.

4.9.2 Terrestrial Wildlife

Chatham has within its boundaries an unusual number of diverse habitats supporting healthy wildlife populations. Chatham's more commonly observed species include the white-tailed deer, raccoon, red fox, opossum, squirrel, mice, rabbit, voles, skunk, coyote and a wide array of birds. Great Horned Owl, several of the hawks, coyote and the fox are important natural predators that serve to keep the rodent populations in balance.

Individual wildlife will be best conserved if their habitats are protected intact with enough space to provide the food webs needed to sustain each species. All planning decisions for the use of Chatham land should reflect wildlife habitat considerations.

4.9.3 Birds

Birds that visit but do not nest in Chatham are Semipalmated Plover (*Charadrius semipalmatus*), Black-bellied Plover (*Pluvialis squatarola*), Ruddy Turnstone (*Arenaria interpres*), Greater Yellowlegs (*Tringa melanoleuca*), Knot (*Calidris canutus*), Dunlin (*Calidris alpina*), Short-billed Dowitcher (*Limnodromus griseus*), Semipalmated Sandpiper (*Calidris pusilla*) and Sanderlings (*Calidris alba*).

Shorebirds which nest here in colonies cover sizable areas. Large colonies of Black Back (*Larus marinus*) and Herring Gulls (*Larus argentatus*) nest on Monomoy and some of the nearby beaches. These species have exploded in population over the last several decades, often crowding out the previously plentiful Least and Common Terns, which used to dominate shorebird populations in Chatham. These terns are listed as a species of special concern by the Massachusetts Natural Heritage Program. The closely related Arctic and Roseate Terns have been found nesting here as well. The Roseate is listed as threatened and the Arctic as a species of special concern by Massachusetts NHESP.

Nesting birds that do not form colonies are equally varied. Willets (*Cataprophorus semipalmatus*) appear on Monomoy and around the Cockle Cove marsh. Oyster Catchers (*Haematopus palliatus*) have been found nesting on Monomoy, Harding's Beach and North Beach. Short Eared Owls (*Asio flammeus*) have also been recorded on Monomoy. Snowy Egrets (*Egretta thula*), Laughing Gulls (*Larus atricilla*) and Black-crowned Night Herons (*Nycticorax nycticorax*) also nest in colonies on Monomoy.

Federally threatened Piping Plovers (*Charadrius melodus*) are known to nest on Monomoy, North Beach, South Beach, in smaller numbers on Harding's Beach, Forest Beach. These small birds are very sensitive to ORV traffic, other human disturbance, dogs and foxes. They are listed by Mass NHESP as endangered. Northern Harriers (*Circus cyaneus*) and Black Skimmers (*Rynchops niger*) nest in this area as well (the Northern Harrier is listed as threatened). As of September 2005, a total of 19 pairs of piping plovers nested on the refuge, a decrease from the 27 pairs in 2004. A complete shorebird inventory for Monomoy is included later in this section.

The Cape Cod Bird Club conducts an annual Christmas Bird Count for all of Cape Cod. Owing to the habitat diversity in Chatham, most of the 129 species of birds found in the survey can be found in Chatham.

4.9.4 Fisheries

Chatham's eye has always been turned toward the sea, and its maritime heritage is one of the historical underpinnings of the entire community. Some of its earlier activities — salvaging, inter-coastal commerce, whaling and the like — are now only history, but its fin and shellfishing industry are vibrant, and each lends a special flavor and identity to the residents and the Town itself. As noted above, Chatham fish landings reported in 2000 were almost \$15 million, and the Town's 2001 shellfish harvest was \$5.6 million. It is estimated that Chatham finfish landings could account for as much as half of the value of all Cape finfish landings. While the fishing community has always prided itself on being independent and self-sufficient, the Town has often rendered assistance in the form of active lobbying with state and federal agencies, shellfish seeding and propagation, and providing infrastructure for the small boat fishing fleet. The quality of the local waters is of particular importance to the shellfishing business which has continued to grow. Surveys and questionnaires, as well as the *Community Vision Statement*, developed as part of the Local Comprehensive Planning process, confirm the strong support among residents for maintaining the vibrancy of Chatham's fishing industry and community.

4.10 Scenic and Cultural Resources

4.10.1 Scenic Roadways and Vistas

In Chatham, the entire Pleasant Bay and Atlantic Ocean coastlines are designated as highly scenic by the Massachusetts DEM Scenic Landscapes Inventory. Specifically, Pleasant Bay, Chatham Harbor and their coastlines are ranked as Noteworthy in DEM's Inventory while the outerlands of Nauset Beach and Monomoy Island are considered Distinctive. These two categories are shown as one large area encompassing Chatham's east coast on Map 5, *Unique Features and Scenic Resources*.

There are over 30 town landings and other public spots on the shore offering views of the harbors, ocean and ponds. Although the majority of these have only a handful of parking spaces, they are popular spots for scenic viewing, even in the off-season. These views are shown on Map 5. Other scenic views and vistas shown on the map include Chatham Harbor from Shore Road, Pleasant Bay from Route 28 and adjacent roads, Stage Harbor, Oyster Pond and River, Nantucket Sound, and numerous freshwater ponds and cranberry bogs. Chatham has designated 32 scenic streets/roads, which are listed in Table 5.

Table 5. Designated Scenic Streets

Andrew Harding's Lane	Eliphamets Lane	Ridgevale Road	Queen Anne Rd.
Barcliff Road	Forest Beach Road	Scatteree Road	Water Street
Barn Hill Road	Fox Hill Road	Sears Road	Training Field.
Bridge Street	Hallet Lane	School Street	Pleasant Street
Cedar Street	Hammond Lane	Shattuck Place	Old Wharf Road
Champlain Road	Harding's Beach Road	Shore Road	Eldredge Square
Cockle Cove Rd.	Holway Street	Silverleaf Avenue	Cross Street
Cotchpinicut Road	Mill Creek Road	Stage Harbor Rd.	Crow's Pond Rd.

Source: Town of Chatham Planning Department

4.10.2 Historic and Archaeological Resources

The Historical Commission has identified approximately 400 buildings in Chatham which are over 75 years old. Four are older than 1700 and have been extensively restored. About 55 of them date to the 1700s. Approximately 300 were built in the 1800s. About 65 were built between 1900 and 1925. The oldest buildings (before 1750) tend to cluster in either North or South Chatham. Churches which have been identified as historic or significant in historic streetscapes are First United Methodist Church, St. Christopher's Episcopal Church, First Congregational Church of Chatham, Unitarian Universalist Church, South Chatham Community Church and Church of the Holy Redeemer.

Sites of historical significance throughout the Town are shown on Map 5 found in Appendix E. These include 12 properties in Chatham listed on the State Register of Historic Places (Table 6).

There are 15 historical burial grounds identified in Chatham. These include site with grave stones dating to the 17th, 18th, and 19th centuries, including veterans of all American wars back the French and Indian Wars.

Table 6. National Register Sites

Site	National Register Status
Louis Brandeis House	National Historic Landmark, National Register Individual Property
Brick Block	National Register Individual Property
Historic Business District	Local Historic District
Chatham Light Station	National Register District, National Register Thematic Resource Area
Chatham Railroad Depot	National Register Individual Property
Chatham Windmill	National Register Individual Property, Preservation Restriction
Eldredge Public Library	National Register Individual Property
Halfway House	National Register Individual Property
Lighthouses of MA: Chatham & Monomoy	National Register Thematic Resource Area
Marconi-RCA Wireless Receiving Station	National Register District
Monomoy Point Lighthouse	National Register District, National Register Thematic Resource Area
Old Village	National Register District
The Port Royal House	National Register Individual Property

Source: State Register of Historic Places - 2009

In 2009, through funding under the Community Preservation Act, the Town completed a town-wide "Archaeological Reconnaissance Survey" identifying known and potential archaeological sites in Chatham. Created as part of the Survey, archaeological sensitivity maps were generated and corresponding management recommendations for the protection of cultural resources and sensitive areas were put forward. This project was closely coordinated the Massachusetts Historical Commission.

4.11 Environmental Challenges

4.11.1 Wastewater and Stormwater Management

Like other Cape Cod towns, Chatham is working to address problems associated with nutrient loading into estuaries, ponds and groundwater. The main controllable source of nutrient loading is from septic systems and other land uses such as fertilizers and run-off. Scientific studies have documented eutrophic or near eutrophic conditions in many Chatham water bodies. Total Maximum Daily Loads (TMDLs) have been established and certified by the U.S. EPA for Total Nitrogen for Chatham embayments. These thresholds have guided the development of Chatham's CW/NMP. Significant public resource and political resolve will continue to be necessary if full implementation of the CW/NMP, which calls for extensive sewerage throughout town, is to be implemented.

Stormwater management is a related environmental challenge and poses a major threat to water quality in ponds and estuaries. Stormwater is categorized as coming from a point source, such as a discharge pipe from a municipal stormwater system, and non-point source, which emanates from diffuse sources such as rooftops, driveways and roads. In Chatham, most stormwater runoff comes from non-point sources and is therefore more difficult to manage. Chatham is involved in implementing measures to achieve compliance with phase II of the National Pollution Discharge Elimination System (NPDES).

Also of concern, Chatham has a number of underground storage tanks that pose threats to groundwater. These locations are mapped and carefully monitored.

4.11.2 Coastal Erosion

Chatham's Coastal Resource Department is charged with managing and protecting the Town's extensive coastal shoreline. On the North side, the formation of North Inlet into Chatham Harbor and Pleasant Bay has resulted in erosion pressure on the inner shoreline across from the inlet. The formerly protected shoreline is now exposed to more direct ocean wave energy and an increased tide range. On the South side, Nantucket sound beaches are experiencing a sustained loss of sediment due to coastal armoring of the Sound shore to the west. The Southway and Monomoy Islands are in a constant state of flux as a dynamic barrier beach system. In addition to coastal shoreline protection, the Town is managed to maintain navigation amidst extensive shoaling. Private property, municipal roadways and town beaches and landings all are threatened by coastal erosion. The Town's management program involves re nourishment, dredging, and permitting designed to sustain shoreline areas and natural resources.

4.11.3 Coastal Flooding

The 100-year coastal floodplain, the area that has the statistical probability of being flooded by major storm events that occur on the average once every 100 years, comprises approximately 10 percent of town. The entire coast of Chatham is in a velocity zone, which means it is susceptible to storm surge. While most of the Town's developed areas lie above the 100-year flood plain, the floodplain has been extensively developed, primarily for residential homes. Development is closely regulated in the floodplain in order to minimize storm damage. Flood hazard areas are included in the Conservancy District under Chatham's Protective Bylaw, limiting new development and requiring setbacks for structures constructed adjacent to the district. In addition, the Town has adopted a floodplain zoning bylaw which sets standards for new construction within floodplains. Flood hazard areas are shown on Map 6B found in Appendix E.

4.11.4 Habitat Fragmentation

Since World War II, unprecedented residential development has steadily reduced land area available for habitat for plant and animal species. While there is some degree of protection for wetland habitat under local and state law, upland areas particularly are dwindling because of their suitability for development. Acquisition of land by the Town and CCF has prevented the development of significant tracts, notably the Town Forest in South Chatham, the Goose Pond Property, the Training Field Triangle, the Cedar Swamp, Strong Island and the MCI properties at Forest Beach and in North Chatham at Old Comers Road.

4.11.5 Biodiversity and Invasive Species

The tremendous diversity of animal and plant life that enriches the Town's natural environment is threatened by encroachment from land uses, nutrient, bacterial and hazardous pollutants, and encroachment from invasive species. Non-native invasive plant species, such as Asiatic bittersweet, phragmites and porcelain berry can grow at a rapid rate squeezing out native species and reducing diversity of plant life and habitat. Aquatic invertebrates such as tunicates also are a source of concern. Through its involvement with the Pleasant Bay Alliance the Town will evaluate best management practices for dealing with invasive plant and marine species that can be applied town-wide. In addition, the Town is actively promoting compliance with NHESP filing and reporting requirements. Invasive species

management is a major component of the *Comprehensive Conservation Lands Management Plan*, prepared in 2007.

4.11.6 Clear-cutting and Shade Tree Protection

Management of the Town's shade trees is the responsibility of the tree warden. This position was incorporated into the Parks and Recreation Department several years ago. Prior to enactment of the Town's Charter, the position was elected. The Friends of Trees has been active for a number of years in planting trees along streets. In reaction to the unfortunate cutting of several trees planted along a road on private property, the group successfully amended the state's law on shade trees to extend protection to trees planted by the public on private property. The designation of certain roads in town as Scenic Roads under state law provides protection for trees by requiring a public hearing and Planning Board review prior to the removal of trees for roadway construction or other reasons.

The Conservation Commission has faced several incidents of illegal clearing and pruning in wetland resource areas. The Commission has taken the strongest action possible under state regulations to enact penalties for illegal clearing.

4.11.7 Tidally-Restricted Wetlands

The Cape Cod Commission's *Cape Cod Atlas of Tidally Restricted Salt Marshes* identifies salt marsh systems impaired by the restriction of tidal flow along the coast of Cape Cod, Massachusetts. According to this study, the Town of Chatham has seven (7) tidally restricted wetland sites impacted by transportation-related facilities such as roads, railroads, causeways, and footpaths⁷. In some cases, dikes serving no transportation purpose were identified and included if they were found to be restricting tidal flow to a salt marsh, as with cranberry farming area⁸. Five of Chatham's documented salt marsh restrictions are along the south coast at Nantucket Sound, one of which is associated with an anadromous fish run. These are:

- Deep Hole Road Restriction of the Red River (CH-1)
- Chatharbor Lane Restriction of Unnamed Channel off Mill Creek (CH-2)
- Ridgevale Road Restriction of Channel between Cockle Cove Creek and Buck's Creek (CH-3)
- Cranberry Lane Restriction of Unnamed Channel off Bucks Creek (CH-4)
- Stage Harbor Road Restriction of Champlain Creek (CH-5)

The other two are along the north coast, adjacent to Pleasant Bay, and both are associated with anadromous fish runs. These are:

- Route 28 and Earthen Dike Restriction of Frost Fish Creek (CH-6)
- Route 28 and Earthen Dike Restriction of Muddy River (CH-7)

All seven are located within a NHESP Priority Habitat of Rare Wildlife, which includes the entire coastline of Chatham. Those located adjacent to Pleasant Bay are within an MNHESP Estimated Habitat of Rare Wetlands Wildlife and Biomap Core Habitat area. The continued restriction of these salt marshes has widespread impact upon the habitats and species they support.

⁷ Cape Cod Commission, *Cape Cod Atlas of Tidally Restricted Salt Marshes*: Town of Chatham, December 2001.

⁸ Description of this project was taken from the Cape Cod Commission website at <http://www.capecodcommission.org/tidalatlas/>