

Regulating Residential Development on Massachusetts Barrier Beaches:
Inadequacies, Opportunities, and the Case of Plum Island

by

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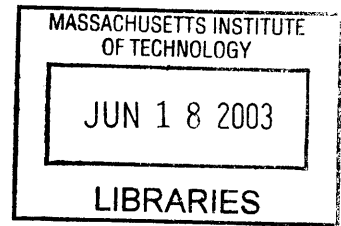
Submitted to the Department of Urban Studies and Planning
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ROTCH!

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ABSTRACT

This thesis explores the challenges of and opportunities for regulating residential development on Massachusetts barrier beaches. This research finds that the existing federal, state, and local regulatory frameworks relevant to Massachusetts barrier beaches struggle to manage the tension between the viability and safety of existing Massachusetts barrier beach communities and the need to reduce environmental impacts of this existing development as well as limit further growth in these areas. This struggle is exemplified by a case study of Plum Island, a barrier island off the North Shore of Massachusetts. The thesis concludes with several proposed initiatives Massachusetts could employ to improve regulation of residential development on its barrier beaches.

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CHAPTER 1 : Introduction

This thesis explores the challenges of and opportunities for regulating residential development on Massachusetts barrier beaches. Additionally, the primary goal of this thesis is to identify supplementary methods the Commonwealth could employ to successfully lessen existing and future environmental impacts related to residential development on its barrier beaches.

Barrier beaches are narrow, low-lying strips of land consisting generally of coastal beaches and dunes extending roughly parallel to the trend of the coast.¹ Essentially sandy bars, they can often be identified by the casual observer not only by their coastal dunes, but also by the narrow body of fresh, brackish or saline water or a marsh system separating them from the mainland. Barrier beaches make up nearly 120 miles of Massachusetts' 192 mile coastline (Figure 1-1). Attractive because they are beautiful, fun and often economically productive, these sensitive and shifting landforms provide habitat for thousands of plant and animal species as well as provide mainland dwellers a first line of defense from coastal storms.

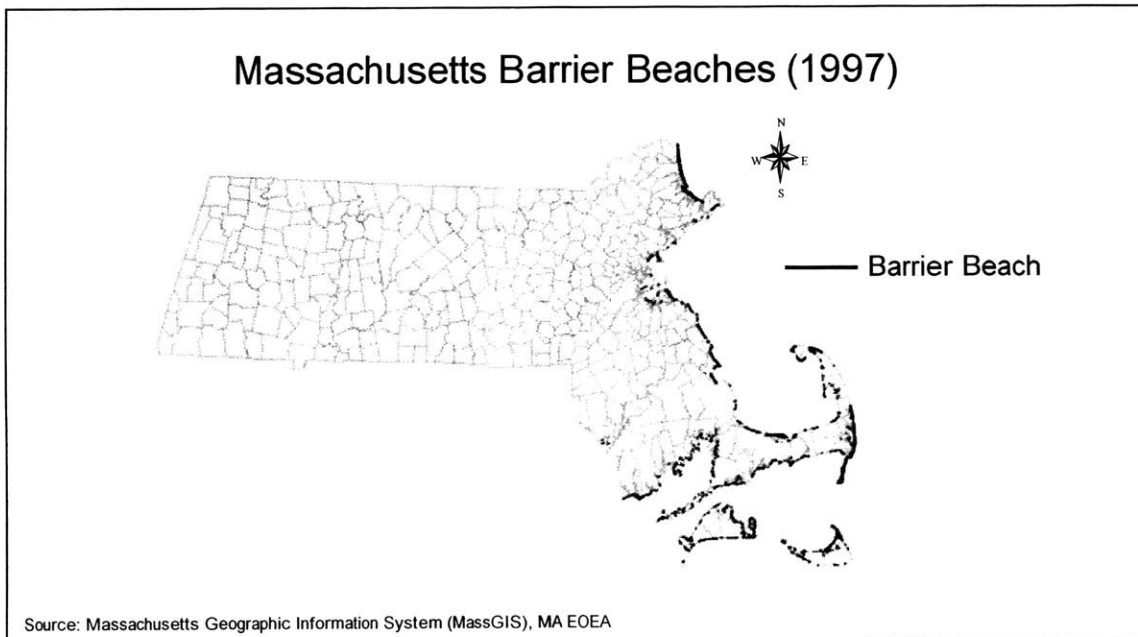


Figure 1-1: Massachusetts Barrier Beaches (1997)

As more and more Americans flock to the coasts, barrier beaches are experiencing an increasing host of environmental and land use conflicts and issues. As will be discussed in the following chapters, human pressures on barrier beaches can be deleterious. Exposure of lives and investments to risks are increasing on most developed barrier beaches due to infilling of vacant land, intensification of already developed land, and rising property values of existing development.² As development pressure on these areas increases, there is a concern not only about the marginal impacts additional development may wreak, but also a concern about the health and safety, and even the very viability, of existing barrier beach communities. Management issues critical to these areas include: coastal storm mitigation, shoreline erosion, sea level rise, protection of coastal wetlands and waters, biodiversity and habitat conservation, marine and fishery management, protecting access to beaches and shorelines, and social equity.³ All of these management issues will be addressed in the following chapters, with the exception of social equity. Although social equity is an enormous issue for many Massachusetts barrier beach communities, it falls out of the purview of this particular analysis.

Addressing these management issues simultaneously, particularly in the face of development pressure, is extremely challenging. Not only are there a multitude of management issues, there are also numerous stakeholders involved in formation of management policy. These include federal, state, regional, and local regulators; environmentalists; development interests such as property owners, builders and realtors; various government agencies; state and local officials; and local populations. In addition, existing regulations are complex and often fragmented.

It is thus not surprising that this thesis finds that the existing federal, state, and local regulatory frameworks relevant to Massachusetts barrier beaches struggle to accommodate the tension between the viability and safety of existing Massachusetts barrier beach communities and the need to both reduce environmental impacts of this existing development and limit further growth in these areas. However, in the course of examining barrier beach

¹ As defined in 310 Code of Mass. Regulations 10.29(2)

² Platt (1987) p. 13.

³ Beatley, et al. (2002)

natural dynamics, development impacts on barrier beaches, and an analysis of existing federal, state, and local regulatory frameworks governing development on Massachusetts barrier beaches, a conclusion is also made that there are several initiatives Massachusetts could take to better grapple with development on its barrier beaches. A description of proposed initiatives can be found in Chapter 5.

Plum Island Case Study Overview

The complexity and challenges of providing for existing development, and the need to reduce environmental impacts and further development, on Massachusetts barrier beaches is exemplified through a case study in Chapter 4 of Plum Island, a barrier island off the North Shore of Massachusetts. The following is a brief overview of this case study.

Development on Plum Island is split between the City of Newburyport and the Town of Newbury. While one-third of Plum Island is developed, the other two-thirds of the island consist of state and federal reservation land. The case revolves around a proposed municipal water and sewer project for the island - currently there is no municipal water or sewer service on the island.

The City of Newburyport plans to construct a water and sanitation system on Plum Island were spurred largely in response to an Administrative Consent Order (ACO) issued by the Massachusetts Department of Environmental Protection requiring the City and the Town of Newbury to bring development on Plum Island into compliance with Title 5, the Commonwealth's sewer regulations. A large number of individual properties on the island are not able to comply with these regulations due primarily to their small size. Water quality and related health impacts are a concern. In order to achieve compliance with Title 5 the City and Town have chosen a centralized sewer system, to be built, operated and maintained by the City of Newburyport.

The proposed system has become an enormously contentious issue for nearly all stakeholders involved. This is due not only because of its monetary cost to Island residents, but also because water and sewer may lead to further development and increased environmental

pressure on the island. Chapter 4 examines the potential growth impacts of bringing water and sewer to Plum Island as well as the regulatory and political processes involved with the proposal. The case study makes clear that there are no easy answers to regulating residential development on barrier beaches. However, it also provides insight into potential remedies, which are explored in Chapter 5.

Research Motivation

My interest in development on barrier beaches was first sparked at a personal level as a resident of Newburyport, MA. I began following the debate on the Plum Island water and sewer proposal shortly after I moved to Newburyport in 1999. Plum Island's built environment has changed noticeably even during my relatively short tenure in Newburyport. Erosion is becoming an increasing threat to several homes. In addition, a number of large homes have been erected on the Island and many existing homes have been expanded. The character of the community is clearly experiencing a transformation.

The first time I visited Plum Island, I was surprised at the density and diversity of its built environment. I was also mesmerized by its beautiful beaches and dunes. The water and sewer proposal became particularly interesting to me after having breakfast at one of the Island's restaurants and finding that our meal was served on paper plates with plastic utensils. The wait staff explained that they were unable to wash dishes due to the island's water supply and sewer restrictions. I asked where the water that I ordered to drink had come from. They told me it was bottled water and that almost everyone on the island used bottled water. I was, at the time, quite surprised.

As the debate over the water and sewer project was hitting a feverish pitch in the local newspaper, *The Daily News*, I was beginning my graduate studies in urban planning at MIT. My interest in Plum Island began to shift from intermittent curiosity to one of intrigue and bafflement. While letters to the editor in *The Daily News* in support of the project were highlighting concerns about water quality and regulatory sewer compliance, other letters emphasized the Island's changing community character, and fears of growth and environmental degradation. There was clearly an unresolved tension between health and

safety of existing development and the desire for growth management and environmental preservation.

I wondered what was going on behind the scenes. Was the water and sewer project the best approach, and would it lead to further development? What impacts might further development have on the island's environment? What processes, regulatory or otherwise, were in place to protect the island's natural environment from further residential development? I suspected that Plum Island was not unique and that other barrier beach communities were facing similar challenges and I wondered how they were dealing with them. And, perhaps foremost in my mind, I wanted to know what might be done additionally to prevent future degradation of barrier beaches facing increasing development pressure.

As my research progressed, I became intrigued with the seeming inability for our current regulatory processes to effectively synergize the need for health and safety of existing communities (e.g. water and sewer infrastructure, risk from erosion, etc.) with the need to lessen environmental impacts and limit development on barrier beaches. Subsequently, when a couple of friends suggested that I use Plum Island as a case study for my then yet to be determined graduate thesis, I jumped at the chance.

The Broader Picture

Barrier beaches are not of course the only places where competing demands of existing development collide with need for conservation measures. Many places, coastal and otherwise, are experiencing development pressure and related environmental stress. However, barrier beach communities are an ideal focus to shed light onto this broader issue because they are in a sense microcosms of the larger developed world. The combination of their physical boundaries, their heightened environmental sensitivity, and their strong real estate appeal, make them an ideal study ground.

Finding a balance between environment and existing community in the face of development pressure is particularly important for the future vitality of barrier beaches. The ecology of these islands is highly sensitive to the impacts of development. Average erosion rates along

the Atlantic seaboard are two to three feet per year - alteration of beaches and dunes from human development often leads to even faster rates. This change in the shoreline not only threatens built structures, creating public safety hazards, but also precipitates loss of habitat for indigenous rare plant and animal species. Additionally, rising sea levels from global warming compound the environmental and public safety threats to these islands.

Plans and regulations that creatively address both the ecological and human environments are essential to the sustainability of barrier beaches and other coastal areas. Ideally, the built environment will be ecologically restorative – embracing the unique natural characteristics of these beaches. As discussed in Chapter 2, this is particularly challenging due to their natural migration and constant subjection to coastal storms. Beatley et al. suggest a number of additional characteristics of sustainable coastal communities. The following are four of these characteristics that are particularly relevant to this thesis. Sustainable communities:⁴

- Minimize disruption of natural systems and avoid consumption and destruction of ecologically sensitive lands (e.g., coastal wetlands, maritime forests, species habitat, and areas rich in biodiversity);
- Avoid environmental hazards and reduce the exposure of people and property to coastal hazards by keeping people and property out of coastal floodplains, high-erosion zones, and inlet hazard areas;
- Promote and develop a sense of place and an understanding and appreciation of the bioregional context in which they are situated; and
- Value the participation of all citizens and provide opportunities for citizens to be actively involved in their governance.

As Chapter 3 will show, there are numerous regulations and programs that affect development on Massachusetts barrier beaches. However, these laws are generally fragmented across many jurisdictions. They are complex, sometimes even redundant. And as a glance at the state of development on our barrier beaches such as Plum Island shows, they are not achieving sustainable barrier beach communities.

In order to better address the paradox of development on Massachusetts barrier beaches, a more holistic approach to policy and regulation is necessary. This thesis is my attempt to chip away at this challenge.

⁴ Beatley, et al. (2002) p. 198-99

Research Methodology

My formal thesis research began with a survey of relevant science and planning literature to gain a better understanding of the natural dynamics of barrier beaches and development's impacts on these processes. I then conducted a review of the federal, state, and common local regulations governing development on Massachusetts barrier beaches. Although this research focused in particular on Massachusetts, for comparison I also conducted a limited review of other state's regulatory programs, as well as published evaluations of their effectiveness.

To make sure that I gained an accurate appreciation for concerns about the Plum Island water and sewer proposal and its potential impacts, I interviewed a number of people involved directly with the project, including local planners and Newburyport's sewer superintendent and former Plum Island water and sewer project manager. I spoke with members of the Island Futures Group, a Plum Island resident's group who are staunch opponents of the project. In addition, I interviewed two staff members from MA Coastal Zone Management who were involved in the approval process for the project. They were able to provide not only a better understanding of the work that went into gaining regulatory approval for the project, but also of the development-related challenges facing all Massachusetts barrier beach communities. Additionally, conversations with staff at MassAudubon helped me to better understand an environmentalist's view on the challenges of development on barrier beaches. I also conducted interviews with planning experts familiar with the regulatory challenges of managing growth in coastal areas. For a full list of interviews conducted, please see the Bibliography.

In order to gain a better understanding of the public participation process involved in the approval of the water and sewer proposal, as well as the technical details of the proposal, I consulted the project's Draft and Final Environmental Impact Reports, which were required under the Massachusetts Environmental Protection Act (MEPA). In addition, letters to the editor published in the local newspaper provided insight into the diverse views held by many island residents on the proposed project.

Outline of Chapters

In Chapter 2, I explore why it is important for Massachusetts to better manage residential development on its barrier beaches by providing a brief overview of barrier beach dynamics, as well as the natural benefits barrier beaches provide. Included in Chapter 2 is also a discussion of current development on Massachusetts barrier beaches and how residential development impacts these areas. Chapter 3 follows with an introduction to the federal, state, regional, and local regulatory frameworks governing development within the Massachusetts coastal zone, and where applicable, its barrier beaches. The complexity and challenges of providing for existing development on barrier beaches and the need to reduce environmental impacts and further development in these areas is further exemplified through a case study in Chapter 4 of Plum Island, a barrier island off the North Shore of Massachusetts. As mentioned above, Chapter 5 then offers a number of proposals that Massachusetts could take to improve regulation of residential development on its barrier beaches, as well as other coastal areas.

CHAPTER 2 : Barrier Beaches and Development - A Paradox

The tension that exists between maintaining the health and safety of existing barrier beach communities and the need for future conservation requires a planning approach that is integrated and systematic. A greater understanding of the unique qualities of barrier beach environments is a first step toward better management of these inherently complex places. As Klee writes, “Although coastal geologists, coastal engineers, physical geographers, and environmental scientists may understand and appreciate the intricate interactions between winds, longshore currents, waves, beach sand, and dune formation, this



Figure 2-1: Natural, sandy barrier beach (South Carolina)

information is often not adequately considered when planning shoreline development.”⁵ Accordingly, the following is an overview of barrier beach natural characteristics and a description of the natural functions barrier beaches perform. The latter part of the chapter includes an analysis of current and future levels of development on Massachusetts barrier beaches, followed by a discussion of both the impacts that development can have on the barrier beach environment as well as the inevitable vulnerability of barrier beach communities.

Coastal Barriers: Beaches & Islands

Barrier beaches are narrow, low-lying strips of land consisting generally of coastal beaches and dunes extending roughly parallel to the trend of the coast (Figure 2-1). Essentially sandy bars, they are separated from the mainland by a narrow body of fresh, brackish or saline water or a marsh system (Figure 2-2). A barrier beach may be joined to the mainland at one or both ends.⁶ These beaches are composed of sand and other sediments supplied by

⁵ Klee (1999) p. 104

⁶ As defined in 310 Code of Mass. Regulations 10.29(2)

longshore currents, tides, and waves. There are an estimated 1.7 million acres, or 650 miles, of barrier beaches along the 2,685 miles of the U.S. Atlantic and Gulf coasts. There are no barrier beaches along the West coast if the United States. Massachusetts has approximately 120 miles of barrier beaches along its 192 miles of coastline.⁷



Figure 2-2: Interior Marsh (Plum Island, MA)

If the sandy bar of the barrier beach is in the form of an island, meaning it is not

attached to the mainland, it is commonly referred to as a barrier island (Figure 2-

3). Of all barriers beaches, barrier islands have been the most negatively impacted by humans.⁸ There are very few large, undisturbed barrier islands on the Atlantic Coast. The better known, heavily developed, U.S. barrier islands are along Outer Banks of North Carolina and along the New Jersey coastline. Plum Island, a developed barrier island off the North Shore of Massachusetts, is the principal case study of this thesis.



Figure 2-3: Common barrier island form (Prince Edward Island, Canada)

As a matter of clarification, it should be noted that throughout this thesis the term barrier beach will be used to mean both barrier beach or barrier island. However, a distinction will be made when it is beneficial to differentiate between the two.

⁷ U.S. Department of the Interior, 1983 and National Oceanic and Atmospheric Administration (NOAA)

⁸ Klee (1999) p. 18

Coastal Sand Dunes

Coastal sand dunes are an integral part of barrier beaches. They are commonly defined as mounds, ridges, or hills of loose sand that have been shaped by the wind. Dunes are formed by the coalescence of sand blowing inland and sand blowing seaward around obstacles on the beach.



Figure 2-4: Coastal sand dune with beach grass

These obstacles are usually in the form of beach grass or other vegetation, but can also include mounds of old sea shells or other similar

objects. Sand dunes tend to drift until grasses or other plants take root and act as stabilizers (Figure 2-2). This stabilization is not permanent, however, as dunes still change shape and move under the stress of wind, storm waves, and traffic from human activity.⁹ A natural byproduct of this migration is erosion, a natural occurrence on barrier beaches.

Barrier Beach Dynamics

Undoubtedly, barrier beaches are beautiful places to visit, and for many, to live. However, they also perform a number of significant natural functions that are important to our environment as well as to human safety. Barrier beaches provide habitat to thousands of plant and animal species, including several endangered species. Barrier beach wetlands filter impurities from waters passing through them. Barrier islands, in particular, also serve as buffers to mainland communities from the often brutal high winds and seas of coastal storms.

In his recent book, *The Coastal Environment*, Garry Klee identifies a number of coastal dune functions, including: 1) buffering the shore against extreme winds and waves; 2) replenishing beaches and nearshore areas that have had their sand supply depleted during and after heavy storms (as sands erode from dunes and beaches during winter storms they often form a sandbar offshore. During the calmer summer season, the sand is gradually returned to the

⁹ Ibid.

beach); 3) sheltering inland residences and settlements; 4) helping to keep salt-water intrusion from contaminating fresh water lenses (underground fresh water supplies).¹⁰

Dunes must be able to migrate to retain their buffering attributes, as well their other natural functions. Dune migration, the process of sand moving from place to place is continuous. However, a single storm can lead to as much migration as would typically occur throughout an entire year. Michael Hoel explains in his book *Land's Edge*, "A single northeast storm can move as much sand in a few hours as the lighter prevailing winds have moved all year. For example, an hour of wind blowing at 50 mph will move as much sand as when the wind blows 30 mph for 14.3 hours. At 20 mph, it takes 611 hours to move as much sand as is moved in 1 hour at 50 mph!"¹¹

A natural byproduct of this migration is erosion. Massachusetts Coastal Zone Management (CZM) makes no secret of the erosion taking place on the state's shoreline. In its April 2000 *Focal Points* publication, CZM explains that:

"the Massachusetts shore is, for the most part, eroding. Results of a statistical analysis of shoreline change spanning 140 years and covering approximately 1,000 miles of ocean-facing shore reveals that, overall, the Massachusetts shore is eroding at approximately 0.56 feet per year. Data from published charts and aerial photographs from the mid-1800s to 1978 show that 72 percent of the communities for which shoreline change data were available exhibit a long-term erosion trend, while 28 percent exhibit long-term accretion. The highest long-term average annual erosion rates occur along the south shore of Nantucket at approximately 12 feet per year."¹²

Residential Development on Massachusetts Barrier Beaches

People have utilized and lived on barrier beaches for hundreds, perhaps thousands of years. The types of development common on barrier beaches are fairly diverse. This thesis is concerned residential development. Other forms of development include commercial

¹⁰ Ibid. p. 17

¹¹ Hoel (1986) p. 35

¹² Shoreline Change and the Importance of Coastal Erosion, April 2000, *Focal Points*. MA Coastal Zone Management. p. 3

development; tourist related development such as walkways and parking lots; engineered protective structures, such as seawalls, jetties and groins; and infrastructure such as water, sewer, and electricity.

Recent trends indicate unprecedented development in coastal areas. The U.S. coastal population is growing by 3,600 people per day. While the coastal zone accounts for only 17 percent of the total U.S. land area, it is expected that its population will increase by 28 million people by 2015, compared to a 22 million increase in noncoastal areas. In the 1960s, coastal population soared by 16%, from 95 million people to over 110 million; in the 1980s, the population grew another 11% (14 million). Population increases during the 1990s and between 2000 and 2010 are projected to increase by about 9% (12 to 13 million people) in each decade. In terms of density, this translates into 327 people per square mile in 2015, compared to 273 people per square mile in 1998, and 187 people in 1960.¹³

Although there is no hard data on current barrier beach populations, in the mid-1970s, an estimated 14% of barrier beach acreage in the United States was developed with buildings, roads, and related infrastructure.¹⁴ This study was done by Howard Lins for a project commissioned by the U.S. Geological Survey. There has been no comprehensive survey of barrier beach development since this study. The vast majority of states, including Massachusetts, do not maintain inventories of development on their barrier beaches. This is problematic for a number of reasons and will be addressed in further detail later. Nevertheless, many if not most authorities on coastal management agree that barrier beaches and islands are experiencing similar or even higher rates of growth than other coastal areas.¹⁵ Most of the developed barrier beach acreage (87%) is along the Atlantic and Gulf coast and

¹³ National Oceanic and Atmospheric Administration (NOAA). 1998 (on-line). "Population: Distribution, Density and Growth" by Thomas J. Culliton. NOAA's State of the Coast Report. Silver Spring, MD: NOAA.

¹⁴ In Platt et al. (1987) referring to Lins, H.F. (1980) *Patterns and Trends of Land Use and Land Cover in Atlantic and Gulf Coast Barrier Islands*. Professional Paper 1156. Reston, Virginia: U.S. Geological Survey.

¹⁵ See for example NOAA, State of the Coast publications, Beatley et al., Platt et al.

is highly concentrated within seven states: Massachusetts, New York, New Jersey, and North Carolina, South Carolina, Florida, and Texas.¹⁶

Currently, 4.5 million people live in Massachusetts’ coastal communities – nearly half of the state’s total population.¹⁷ Half of the state’s current development is occurring in the coastal zone. In 1980, 22% (8,126 acres) of Massachusetts barrier coast was ‘built up’.¹⁸ As mentioned above, figures on the amount of development currently on Massachusetts barrier beaches are unavailable.¹⁹ However, a look at growth rates in Massachusetts communities that contain barrier beaches shows that growth in these areas has likely been substantial in recent years. Table 2-1 shows growth in Massachusetts coastal counties that contain the state’s 20 largest barrier beaches. These counties were identified in the Massachusetts Barrier Beach Inventory completed in 1982 by CZM.

On average, these counties have grown 76% in the last 40 years. Although a large portion of this growth likely occurred off of the immediate coastline, the figures clearly indicate that significant growth is occurring near barrier beaches, leading to at the very least more visitations of these areas.

Table 2-1: Population Growth in Massachusetts Counties with Largest Barrier Beaches*

Coastal County *	Land Area (Square Miles)	1960 Census Population	1970 Census Population	1980 Census Population	1990 Census Population	1960 - 1990 % Change
Barnstable, MA	400	70,286	96,656	147,925	186,605	165%
Bristol, MA	557	398,488	444,301	474,641	506,325	27%
Dukes, MA	102	5,829	6,117	8,942	11,639	100%
Essex, MA	495	568,831	637,887	633,688	670,080	18%
Nantucket, MA	47	3,559	3,774	5,087	6,012	69%
Plymouth, MA	655	248,449	333,314	405,437	435,276	75%

* Largest 30 barrier beaches. **County or equivalent (includes independent cities). Source: Population and Development in Coastal Areas, Coastal Counties Lists, http://spo.nos.noaa.gov/projects/population/coastal_counties.html, accessed May 7, 2003.

¹⁶ Platt et al., (1987) p. 34

¹⁷ Massachusetts Executive Office of Environmental Affairs, 1997

¹⁸ Platt et al. quoting Lins study for U.S. Geological Survey. See note 13.

¹⁹ Confirmed by e-mail correspondence with Diane Carle, Data Manager, Office of Coastal Zone Management. 4/11/03.

In addition, buildout analysis of Massachusetts communities with the 20 largest beaches shows potential for substantial additional growth. Table 2-2 includes a list of these communities and their barrier beaches. The Massachusetts Executive Office of Environmental Affairs' Community Preservation Initiative shows a potential population increase of 40 percent in these communities, if current zoning and other land-use regulations remain unchanged.²⁰ Although this increase in population will be spread throughout these communities, their barrier beaches will likely experience

Table 2-2: Massachusetts' 20 Largest Barrier Beaches

Acres	Barrier Beach Landform	Town(s)
2126.8	Monomoy Island	Chatham
1381.7	Sandy Neck	Barnstable/Sandwich
1255	Nauset Beach	Chatham/Orleans
1241.4	Plum Island	Newbury/Newburyport
1119.6	Cautue Point and Beach	Nantucket
875.2	Castle Neck/Cranes Beach	Ipswich/Gloucester
789	Head of the Meadow Beach	Truro
651.7	Horseneck Beach	Westport
527.7	Nantasket Beach	Hull
442.7	Race Point/Hatches Harbor	Provincetown
345.3	Salisbury Beach	Salisbury
337.5	Lobsterville/West Payson Road	Gay Head
310.8	Duxbury Beach	Duxbury, Marshfield, Plymouth
301.2	Cape Poge	Edgartown
283.1	Wood Wnd/Long Point	Provincetown
270.6	Hummarock/Rexhame	Marshfield, Scituate
223.5	Norton Point	Edgartown
149.7	Revere Beach	Revere
138.7	Wauwinet	Nantucket
135.7	Coast Guard/Nauset Beach	Eastham

Source: Massachusetts Barrier Beach Inventory (1982), Massachusetts Coastal Zone Management

significant impacts from development, if permitted, and from additional visitation. It should be noted that many barrier beaches included in this buildout analysis are along the Cape Cod National Seashore and are subsequently protected from development. Although this may protect the barrier beaches from development, adjacent growth will likely still have a marginal impact on these beaches. Conversely, several other of the Massachusetts largest barrier beaches communities in this analysis are already developed significantly. These include Plum Island (Newbury/ Newburyport), Nantasket Beach (Hull), Salisbury Beach (Salisbury), Revere Beach (Revere).²¹ (Residential development on Plum Island will be covered in depth in Chapter 4.)

²⁰ Commonwealth of Massachusetts Executive Office of Environmental Affairs, Community Preservation Initiative online regional buildout analysis. Communities analyzed are: Barnstable, Chatham, Edgartown, Nantucket, Provincetown, Sandwich, Truro, Ipswich, Salisbury, Duxbury, Hull, Westport, Newbury, and Newburyport. See http://commpres.env.state.ma.us/community/cmt_y_build.asp.

²¹ Portions of the Nantasket and Revere beach shorelines fall within Metropolitan District Commission (MDC) reservation land. However, MDC has authority only over the immediate ocean front, not adjacent land. These communities are very dense. See <http://www.state.ma.us/mdc/comm.htm> for more information on the Metropolitan District Commission. Accessed May 7, 2003.

Clearly, the lack of data on the extent of development on Massachusetts barrier beaches is problematic. Not only is it difficult to get a handle on current development trends, it also hinders risk assessment in these areas, as well as any attempt to assess the effectiveness current CZM growth management initiatives. This issue will be addressed further in following chapters.

Development's Impact on the Barrier Beach Environment

Development on barrier beaches can threaten wildlife and plant species, including many endangered species that depend on these areas for breeding habitat. Perhaps counterintuitive, but true nonetheless, groins, jetties and other engineered, hard protective structures often lead to increased erosion. Buildings can also exacerbate erosion by preventing natural migration of coastal dunes. In addition, roads and other impervious surfaces worsen flooding and slow recharge of groundwater. More generally, development can cause pollution in the form of sewage outfalls, industrial waste water, agricultural and urban run-off, and groundwater withdrawal, which exacerbates saltwater intrusion.²²

Bush, et.al. name a number of impacts residential development in particular can have on the natural environment of barrier beaches. The authors assert that residential development in the form of single-family, high-, medium, and low- rise multifamily buildings alters wind patterns, truncate the beach and dune zone, channel storm surge and ebb flow, and reflect waves. Buildings can also obstruct overwash, the process of sand being shunted into the interior of the barrier beach. Overwash is important to the function of a barrier beach because it works to build the secondary dunes that provide shelter from salt spray so that swales and maritime forests can develop.²³ In addition, human related traffic in its various forms (foot, horses, and off-road vehicles, etc.) damage dune plants acting as protective veils. This leads to further wind erosion and blowout, in other words exacerbated erosion. More indirect

²² Klee (1999)

²³ Hoel (1986) p. 43

effects include a concentration of human use and impacts, leading to further construction of support infrastructure of protection structures and in turn an increase in population density.²⁴

Many houses and other development on barrier beaches will inevitably succumb to erosion and other natural elements that occur in these areas. It has been estimated that roughly 1,500 structures and the land on which they are built will be lost to erosion each year.²⁵ Although erosion is a natural process, it is often exacerbated by development, the same development that often falls prey to it.

Safety Concerns

The coastline can be a dangerous place to live. The Blizzard of '78 dumped up to 27.1 inches of snow on the Massachusetts coastline. At its peak, the ocean rose 15.2 feet above mean low water mark. Given that major tidal flooding begins at 13.6 feet, these tides, topped with crashing waves, inflicted mayhem on coastal homes, roads, and infrastructure. Ninety-nine people were killed and thousands of houses and businesses were destroyed or severely damaged during the storm. Damages exceeded \$2.3 billion (in 1998 dollars).²⁶

In the past decade, the Massachusetts Emergency Management Agency (MEMA) has secured \$42 million in hurricane-related assistance for local communities. Over two-thirds of this money was spent in response to one storm, 1999's Hurricane Bob.²⁷

In 1991, Hurricane Bob inflicted \$39 million dollars in damage, mostly to coastal communities. And as bad as Hurricane Bob was (a Category 2 hurricane), it wasn't nearly as powerful as other hurricanes to have hit Massachusetts in the past.²⁸ Accordingly, It is

²⁴ Adopted from Table 4-5, Impacts on Development on Natural Environment and on Risk of Property Damage.. Bush, David M., Orrin H. Pilkey Jr., William J Neal. 1996. *Living by the Rules of the Sea*. Duke University Press, Durham and London. p 49.

²⁵ *Evaluation of Erosion Hazards*, The H. John Heinz III Center, April 2000.

²⁶ Information accessed from <http://www.state.ma.us/czm/blizzard78.htm> on April 14, 2003.

²⁷ *Coastlines*, Massachusetts Coastal Zone Management. Summer 2002.

²⁸ The National Hurricane Center uses the Saffir/Simpson scale to classify hurricanes into five categories, based on wind speed. A Category 3 hurricane consists of 111-130 mph sustained winds with 9-12 foot storm surge. Extensive damage, including: destruction of smaller structures by coastal flooding and destruction of larger structure by battering waves and floating debris; mobile homes destroyed; low-lying roads flooded 3-5 hours before eye hits; terrain less than 5 feet above seal level flooded for up to 8 miles inland. Category 2 hurricanes

inevitable that more powerful storms will hit the Massachusetts coast in the future. While Massachusetts hasn't felt a category 3 storm in almost 50 years, there is a possibility that several of these storms could hit successively in the future: Four Category 3 storms hit Massachusetts in a span of eighteen years, from 1938 (the Great New England Hurricane) to 1954 (Hurricane Edna). Because the shoreline has little time to recuperate between storms, consecutive storms such as these have a particularly high level of impact.

In the meantime, development on the Massachusetts coastline, including its barrier beaches, has exploded. The Great New England Hurricane on '38 killed 564 people in New England and destroyed 8,900 buildings.²⁹ This was during a time when most coastal development consisted of small, summer cottages. The Massachusetts coast was predominantly farmland. CZM reports that if a similar storm were to hit Massachusetts today, the destruction of coastal developments and the loss of life would likely be much greater.

Memories are short. Perhaps many coastal homeowners have either forgotten or are unaware that their homes are likely in jeopardy should a major storm hit. Others are willing to take that risk, in part because they have insurance – insurance that is provided by the federal government. This insurance effectively serves as an incentive for development on barrier beaches and other

Table 2-3: Arguments for Better Regulation of Development on Barrier Beaches

<p><u>Environment</u> Species preservation Wetland preservation, including important functions of wetlands Alleviate unnatural erosion, preserve dunes Preserve for future generations enjoyment</p> <p><u>Economics</u> Money spent on insurance Possible threats from hurricanes include storm surges, high winds, and torrential Money spent on future beach nourishment and other preventative measures Protect tourism dollars</p> <p><u>Human safety</u> Form of risk management</p> <p><u>Efficiency</u> Current process fragmented, complex, duplicative, and in many ways ineffective</p>
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(such as the blizzard of '78???), consist of 96-110 mph sustained winds with 6-8 foot storm surge. Moderate damage, including: some wind damage to roofing material, doors, and windows; flooding of low-lying coastal escape routes 2-4 hours before eye passes; considerable damage to piers and mobile homes; marinas flooded; small vessels with unprotected anchorages torn from moorings. Four Category 3 hurricanes and three category 2 storms have hit Massachusetts in the last 100 years. Source: CZM

²⁹ *Coastlines*, Massachusetts Coastal Zone Management. Summer 2002.

coastal areas, as will be discussed in the coming Chapters, particularly Chapter 3.

Sea-Level rise

Sea-level rise cannot be ignored when considering development on the coast. Even without accounting for potential sea level rise from global climate change, sea levels are rising along the U.S. coastline, including the Massachusetts' coast. Future projections of relative sea-level rise for the Massachusetts coast range from 10-20 cm (low-rise scenario), to 40-50 cm (high-rise scenario) between 1990 and 2050.³⁰ Sea-level rise not only affects the very edge of the coast line, it also increases wave range and overwash. Within 50 years, many homes on Massachusetts barrier beaches and other coastal areas that are currently somewhat 'safe' could be inundated with water.

Development's impact on barrier beaches not only effects local environments, but also gives rise to human health and safety concerns. These problems will only be exacerbated by increasing sea-levels. It is therefore imperative that better accounting and management of development be applied to these areas. Table 2-3 provides a summary of arguments for better regulation of development on barrier beaches.

Table 2-4: Beachfront Property Damage Mitigation

<p><u>Modification of Development and Infrastructure</u></p> <p>Retrofit houses Elevate houses Curve and elevate roads Block roads terminating in dune gaps Move utility and service lines into interior or bury below erosion level</p> <p><u>Zoning, Land-Use Planning</u></p> <p>Recognize hazard areas and avoid: Tidal inlets Swashes Permanent overwash passes Setbacks Choose elevated building sites Lower density development</p> <p>By Ordinance: Protect interior dunes and other topographic highs against modification or removal Protect vegetation cover against removal or heavy disturbance</p>
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³⁰ Neuman et.al. (2000)

²⁷ Adopted from Table 5-1, Beachfront Property Damage Mitigation Options.. Bush, David M., Orrin H. Pilkey Jr., William J Neal. 1996. *Living by the Rules of the Sea*. Duke University Press, Durham and London. p 69.

Many opportunities exist to lessen the environmental impact, as well as the risks, of living on barrier beaches. Table 2-4 lists a number of mitigation options for existing barrier beach development. In addition, Bush et.al. recommends a number of additional planning approaches to already developed barrier island. These include restoration of frontal, interior dunes and revegetation of dunes and maritime forests. To protect beaches, Bush recommends adopting long-term plan to remove seawalls and rezoning and relocation of development out of inlet hazard areas, including historical, present, and potential inlets. Many of these suggestions, as well as those in Table 2-4 will be explored further in Chapters 4 and 5. But first, Chapter 3's examination of the federal, state, and local regulatory frameworks governing development on barrier beaches will work to put these mitigation options in better context.

CHAPTER 3 – The Regulatory Environment

As discussed in Chapter 2, efforts to effectively manage residential and other development in coastal areas, particularly barrier beaches, need to be integrative and systemic. The complexity of these areas demands a regulatory framework that is responsive at the local level, while maintaining broad-based consistency. In addition, management efforts must not only deal with future growth, but also the difficult issues concerning existing development. These include the health and safety of residents and visitors, as well as the impacts that existing development has on the natural environment.

David J. Brower and Timothy Beatley, both of the University of North Carolina at Chapel Hill, have identified five principal growth management techniques used by government for managing coastal zone communities (Table 3-1)³¹. The main techniques he has identified are 1) development regulation, 2) land and property

Table 3-1: Coastal Zone Growth Management Tools

<p><u>Development Regulation</u></p> <ul style="list-style-type: none"> Conventional Zoning Exclusive agricultural or nonresidential zones Conditional and contract zoning Bonus and incentive zoning Interim or temporary development regulations Floating zones Performance zoning Planned unit development Subdivision regulations Cluster or average density zoning Environmental impact ordinance Annual permit limits Building codes <p><u>Land and Property Acquisition</u></p> <ul style="list-style-type: none"> Fee simple acquisition Less-than-fee simple acquisition Advance site acquisition Land banking Compensable regulation <p><u>Capital Facilities Policies</u></p> <ul style="list-style-type: none"> Capital improvements programming Urban and rural service areas Annexation Development timing <p><u>Taxation, Financial, and Other Incentives</u></p> <ul style="list-style-type: none"> Impact taxes Use-value and preferential tax assessment Site-value taxation Land gains taxation Public service pricing policies <p><u>Information Distribution and Dissemination</u></p> <ul style="list-style-type: none"> Real estate disclosure provisions Posting of hazard zone signs Construction practices seminars Hazard zone delineations on plats and deeds

³¹ The tools and techniques in Table 3-1 come from Brower and Beatley's chapter on managing change on developed coastal barrier in Platt (1987) p. 86-7.

acquisition, 3) capital facilities policies, 4) taxation, financial and other incentives, and 5) information distribution and dissemination. This list is not only a good example of the diverse approaches government can take to manage growth on barrier beaches and other coastal areas, but also of the potential complexity in managing growth in these areas.

Indeed, government uses a plethora of programs when working to manage growth on barrier beaches. The Federal government relies primarily on ownership and operation, regulation, and incentives to manage barrier beaches. States, including Massachusetts, use ownership and operation, regulation, incentives, and a significant amount of public education and technical assistance. Local governments rely primarily on regulation, usually in the form of zoning, but also sometimes in tax incentives and public education.

From the federal government's use of the Clean Water Act, to a State's use of a Coastal Zone Management Program, to a local municipality's use of zoning bylaws, growth management of barrier beaches is at times innovative and almost always complex. This complexity is a product of three levels of government and the several dozen subordinate agencies and organizations working, for the most part, independently. This has resulted in a true hodgepodge of regulations and programs and, perhaps inevitably, conflicts between public policies and public and private actions. In addition, private property rights, economics, and politics all play significant roles in effectiveness of any management effort concerning barrier beaches.

The following is a brief introduction to the federal, state, and local regulatory frameworks governing development within the U.S. coastal zone. I have attempted to highlight those regulations that specifically address barrier beaches. I have found, however, that across the board barrier beaches are most often treated as any other coastal area would be. This in itself is cause for concern, as these areas are unique both in their natural attributes as well as their benefits to animal and plant species, and to humans.

Federal Coastal Zone Management

The U.S. federal government uses primarily ownership and operation, regulation and incentives as well as some technical assistance when addressing growth management on barrier beaches. Much of its regulation is fragmented, in that it comes in the form of several legislative acts that fall under the jurisdiction of numerous departments.³²

The federal agency with perhaps the greatest influence over the federal government's role in coastal zone management is the Office of Ocean and Coastal Resource Management (OCRM). OCRM is responsible for implementing the federal coastal zone management program and works with states in developing and implementing their individualized coastal zone programs. OCRM's authorizing legislation is the Coastal Zone Management Act (CZMA). By playing a significant role in state coastal zone regulation, CZMA is the most significant federal program addressing development and growth issues on barrier beaches.

Enacted in 1972 and reauthorized every five years, CZMA is a voluntary national program open to states that choose to design their coastal plans to meet certain CZMA guidelines. It was developed in part as an effort to achieve consistency between states' coastal management plans and federal activities. Significantly, CZMA seeks to simultaneously sustain coastal communities and coastal ecosystems. Twenty-nine coastal states and five island territories have developed CZM programs. Together, these programs protect more than 99 percent of the nation's 95,331 miles of oceanic and Great Lakes coastline.

CZMA has four general goals:³³

1. Preserve, protect, develop, and, where possible, restore and enhance the resources of the nation's coastal zone for this and succeeding generations;
2. Encourage and assist the states to exercise effectively their responsibilities in the coastal zone to achieve wise use of land and water resources there, giving full

³² Beatley, et al. (2002) p. 92

³³ Accessed from <http://coastalmanagement.noaa.gov/czm/national.html>. April 22, 2003.

consideration to ecological, cultural, historic, and esthetic values, as well as the need for compatible economic development;

3. Encourage the preparation of special area management plans to provide increased specificity in protecting significant natural resources, reasonable coastal-dependent economic growth, improved protection of life and property in hazardous areas and improved predictability in governmental decision-making; and
4. Encourage the participation, cooperation, and coordination of the public, federal, state, local, interstate and regional agencies, and governments affecting the coastal zone.

A 1990 reauthorization of CZMA enhanced the ability of states to protect coastal resources by recognizing of the impacts of fishing, taking of endangered species, dumping of contaminated dredged materials, and extraction of oil and gas resources that occur beyond a state's defined coastal boundary. The 1990 reauthorization also broadened the authority that states have in dealing with their coastal areas by requiring that any federal activity that might reasonably be expected to affect the land or water resources or uses of a state's coastal zone be found to be consistent with state coastal policy before the federal action can proceed. This provides a large incentive for states to participate in the Coastal Zone Management Program, as it gives them greater control over the management of their coastal resources.³⁴ However, CZMA does not use performance standards to enforce or monitor states' programs. This has led many to question the overall effectiveness of CZMA's programs.

Other federal agencies involved in the authorization and enforcement of regulatory standards on barrier beaches include Environmental Protection Agency (EPA), U.S. Army Corps of Engineers, and National Park Service (NPS) and U.S. Fish and Wildlife Service (FWS), both of which are within the Department of the Interior (DOI) and the Federal Emergency Management Agency (FEMA).

³⁴ *Massachusetts Coastal Zone Management Plan*, p. 3.

The Environmental Protection Agency (EPA) is also an important player in coastal zone management, including barrier beaches. The Agency's programs have traditionally organized by topic, i.e. air, pesticides, pollution prevention, toxics & chemicals, water, and wastes and recycling. More than a dozen major statutes or laws form the legal basis for these programs, most significant to coastal areas are the Clean Water Act (CWA), the National Environmental Policy Act (NEPA), and the Coastal Zone Management Act (CZMA), discussed above.

The U.S. Fish and Wildlife Service enforces federal wildlife and endangered species laws, prepares and implements species recovery plans, and establishes and maintains the system of national wildlife refuges. National wildlife refuges, national seashores, and state and local reserves are effective methods for the preservation of barrier beaches. This approach works well in areas that have not been developed and where money is readily available to buyout landowners. However, in areas where development is pervasive or where private ownership of land is diverse and abundant, this form of preservation is usually not a realistic option.

The Army Corps of Engineers (COE) is responsible for implementing Section 404 of the Wetlands Permit Program under the Clean Water Act. Section 404 of the Clean Water Act establishes a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Activities in waters of the United States that are regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry.³⁵ COE also provides technical assistance and funding of shoreline protection, beach nourishment, and dredging of navigable waters.

A piece of legislation that has had a large influence over U.S. barrier beaches is the Coastal Barriers Resource Act (CBRA) of 1982. CBRA established the Coastal Barrier Resource System, which eliminates federal development incentives on undeveloped coastal barriers by restricting the availability of any new federal assistance to develop the property and denying new federal flood insurance for properties located within the System. The CBRA has thus

³⁵ From <http://www.epa.gov/owow/wetlands/facts/fact10.html>, accessed April 24, 2003.

played a very important role in preserving undeveloped barrier beaches. It, however, has very little if any influence over barrier beaches that were developed prior to its adoption.

Growth Incentives

Many perceive that the federal government, through the Federal Emergency Management Agency (FEMA), also plays a role in *encouraging* irresponsible development on barrier beaches and coastal communities. Through its National Flood Insurance Program (NFIP), FEMA provides pre- and post-disaster assistance to coastal states and local governments. NFIP, instituted in 1968, was originally designed to restrict shoreline development by providing coverage only to property in communities with stringent building codes. It has since been identified by the U.S. General Accounting Office, among others, as a stimulus to new construction and reconstruction in coastal hazard areas.³⁶ Consequently, FEMA is in many ways working at cross-purposes with the federal government's other coastal management programs.

It should be noted that FEMA has also made considerable progress toward floodplain hazard mitigation. When a community joins the NFIP, it must adopt and enforce minimum floodplain management standards for participation. These include requiring any new development, as well as substantial redevelopment, in these areas be elevated on posts or pilings. As described in Chapter 2, elevation of buildings in the floodplain lessens their impact on the coastal environment.

Authorizing legislation for FEMA comes from the National Flood Insurance Act, Flood Disaster Protection Act, Stafford Disaster Relief and Emergency Assistance Act, and the Disaster Mitigation Act of 2000.

Another federal government program that at times subsidizes growth on barrier beaches and coastal communities is the federal tax code. Through casualty loss deductions for uninsured items, interest and property tax deductions allowed for second homes, and accelerated

³⁶ U.S. Congress, General Accounting Office (GAO), National Flood Insurance: Marginal Impact On Flood Plain Development, Administration Improvements Needed, GAO/CED-82-105, Washington, DC: GAO, 1982.

depreciation for seasonal rental properties, the U.S. government's tax code in effect contradicts many of the other federal programs mentioned above (with the exception of FEMA). In addition, several other forms of federal assistance, for example highway and bridge subsidies, sewer and water grants, and beach protection, have also been identified as further incentives to coastal development, particularly on barrier beaches (Miller, 1981).³⁷

The challenges of federal jurisdiction over development on barrier islands

Federal coastal management programs are by their very nature somewhat general. Legislation such as the National Environmental Protection Act (NEPA) and the Clean Water Act (CWA) have broad goals in order to be applicable nationwide, and therefore are not written with the particulars of local coastal areas in mind. Consequently, federal laws that affect barrier beaches aren't specific to them. Although the Coastal Zone Management Act (CZMA) helps to bridge the gap between federal and state jurisdictions by integrating federal and state management of coastal zones, it does not have the ability to require cooperation between state and local agencies. One of CZMA's foremost goals is to balance development and conservation in the coastal zone. However, because it has only tenuous control over local jurisdiction (where most of development is governed) its efficacy depends greatly on the viability of individual state and local coastal zone management efforts. As mentioned above, this problem is exacerbated by CZMA's lack of performance standards, which in turn leaves a great deal of latitude within states' individual coastal management plans. As a consequence, the responsibility of managing the tension between residential development and conservation efforts on barrier beaches is located largely at the state, regional, and local levels. Below is a description of Massachusetts' coastal zone management efforts.

Massachusetts Coastal Zone Management

The Commonwealth of Massachusetts uses ownership and operation, regulation, incentives, as well as information to manage growth on its barrier beaches. The Massachusetts Department of Environmental Protection (DEP) oversees the state's environmental programs.

³⁷ Platt, et al. (1987) p. 11, citing H.C. Miller (1981) "The Barrier Islands: A Gamble with Time and Nature." *Environment* (November): 6-12; 36-41.

In Massachusetts, many local towns and cities are empowered to govern themselves through the Home Rule Amendment.³⁸ Thus, individual municipalities in Massachusetts have the greatest power over the land use restrictions and development of the Massachusetts coastline.

Before addressing Massachusetts' particular coastal zone management efforts, it is important to first understand the context of land use regulation in order to appreciate the complexity under which Massachusetts and its local communities are operating. All states have the constitutional right to regulate land use. Five major types of regulation are typically used by states to protect the environment: 1) land division and subdivision restrictions, 2) setback lines, 3) building codes, 4) relocation, 5) owner-assumed liability. All of these can be used to guide more responsible residential development on barrier beaches and other coastal areas. Setback lines in particular are one of the most effective ways to address erosion and other shoreline hazards. Twenty-five of the nation's 33 designated coastal states and territories use setback restrictions.³⁹ These restrictions can, for example, require that new development locate a certain distance landward of the ocean as measured by the high water line, or alternatively at a distance of at least 30 (sometimes even 60) times the average annual rate of erosion. Massachusetts does not employ this tool, although many of its local communities have opted to do so through local ordinances and bylaws. The vast majority, if not all, states including Massachusetts regulate development through building codes. However, Massachusetts does not have a set of building codes particular to development on barrier beaches (outside of FEMA requirements). These issues will be addressed further in the following sections, as well as in Chapters 4 and 5.

Similar to the federal regulatory framework, Massachusetts employs a laundry list of legislation that effects development on barrier beaches. Also similar to the federal framework is that little of this legislation was written to specifically address development or conservation on barrier beaches in particular. One such piece of legislation is the Massachusetts Environmental Policy Act (MEPA). MEPA requires an evaluation and discussion of potentially harmful environmental impacts of any proposed projects by any

³⁸ Massachusetts Home Rule Amendment, Massachusetts General Law, Chapter 43B

³⁹ Beatley, et al. (2002) p. 138.

state agency, or that require state or federal financial assistance or permitting and that fall within other predetermined thresholds. Projects in Areas of Critical Environmental Concern (ACECs) are also subject to review. MEPA requires that state agencies “use all practical means to minimize damage to the environment,” including the consideration of alternatives. Environmental Notification Forms (ENFs) are required if a project exceeds a review threshold. In addition, Environmental Impact Reports (EIRs) are automatically required if a project is deemed to have a large impact on the environment, e.g. significant alteration of wetlands. It is important to note that MEPA is not in itself a permitting process but instead it helps State permitting agencies ensure that a project meets regulatory requirements. MEPA and Environmental Impact Reports will be discussed at length the Plum Island case study (Chapter 4).

Other relevant Commonwealth programs include the Massachusetts Office of Coastal Zone Management, the Coastal Wetlands Restriction and Wetlands Protection Acts (MGL Chapter 130); the Endangered Species Act (MGL Chapter 131A); and the Public Waterfront Act (MGL Chapter 91). Three programs that specifically address the built environment on barrier beaches are Wetlands Protection Regulatory Performance Standards for Coastal Dunes and Barrier Beaches (Wetlands Protection Act -310 Code of Mass. Regulation 10.29), Executive Order Number 181: Barrier Beaches, and Executive Order Number 385: Planning for Growth. Although Title 5 of the State Environmental Code (MGL Chapter 21A) does not address barrier beaches specifically, this law does have direct impacts on development in these areas. All of these programs will be explored below.

Massachusetts Office of Coastal Zone Management

As mentioned above, most coastal states participate in Coastal Zone Management Plans as part of the federal Coastal Zone Management Act (CZMA). Before implementing their programs, states must address nine national objectives identified in the CZMA:

1. public access to shorelines
2. conservation of natural resources
3. conservation, planning, and management of living marine resources
4. coastal development to avoid hazardous areas

5. redevelopment of urban waterfronts and ports
6. development priority given to coastal dependent uses and energy facility siting
7. consultation and coordination with Federal agencies
8. coordination and streamlining of coastal management governmental procedures
9. public participation in the coastal decision-making process

Massachusetts has developed and implemented a “networking” Coastal Management Program led by a state agency called the Office of Coastal Zone Management (CZM). CZM is essentially an assembly of technical specialists in marine sciences, environmental law and policy, and public outreach, along with regional coordinators who serve as liaisons to communities and local organizations.

It is important to note that CZM is not a state permitting agency. It works instead with other state agencies and project proponents during the permitting of proposed projects. For example, CZM acts in an advisory role within the MEPA and NEPA review processes on how facilities constructed with federal or state funds can be best sited and designed according to regulatory requirements. CZM responsibilities also include offering technical assistance to communities to develop and implement comprehensive coastal management plans and

Table 3-2: MA Coastal Zone Management’s Growth Management Principles

<p>•Growth Management Principle #1 Encourage, through technical assistance and review of publicly funded development, compatibility of proposed development with local community character and scenic resources.</p> <p>•Growth Management Principle #2 Ensure that state and federally funded transportation and wastewater projects primarily serve existing developed areas, assigning highest priority to projects that meet the needs of urban and community development centers.</p> <p>•Growth Management Principle #3 Encourage the revitalization and enhancement of existing development centers in the coastal zone through technical assistance and federal and state financial support for residential, commercial and industrial development.</p>
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reviewing projects requiring federal permitting. The agency is organized by major resource, including water quality, habitat, protected areas, coastal hazards, port and harbor infrastructure, public access, energy, and ocean resources.

In Massachusetts, 28 policies govern activities in the coastal zone. Nineteen of these are regulatory policies and form the basis for administrative

decisions on proposed activities that are likely to affect the coastal zone. The Wetlands Protection Act and Chapter 91 Public Waterfront Act are two of the more well know programs that authorize these policies. The remaining nine policies, although not enforceable, promote improved coastal management. For these policies, CZM uses Management Principles to offer “guidance to proponents of projects in the coastal zone of a preferred approach to resource management.”⁴⁰

Growth management on barrier beaches is guided by these Management Principles. Growth Management Principle #1, “Encourage, through technical assistance and review of publicly funded development, compatibility of proposed development with local community character,” comes closest to grappling with land use and residential development on barrier beaches. CZM adheres to this Principle by providing technical assistance for the promotion of improved community preservation, recommendations to developers and municipalities, and legal assistance to municipalities for the development of local zoning bylaws, land use controls, and tax incentives. See Table 3-2 for all of CZM’s Growth Management Principles.

Another component of the CZM regarding development on barrier beaches is its *Guidelines for Barrier Beach Management in Massachusetts*. These Guidelines, written in 1994, are “provided as a public service to those given responsibility for implementing and complying with a myriad of federal, state, and local laws relevant to barrier beaches. They are designed to serve as a reference tool to those charged with the responsibility of preparing, reviewing, and implementing barrier beach management plans.”⁴¹

Construction of facilities is addressed by the *Guidelines*. Interestingly, rather than spelling out exactly what beach managers should do regarding construction of facilities, the *Guidelines* refer beach managers to the “case history” for guidance on how to properly address proposed construction activities on barrier beaches. This case history is based on

⁴⁰ Massachusetts Coastal Zone Management Plan, p. 6

⁴¹ *Guidelines for Barrier Beach Management in Massachusetts*, p. 5.

relevant regulation, particularly the Massachusetts Wetlands Protection Act's Coastal Regulations of 1978.

Other programs that directly address development on barrier beaches are Title 5 of State Environmental Code (MGL Chapter 21A), Wetlands Protection Regulatory Performance Standards for Coastal Dunes and Barrier Beaches (Wetlands Protection Act, 310 Code of Mass. Regulation 10.28 and 10.29), Executive Order Number 181: Barrier Beaches, and Executive Order Number 385: Planning for Growth.

Title 5 of the Massachusetts Environmental Code

Title 5 authorizes Massachusetts Department of Environmental Protection's (DEP) Division of Water Pollution Control to regulate the design, construction, and maintenance of on-site subsurface sewage disposal systems (septic systems). DEP and local boards of health are responsible for the enforcement of Title 5. In addition, communities may adopt more stringent regulations when local conditions warrant higher standards. Septic systems that are not properly sited or maintained are major contributors of pollution of rivers, coastal waters, groundwater, and surface water. Pollutants include harmful pathogens and nutrients that can degrade both recreational and drinking water supplies.⁴²

Title 5 is significant to development trends on barrier beaches because it can restrict further development if sewer systems cannot be upgraded – thus slowing growth in these areas. This may occur in cases where lot sizes are too small to accommodate both wells and septic systems, or in areas where groundwater elevations are too high. On the other hand, this regulation can encourage municipalities to develop municipal infrastructure if private sewer systems are failing – which may in turn lead allow additional development to occur where

⁴² This information was obtained from the State Environmental Code, Title 5: Standard Requirements for the siting, construction, inspection, upgrade, and expansion of on-site sewage treatment and disposal systems and for transport of septage, <http://www.state.ma.us/dep/brp/files/310cmr15.PDF>, accessed May 9, 2003. Also see <http://www.state.ma.us/dep/brp/wwm/t5pubs.htm>.

previously it was prohibited. This situation has occurred on Plum Island and will be explored further in Chapter 4.

Wetlands Protection Regulatory Performance Standards

The Performance Standards for Barrier Beaches are authorized by the Massachusetts Wetlands Protection Act and restrict construction on many coastal areas, including barrier beaches and coastal dunes. Generally, any alteration of, or structure on, any of these areas (or within 100 feet of a coastal dune) cannot have an adverse effect on the said area. However, there are exceptions. For example, the standards allow accessory buildings to be built on coastal dunes provided that adverse effects are minimized. Adverse effects are defined as:

- Affecting the ability of waves to remove sand from the dune;
- Disturbing the vegetative cover so as to destabilize the dune;
- Causing any modification of the dune from that would increase the potential for storm or flood damage;
- Interfering with the landward or lateral movement of the dune;
- Causing removal of sand from the dune artificially; or
- Interfering with mapped or otherwise identified bird nesting habitat.

Executive Orders

As mentioned above, management of development on Massachusetts barrier beaches is also dealt with in through executive orders. An executive order is any written or printed order, directive, rule, regulation, proclamation or other instrument promulgated by the governor of the state. Although executive orders have the force of law, they are not legislative acts. Executive Order 181 acknowledges the importance of barrier beaches as migrating landforms that provide storm damage prevention and flood control. The Order discourages development by limiting state and federal funding for new support facilities, such as sewer and water lines and coastal engineering structures and also encourages preparation of municipal management plans. Similarly, Massachusetts Executive Order 385 (Planning for Growth) requires that all state-funded infrastructure projects consider the growth impacts of the proposed project. It should be noted that Executive Orders 181 and 385 are the most indirect of the above

legislation in that it does not have absolute restrictions, but instead relies on the restriction of state funds to discourage development.

In many ways, Massachusetts' efforts to regulate residential development on its barrier beaches are based on collaboration and education rather than regulation (see above discussion of the Office of Coastal Zone Management). One likely reason for this is Massachusetts Home Rule, which limits the Commonwealth's ability to regulate land use. In addition, dissemination of information is also less expensive than some of the other tools that the state could choose to use, such as a program of property acquisition. CZM attempts to get around the lack of regulatory authority by utilizing Growth Management Principles. While this does get CZM a voice in the process, the majority of responsibility for regulating development on barrier beaches continues to fall on local communities.

A piece of legislation that could have a significant impact on State regulation of development on barrier beaches was recently adopted in August 2002. Chapter 236 of the Acts of 2002, Section 27: An Act Providing for the Preservation and Improvement of the Environmental Assets of the Commonwealth instructs the Massachusetts Secretary of Environmental Affairs to develop a statewide comprehensive coastal hazards management plan. The plan is to be developed by a coastal hazards management steering committee. The legislation instructs this coastal hazards steering committee to "examine innovative solutions to coastal hazards, including existing seawall repair, removal or replacement with an alternative; beach nourishment, including the application of offshore sand mining for such purpose; private property acquisition; infrastructure relocation; best management practices for development in coastal flood or erosion prone areas; funding hazard mitigation plan development and implementation and potential insurance options." To date, however, the coastal hazards management steering committee has not been formed.

Chapter 5 explores a number of proposed changes to the Massachusetts regulatory framework that would enhance the Commonwealth's regulation of residential development on barrier beaches.

Local Coastal Zone Management

As discussed above, the vast majority of Massachusetts towns and cities are empowered to govern themselves through the Massachusetts Home Rule Amendment. Because of this, individual municipalities in Massachusetts have the greatest power over the development of the Massachusetts coastline. Although local communities do rely on federal and state programs to regulate development on their barrier beaches (e.g. FEMA requirements), it is often local zoning ordinances and building codes that have the greatest impact on the built environment. Across the nation, the most common management tools utilized at the local level include traditional zoning practices such as use limitations and setbacks, urban growth boundaries, cluster development, and building codes. For a fairly comprehensive list of development regulations utilized at the local level, see Table 3-1 at the beginning of this chapter.

Massachusetts municipalities are able to adopt wetlands bylaws/ordinances and regulations that provide greater levels of protection than contained in the state Wetlands Protection Act and regulations.⁴³ Accordingly, communities often apply overlay zoning districts over their shoreline to restrict development, as was done recently on Plum Island, a barrier beach off the coast of Newburyport, MA (see Chapter 4).

A consequence of strong local control is that program implementation and enforcement responsibility falls on individuals, most often local officials and local board volunteers. For example, local, voluntary conservation commissions are charged by the Commonwealth to enforce the MA Wetlands Protection Act. This level of local control can be particularly challenging as growth management and other development regulation decisions can be at times controversial and politically charged. Indeed, not only are town officials and members of local boards charged with the responsibility protecting barrier beaches from the impacts of current and future development, they must do so while also accommodating many powerful

⁴³ See Lovequist v. Conservation Commission of Dennis, 379 Mass 7 (1979).

yet diverse interests, including professional developers and builders, private property owners, lenders, realtors, environmental advocates, and federal and state agencies.

Local methods to control growth on barrier islands in Massachusetts, including the Plum Island Overlay District, will be discussed at length in Chapter 4.

Regional Management Strategies

In addition to the federal, state, and local regulatory frameworks, many coastal areas are governed by regional agencies. These agencies are able to sidestep federal, state, and local political jurisdictions and thus are better able to conform to natural ecosystems. Several states, such as North Carolina, Florida and California have strong regional bodies that are charged with management coastal areas. There are number of ways to approach regional control of barrier beaches. The most common are by watershed or estuary, or by designating special management areas or areas of environmental concern.⁴⁴ Although Massachusetts has thirteen regional planning agencies, they serve as public service agencies and do not have regulatory authority. Thus, they arguably have minimal impact on planning and development in their particular jurisdictions. However, two regional agencies in the Cape Cod area have been given regulatory and enforcement authority. These are the Cape Cod Commission and the Martha's Vineyard Commission.

The Martha's Vineyard Commission, established in 1974, was the first regional land-use planning agency in the State with regulatory powers. It is a regional planning agency for Dukes County, including the islands of Martha's Vineyard and Gosnold (Cuttyhunk). Its purposes are (1) to help the towns regulate development in fragile areas, using standards set by the Commission with state approval (Districts of Critical Planning Concern); (2) to regulate changes affecting more than one town because of location, size, or type

⁴⁴ Klee (1999) p. 44

(Developments of Regional Impact); and (3) to promote public services and economic activities suited to the Island's resources and ecology.⁴⁵

The Cape Cod Commission was created in 1990 by an Act of the Massachusetts General Court and confirmed by a majority of Barnstable County voters. The Commission was established as a regional planning and regulatory agency to prepare and implement a regional land use policy plan for all of Cape Cod, review and regulate Developments of Regional Impact, and recommend designation of certain areas as Districts of Critical Planning Concern. Among the Commission's many programs is the Cape Cod Land Bank, an initiative providing Cape towns with technical support and assistance to fulfill their land acquisition and natural resource protection goals.⁴⁶

These regional planning agencies were formed only after Cape Cod and the Vineyard had experienced unprecedented growth and severe environmental impacts. And even then, it took a tremendous organized effort. Although a regional approach to regulating development on Massachusetts barrier beaches would likely be an ideal approach, it would likely be exceedingly difficult to implement in the short term due in no small part to Home Rule. Beatley has catalogued a number of additional reasons why regional approaches to coastal management are difficult to achieve:⁴⁷

- Public's resistance toward governmental jurisdiction on private property rights;
- Public's overall feeling that the community will survive any short-term problems (e.g. flooding every 100 years);
- Lack of funding to support regional management activities;
- Opposition by local business, real estate companies, homeowners, and area developers;
- No incentives to protect resources of regional significance; and
- Lack of clear regional management goals and priorities, and a lack of trained personnel to implement the program.

⁴⁵ This information was obtained from the Martha's Vineyard Commission's web site. See http://almanac.vineyardconservationsociety.org/mvc/mvc_mainpage.shtml for more information. Accessed May 11, 2003.

⁴⁶ This information was obtained from the Cape Cod Commission's web site. See <http://www.vsa.cape.com/~cccom/> for more information. Accessed May 11, 2003.

⁴⁷ Further analysis of these factors can be found in Klee (1999), p. 47

The Private Approach: Private Barrier Beach Communities and the Use of Covenants

Another form of management pertaining to development on barrier beaches can be found in private, barrier beach communities. These communities utilize covenants to regulate development. They work largely outside of local zoning and other regulations, but remain subject to applicable state and federal regulations. Below is a brief summary of the covenants and standards governing Spring Island and Dewees Island, two private, barrier island communities off the coast of the Carolinas. As will be shown in the following sections, the covenants and standards of these communities are largely more place-based than public zoning ordinances. They are also more intrusive and somewhat less flexible.

Spring Island

Spring Island is a private island community of the coast of South Carolina. Encompassing over 3,000 acres, Spring Island has only 410 homes. Standards for development on Spring Island are incorporated in what are called the Spring Island Habitat Review Guidelines. The stated intent of the Habitat Review Guidelines is “to encourage outstanding individually designed environments which gently blend into the overall context of Spring Island, a private Nature Park community.”⁴⁸ Spring Island has a Habitat Review Board that makes recommendations, reviews and approves architectural and landscape plans in accordance with the Habitat Review Guidelines and the recorded Declaration of Covenants & Restrictions for the Island.

While the Guidelines include elements of typical zoning ordinances such as general setbacks, siting, and massing standards, they also address development on a more micro scale. For instance, each lot on Spring Island has its own specific property setback lines and building envelope.

The Habitat Review Guidelines also make recommendations regarding environmentally sensitive design opportunities. Areas include site responsiveness, views and natural

⁴⁸ Spring Island Habitat Review Guidelines. August, 1998, Revised December 2001: 1.1.

ventilation, massing, and design quality. Also notable, Spring Island’s Habitat Review Board has a representative versed in site planning and a naturalist familiar with the Island to provide guidance for optimum placement of homes.

Dewees Island

Dewees Island is private island community of 1,200 acres lies off the coast of Charleston, South Carolina. The island is zoned by the Charleston County Zoning Ordinance as Agricultural General (AG). Through the issuance of numerous variances, the developers of Dewees were able to locate 150 homes on the island. The community’s progressive environmental stance is credited for obtaining these variances.

The development philosophy of the Dewees Island community is to “limit impact on your neighbor and the native environment and natural character of the island, and for the presence of man to have a positive impact on the environment and ecosystem now, and in the future.”⁴⁹ This philosophy is reflected in the Island’s Design Guidelines, Master Plan and the Island Covenants. Similar to Spring Island’s Habitat Review Board, the developers of Dewees Island have established an Architectural Resource Board (ARB), charged with ensuring “a design approach that stresses reduced dependency on limited resources both on and outside of the island.”⁵⁰

Beyond being in tune with the island’s natural environment and desired community character, Dewees’s Design Guidelines are notable because they actually explain why each standard is required. Below is a list of examples of Dewees design guidelines and their explanations:

- Fertilizers and pesticides shall be limited to organic types and practices.
Reason: Composting is a good way to recycle nutrients from island landscape waste that would otherwise be disposed of and removed from the island food chain.

⁴⁹ Dewees Island Architectural & Environmental Design Guidelines. October 25, 1996.

⁵⁰ Ibid.

- Design of homes on Dewees Island must consider waste reduction and toxicity of materials and processes. Not only should materials used in construction of the home be the least toxic, but also the waste produced as these building products are used should be minimized, be recyclable, or be reusable
Reason: By designing homes so that construction waste is reduced, the cost of construction on a boat-access-only island is also reduced.
- Houses should be designed to use natural ventilation as the norm. Mechanical systems should be considered supplementary.
Reason: Conditions on Dewees are ideal for these systems, providing for maximum efficiency combined with the lowest energy usage/expense. They are quiet and include no exterior mechanical components exposed to the salt air environment.
- A maximum of 7,500 square feet of permanently disturbed area will be permitted on any home site.
Reason: This limitation is necessary to preserve the natural environment of Dewees Island, and to prevent destruction of native vegetation, and other natural features, such as wetlands, and to enhance the regeneration of the maritime forest.
- All homes built on the Island are limited to a maximum of 5,000 square feet of heated area.
Reason: Houses of great size can overpower the delicate scale of the island environment.

Both Dewees Island and Spring Island have an extensive development approval process. The Guidelines for both communities also give a great deal of information in their Appendices regarding recommended species for planting, environmentally friendly design, and utility management. In addition, the Spring Island Habitat Review Guidelines include a list of sustainable design products and material sources, including phone numbers of suppliers.

Aside from the differences stemming from public versus public processes, there are three general differences between the Plum Island Overlay District and Spring and Dewees Islands covenants:

- The private covenants are largely more place-based with an emphasis on detail (e.g. landscape sensitivity)
- The private covenants are buttressed by explicit reasoning
- The private covenants are sometimes more intrusive (e.g. color of houses)

Clearly, private community planners can have an advantage over their public counterparts in that they initially have a clean slate of undeveloped land. Once approved, they also work largely outside of the political realm. But these advantages should not preclude public planners and regulators from looking to private covenants like those found in Spring and Dewees communities for examples of how to better incorporate environment and community into local regulations and standards.

Private Property Rights and The Fifth Amendment's Takings Clause

All of the regulations discussed above effect private property in one way or another. It is thus important to be conscious of issues related to private property and the Takings Clause of the Fifth Amendment of the U.S. Constitution. The Takings Clause provides that private property shall not be taken for public use, without just compensation. Consequently, if a property owner has been affected significantly by land use and environmental regulations they may claim that such regulations constitute a taking of their property. Wetlands and coastal regulations have come under particular scrutiny in the past ten years.

Regulatory takings are a complex area of law – so much so that there is broad-based confusion over what actually constitutes a taking of property. Rulings by the Supreme Court, as well as the lower Courts, have been somewhat inconsistent over the years. However, there are some general rules of thumb pertaining to takings that planners and regulators should follow. Beatley et al. summarize these nicely with the following points:⁵¹

- The physical occupation of private land by a unit of government, except under extreme circumstances, is a taking (e.g. building a city hall on the front yard of a private residence).
- A government regulation that removes all economic value of privately owned land is a taking (e.g. zoning a piece of privately owned property for a public park).
- A government regulation that regulates the use of land that has no rational connection to a valid public purpose is a taking.

⁵¹ Beatley, et al. (2002) p. 87

For a more in depth examination of the takings issue, one should consider the following landmark cases:

Penn Central Transportation Co. v. City of New York, 438 U.S. 104 (1978)

Agins v. City of Tiburon, 447 U.S. 255 (1980)

Nollan v. California Coastal Commission, 483 U.S. 825 (1987)

Lucas v. South Carolina Coastal Council, 112 U.S. 2886, 120 (1992)

Dolan v. City of Tigard, 512 U.S. 374 (1994)

Palazzolo v. Rhode Island, 533 U.S. 606 (2001)

Tahoe Sierra Preservation Council v. Tahoe Regional Planning Agency, 122 S.Ct. 1465 U.S. (2002)

It would behoove regulatory bodies to consider facial and applied takings issues when exploring new growth management programs and policies.

CHAPTER 4 – The Case of Plum Island

Plum Island, aptly named for its hundreds of beach plum bushes, is a ten mile barrier island off the North Shore of Massachusetts at the mouth of the Merrimack River. Split between four municipalities, Newburyport, Newbury, Rowley, and Ipswich, approximately one-quarter of the island is developed. This development is on the northern part of the island in the Town of Newbury and the City of Newburyport.

Currently, there are 1200 dwelling units on Plum Island; 700 are in Newbury and 500 are in Newburyport.

Development on the island is made up primarily of densely-placed, single family homes, ranging widely in quality, size, and age. The majority of lot sizes on the island are around 5,000 square feet. Potable water quality and erosion are significant concerns to many island residents. Though hard to believe when touring Plum Island’s densely-built neighborhoods, there is an estimated 300 vacant lots on the island.⁵² Historically, Plum Island’s community has been economically diverse. However, it is becoming less so as demand for property on the island increases.

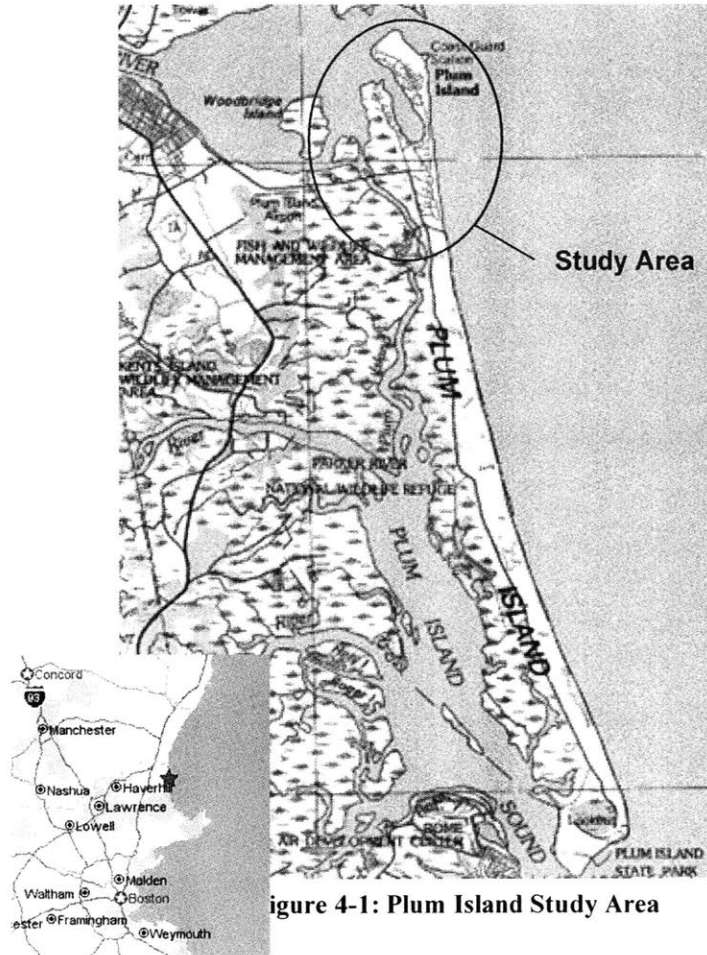


Figure 4-1: Plum Island Study Area

Source: Topaz Maps Inc. Map Design & Publishing info@topazmaps.com ©1997

⁵² Camp Dresser & McKee (October 2001) *City and Newburyport and Town of Newbury: Utility Services to Plum Island Final Environmental Impact Report (FEIR)*.

The remaining three-quarters of the island consist of the Parker River National Wildlife Refuge and the Sandy Point State Reservation. Internationally known for recreational birding, these refuges are of vital stopover significance to waterfowl, shorebirds, and songbirds during pre- and



Figure 4-2: Development on Plum Island

postbreeding migratory periods. The piping plover, a federally endangered species, and the least tern, a species of special concern in Massachusetts both use Plum Island for breeding habitat. In addition, the refuges provide habitat to hundreds of additional species of mammals, reptiles, amphibians, insects, and plants.

Plum Island is part of The Parker River/Essex Bay Area of Critical Environmental Concern (ACEC). The purpose of the Massachusetts ACEC program is to preserve, restore, and enhance critical environmental resources and resource areas of the Commonwealth of Massachusetts. As such, Plum Island and other ACECs are subject to a higher set of standards and regulations than other, non-designated areas in Massachusetts. Most relevant to this case study is the stipulation that any proponent of a project (as defined by MEPA regulations) located within an ACEC must file an Environmental Notification Form (ENF) for MEPA review, unless the project consists solely of one single family dwelling.⁵³ This MEPA review process has come into play on Plum Island through a recent proposal by the City of Newburyport to bring city water and sewer to the island.

The impetus of this proposal has brought far more than the possibility of centralized water and sewer to Plum Island. It has brought political strife, fears of growth and environmental impacts, and escalating legal fees. In addition, the process by which this proposal came to

⁵³ See ACEC Program Regulatory Summary for further information, <http://www.state.ma.us/dem/programs/acec/regsum.htm>. Accessed April 26, 2003.

fruition, and the journey it has since traveled, highlight clearly the disorderliness, complexity, and the utter difficulty of regulating residential development on Massachusetts' barrier islands.

The Water and Sewer Proposal: Overview

Currently, there is no city water or sewer on Plum Island. For water, island residents and businesses rely on individual wells that draw from a fresh water lens under the island or they rely on bottled water, as many wells have become contaminated with saltwater and/or leaching sewer. Individual septic systems are relied on for sewer waste.

The City of Newburyport first proposed bringing centralized water and sewer to Plum Island after signing, with the Town of Newbury, an Administrative Consent Order (ACO) issued by the Massachusetts Department of Environmental Protection (DEP) in September 2000 requiring the City and Town of Newbury to work towards a regional solution to solve Title 5 problems on Plum Island. A previous ACO was issued to the City Of Newburyport concerning the city's poor compliance with Title 5 on Plum Island. As mentioned in Chapter 3, Title 5 of the Massachusetts Environmental Code authorizes MA DEP's Division of Water Pollution Control to regulate the design, construction, and maintenance of septic systems. Because Plum Island is not currently served by a municipal sewer system, all properties on the island are subject to Title 5 requirements. A significant concern on Plum Island relating to Title 5 is that many lots are too small to achieve compliance, in that there is not sufficient separation between the property's well and septic system. Title 5 restrictions have also played an inadvertent yet significant role in slowing development on Plum Island due to the difficulty many property owners have obtaining compliance on many of the Island's small lots.⁵⁴

⁵⁴ Massachusetts property owners must gain compliance with Title 5 prior to any transfer of property or building on any vacant lot requiring a septic system.. In addition, compliance must be met prior to a change of use or expansion of the building(s) served by the system. See <http://www.state.ma.us/dep/brp/wwm/faqs/gen.htm> for more information. Accessed May 11, 2003.

Initially scheduled to begin March 2002, the \$22.9 million project is to be built by the City of Newburyport with betterment fees obtained by all Plum Island residents (including Newbury residents). To date, \$2.4 million has been spent on study and design. The funding for construction is to come from the Massachusetts Clean Water State Revolving Fund (CWSRF) in what is equivalent to a no interest, 30-year loan. The sewer will be hooked up to Newburyport's existing sewer treatment facility. The water source is still uncertain. In an intermunicipal agreement between Newbury and Newburyport signed in 2000, Newburyport was given authority to take water from Newbury via eminent domain. This agreement has since been retracted due in large part to protest from Newbury residents. As of this writing, the source of water for Plum Island continues to be debated. To add to an already difficult situation, a number of people have voiced concern that the local watershed simply cannot support the additional drain of water service to Plum Island.⁵⁵ Another concern voiced is that Newburyport's existing sewer treatment plant is unable to accommodate additional Plum Island sewer. Brendan O'Regan, from Newburyport's Sewer Department and former project manager of the water and sewer project strongly refutes this claim.⁵⁶

Because funding for the project is to come from the state, Executive Order 181 has come into play. As discussed in Chapter 3, Executive Order 181 prohibits state funding for projects on barrier islands that will promote growth (see Appendix A). Accordingly, the ACO required Newburyport and Newbury to take the following three steps prior to receiving funding from the CWSRF: 1) Adopt a zoning overlay to discourage growth that may stem from the addition of water and sewer to the island; 2) Adopt a wetlands ordinance/bylaw; and 3) Adopt wetlands regulations.

⁵⁵ Interview with Dave McFarland, February 27, 2003.

⁵⁶ Interview, May 2, 2003. O'Regan reported that the Newburyport sewer treatment plant is permitted for 3.4 million gallons of waste per day. Sewage waste has averaged 2.4 -2.5 millions gallons per day over the last 3 years. Plum Island is expected to average 270,000 gallons per day. In addition, Newburyport is completing a sewer renovation project, which will reduce waste by an estimated 400,000 gallons per day.

From the Spring to the Fall of 2001, the City and Town passed the Plum Island Overlay District (PIOD) and the Wetlands Protection Ordinance/Bylaw.

The wetlands regulations have not yet been enacted. Summaries of the PIOD and the Wetlands Protection Ordinance can be found in Table 4-1 and Table 4-2, respectively. Copies of these measures in their entirety are in Appendix B. Both of these growth management measures will be discussed in more detail later in this Chapter.

Special Legislation also needs to be enacted in order to proceed with water and sewer project. This legislation is currently “in

Table 4-1: Summary of Plum Island Overlay District (PIOD)*

<u>Statement of Purpose:</u>	
Reduce damage to public and private property resulting from flood waters;	
Ensure public safety by reducing threats to life and personal injury;	
Eliminate costs associated with the response and cleanup of flooding conditions;	
Avoid the loss of utility services;	
Eliminate new hazards to emergency response officials; and	
Limit the expansion of nonconforming single and two-family structures so as to prevent the exacerbation of existing problems with density and intensity of use.	
<u>Permitted Uses:</u>	
Municipal uses owned or operated by the City of Newburyport	
Single-family dwellings, subject to dimensional requirements	
<u>Dimensional Requirements:</u>	
Minimum lot area:	12,000 square feet
Minimum lot frontage:	120 feet
Maximum building height:	35 feet
Maximum number of stories:	2
Minimum front setback:	20 feet
Minimum side setback:	20 feet
Minimum rear setback:	20 feet
Maximum floor area ratio:	0.25
Maximum lot coverage by buildings:	20 percent
<u>Prohibited Uses:</u>	
Any use not set forth above	
<u>Nonconforming Uses:</u>	
Nonconforming uses and structures shall not be enlarged or extended without the grant of a special permit (see Appendix B for full list of special permit conditions)	
One additional bedroom may be created by special permit in one and two bedroom dwelling units.	

* This Table summarizes the Newburyport PIOD. Newbury's PIOD reads similarly.

committee.”⁵⁷ Representative Michael Costello and Senator Steven Baddour have stated publicly that they won’t sponsor the PI Water and Sewer special legislation until the City of Newburyport and Town of Newbury reach some kind of agreement over eminent domain water rights.

The project’s Final Environmental Impact Report states that “On November 30, 2001, the

Table 4-2: Summary of Newburyport Wetlands Ordinance, Sec. 6.5-28: Specific performance standards for the barrier beach

<p><u>Performance Standards (partial list):</u></p> <p>No development shall be permitted within a FEMA V-zone or AO-zone. However, structures in these zones may be repaired in accordance with current local, state and federal regulatory standards.</p> <p>All new buildings or substantial improvements to existing buildings shall be built on open pilings and comply with FEMA National Flood Insurance Regulations and state building code regulations for elevation and flood proofing.</p> <p>Development or redevelopment on or within two hundred feet landward of the top of a coastal bank or dune shall have no adverse impact on the height, stability or function of the bank or dune.</p> <p>In areas where there are coastal banks or primary or frontal dunes, all new buildings and structures shall be set back from the beach dune interface at a distance equal to 30 times the average yearly historical erosion.</p> <p>No activity shall increase the elevation or velocity of flows in a floodplain.</p> <p><u>Variations:</u></p> <p>The conservation commission may grant a variance from these special requirements when it finds after opportunity for public hearing that:</p> <p>There are no reasonable conditions or alternatives that would allow the project to proceed in compliance with the restrictions set forth in this ordinance.</p> <p>Mitigating measures are proposed that will allow the project to be conditioned so as to contribute to the protection of the wetland resource areas located on the barrier beach. The variance is necessary to accommodate an overriding community public interest or to avoid a decision that so restricts the use of property as to constitute an unconstitutional taking without compensation.</p>
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* * This Table summarizes Newburyport's wetlands ordinance. Newbury's wetlands bylaw reads similarly.

⁵⁷ Conversation with Annie McGlynn, Legislative Aide, Office of State Representative Mike Costello, April 1, 2003. Special Legislation is an act applying to a particular county, city, town or district, individual or group of individuals and not general in nature.

City of Newburyport and the Town of Newbury received approval from MEPA for the Plum Island Water and Sewer Project. In their approval, they wrote that this project, “adequately and properly” complies with MEPA. They also wrote that they were “satisfied that the project has avoided and mitigated environmental impacts to the greatest feasible extent.”

Not everyone agreed.

The DEP approval has been appealed by a group called the Island Futures Group, self-described as a non-partisan consortium of citizens from a number of communities in the lower Merrimac Valley, and by the Town of Salisbury. The Massachusetts Audubon Society and the Conservation Law Foundation have both written the DEP in support of the appeal.⁵⁸ The appeal is grounded in the appellant’s concern that the water and sewer project will damage the health of the Merrimack River and the island itself.

The mediation process that followed the appeal to DEP has ended without an agreement. The project’s future will now be decided in court, with proceedings starting in June of this year. Newburyport and Newbury have reportedly spent over \$50,000 in legal fees to date. Meanwhile, the funding for the Clean Water State Revolving Fund may be in jeopardy due to State budget cuts.

While the dispute continues, Plum Island property owners are exempt from Title 5 regulations if they have signed an agreement with the City of Newburyport to connect to the water and sewer system within 30 days of notice that they can connect to the system.⁵⁹ They are also able to sell their homes as long as the prospective buyers sign this agreement. Normally, Title 5 compliance is compulsory before a piece of property changes hands. In part due to this situation, a number of project opponents are convinced that even the possibility of water and sewer has sparked a building boom on the island, regardless of the Plum Island Overly District and the Wetlands Ordinance.⁶⁰

⁵⁸ Interview with Tim Purrinton, MassAudubon, DATE

⁵⁹ ACO, signed 9-15-00

⁶⁰ Interview with Dave McFarland, City Councilor Ward 1 and member of the Island Future Group. DATE

The Water and Sewer Proposal: The Dispute

The following quotes are emblematic of the tensions felt among opponents and proponents over the Plum Island water and sewer project. Several dozen similar letters have been written to the local paper as well as to public officials and agencies since the project was proposed in 2000.

“Mayor Mead and Selectman Machiro...have acted to polarize opinion among Island property owners and residents of mainland Newburyport alike. Many people are confused about the issues. This is hardly surprising, since the [water and sewer] project proponents cannot provide guarantees on some very big unknowns. What will the final cost be? What if it turns out that there isn't enough water and/or treatment plant capacity and efficiency to handle P.I. after all? If this project goes ahead, how will taxpayers' everyday lives and finances be affected? Will our local water and wildlife resources be better or worse of in the long term? Who will guarantee protection of now-open space to prevent growth and the higher tax burdens for all Newburyporters that development inevitably brings?” (Excerpted from an open letter to the Newburyport City Council from the Island Futures Group regarding the Plum Island water and sewer proposal, 8-14-00)

“When we purchased our house, we were under the impression that water and sewer lines were coming to Plum Island. We expected to have the same services that the rest of Newburyport enjoyed (after all, we pay the same taxes). So, the Plum Island project was approved. Two-thirds of the residents of Newbury voted in favor of the project, as did the Newburyport City Council. It would cost the residents of Plum Island a considerable amount of money, but we were willing to pay the price. Quality of life is important to us and we wanted a safe place to raise our families. The addition of water lines would give us safe drinking water and fire hydrants for fire protection.” (Letter to the Editor, Laurel Silvia, *The Daily News*, 12-30-02, A4)

The following is an analysis of the more significance issues involve in the dispute over the Plum Island water and sewer proposal. A central theme to this analysis is the ongoing tension between the need for health and safety of existing development on the island, and the need to minimize environmental impact from current and future development on the island.

Concerns about Growth

Concerns about the sewer and water project leading to further development on the island will be addressed in detail in the following section. Briefly, many project opponents are concerned that the extension of water and sewer service to Plum Island may result in secondary growth impacts affecting everything from wetlands and wildlife habitat to the character of the community.⁶¹ My interviews with project opponents have verified these concerns. In addition, my interviews with DEP staff indicate that CZM is also concerned about potential growth, but, to quote one staff member, “In this instance, you’ve got the best you can achieve – water and sewer will improve public health.”⁶²

As will be shown in the following section, numbers taken directly from the project’s Final Environmental Impact Report (FEIR) show that more development will be allowed on Plum Island due solely to the addition of water and sewer than would be allowed to occur without the additional infrastructure. This is due primarily because Title 5 restrictions, which have acted to restrict growth on the island, would be nullified by the addition of municipal sewer. The FEIR concluded, however, that building the water and sewer project does not qualify as an encouragement of growth due to the adoption of the Plum Island Overlay District (PIOD) and the Wetlands bylaws (see Tables 4-1 and 4-2), stating: “As discussed in the Draft EIR, issues associated with the management and control of growth are being addressed through the PIOD and the Wetlands Ordinance/Bylaw and regulations. Both the PIOD and the Wetlands provisions are being implemented as required by the ACO so that growth and development on Plum Island are not encouraged by the availability of utilities and, therefore, the barrier island environment will be better protected.”

It should also be noted that if Newburyport and Newbury were to go ahead with the water and sewer project without state funding, Executive Order 181 would no longer apply and they would be under no obligation to restrict development on the island except in those areas governed by existing regulations such as the Wetlands Protection Act and the Federal Emergency Management Agency. Although it is unlikely that Newburyport would be able to proceed with the project without state funding, the fact that the applicability of Executive

⁶¹ Camp, Dresser, and McKee, Draft Environmental Report (2000)

⁶² Interview with DEP staff member, 2/24/03.

Order 181 hinges on such support is an important one with broader ramifications than just this case.

Health Concerns

Water quality concerns on the island stem from problems of saltwater intrusion and leaching septic systems into private wells. Although the water and sewer project has been labeled a solution to health concerns related to water quality problems on the island, there has not been a lot-by-lot study for water quality on the Plum Island. Likewise, there has not been a lot-by-lot analysis of Title 5 compliance. It has been estimated by Camp, Dresser and McKee (CDM) that 75 percent to 85 percent of lots cannot meet the requirements of Title 5.⁶³ This analysis was based primarily on size of lots, not actual testing. However, CDM contends that water quality problems can be inferred sufficiently from those findings. Many island residents test for water and a private lab on the island has done unofficial testing for many years. The results of these tests have shown periodic well water contamination. The 2000 Administrative Consent Order signed by Newburyport for the implementation of improvement at City's Board of Health finds that the Board of Health "has received inspection reports that indicate the presence of nitrates... and volatile organic compounds in private wells...and has taken no action to require the upgrade of these systems [within the required amount of time]."

Lack of public participation

Many project dissenters claim foul when it comes to the quality and quantity of public participation that went into planning for the current water and sewer proposal. In addition, some believe that Plum Island residents should be polled to see if they even want water and sewer. In many ways this is moot – Title 5 sewer regulations must be complied with, no matter what residents want. However, some project opponents contend that the public was not properly consulted when the decision to proceed with the proposed water and sewer project was made and that a number of meetings took place without proper public notice and that other meetings that should have happened never did. Project proponents, including

⁶³ Camp, Dresser, and McKee, *Final Environmental Impact Report* (October 2001)

Newburyport's sewer department, CZMA, and DEP assert that there have been no violations of public participation requirements. The FEIR concurred.

Lack of discussion of alternatives

Another concern of many project opponents is that alternatives water and sewer solutions were never genuinely considered. This concern stems from Newbury and Newburyport signing the ACO, which essentially mandated centralized sewer, before a complete analysis was done to assess the best solution to the Title 5 problems on the island. As discussed in Chapter 3, consideration of alternatives is mandatory under MEPA. Project proponents, including Newburyport's sewer department, CZMA, and DEP assert that alternatives were considered but ruled out for a variety of reasons. The FEIR concurred.

Intercommunity Cooperation: Water Rights

As mentioned earlier, the source of water to Plum Island is uncertain. The memorandum of understanding giving Newburyport eminent domain in Newbury has been nullified. The special legislation authorizing the water and sewer project is in the process of being redrafted to not include the eminent domain language. An additional question about the local watersheds capacity to service Plum Island also remains open.

Fuzzy numbers

As mentioned above, a lot-by-lot analysis of Title 5 compliance on Plum Island has not been done. Furthermore, the figures used by the FEIR to justify the need for the water and sewer project are based on ill kept Board of Health records and local officials' estimates. The 2000 ACO found that Newburyport's Board of Health "is not carrying out its responsibilities under Title 5" and that "many property owners have transferred property without having the subsurface disposal system inspected by an approved System Inspector." The lack of record keeping and lot by lot analysis concerning Title 5 has led some project opponents to question the basis of the decision to bring municipal sewer to the island.

In addition, some project opponents are arguing that Newburyport's sanitary waste facility, which empties into the Merrimack River, would not be able to manage the increase in waste

from Plum Island. Some believe that has been inconsistency over the years as to the capacity to handle marginal increases in waste. The Conservation Law Foundation has reportedly written to the DEP with these concerns.

The Water and Sewer Proposal: Potential Growth Impacts

Prior to the adoption of the Plum Island Overlay District the island was zoned R3, with a few small areas zoned for agricultural use. Although primarily residential, there are a number of commercial businesses and restaurants on the island. With the adoption of the Plum Island Overlay District, the island is now zoned for single-family residential use.

The FEIR shows that there will be more development allowed on Plum Island after the water and sewer project is completed than is currently allowed. Table 4-3 is a duplicate of Table 3-3, p 3.3 in the FEIR.⁶⁴ It shows that even with the now enacted growth controls, nearly 48 new dwelling units are permissible on the island if the project goes forward, where barely any additional dwelling units would be permissible without water and sewer. It should be noted, however, that several of these lots are located within or near designated FEMA velocity zones, where new development is not permitted. According to CZM, after FEMA updates their maps, these ten homes would likely be included in the new velocity zone. As no new buildings are permitted in FEMA velocity zones, the number of permissible new dwelling units in all likelihood would be closer to 38.⁶⁵

Additionally, 647 additional bedrooms are permitted with water and sewer and growth controls compared to 120 additional bedrooms with no water and sewer (22% increase in

⁶⁴ It is important to note that there is some debate in the community over the number of buildable lots on Plum Island, with or without water and sewer. I have chosen to use the figures from the FEIR for this analysis because they are the ones that are on public record.

⁶⁵ Camp, Dresser, and McKee, *Final Environmental Impact Report* (October 2001)

Table 4-3: Growth Impacts from Water and Sewer Proposal (FEIR)

Development Scenario	Newbury	Newburyport	Total Plum Island
Existing Conditions			
Number of Dwelling Units	700	500	1,200
Number of Bedrooms	1,800	1,170	2,970
Vacant Lots	143	157	300
Residential Construction Scenarios			
1. Construction Currently Permitted⁽¹⁾			
New Dwelling Units	Note (4)	Note (4)	Note (4)
Additional Bedrooms to Existing Units ⁽⁶⁾	70	50	120
2. Construction Based on Water and Sewers w/ No New Growth Controls⁽²⁾			
New Dwelling Units	280	57	337
Additional Bedrooms to Existing Units ⁽⁷⁾	1,053	741	1,794
3. Construction Based on Water and Sewers w/ Proposed Growth Control⁽³⁾			
New Dwelling Units	24	24	48
Additional Bedrooms to Existing Units ⁽⁷⁾	374	273	647

Source: Plum Island Sewer and Water Project FEIR, October 2001, Table 3-1, p. 3.3

Notes:

- (1) No water or sewer. Zoning prior to PIOD. Includes Title 5.
- (2) Water and sewer. Zoning prior to adoption of PIOD. No Title 5 restrictions.
- (3) The proposed project. Water and sewer. Zoning includes adoption of PIOD. No Title 5 restrictions.
- (4) According to health inspector and building inspectors, very few vacant lots would be developable due to Title 5 restrictions.
- (5) Based on recent experience with homeowner requests for additional bedrooms, only approximately 1 out of 10 existing units have Title 5 systems that can accommodate additional bedrooms, Therefore, for this estimate, 1 additional bedroom has been considered for every 10 existing dwelling units. These estimates may be in the low range.
- (6) Assumes for comparative purposes that existing 1 bedroom homes would add 2 bedrooms, existing 2 bedroom homes would add 2 bedrooms, existing 3 or 4 bedroom homes would add 1 bedroom, and existing homes with more than 4 bedrooms would not add any bedrooms.
- (7) Includes existing 1 and 2 bedroom homes adding 1 additional bedroom each in accordance with PIOD. Existing homes with 3 or more bedrooms would not add any bedrooms.

total bedrooms, 540% increase in permissible additional bedrooms).⁶⁶ The FEIR states that many of these homes are on small lots and that setback requirements and building height restrictions would reduce the number of permissible bedrooms. Nevertheless, it is likely that the number of additional bedrooms with water and sewer would remain greater than without the addition of water and sewer.

As stated above, the likelihood that Newburyport could go forward with the water and sewer project without financial help from the Massachusetts Clean Water State Revolving Fund is questionable. However, if the project were to go forward without funding, Newburyport and Newbury would no longer have to adhere to Executive Order 181's requirement for growth control. Because 181 would no longer be applicable, PIOD and Wetlands Ordinance/Bylaw could legally be rolled back. According to the FEIR figures, 337 additional dwelling units (28% increase in total dwelling units) and 1,794 additional bedrooms (60% increase in total bedrooms, 1495% increase in permissible additional bedrooms) would be allowed if this were to occur.

This scenario aside, the FEIR concluded that the PIOD is expected to be an effective means for controlling growth on Plum Island. This conclusion was based in part on the following analysis:

“Even under the extreme example where all existing one and two bedroom homes add an additional bedroom, the overall density of development (3.0 bedrooms per unit) would remain less than other currently sewerred portions of Newburyport. For comparative purposes, the approximate number of bedrooms per unit in the currently sewer portion of Newburyport (not including 1 and 2 bedroom apartments) is approximately 3.5 bedrooms per unit.”⁶⁷

⁶⁶ Because virtually all of the existing single family homes on Plum Island were, or became, nonconforming with the adoption of the PIODs, the vast majority of existing structures on Plum Island are nonconforming structures. This allows the communities to restrict the type of expansion eligible for consideration by the local Board of Appeals. The PIODs allows one and two bedroom homes only to add one bedroom. The PIODs do allow for demolition of existing nonconforming homes and rebuilding by the same building permit/special permit approach. Of course, a special permit may be applied for to add additional bedrooms.

⁶⁷ Camp, Dresser, and McKee, *Final Environmental Impact Report* (October 2001)

I believe this comparison is inappropriate. Comparing Plum Island, a barrier island with a unique, fragile environment and Newburyport, a mainland community, is like comparing the proverbial apple and orange. As mentioned in Chapter 3, Executive Order 181 was explicitly adopted to make sure that barrier beaches are treated differently than other places in Massachusetts. It is thus disconcerting that in an FEIR addressing issues concerning Executive 181, a comparison between allowed densities on a barrier island community and densities in a mainland community is used to show growth is being effectively controlled on the barrier island.

The Issue of Grandfathering

The above figures do not incorporate the issue of grandfathering (M.G.L. c.40A, s.6.) This statute states, in part:

[a]ny increase in area, frontage, width, yard, or depth requirements of a zoning ordinance or by-law *shall not apply* to a lot for single and two family residential use which at the time of recording or endorsement, whichever occurs sooner, was not held in common ownership with any adjoining land, conformed to then existing requirements and had less than the proposed requirement but at least five thousand square feet of area and fifty feet of frontage (emphasis added).

A lot that qualifies for protection under this sentence is called a “grandfathered” lot. Grandfathering applies only to vacant land.

Grandfathering hinders significantly the growth controls measures adopted through the PIOD and wetlands ordinances and is the main reason why the 48 lots mentioned above remain buildable. Mark Bobrowski, a widely respected land use lawyer and consultant to the City of Newburyport, explains in a memo written in 2000 that “almost all of the 344 vacant lots on Plum Island are ‘grandfathered in’ for either single or two-family usage” and that “the biggest problem is that without the sewer and water restriction, most of the properties are

“grandfathered in” as two-family homes.”⁶⁸ However, because many of these lots are held on common ownership, Bobrowski found that with water and sewer, and prior to the PIOD’s adoption, grandfathering would allow 62 new housing units in Newburyport and 38 new housing units in Newbury, not 344 as the number of vacant lots would suggest. Largely due to the elimination of two-family zoning on Plum Island, the PIOD has succeeded in reducing these numbers to 24 additional units in Newburyport and 24 additional units in Newbury (see Table 4-3).

Nick Cracknell, Newburyport’s planning director, cited grandfathering as one of the biggest hindrances to controlling growth on the island.⁶⁹ Obviously, grandfathering is not unique to just Plum Island – it is likely that grandfathering of building rights is a significant issue when attempting to restrict growth on many barrier beaches.

History of Plum Island’s Built and Natural Environments⁷⁰

As described in Chapter 2, it is important to first understand the natural dynamics of barrier beaches in order to understand how best to regulate development on these beaches. The following is a brief history of Plum Island’s natural environment. In addition, I believe it is important to also understand the island’s history of development. This understanding will provide insight into how current development patterns have arisen on Plum Island, as well as into the challenges this development has faced during past years.

Evolution of Plum Island’s Natural Environment

Many scientists believe that Plum Island was likely formed according to the spit accretion theory. As Michael Hoel, author of *Land’s Edge: A Natural History and Field Guide to Barrier Beaches from Maine to North Carolina*, describes, “Sand was likely furnished either by headlands, an eroding drumlin, or offshore sand deposits from the last glaciation. Ocean

⁶⁸ Bobrowski’s analysis found 344 vacant lots on Plum Island. However, the FEIR stated that there are 300 vacant lots on the island. The reason for the discrepancy remains unclear.

⁶⁹ Interview with Nick Cracknell, Newburyport Planning Director, February ???, 2003.

⁷⁰ The bulk of the history section was found in Nancy Weare’s book *Plum Island: the Way it Was* (1993), Second Edition. Newbury, MA: Newburyport Press, Inc.

currents sweep the coast in a north-to-south direction, depositing the sand in a spit that gradually elongates into a fingerlike ridge that is attached to the mainland but ends in the open ocean or a bay. A sound is formed behind the barrier beach and an extensive salt marsh may grow in the estuary.”⁷¹

Erosion on Plum Island

Nancy Weare, a resident of Ipswich, MA recently published “*Island: the Way it Was*,” a book detailing the history of Plum Island. In this book, Weare reports that erosion on the island was a concern even in Colonial times. It seems that town selectmen tried through regulations to prevent the destruction of the dunes so that the shifting sands would not overrun the island’s valuable salt meadows. In the mid-1800s the island went through a significant physical change after three storms hit in 1839, eventually leading to the formation of a cove now referred to as the Basin and the area on the Island now called the Point (both are at the northern tip of Plum Island, see Figure 4-1). Over the course of just two decades, the physical shape of the northern portion of the island changed entirely.

Weare writes:

As a barrier island, Plum Island has always been vulnerable to erosion. There are references from earliest times to the ocean breaching the fore dunes during severe storms. For many years, however, the shifting of the sands was of little consequence because few structures existed other than the lighthouse buildings and the hotel at the centers. When the first cottages were built along the ocean front in the 1880’s, most of them enjoyed a comfortable expanse of beach and dune between house and ocean.

We do know that wave action began to undermine property by the turn of the century; a message on a 1910 postcard describes the moving back of a family cottage threatened by erosion. This protective action was possible for many years because there was sufficient land behind the buildings to move them. However, as the ocean-front sand continued to wash away, there was no further safety net.

By 1950, erosion had endangered a number of cottages, and two vicious storms that occurred late in that year took a tremendous toll. On September 13, 1950, The Daily News refers to “a devastating high tide backed by gale force winds...smashing and ripping ocean front cottages between 18th and 30th Streets.” That same year on November 25th another violent storm, with winds that reached hurricane strength, threatened to cut the island in half. The ocean swept over the bank near the Center

⁷¹ Hoel (1986) p. 28

and down to the boulevard. These two storms alone accounted for a least eight cottages being lost or severely damaged.

One of the first attempts to prevent further destruction of cottages was made in 1952 when funds were appropriated to pump sand from the Basin onto the ocean beach, but this measure brought only temporary relief. Another destructive storm in 1956 indicated the need to do something further, and a series of groins were placed on the ocean front perpendicular to the beach. Although the groins proved to be more effective than sand replenishment, storms in the 1960's continued to do damage.

In 1970 the south jetty was raised and extended, and the previous jagged top was replaced with a walkway for fishermen. The severe erosion that followed south of the jetty in the area of the Coast Guard Station caused some to question the wisdom of the jetty's flat top, which allowed the waves to sweep unbroken across the smooth surface.

The 1970's also brought severe storms, including a late February blizzard in 1972 that was referred to as the 'the storm of the century.' Another cottage was lost and Plum Island declared a disaster area. During this storm, the water was two-feet deep on Northern Boulevard.

Erosion took its toll south of the Center in 1976 when the Saltbox cottage landed on its side on the beach and other nearby houses were threatened. At the far northern end of the island, Jack Stickney's cottage was lost to the raging sea during the blizzard of 1978. (Weare, p. 103-04)

Currently there is a beach restoration project underway on the southern (Newbury) end of the island where erosion has recently been most significant (Figure 4-3). The Plan includes installing snow fencing, planting beach grass, and creating a 10 to 15 foot-wide pedestrian access way to the beach. In a recent DEP decision, a house located in this area that appears ready to collapse over an eroded dune will not be able to bulldoze sand to maintain structural support (figure 4-4).⁷² Several other nearby homes are also experiencing significant threat from erosion.

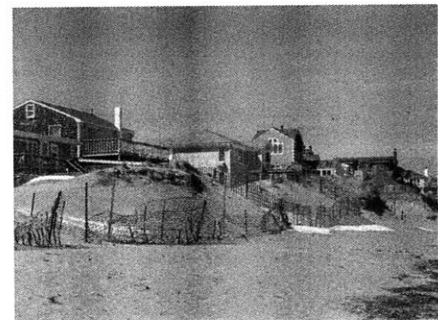


Figure 4-3: Erosion along Fordham Way. Author's photo, 4/10/03

⁷² Letter dated 2/26/03 from DEP to Douglas Packer, Conservation Agent for the Town of Newbury

Massachusetts has recently completed an extensive survey of the long-term erosion rate of all its barrier beaches. Available online, the Shoreline Change Project provides shoreline change maps and accompanying data tables that show the relative positions of four or five historic shorelines and depict the long-term change rates. Figure 4-5 shows Plum Island's shoreline change from 1892 to 1994. As one might expect, the changes have been fairly significant.⁷³

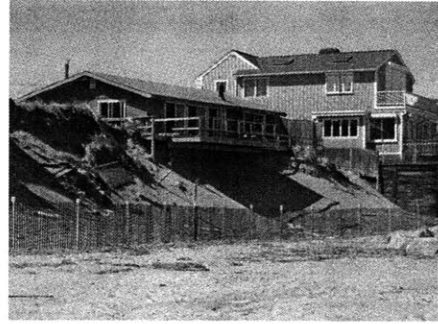


Figure 4-4: Fordham Way erosion

Evolution of Plum Island's Built Environment

Plum Island has a long history of development. First recorded on European charts in the early seventeenth century, the Massachusetts General Court divided Plum Island among the townships of Ipswich, Newbury, and Rowley in 1649. In the mid 1700s, Newburyport and Newbury became separate townships, splitting their property on Plum Island. More recently, in the 1920s a development company divided the north end of the island into

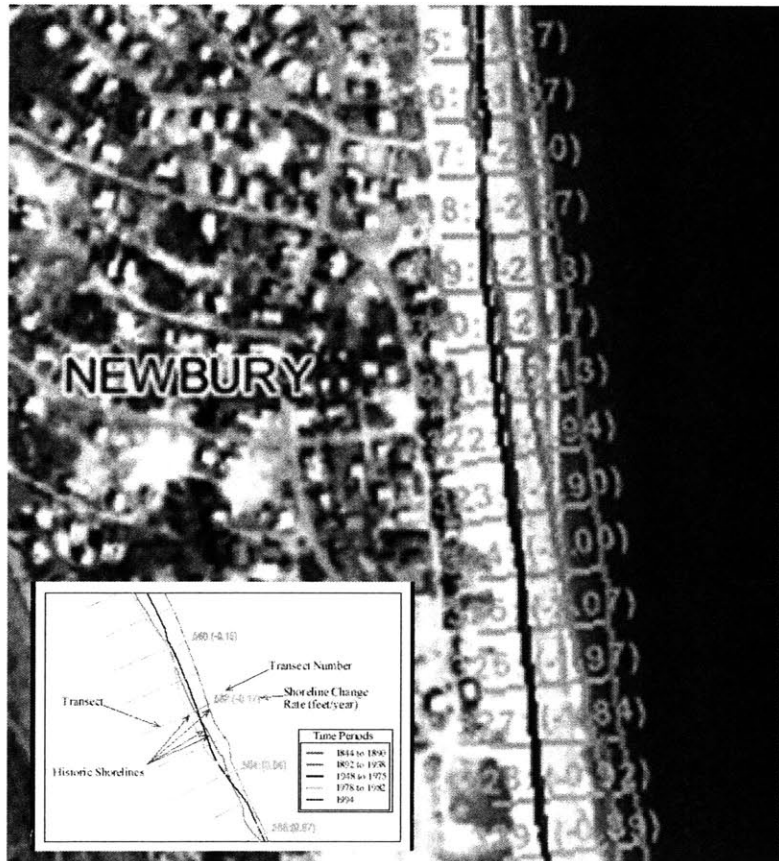


Figure 4-5: Plum Island Shoreline Changes - Fordham Way (1892-1994).^{73 above}

⁷³ Source: Massachusetts Historic Shoreline Change Project, <http://www.state.ma.us/czm/shorelinechangeproject.htm>

70' by 70' lots. As described earlier in this Chapter, these small lot lines for the most part still exists today and are an integral reason for the Title 5 sewer problems the island is currently facing.

However, as Weare explains, the first attempt to promote Plum Island as a resort came in 1806 when a group of Newburyport business men formed a corporation to build a bridge over Plum Island River and a toll road from the corner of Ocean Avenue to the Center. She writes:

In late fall of that year a small hotel was erected near the beginning of Old Point Road...In 1827, Moses Pettingell purchased for six hundred dollars all of the land at the north end of Plum Island from the Proprietors of Newbury with the exception of the government lot containing the lighthouses and the land occupied by the hotel complex. They recouped the cost of the land from the sale of timber cut down on the island and from the ongoing sale of sand, which was in demand for use in the building trade.⁷⁴

Weare goes on:

In 1886, the Plum Island turnpike, bridge and hotel were sold to E.P. Shaw, a local business man and entrepreneur. Mr. Shaw immediately built a horsecar railway line from the hotel to the Point in order to connect with the steamers of the People's line. The following spring, tracks were laid the length of Plum Island turnpike, linking Plum Island to Newburyport and beyond. Many families now spent vacations and even whole summers at the island, since the regularly scheduled and frequent trips made it possible to commute to work.⁷⁵

Plum Island's Northern End

In 1920, the Pettingell family sold their land on the north end of Plum Island to J. Summer Draper of Milton, Massachusetts. Later that year, the Plum Island Beach Company purchased the land for the purposes of development. At the time of the sale, the land contained roughly three hundred and fifteen houses on rented land.⁷⁶ The Plum Island Beach Company

⁷⁴ Weare (1993) p. 5-7

⁷⁵ Ibid. p. 15

⁷⁶ Ibid. p. 20

surveyed and divided the land into over a thousand 70'x70' lots (Figure 4-6). Owners of cottages were given the opportunity to purchase the land or to sell their cottages to the Corporation. As mentioned above, the majority of these lot lines still exist.

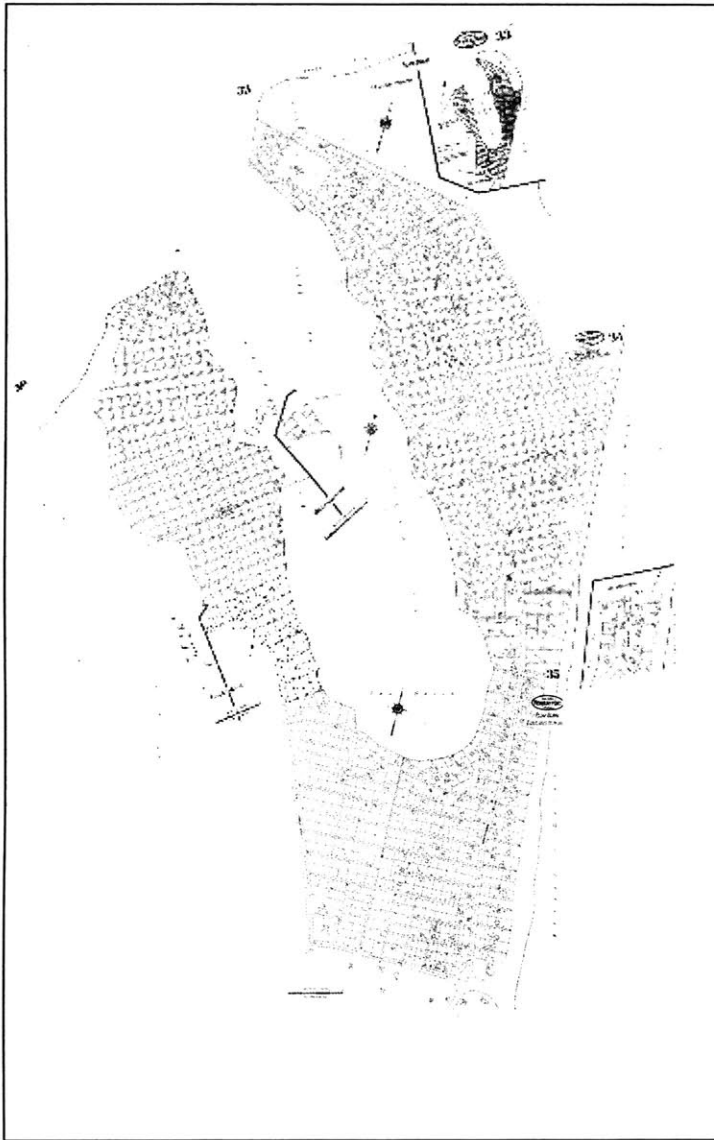


Figure 4-6: Plum Island lot lines (1924)

Source: Online Sanborn Fire Insurance Maps of Massachusetts

the north end of the island, Plum Island's southern end is federal and state reservation land. However, it may have ended up developed if it weren't for, in part, mismanagement on the part of investors and also the recognition from the state and federal government that the area

Weare reports that not everyone was enthusiastic about the new development due to the size of the lots and potential loss of open space and ocean views. However, over the next few of decades, a summer community blossomed, with both rental and owned cottages. In the mid-1930's the Plum Island Casino containing a bowling alley, flying horses, and ice-cream stand, and a penny arcade was built. Nevertheless, the Island continued to be more of a family-oriented summer resort.

Today, the vast majority of development on Plum Island is residential. There are over 1,200 homes on the island, and several commercial businesses.

Plum Island's Southern End

The reader may recall that unlike

was worthy of preservation. The initial plans for the southern end, if allowed to come to fruition, would have led to development similar to that of the north end of the island.

In 1922, a group of Ipswich men in 1922 formed the Bar Island Realty Trust and made plans to subdivide a large portion of the southern end of the island into five hundred house lots. However, in 1942 the U.S. Fish & Wildlife Service purchased almost all of this land to form the Annie H. Brown Wildlife Sanctuary. The Bar Island Realty Trust retained ownership of the very southern tip of the island known as Bar Head and Sandy Point.

In 1933 Oscar Thurlow, a Newburyport Native, purchased Bar Head and Sandy Point. Soon afterward, Mr. Thurlow donated Bar Head to MIT for use as a radar test site and another large piece of land to the Newburyport YMCA. In 1950 John Hayes of Ipswich purchased and subsequently subdivided the remainder of Thurlow's land, forming the Ipswich Bay Realty Company. Weare reports that initial lack of easy access to these lots led to only a few house lots being sold and even fewer cottages being built. However, the Wildlife Refuge soon completed construction of a solid road extending from the Center to Sandy Point, making it available via car. A number of Hayes' lots were subsequently sold.

A turning point came in the 1960s. Weare explains:

By the 1960's, Sandy Point had become very popular with both boaters and campers and many pitched tents there. Unfortunately, there were no sanitary facilities and no supervision, and some felt that the area was abused. In 1964, the Commonwealth of Massachusetts decided to make the site a state park and began proceedings to acquire the land and existing buildings. The cottage owners, who sold reluctantly and hoped for life-tenancy, were instead given a grace period. By October 1975, all private occupancy was halted and the buildings were disposed of by burning. Sandy Point State Park, as it is now called, bans overnight camping, but remains a haven for boaters and beachers. (Weare, p. 101)

Today, the southern end of Plum Island is made up of the Parker River National Wildlife Refuge and the Sandy Point State Park.

A clear connection exists between Plum Island's history of erosion and the desire on the part of investors to develop the island. The Island physical changes in the last 120 years have not worked to deter significant development. The challenge is now how to deal with the need for water and sewer infrastructure for existing development while limiting future growth. A perhaps grander, but no less important challenge is the ultimate sustainability of Plum Island. As discussed in previous chapters, our currently regulatory frameworks struggle to achieve these goals. The following case study analysis sheds further light onto this difficulty.

Case Study Analysis

Appendix C contains a brief analysis of the various stakeholder positions concerning the proposed water and sewer project on Plum Island. In this analysis, five primary stakeholders in the dispute are identified and the pressures and counterpressures they are encountering to the resolution this conflict are explored. The principal stakeholders identified are the City of Newburyport and Town of Newbury; Plum Island property owners; DEP/CZM; the Island Futures Group and other appellants; and the environmental advocates.

Initially, the analysis was performed in hope of gaining a better understanding of the current conflict over the Plum Island water and sewer project. It was soon realized the analysis was also useful in understanding potential opportunities for improvement within the regulatory framework governing development on Plum Island. The following conclusions were drawn from the analysis.

Impacts of water and sewer infrastructure

New infrastructure on Plum Island can have at least a threefold effect: 1) it may lead to an improvement in the ecological integrity of the island by better dealing with wastes; 2) it may extend the life of current development by ensuring a safe water supply and approved sewage disposal system; and 3) it may encourage further development, leading to additional ecological stresses as well as alterations to the character of the current social and built environment. From the above discussion of potential impacts of the water and sewer project, it can be discerned that all three effects are likely to occur in varying degrees. Gaining a

better understanding of the factors contributing to the realization of each of these scenarios will provide insight on how to best avoid any negative, unintended environmental and community consequences of this new infrastructure.

Executive Order 181 is insufficient for managing growth on barrier beaches. Even at CZM, there is lack of clarity on what is meant by EO 181's language, "shall not be used to encourage growth."⁷⁷ This may be why, in part, the PIOD and wetlands bylaws were deemed sufficient growth control measures to allow state funding for the water and sewer project even though they allow considerable additional development. Perhaps more importantly, EO 181 applies only to state funded projects. The Commonwealth of Massachusetts has very little say over independently funded projects that may cause even significant growth on barrier beaches, so long as they satisfy the requirements of the Wetlands Protection Act.

Enhanced Accountability is needed. Although CZM's Growth Management Principles address the built environment, they are in the end only guidelines. In addition, there is no DEP process to review local compliance with growth management measures required under Executive Order 181. The lack of Title 5 record keeping at Newburyport's and Newbury's Boards of Health is clear evidence that local communities do not always comply with the rules.

Grandfathering can be a significant hindrance to controlling development on barrier beaches (as well as other places). The Massachusetts Grandfathering statute (M.G.L. c.40A, s.6.) allows development on many Plum Island lots that would otherwise be prohibited by the Plum Island Overlay District. This problem likely extends to other barrier beaches as well.

Effective Public Participation is a necessity. It is likely that both project proponents and opponents would agree that at some point, communication related to the water and sewer

⁷⁷ Interview with CZM staff member, 2/20/03.

broke down – accusations of closed “public” meetings notwithstanding. In addition to the rift between project opponents and proponents, there is likely a contingency of quiet residents, hesitant to now get into the fray of such a heated debate.⁷⁸ Newburyport and Newbury are reportedly spending between \$20,000 and \$30,000 a month on legal and administrative fees related to the project. An alternative approach to public participation, such as consensus building through alternative dispute resolution, at the forefront of the proposal may have avoided these problems.

Title 5 can lead to unintended consequences. With DEP’s efforts to bring Plum Island into Title 5 compliance, more development will likely occur on the island than would otherwise be permissible. As explained earlier in this Chapter, this is because Title 5 restrictions, which have historically acted to restrict growth on the island, would be nullified by the addition of municipal sewer. A systems view of regulation is needed to better ensure that environmental goals are not undermined by the very regulations that are, on paper, supporting them.

Traditional Zoning leaves much to be desired. The PIOD is a good example of how zoning, as typically practiced, does little to address individual attributes of local environments and communities. (See Appendix B for complete PIOD text.) PIOD’s Statement of Purpose focuses almost solely on avoiding damage, health threats and expense due to flooding.⁷⁹ Only in its last sentence does the Statement of Purpose mention that the PIOD is intended to also prevent the exacerbation of existing problems with density and intensity of use. However, Plum Island, typical of most barrier beaches, is not only subjected to year-round wind and storms (giving credence to an emphasis on flood control), but its dunes migrate and it is frequented by thousands and thousands of visitors annually! Development on Plum Island is made up primarily of densely-placed, single family homes, ranging widely in quality, size, and age. Erosion is a significant concern to many island residents. The community’s physical and economic diversity gives it a unique sense of place. The PIOD does little to address any of these phenomena (albeit the Wetlands ordinance does address building on or near dunes, which will help to reduce development induced erosion). In addition, PIOD stipulates that

⁷⁸ CZM has received a number of letters from Plum Island residents concerned about the water and sewer project but asking that their names not be released. Interview, CZM staff, 2/20/03.

⁷⁹ Zoning Ordinance of the City of Newburyport, Section XXI-A Statement of Purpose.

municipal uses and single-family homes are the only permitted uses on the Island. However, in reality there is a gas station, several small convenience stores, at least three restaurants, and a number of two-family homes on the Island.

The PIOD zoning ordinances are largely standard fare. By proscribing stricter dimensional requirements, it attempts to reduce buildout. Mildly interesting is PIOD's minimum dimensional requirement of 12,000 sq. feet, up from a previous 8,000 sq. foot requirement, which was presumably done to decrease the number of buildable lots on the island. However, as discussed above, grandfathering leaves this dimensional change largely moot. More effective is the PIOD's elimination of two-family (R3) zoning, which has served to reduce allowable additional development.

As the development figures from the FEIR show that the PIOD and Wetlands Ordinances are not enough to impede future development to a level equivalent to even pre-water and sewer infrastructure. In order to truly restrict growth on Plum Island, the PIOD would need to at the very least restrict the expansion of all single-family homes by limiting the addition of bedrooms.⁸⁰ This measure could allow for renovation and improvement of existing homes without allowing for increased usage. In addition, the PIOD provisions for special permits are lax. In particular, the provision to grant special permits on a finding that the proposed alteration "shall not be substantially more detrimental than the existing nonconforming structure or use to the neighborhood or the PIOD" is subject to a wide range of interpretation and provides City and Town's Zoning Boards of Appeals (ZBAs) wide latitude to set their own policies on growth and development for the island.

It is also noteworthy that there is no verification procedures on the part of DEP to make sure the PIOD and Wetlands Ordinances are carried out to their greatest extent. Juli Beth Hoover, Director of Planning & Zoning for the City of South Burlington, Vermont, describes this issue nicely in a memo evaluating the terms of the PIOD and Wetlands Ordinances provided

⁸⁰ Mark Bobrowski, memo to City of Newburyport concerning restricting growth on Plum Island (2000)

to the Island Futures Group.⁸¹ She states that, “The procedures for cross-checking local and DEP approvals are not spelled out in the PIOD and Wetlands Ordinance. Five reviewing authorities (Select Board/City Council, Planning Commission, ZBA, Building Inspector, and Conservation Commission) have authority for implementation of pieces of these regulations, but there is no procedure for cross-approval or even referral of applications among these authorities. In practice, this type of situation leads to fragmented and conflicting decision-making on different pieces of the regulations.”

Additionally, there is a true disconnect between the PIOD’s and Wetlands Ordinances and Plum Island as a place and natural environment. Erosion isn’t addressed, nor is water usage, community fabric, green building standards, or landscape solutions. The PIOD may be somewhat successful in slowing growth, but it does little to encourage development appropriate for Plum Island as an environment and community.

This Case Study demonstrates a disconnection between the built environment and community on Plum Island and the island’s natural environment. This is best shown by the persistence of development in the face of erosion and historical storm damage. The tension discussed in previous chapters between health and safety of existing development and the need for environmental conservation on barrier islands is revealed first hand in the case of Plum Island: By construction of municipal water and sewer, the health of residents will be better assured. However, the addition of sewer not only extends the life of existing development, but has enabled more development to occur on the island. Consequently, more people will be exposed to impacts from erosion and storms and the island’s environment and natural functions will continue to be jeopardized.

Although there are numerous programs and regulations in place to regulate residential development on Massachusetts barrier beaches, these are not leading to a more sustainable

⁸¹ Juli Beth Hoover, AICP. Memo evaluating the terms of the PIOD and Wetlands Ordinances provided to the Island Futures Group, dated 1/22/03.

community on Plum Island. A more holistic approach to policy and regulation of Massachusetts barrier beaches, incorporating the needs of existing development, erosion, hazard mitigation, and natural environment is necessary. The following chapter reflects further on lessons learned from this case study analysis and provides several proposed initiatives for the Commonwealth to take in order to successfully lessen existing and future environmental impacts related to residential development on its barrier beaches, including Plum Island.

CHAPTER 5 – Opportunities for Regulatory Improvement

Modern history shows a pattern of people engineering against nature. As discussed in Chapter 2, on barrier beaches this engineering has taken the form of jetties, groins, and retaining walls. Regulations haven't generally concentrated on the interaction between humans and the environment. In turn, environmental and development-oriented regulations and standards are largely fragmented and inflexible. It is understandable how this has happened – regulations are usually adopted as reactive measures. But a quick look outside at our communities makes for a strong argument for regulations to be more sensitive to local environments – both built and natural. Increasing development on barrier beaches, in particular, highlights this need.

This thesis has thus far explored the challenges of regulating residential development on Massachusetts barrier beaches. In this chapter, I identify several methods the Commonwealth could employ to successfully lessen existing and future environmental impacts related to residential development on its barrier beaches. The diverse management issues concerning barrier beaches make this a complex undertaking. The reader will note the attempt to make the proposed recommendations systematic in nature, while also keeping them simple enough to enhance their likelihood to be implemented in the short term. We begin with a more general discussion of recommendations and finish with individual methods for regulatory improvement.

There is much that federal, state, regional, and local authorities can do to counter current development trends on these beaches. Addressing incentives *for growth* would likely help the situation immensely. As previously discussed, federal flood insurance provides an incentive to both build and rebuild on the coast, including barrier beaches. Doing away with this type of disaster relief would at the very least take away an errant incentive, and perhaps even provide enough impetus to slow growth in these areas. Reforming the tax system by doing away with tax deductions for uninsured losses and second homes may have a similar effect. Along similar lines, owner-assumed liability would provide a disincentive to build on barrier

beaches. Klee advocates that: “If the local city or county government warns the potential builder against constructing at a hazardous site, the builder should be required to sign a waiver within the deed restriction saying that he/she cannot seek government aid if the building is damaged or destroyed.”⁸²

Expanding federal funding and technical assistance for state coastal management programs would enable states to better monitor and update their programs – making them more effective. A major criticism raised by Beatley et. al. of the federal coastal zone management program is that it fails to evaluate coastal states against a clear set of performance standards. They suggest that National Oceanic and Atmospheric Administration (NOAA) develop clear standards for judging acceptable performance and progress.⁸³ For example, each coastal state should be required to develop and maintain a set of suitable coastal sustainability indicators in order to receive funds for its coastal management program. Without performance standards, the federal government will continue to have a difficult time getting states to adhere uniformly to CZMA’s goals. It is also important for all levels of government to monitor the progress of their programs, and remain flexible to change.

It is helpful to keep in mind the following when considering specific opportunities for regulatory change of residential development on Massachusetts barrier beaches:⁸⁴

- Each beach community is different, *therefore flexibility is necessary in any regulatory or management process.*
- The entire coastal zone (including adjacent mainland) must be considered, *and so a systemic approach is necessary.*
- Rising sea levels as well as other potential hazards must be considered, *making effectiveness and compliance an utmost concern.*

In order to achieve these formidable objectives, it makes sense for federal, state, regional, and local governments to utilize a diverse package of programs and policies. Ownership and operation, regulation, incentives, property rights, and the provision of information are all

⁸² Klee (1999) p. 106

⁸³ Beatley, et. al. (2002) p. 289

⁸⁴ Bush, et al. (1996)

available to the government intervention and all should be considered.⁸⁵ The following proposals for change within the Massachusetts regulatory framework incorporate many of these strategies.

A Proposal for Change

After reviewing related literature, consulting several land use and environmental experts, and studying what has happened in the case of Plum Island, it appears that there is room within the current Massachusetts home rule framework to significantly improve its regulation of residential development on barrier islands so as to have less impact on the environment. The following measures, if taken by the Commonwealth of Massachusetts, would work toward this objective:

- 1) Define Executive Order 181's "will not encourage growth" language;
- 2) Develop the statewide comprehensive coastal hazards management plan mandated in Section 27 of the MGL, Chapter 236;
- 3) Amend the Wetlands Protection Act to include performance standards for development in coastal floodplains and wetlands;
- 4) Retain flexibility at the local level while providing incentives for local communities to adopt measures that will preserve barrier beach habitat and natural functions;
- 5) Enhance the public participation process;
- 6) Correct for unintended consequences of Title 5 on barrier islands specifically (or in all ACECs);
- 7) Limit the grandfathering of development rights of vacant lots on barrier islands (or in all ACECs); and
- 8) Work with FEMA on developing a relocation/acquisition scheme.

⁸⁵ Schuster (1997)

Define Executive Order 181's "shall not be used to encourage growth and development" language. Executive Order 181 was adopted in 1980 in order to mitigate future storm damage to the Commonwealth's barrier beaches. Part of its strategy in mitigating future storm damage is to discourage growth and development on barrier beaches by restricting state funds. Outside of the Wetlands Protection Act, which applies only to designated wetlands areas, Executive Order 181 is the strongest growth management tool the Commonwealth has to manage growth on its barrier beaches. It is, however, a weak form of growth control, primarily for two reasons: 1) it is applicable only when a municipality wants state or federal assistance for a construction project; and 2) there are varying interpretations of its policies, particularly #2, "State funds and federal grants for construction projects *shall not be used to encourage growth and development* in hazard prone barrier beach areas (emphasis added)."

A remedy to the first weakness by, for example, changing the language to apply to all municipal construction projects, regardless of funding source, may not be feasible due to the Commonwealth's Home Rule Amendment. However, the second weakness could be remedied by clarification of what "growth" means. Although on its face this policy seems rather straight forward, the terminology "shall not encourage growth and development" has proved troublesome. A CZM staff member that has experience working with municipalities on adhering to EO 181 explained that the Commonwealth has lately been interpreting this policy to mean that local communities must minimize growth impacts *down to a certain level*.⁸⁶ What that certain level is remains unclear. Altering Executive Order 181's policy #2 to read "State funds and federal grants for construction projects shall not be used if the project would in effect enable additional new growth and development on hazard prone barrier beach areas," for instance, may remedy this ambiguity and strengthen Executive Order 181's ability to control growth on barrier beaches, thereby better mitigating future storm damage. This modification, however, would likely face political resistance.

⁸⁶ Interview, DEP staff member, 3/6/03.

Develop a statewide comprehensive coastal hazards management plan. A coastal hazards management plan would work to augment the hazard mitigation goals of Executive Order 181 as well as CZM’s Management Principles. Coastal hazard management plans are widely accepted as being the next best alternative to relocation and acquisition on developed barrier beaches.⁸⁷ Although Massachusetts does not currently have such a plan, the recently adopted *Act Providing for the Preservation and Improvement of the Environmental Assets of the Commonwealth* (Chapter 236 of the Acts of 2002, Section 27) instructs the DEP to develop such a plan through a coastal hazards steering committee. The Act calls for the coastal hazards steering committee to “examine innovative solutions to coastal hazards, including existing seawall repair, removal or replacement with an alternative; beach nourishment, including the application of offshore sand mining for such purpose; private property acquisition; infrastructure relocation; best management practices for development in coastal flood or erosion prone areas; funding hazard mitigation plan development and implementation and potential insurance options.”

It is important that a coastal hazards management plan recognize geological differences between individual coastal areas as well as differing development patterns. Barrier beaches differ significantly from other coastal areas and therefore should be treated as such. Also, property damage risk exposure varies on individual barrier beaches, due to their diverse geological attributes. Due to this variation, many experts recommend that coastal hazards management plans utilize tailored risk assessments when considering hazards mitigation on barrier islands and beaches.⁸⁸

This plan should include comprehensive mapping existing development and erosion hot spots of the Commonwealth’s barrier beaches. Knowledge of these conditions will aid planning efforts.

⁸⁷ Bush (1996) p. 13

⁸⁸ Ibid.

Amend the Wetlands Protection Act to include to include performance standards for development in coastal floodplains and wetlands. Because Massachusetts is a Home Rule state, the majority of power to regulate land use rests with local communities. However local communities do not always have the wherewithal to self-inflict strict growth controls on their barrier beaches – if they did, the tremendous growth witnessed in these areas wouldn't be happening. Although CZM works diligently to supports its growth management principles for coastal areas, they are in the end unenforceable. In turn, they cannot be held accountable for successful growth management on barrier beaches or any other coastal area in Massachusetts. A stronger state-wide or regional regulatory floor is needed. One way to do this is through mandatory performance standards.

Massachusetts has already adopted performance standards for its coastal dunes and barrier beaches (Wetlands Protection Regulatory Performance Standards for Coastal Dunes and Barrier Beaches: Wetlands Protection Act, 310 Code of Mass. Regulation 10.28 and 10.29). As mentioned in Chapter 3, these standards restrict construction on many coastal areas, including barrier beaches and coastal dunes. Generally, any alteration of, or structure on, any of these areas (or within 100 feet of a coastal dune) cannot have an adverse effect on the said area. However, there are exceptions. For example, the standards allow accessory buildings to be built on coastal dunes provided that adverse effects are minimized.

These standards are enforced by local conservation commissions and have been significant to the preservation of coastal dunes. These standards, however, do allow for limited development to occur on coastal dunes. And more importantly, they address primarily coastal dunes and not the larger floodplain of barrier beaches.

In 1995, a series of performance standards addressing the larger floodplain were recommended to DEP by a Coastal Floodplain Task Force, chaired by CZM. A copy of these proposed standards can be found in Appendix D.

The goal of the Task Force was to:

“describe the vital importance and beneficial function of the coastal floodplain, and to ultimately generate technical standards by which to review proposed activities within this resource [coastal floodplain] based on currently accepted scientific principles...in addition...the ultimate goal of the recommendations is to protect the beneficial functions of this important resource in order to prevent or significantly reduce the threats of loss of life and destruction of property, as well as to protect and enhance the beneficial functions of other wetland resource areas within the coastal floodplain.”⁸⁹

These performance standards would apply readily to the Commonwealth’s barrier beaches because so much of these beaches fall into the coastal floodplain. The standards also go beyond the existing Regulatory Performance Standards for Coastal Dunes and Barrier Beaches to address storm damage prevention and flood control, protection of wildlife habitat (beyond bird nesting habitat), and relative sea level rise considerations.

These proposed performance standards also apply stricter building restrictions than the existing standards do. For example, they prohibit “buildings, sheds and garages, additions and substantial improvements to existing structures,” as well as “impermeable paving for unpaved roads, driveways or parking lots” and “new septic systems” in the 100 year coastal floodplain.

Unfortunately, there has been little movement in the adoption of these performance standards. As one staff member of CZM put it, “the Task Force presented its findings, and they have sat on a shelf ever since.” The Coastal Hazards Steering Committee, should it be developed, should reconsider adoption of these or other similar performance standards.

Retain flexibility at the local level while providing incentives for local communities to adopt measures that will preserve barrier beach habitat and natural functions. Because every barrier beach is different, it is important to retain flexibility at the local level in state-wide regulatory programs. Although it may at first seem to be, this is not in contradiction with the recommendations discussed thus far. A hazards mitigation plan, performance standards, Title 5, wetlands regulations, and CZM management principles should indeed

⁸⁹ See *Scientific Recommendations for Performance Standards for Land Subject to Coastal Storm Flowage* by the Coastal Floodplain Task Force. Presented to DEP July 14, 1995.

pertain to all applicable Commonwealth communities. However, the methods to achieve a number of these goals and standards could be left, in some instances, to the local municipalities.

For instance, if a hazards mitigation plan were adopted by the Commonwealth that tailored individual barrier beach risk assessments, it would be appropriate for the local communities to be involved not only in the development of such assessments but also in the related mitigation efforts. Locals are truly the experts of their own communities. They are likely familiar with year-to-year changes in dunes, water quality issues, flooding occurrences, etc. and thus are potentially enormous resources when it comes to assessing potential risks, and developing customized mitigation efforts.

Incentives for local communities to adopt measures that will preserve barrier beach habitat and natural functions are also important. For example, Massachusetts could provide financial incentives to encourage local communities to develop comprehensive regional coastal management plans. Examples of incentives include State grants for communities (or regions) choosing to develop such plans and priority funding for projects consistent with the plans (e.g. low interest loans or grants for beach nourishment projects (dune preservation); green design initiatives such as replacing impervious surfaces with more pervious materials (flood control); or for the relocation of municipal buildings currently located in coastal floodplains (risk management).⁹⁰ These incentives could also be used to promote local zoning measures that go beyond traditional zoning (like the Plum Island Overlay District) and work to treat

⁹⁰ For a similar initiative, see Maine's recent program directing its Land and Water Resource Council to establish a pilot project to provide financial incentives to local governments that engage in multi-municipal planning [2002 LD 2061; HP 1559 (Enacted as Chapter 621)]. The incentives include priority in receiving state transportation funding, growth management funding, municipal investment trust funds, and community development block grants. Additionally, Pennsylvania authorizes municipalities to enter into intergovernmental cooperative agreements and cooperative implementation agreements for the purpose of developing and implementing a county or multimunicipal comprehensive plan (Acts 67 & 68). State agencies may give priority to applicants for financial assistance for projects that are consistent with the comprehensive plans. Municipalities that have entered into cooperative implementation agreements are authorized to share tax revenue and impact fees with other municipalities within the region, and to adopt transfer of development rights programs to enable the transfer of development rights from rural resource areas to designated growth areas. These and other incentive programs are described in National Conference for State Legislatures - State Incentive-Based Growth Management Laws Database: <http://www.ncsl.org/programs/ESNR/growthdata.htm>. An additional source for green design ideas are private barrier community covenants, particularly those governing Dewees and Spring Island mentioned in Chapter 3.

barrier beaches as the unique places that they are. The discussion of private covenants in Chapter 3 explores potential methods to achieve this approach.

Enhance the public participation process. The case of Plum Island’s water and sewer proposal highlights the need for public education and involvement concerning projects impacting barrier beaches. The current conflict over the water and sewer proposal stems from, among other things, distrust, disagreement over technical numbers, and diverse priorities. These contributing factors are common among coastal land use disputes.⁹¹ CZM could work to mitigate public disagreement by introducing an alternative dispute resolution process when there are project proposals, such as the water and sewer proposal on Plum Island, that show signs of escalating conflict. This role would fit in with CZM’s mission to “balance the impact of human activities with the protection of coastal and marine resources through planning, *public involvement*, education, research, and sound resource management (emphasis added).”

Correct for unintended consequences of Title 5 on barrier islands specifically (or in all Areas of Critical Environmental Concern [ACECs]) In the case of Plum Island, efforts to comply with Title 5 will potentially lead to more development on the island, which may lead to more risk and environmental degradation. One solution would be for the State to stipulate that any property on a barrier island that is currently unbuildable due to Title 5, but becomes buildable due to improvements in sewer triggered from Title 5-related compliance concerns, will remain unbuildable. Along the same lines, any dwelling unit that will be able to increase bedrooms due to fallout from Title 5 compliance will not be able to do so. Restricting building rights in this way could potentially be challenged under Constitutional grounds. Methods to avoid this challenge are addressed under the following recommendation.

⁹¹ For further information on the nature of coastal land use disputes as well as a detailed examination of how to incorporate alternative dispute resolution, see *Applying a Mediated Negotiation Framework to Integrated Coastal Zone Management* by Scott McCreary, et al., Coastal Zone Management, 29:183-216, 2001.

Limit the grandfathering of development rights of vacant lots on barrier islands (or in all Areas of Critical Environmental Concern [ACECs]).

As the case of Plum Island clearly demonstrates, “grandfathering” under M.G.L. c.40A, s.6. is a hindrance to managing growth on other Massachusetts barrier beaches. Consequently, Massachusetts should consider limiting grandfathering on barrier beaches, as well as other environmentally sensitive areas such as ACECs.

Limiting building rights after Title 5 restrictions have been lifted, and abolishing grandfathering of building rights, could be challenged under Constitutional grounds (see Chapter 3 – 5th Amendment Takings Clause). However, if the Commonwealth were to provide property owners with adequate compensation while limiting these building rights, this issue may be avoided. One method of doing this is transfer of development rights (TDRs). The underlying principle of TDRs is that ownership of land includes a right to develop that land, a right that may be separated from other ownership rights and transferred to someone else.⁹²

For the purposes of this discussion, to employ TDRs the Commonwealth would prohibit development on land made available from either Title 5 compliance or grandfathering but permit the effected property owners to transfer all or some of their unused development rights to parcels in designated development areas or to land in areas designated for development. They could either use these rights themselves, or sell them to others. As an incentive for property owners to use of TDRs, the Commonwealth may want to consider providing development bonuses on receding parcels. This is a very simplistic overview of TDRs as several administrative concerns would need to be addressed in detail prior to implementation. Nevertheless, TDRs should be considered a potentially a viable approach to restricting development on barrier beaches.

⁹² Beatley, et al. (2002)

Work with FEMA on a relocation/acquisition scheme. The relocation of buildings and other development off of barrier beaches is the most effective way of preserving the natural functions and benefits of these areas.⁹³ However, it is also the most difficult due to legal and monetary constraints. Currently, FEMA provides limited funding to states for property acquisition through its Hazard Mitigation Grant Program (HMGP).⁹⁴ However, this money can be used only in communities that are recovering from disasters. As discussed in Chapter 2, properties on barrier islands are at elevated and constant risk of damage from storms and sea level rise. An acquisition and relocation scheme for properties that are at risk would reduce future damage and reconstruction costs, as well as save lives.

All of these recommendations face implementation challenges. Lack of political will, monetary constraints, apathy, and constitutional takings issues lead the list. A Coastal Hazards Management Plan has already been legislated and probably has the best likelihood of all of these recommendations to be implemented. State-wide performance standards have already been drafted and could, perhaps, be incorporated into this Plan. Enhanced public participation through a CZM alternative dispute resolution program and providing incentives for local communities to adopt preservation measures are probably the two more politically palatable recommendations. Conversely, retained building restrictions after Title 5 compliance and grandfathering are not only legally tricky, but would also face significant political resistance. An acquisition scheme is probably the most expensive of the recommendations, however, if FEMA were somehow involved costs could be reduced.

These recommendations address many of the management issues facing barrier beaches, including health and safety of existing development, coastal storm mitigation, shoreline erosion, sea level rise, protection of coastal wetlands, and biodiversity and habitat conservation. As discussed throughout this thesis, addressing these management issues simultaneously is extremely challenging. However, the risk associated with increasing development on barrier beaches is high enough to warrant such decisive action. Taken

⁹³ See, for example Beatley, et al. (2002).

⁹⁴ For more information see <http://www.fema.gov/fima/hmgrp/buyouts.shtml>, accessed April 28, 2003.

together as a package, these recommendations could work to supplement the existing regulations governing residential development on Massachusetts barrier beaches to make for a more holistic and effective regulatory framework.

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Interviews Conducted

Staff Member, Massachusetts Department of Environmental Protection (February 20, 2003)
Staff Member, Massachusetts Department of Environmental Protection (March 6, 2003)
Jack Clarke, Massachusetts Audubon Society (October 2002)
Nancy Colbert, former Newburyport Planning Director, currently with Taintor and Associates (numerous conversations, Fall 2003 & Spring 2003)
Nick Cracknell, Newburyport Planning Director (February 19, 2003)
Robert Fultz, Planning Consultant (April 11, 2003)
David McFarland, Newburyport City Councilor and Island Futures Group member (February 27, 2003)
Brendan O'Regan, Newburyport Sewer Department (May 2, 2003)
Tim Purinton, Massachusetts Audubon Society (April 4, 2003)
Alix Ritchie, Provincetown, MA (March 11, 2003)
Elizabeth Symanski, Island Futures Group member (February 27, 2003)
Rick Taintor, Taintor and Associates (numerous conversations, Fall 2003 & Spring 2003)
Jerard Whitton, Merrimac Valley Planning Commission (April 4, 2003)

APPENDIX A

COMMONWEALTH OF MASSACHUSETTS

BY His Excellency

EDWARD J. King

Governor

EXECUTIVE ORDER NO. 181

BARRIER BEACHES

Preamble

A barrier beach is a narrow low-lying strip of land generally consisting of coastal beaches and coastal dunes extending roughly parallel to the trend of the coast. It is separated from the mainland by a narrow body of fresh brackish or saline water or marsh system. It is a fragile buffer that protects landward areas from coastal storm damage and flooding.

The strength of the barrier beach system lies in its dynamic character; its ability to respond to storms by changing to a more stable form. Frequently man induced changes to barrier beaches have decreased the ability of landform to provide storm damage prevention and flood control. Inappropriate development on barrier beaches has resulted in the loss of lives and great economic losses to residents and to local, state and federal governments. The taxpayer, who often cannot gain access to barrier beach areas, must subsidize disaster relief and flood insurance for these high hazard areas.

Since barrier beaches are presently migrating landward in response to rising sea level, future storm damage to development located on the barriers is inevitable.

WHEREAS, the Commonwealth seeks to mitigate future storm damage to its barrier beach areas;

NOW, THEREFORE, I, Edward J. King, Governor of the Commonwealth of Massachusetts, by virtue of the authority vested in me by the Constitution and laws of the Commonwealth, do hereby order and direct all relevant state agencies to adopt the following policies:

1. Barrier beaches shall be given priority status for self-help and other state and federal acquisition programs and this priority status shall be incorporated into the Statewide Outdoor Comprehensive Recreation Plan. The highest priority for disaster assistance funds shall go towards relocating willing sellers from storm damaged barrier beach areas.
2. State funds and federal grants for construction projects shall not be used to encourage growth and development in hazard prone barrier beach areas.

3. For state-owned barrier beach property, management plans shall be prepared which are consistent with state wetland policy and shall be submitted to the Secretary of Environmental Affairs for public review under the provisions of the Massachusetts Environmental Policy Act.
4. At a minimum, no development shall be permitted in the velocity zones or primary dune areas of barrier beaches identified by the Department of Environmental Quality Engineering.
5. Coastal engineering structures shall only be used on barrier beaches to maintain navigation channels at inlets and then only if mechanisms are employed to ensure that downdrift beaches are adequately supplied with sediment.
6. Dredge material of a compatible grain size shall be used for barrier beach nourishment, if economically feasible.
7. The Coastal Zone Management Office shall coordinate state agency management policy for barrier beach areas.

Given at the Executive Chamber in Boston this 8th day of August, in the year of Our Lord one thousand nine hundred and eighty and of the independence of America, two-hundred and five.

EDWARD J. KING
GOVERNOR
Commonwealth of Massachusetts

MICHAEL JOSEPH CONNOLLY
Secretary of the Commonwealth

GOD SAVE THE COMMONWEALTH OF MASSACHUSETTS

APPENDIX B

SECTION XXI. PLUM ISLAND OVERLAY DISTRICT (PIOD)

XXI-A Statement of purpose.

The purpose of the Plum Island Overlay District (PIOD) is to: reduce damage to public and private property resulting from flood waters; ensure public safety by reducing threats to life and personal injury; eliminate costs associated with the response and cleanup of flooding conditions; avoid the loss of utility services which if damaged by flooding would disrupt or shut down the utility network and impact areas of the community beyond the site of flooding; prevent the occurrence of public emergencies resulting from water quality contamination and pollution due to flooding; eliminate new hazards to emergency response officials; and, limit the expansion of nonconforming single and two-family structures so as to prevent the exacerbation of existing problems with density and intensity of use.

(Ord. of 7-9-01)

XXI-B Establishment.

The PIOD is described on a map entitled "City of Newburyport Plum Island Overlay District," dated May 9, 2001. All maps are hereby made a part of the zoning ordinance and are on file in the office of the city clerk.

(Ord. of 7-9-01)

XXI-C Overlay district.

The PIOD is hereby established as an overlay district. Within the PIOD, the provisions of the underlying district(s) shall remain in full force and effect, except to the extent that the provisions of the PIOD are more stringent. In such cases, the provisions of PIOD shall supersede the provisions of the underlying district(s).

(Ord. of 7-9-01)

XXI-D Permitted uses.

1. Municipal uses owned or operated by the City of Newburyport;

2. Single-family dwellings, subject to the dimensional requirements set forth in the table below:

Minimum lot area: Twelve thousand (12,000) square feet.

Minimum lot frontage: One hundred twenty (120) feet.

Maximum building height: Thirty-five (35) feet.

Maximum number of stories: Two (2).

Minimum front setback: Twenty (20) feet.

Minimum side setback: Twenty (20) feet.

Minimum rear setback: Twenty (20) feet.

Maximum floor area ratio: .25.

Maximum lot coverage by buildings: Twenty (20) percent.

(Ord. of 7-9-01)

XXI-E Prohibited uses.

Any use not set forth in section XXI-D is prohibited in the PIOD.

(Ord. of 7-9-01)

XXI-F Nonconforming uses and structures, excluding single and two-family structures.

The provisions of the PIOD shall not apply to pre-existing nonconforming structures or uses lawfully in existence as of [July 9, 2001]. Nonconforming uses and structures within the PIOD shall not be enlarged or extended; provided, however, that the following types of changes or alterations to nonconforming uses or structures may be authorized upon grant of a special permit for nonconformities by the board of appeals upon its determination that the proposed alteration to the nonconforming structure or use shall not be substantially more detrimental than the existing nonconforming structure or use to the neighborhood or the PIOD:

1. Change of a pre-existing nonconforming use;

2. Change of a pre-existing nonconforming use to another, less detrimental, nonconforming use;

3. Reconstruction or structural change to a nonconforming structure;
4. Alteration of a nonconforming structure to provide for a substantially different purpose or for the same purpose in a substantially different manner.

(Ord. of 7-9-01)

XXI-G Nonconforming single and two-family residential structures.

1. *General.* No preexisting nonconforming single- or two-family residential structure within the PIOD shall be altered, reconstructed, extended, or structurally changed except as set forth in this section XXI-G.

2. *Additional bedroom.* One (1) additional bedroom may be created in a lawfully preexisting nonconforming single- or two-family structure with one (1) or two (2) bedrooms, subject to the applicable regulations set forth in subsections XXI-G.3 and XXI-G.4.

3. *As of right changes.* Except as restricted by section XXI-G.1, the alteration, reconstruction, or extension of, or change to such structures may be authorized upon the issuance of a building permit where the building inspector determines that such alteration, reconstruction, extension, or change shall:

- a. Not increase the footprint of the existing structure; and
- b. Not exceed the height of the existing structure, or thirty-five (35) feet, whichever is lower.

4. *Special permit for nonconformities.* The alteration, reconstruction, extension of, or change to such structures to an extent than that authorized by section XXI-G.3, may be authorized by the grant of a special permit by the board of appeals upon its determination that such alteration, reconstruction, extension, or change shall not be substantially more detrimental than the existing nonconforming structure to the neighborhood or the PIOD. The board of appeals shall not grant a special permit for any alteration, reconstruction, extension of, or change to such structures that would cause such structure to be within

ten (10) feet of the side lot line, more than two (2) stories, or more than thirty-five (35) feet in height.

5. *Catastrophe or demolition: rebuilding as of right.* A nonconforming single- or two-family residential structure may be demolished and rebuilt or rebuilt after destroyed or damaged by a catastrophe; provided, however, that:

- a. The rebuilt structure shall not exceed the total aggregate area of all demolished or destroyed residential structures on the locus; and
- b. The rebuilt structure shall not exceed the height of the tallest demolished or destroyed residential structure on the locus; and
- c. The rebuilt structure shall not be located within ten (10) feet of the side lot line;
- d. The rebuilt structure shall not contain more than the total number of bedrooms in all demolished or destroyed structures on the locus; provided, however that one (1) additional bedroom may be created where the total number of bedrooms before the catastrophe or demolition was one (1) or two (2).
- e. Such structure shall be rebuilt not more than two (2) years after the demolition or catastrophe; such period may be extended for one (1) year good cause shown upon a written request to the building inspector.

6. *Catastrophe or demolition: rebuilding after issuance of special permit for nonconformities.* A nonconforming single- or two-family residential structure may be demolished and rebuilt or rebuilt after destroyed or damaged by a catastrophe so as to exceed the total aggregate area of all demolished or destroyed residential structures on the locus and/or exceed the height of the tallest demolished or destroyed residential structure on the locus; upon the grant of a special permit for nonconformities by the board of appeals.

- a. Such structure shall be rebuilt not more than two (2) years after the issuance of the special permit for nonconformities; such period may be extended for one (1) year if

good cause is shown upon a written request to and approval of the building inspector.

- b. Such a special permit for nonconformities may be granted only upon the determination that the proposed rebuilding of the nonconforming structure shall not be substantially more detrimental than the existing nonconforming structure to the neighborhood of the PIOD.
- c. The rebuilt structure shall not contain more than the total number of bedrooms in all demolished or destroyed structures on the locus; provided, however that one (1) additional bedroom may be created where the total number of bedrooms before the catastrophe or demolition was one (1) or two (2).

(Ord. of 7-9-01)

XXI-H Frontage.

No building permit for a single-family residential structure within the PIOD shall be issued unless the lot to be built upon has frontage on a street.

(Ord. of 7-9-01)

XXI-I Unconstructed ways.

No building permit shall be issued for a lot with frontage an unconstructed way which does not qualify as a "street" until the planning board approves a plan, prepared by the applicant, demonstrating that the proposed way has sufficient width and suitable grades to provide for the needs of vehicular traffic in relation to the proposed use of the land thereon or served thereby and for the installation of municipal services to serve such land and the building erected or to be erected thereon and the first course of pavement for such way has been installed in accordance with such plan, as certified in writing by the director of the department of public works. No certificate of occupancy shall be issued for such lot until the second and final course of pavement has been installed in accordance with such plan, as certified in writing by the director of the department of public works.

(Ord. of 7-9-01)

XXI-J Use variances.

The board of appeals shall not grant use variances within the PIOD.

(Ord. of 7-9-01)

XXI-K Definitions.

The following terms shall have the meanings set forth below within the PIOD:

Bedroom shall mean a bedroom as defined in 310 CMR 15.002 of the State Environmental Code.

Floor area, gross shall mean the total square feet of floor space within the outside dimensions of a building including each floor level, without deduction for hallways, stairs, closets, thickness of walls, columns, or other features.

Floor area ratio (FAR) shall be constructed as a mathematical expression determined by dividing total gross floor area of a building by the area of the lot on which is located. For example, a lot with twelve thousand (12,000) square feet in a district with a maximum FAR of .25 could contain three thousand (3,000) square feet of gross floor area ($12,000 \times .25 = 3,000$).

Footprint shall mean the total square feet within the outside dimensions of a building at the top of the foundation, without deduction for hallways, stairs, closets, thickness of walls, columns, or other features.

Reconstruction shall mean the structural alteration of the existing building, but shall not include the demolition and rebuilding thereof.

Street shall mean:

1. A public way or a way which the city clerk certifies is physically constructed and maintained and used as a public way; or
2. A private way shown on a definitive subdivision plan endorsed subsequent to 1953 and built to the specifications set forth therein; or
3. A way presently having in the opinion of the planning board sufficient width, suitable grades and adequate construction to provide for the needs of vehicular traffic in relation to the proposed uses of the

land abutting thereon or served thereby,
and for the installation of municipal ser-
vices to serve such land and the buildings
erected or to be erected thereon.

(Ord. of 7-9-01)

Sec. 6.5-28. Specific performance standards for the barrier beach.

Sec. 6.5-28. Specific performance standards for the barrier beach.

- (a) No development or redevelopment shall be permitted within a FEMA V-zone or AO-zone. Notwithstanding the foregoing, structures damaged or destroyed from fire, storm, or similar disaster may be redeveloped/repared only in accordance with current local, state and federal regulatory standards when damage to or loss of the structure is equal to or greater than fifty (50) percent of the market value of the building. When damage to or loss of the structure is less than fifty (50) percent of the market value of the building, redevelopment/repairs may be allowed to return the structure to pre-damaged conditions. In all instances, reconstruction, renovation or repairs to damaged structures may be authorized as stated herein, provided that there is no increase in floor area.
- (b) All new buildings or substantial improvements to existing buildings shall be built on open pilings and comply with FEMA National Flood Insurance Regulations and state building code regulations for elevation and flood proofing. All development and redevelopment shall comply with M.G.L.A. c. 131, § 40, 310 CMR 10.00 and Section 744 of the Massachusetts State Building Code Design Requirements for Floodplain and Coastal High Hazard Areas.
- (c) For the purposes of this article, the term "substantial improvement" shall mean an improvement that increases the market value of the building by an amount equal to or greater than fifty (50) percent or an improvement that increases the square footage by an amount equal to or greater than twenty-five (25) percent.
- (d) All new buildings, replacements, substantial improvements or expanded footprints less than twenty-five (25) percent in square footage shall have their first floor built at least two (2) feet above base flood elevation or the highest existing ground elevation whichever is higher.
- (e) Electrical, heating, ventilation, plumbing and air conditioning and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

(f) Development or redevelopment on or within two hundred (200) feet landward of the top of a coastal bank or dune shall have no adverse impact on the height, stability or function of the bank or dune to fulfill the purposes set forth in section 6.5-26(b).

(g) In areas where there are coastal banks or primary or frontal dunes, all new buildings and structures shall be set back from the beach dune interface at a distance equal to thirty (30) times the average yearly historical erosion as shown by the most current CZM shoreline change map.

(h) No activity shall increase the elevation or velocity of flows in a floodplain.

(i) Within the FEMA V-zone, A-zone, or AO-zone or their equivalent, new or reconstructed structures or development on the barrier beach that alters vegetation, interrupts sediment supply and/or changes the form or volume of a dune or beach must comply with the specific performance standards in this article and in the regulations promulgated pursuant hereto.

(Ord. of 10-9-01(1), § III)

Sec. 6.5-29. Variance.

(a) The conservation commission may grant a variance from these special requirements when it finds after opportunity for public hearing that:

____ (1) There are no reasonable conditions or alternatives that would allow the project to proceed in compliance with this article;

____ (2) Mitigating measures are proposed that will allow the project to be conditioned so as to contribute to the protection of the wetland resource areas located on the barrier beach; and

____ (3) The variance is necessary to accommodate an overriding community public interest or to avoid a decision that so restricts the use of the property as to constitute an unconstitutional taking without compensation.

(b) A request for a variance shall be made in writing and shall include, at a minimum the following information:

____ (1) A description of alternatives explored that would allow the project to proceed in compliance with this article and an explanation of why each is unreasonable; and

_____ (2) A description of the mitigating measures to be used to contribute to the protection of the wetland resources located on the barrier beach;

_____ (3) Evidence that an overriding public interest is associated with the project which justifies waiver of these requirements or evidence that the decision on this permit application so restricts the use of the land that it constitutes an unconstitutional taking without compensation.

(Ord. of 10-9-01(1), § IV)

Sec. 6.5-30. Applications.

(a) All applications to perform activities in the city's resource areas shall be either in the form of a request for determination, a notice of intent, or an abbreviated notice of resource area delineation. The commission in an appropriate case may accept as the application and plans under this article the application and plans (i.e., notice of intent, request for determination of applicability) under the Wetlands Protection Act, M.G.L.A. c. 131, § 40. Such applications shall contain data and plans as specified in the commission's regulations, and shall be submitted in complete written form to the commission. The commission or its designee shall be authorized to make determinations of completeness for applications submitted to the commission and reject those applications that do not meet the minimum submittal requirements of this article. In order to provide sufficient review time, the commission may continue a public hearing or public meeting if new information is submitted by the applicant, or applicant's agent, less than seven (7) business days before the scheduled public hearing or public meeting.

(b) The applicable forms must be signed by the applicant or applicant's agent where required. The commission may require further information by regulation, guideline, or as otherwise deemed necessary for review of the proposed application by the commission. In order to comply with the provisions of this article, each application must be complete as filed, and must comply with the rules set forth herein and commission's regulations.

(Ord. of 10-9-01(1), § V)

Sec. 6.5-31. Hearings.

(a) Commencement. The commission shall commence the public hearing or meeting within twenty-one (21) days from receipt of a completed application unless the applicant authorizes an extension in writing.

(b) **Combination with state law hearing.** The commission, in its discretion, may hear any oral presentation under this article at the same public hearing or public meeting required to be held under the provisions of the Wetlands Protection Act, M.G.L.A. c. 131, § 40. Notice of the time and place of such hearing(s) shall be given as required below.

(c) **Notice.** For a public hearing, written notice of the time and place of the hearing shall be given at the applicant's expense, not less than seven (7) calendar days prior to the public hearing, by publication in a newspaper of general circulation in the city, and by hand delivering or mailing, by certified mail return receipt requested, at the mailing addresses shown on the most recent applicable tax list of the assessors, a copy of such notice to all abutters within one hundred (100) feet of the property line of the land on which the work is proposed, including, but not limited to, owners of land directly opposite said proposed work on any public or private street or way, and in another municipality or across a body of water. Proof of such notification, with a copy of the notice mailed or delivered, shall be filed with the commission. All publications and notices shall contain the name of the applicant, a description of the area where the activity is proposed by street address, if any, or other adequate identification of the location of the area or premises which is the subject of the notice, the date, time and place of the public hearing, the subject matter of the hearing, and the nature of the action or relief requested, if any. Public notice requirements for continued public hearings under this article shall be the same as the notification requirements set forth in 310 CMR 10.05(5)(b)3.

(d) **Proof.** The applicant shall have the burden of proving by a preponderance of credible evidence that the activity proposed in the request for determination of applicability or the notice of intent will not have a significant or cumulatively detrimental effect upon the interests and values protected by this article. Failure to provide to the commission adequate evidence for it to determine that the proposed activity will not cause such impacts shall be sufficient cause for the commission to deny permission or to grant permission with such conditions as it deems reasonable, necessary, or desirable to carry out the purposes of this article; or to postpone or continue the hearing or public meeting to another date certain to enable the applicant and others to present additional evidence, upon such terms and conditions as deemed by the commission to be reasonable. Due consideration shall be given to possible effects of the proposal on all interests and values protected under this article.

APPENDIX C

Analysis of stakeholder positions concerning proposed Plum Island water and sewer project

City of Newburyport and Town of Newbury

Pressures to resolve dispute: Avoidance of further legal fees – the City and Town are embroiled in an appeal involving the Island Futures Group, the Town of Salisbury, and the DEP; Increase tax base – once the Title 5 issues are resolved, property values on Plum Island, and thus the tax base, will increase; Avoid further bad press – the local paper is filled with letters to the editor regarding the City’s missteps in this issue (as well as letters of support); Avoid being fined daily by the DEP by coming into compliance with Title 5 – although currently not being fined, the DEP has the right to do so because many Plum Island continue to be out of compliance with the State’s Title 5 Sewer requirements.

Countervailing Pressures: The City and Town have publicly stated that City water and sewer, paid for by betterments from Plum Island property owners, is the most appropriate way to remedy related health and safety concerns on the Island; They have already spent a significant amount of money on engineering consultants and legal fees; They have what appears to be majority support for the project from Plum Island property owners and other City residents. These pressures have led the City to continue to pursue the project as is, even given the likelihood of a lawsuit and potential broader political liability.

Plum Island property owners

Pressures to resolve dispute: Come into compliance with Title 5 – until the dispute is resolved, property owners will not know for sure how they will come into compliance with Title 5; Increase property values (related to Title 5 compliance) – once properties are Title 5 compliance, their real estate value will likely increase significantly; City water and sewer will increase the value of their properties (many island residents rely on bottled water); Healthier and safer living environment – there are reports that several properties have failing septic systems, which has raised health and safety concerns.

Countervailing pressures: The primary countervailing pressure for property owners may be the future betterments that will be paid by the property owners if city water and sewer infrastructure is constructed; Those property owners that have potable water and septic systems that are working properly may be satisfied by the status quo and thus may not want the dispute resolved any time soon due to this additional financial burden; many property owners are concerned about the character and natural environment on Plum Island – they see any future infrastructure as a route to more growth on the island; by delaying resolution on this dispute, some feel that they are also delaying growth on the island (this will be covered in more detail in the Island Futures Group stakeholder section).

DEP/CZM

Pressures to resolve the dispute: Obligated under law to enforce Title 5 compliance; avoid legal fees; avoid poor public relations – press coverage has been mixed.

Countervailing pressures: The DEP wants this dispute resolved. I have seen very little information regarding countervailing pressures.

Island Futures Group (IFG)

Most of the members of the Island Futures Group are property owner on Plum Island. I have separated them into their own stakeholder group because they have distinguished themselves from other property owners with a public and legal stance against the water and sewer project.

Pressures to resolve: Avoid further legal costs – IFG is a lead party in an appeal against at DEP involving the water and sewer project; Compliance with Title 5 – like other property owners, most members of IFG want to come into compliance with Title 5 in order to more readily be able to sell their homes, experience increased property values, and alleviate health and safety concerns from malfunctioning septic systems.

Countervailing Pressures: IFG is concerned about the broader environmental and community impacts of the water and sewer project; a number of IFG members have upgraded their septic systems and are in compliance with Title 5, the sewer and water project would be of no benefit to these members; there is a lot of ‘bad blood’ between the City and some members of IFG – This may lead to a tendency to not cooperate in a resolution process.

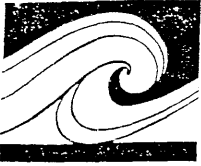
Environmental Advocates

The primary groups that fall into this stakeholder group is MassAudubon and the Conservation Law Foundation. Both have supported IFG’s appeal against the DEP.

Pressures to resolve dispute: Bringing the island properties into Title 5 compliance will likely lead to a healthier environment on the island.

Countervailing pressures: Similar to the IFG, environmental advocates are concerned that water and sewer will lead to growth on the island. Stalling a resolution may work to delay future development.

APPENDIX D



THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
100 CAMBRIDGE STREET, BOSTON, MA 02202
(617) 727-9530 FAX (617) 727-2754

SCIENTIFIC RECOMMENDATIONS FOR PERFORMANCE STANDARDS

FOR

LAND SUBJECT TO COASTAL STORM FLOWAGE

by the

Coastal Floodplain Task Force (see p. 19)

(Presented to DEP July 14, 1995)

(for further information contact TF Chair: see p. 19)

TO USERS OF THE ATTACHED DOCUMENT, "SCIENTIFIC RECOMMENDATIONS FOR
PERFORMANCE STANDARDS FOR LAND SUBJECT TO COASTAL STORM FLOWAGE":

The practices outlined in the attached document, "Scientific Recommendations for Performance Standards for Land Subject to Coastal Storm Flowage", are RECOMMENDATIONS ONLY. They have not been adopted as state regulations, performance standards, or state policy: they are provided as guidance only.

The recommendations were generated by the Coastal Floodplain Task Force which was chaired by MCZM. This Task Force, as noted on the membership list at the end of the document, consisted of public officials at the state, federal, and local levels, research scientists, and consultants who collectively provided a wide range of expertise relating to floodplain issues. The recommendations were submitted to the Department of Environmental Protection (DEP) for their 'consideration' in generating much needed performance standards for the wetland resource Land Subject to Coastal Storm Flowage, i.e. the 100-year coastal floodplain. They have not yet been reviewed by DEP, and will undergo rigorous review, public comment, editing, and potentially revisions before they are adopted as state policy or regulations.

The goal of the Task Force was to describe the vital importance and beneficial functions of the coastal floodplain, and to ultimately generate technical standards by which to review proposed activities

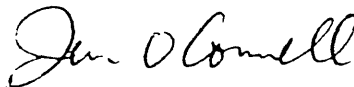


'LAND SUBJECT TO COASTAL STORM FLOWAGE' RECOMMENDATIONS
BY THE COASTAL FLOODPLAIN TASK FORCE: JULY 14, 1995.
THESE ARE NOT REGULATIONS.
THESE RECOMMENDATIONS HAVE BEEN SUBMITTED TO DEP FOR
THEIR CONSIDERATION. HOWEVER, THEY HAVE NOT AS YET BEEN
REVIEWED AND, THEREFORE, ARE NOT ENDORSED BY DEP.

within this resource based on currently accepted scientific principles. The ultimate goal of the recommendations is to protect the beneficial functions of this important resource in order to prevent or significantly reduce the threats of loss of life and destruction of property, as well as to protect and enhance the beneficial functions of other wetland resource areas within the coastal floodplain.

Again, while these are only 'recommendations', if you have any comments to improve the content of the standards in the document, particularly of a technical nature, they would be greatly appreciated. Please contact me at (617) 727-9530 if you have any questions.

Sincerely,



Jim O'Connell, Chair
Coastal Floodplain Task Force

LAND SUBJECT TO COASTAL STORM FLOWAGE

Although Land Subject to Coastal Storm Flowage is listed as a "coastal wetland" in paragraph six of the Act and as an Area Subject to Protection Under the Act in 310 CMR 10.02(1)(d) of the Regulations, and is, therefore, subject to jurisdiction of the Wetlands Protection Act, the Wetlands Protection Regulations do not provide any specific performance standards for regulating activities within this important resource. *

Given the recurring problems with respect to reviewing and assessing projects proposed within Land Subject to Coastal Storm Flowage, particularly the Velocity-Zone component, and the ever-increasing number of filings for such projects, clarification and guidance concerning this resource is both useful and necessary. In accordance with general provisions 310 CMR 10.24(1) of the Wetlands Protection Regulations, the following will attempt to bring Land Subject to Coastal Storm Flowage into the general framework of the Regulations by providing recommended definitions, presumptions of significance regarding the interests of the Act and general performance standards for regulating activities within this Resource Area.

'LAND SUBJECT TO COASTAL STORM FLOWAGE' RECOMMENDATIONS
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3

PREAMBLE

Land Subject to Coastal Storm Flowage is significant to storm damage prevention and flood control. Land Subject to Coastal Storm Flowage is also likely to be significant to the protection of wildlife habitat and the prevention of pollution.

Storm Damage Prevention & Flood Control:

Velocity zones (V-zones) and AO-zones of Land Subject to Coastal Storm Flowage (V-zones especially so) are areas which are subject to hazardous flooding, wave impact, and, in some cases, significant rates of erosion as a result of storm wave impact and scour. V- and AO-zones in coastal areas are generally subject to repeated storm damage which can result in loss of life and property, increasing public expenditures for storm recovery activities, historic taxpayer subsidies for flood insurance and disaster relief, and increased risks for personnel involved in emergency relief programs. Alteration of land surfaces in A-zones could change drainage characteristics that could cause increased flood damage on adjacent properties.

A number of complex and inter-related factors determine the wave height and the landward extent of wave run-up in V- and AO-zones, including shoreline orientation, nearshore/offshore bathymetry, onshore topography, wave fetch, storm frequency and magnitude, and the presence of coastal engineering structures. The topography, soil characteristics (e.g. composition, size, density, & shape of soil material), vegetation, erodibility and permeability of the land surface within V- and AO-zones are critical characteristics which determine how effective an area is in dissipating wave energy and in protecting areas within and landward of these zones from storm damage and flooding. The more gentle and permeable a seaward-sloping land surface is, the more effective that land surface is at reducing the height and velocity of incoming storm waves. Wave energy may be expended in eroding and transporting materials comprising the land surface within the V- and AO-zones, as well as by percolation or the downward movement of the stormwater through more permeable land surfaces, thereby lessening the effects of backrush, scour and erosion.

Development in V- and AO-zones poses environmental problems since construction and development activities can impair or destroy those characteristics cited above which are critical to the stated interests.

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Dredging or the removal of materials within V- and AO-zones acts to increase the landward velocity and height of storm waves, thereby allowing storm waves to break further inland and to impact upland and wetland resource areas which might not otherwise be impacted. Filling and the placement of solid fill structures within V- and AO-zones may cause the refraction, diffraction and/or reflection of waves, thereby forcing wave energy onto adjacent properties, natural resources, and public or private ways potentially resulting in otherwise avoidable storm damage. When struck with storm waves, solid structures within V- and AO-zones also may increase localized rates of erosion and scour (Shore Protection Manual, U.S. Army Corps of Engineers, 1984, V. 1, Pg. 5-3 & 5-5).

In some cases, the placement of fill in hydraulically constricted portions of the coastal floodplain may increase flood levels in conjunction with heavy rainfall events. The placement of fill in AH-zones, where ponding occurs generally as a result of overwash in coastal floodplains, may increase flood levels on the subject and adjacent properties above pre-fill flood levels. (similar to BLSF @ 10.57(1)(a)(2), & ILSF(b)(2))

Protection of Wildlife Habitat:

Certain portions of Land Subject to Coastal Storm Flowage are significant to the protection of wildlife habitat: these significant wildlife habitat areas include all areas within the 10-year floodplain that are within a zone 100 feet landward of any other coastal or freshwater resource area, except for those portions which have been so extensively altered by human activity that their important wildlife habitat functions have been effectively eliminated. (parallels 10.57(1)(a)(3))

Coastal floodplain areas are often low-lying areas that are ecologically transitional areas between marine/estuarine ecosystems and upland areas. Resource areas within the 10 year floodplain are important habitats for a large variety of wildlife species. For example, saltmarshes provide habitat for many crustaceans and mollusks and serve as critical nursery areas for numerous fin fish species which in turn provide food for those species higher-up in the food chain, e.g. herons, osprey, mink and raccoon. These resource areas provide important over-wintering and stopover areas for many species of waterfowl.

Areas of coastal floodplains adjacent to other wetland resource areas provide important wildlife functions, such as nesting and roosting habitat, and also serve as wildlife corridors connecting coastal zone resources with freshwater wetland resources. In

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addition, these adjacent areas within the coastal floodplain serve as transitional zones which are needed to protect the coastal wetland resource's ability to provide essential habitats (Guidance Specifying Management Measures for Sources of Non-point Pollution in Coastal Waters, EPA, 1993; Castelle, et al., 1992, pgs. 5 & 6).

Prevention of Pollution:

Certain portions of Land Subject to Coastal Storm Flowage are significant to the prevention of pollution. These significant pollution prevention areas include all areas within the 100 year floodplain that are within 100 feet of any other coastal or freshwater resource area. These areas can mitigate adverse effects associated with human disturbance and pollutants (Guidance Specifying Management Measures for Sources of Non-point Pollution in Coastal Waters, EPA, 1993; Castille, et al., 1992, pgs. 10 & 11).

Natural or relatively undisturbed coastal floodplains can reduce erosion and sedimentation, and in a vegetated state can prevent pollutants contained in surface runoff from directly entering waterways and other wetland areas during flood events. While erosion of stream banks and shorelines is an important, natural process, the design and management of activities in the floodplain should aim to avoid excessive erosion (and thus possible pollutant-laden runoff) due to man-induced activities (EPA, Guidance Specifying Management Measures for Sources of Non-point Pollution in Coastal Waters, 1993; Castelle, et al., 1992, pgs. 10 & 11).

Relative Sea Level Rise Considerations:

Those portions of coastal floodplains which are immediately landward of salt marshes, coastal beaches, barrier beaches, coastal dunes or coastal banks require special protection. These areas are likely to be in a state of transition as the entire complex of coastal wetland resources gradually moves landward because of the fact that, "for the past thousands of years, relative sea level has been rising in Massachusetts, and it is still rising", (Smith, Clayton, Mayo and Giese, 1978), resulting in inundation of more landward area. As sea level rises, the shoreline may retreat and areas are successively inundated more frequently by storm and tidal activity. Activities carried out within these 'special transitional areas' of coastal floodplains may interfere with the natural landward migration of the adjacent coastal resource areas. Therefore, maintaining these special transitional areas in their natural state is necessary to protect the interests of other wetland resources.

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Historical sea level measurements indicate that relative sea level in Massachusetts is rising at approximately 1 foot per 100 years (Giese, et al., 1987). In FEMA designated A-zones, where stillwater flooding predominates, the increased flood elevations are proportional to that increase in the current relative sea level rise rate in Massachusetts. However, in FEMA designated V-zones, the increased flood elevations will exceed that of a proportional increase in sea level rise. (See attached memo: "Relative Sea Level Rise Calculations for A- and V-zones"; from Sea Level Rise Implications: An Action Plan for Buzzards Bay, prepared for the New England Interstate Water Pollution Control Commission by IEP, Inc., 1990).

Therefore, buildings and other structures should be designed to incorporate a relative sea level rise of at least 1 foot per 100 years in A-zones and at least 2 feet per 100 years in V-zones.

DEFINITIONS, BOUNDARIES, AND CRITICAL CHARACTERISTICS

A. Definitions (for purposes of these Regulations)

1. Land Subject to Coastal Storm Flowage

Land Subject to Coastal Storm Flowage means land subject to any inundation caused by coastal storms up to and including that resulting in a 100 year flood, surge of record, or flood of record, whichever is greater. One hundred year flood (or base flood as it is also referred to) means the flood having a one percent chance of being equaled or exceeded in any given year.) The seaward limit is mean low water.

2. Velocity Zones (including V-, VE-, & V1-30)

Velocity Zones are those portions of Land Subject to Coastal Storm Flowage which are coastal high hazard areas or areas of special flood hazard extending from the mean low water line to the inland limit within the 100 year floodplain supporting waves greater than three feet in height.

3. AO Zones

AO-zones are those portions of Land Subject to Coastal Storm Flowage which are subject to inundation by moving water (usually sheet flow on sloping terrain) where average depths are between one and three feet. In Massachusetts, coastal AO-zones are commonly associated with 'overwash' and generally border on the landward side of V-zones.

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4. A-Zone (including A-, AE-, A1-30, & A99)

A-zones are those portions of Land Subject to Coastal Storm Flowage which are subject to inundation by types of 100 year flooding where stillwater flooding predominates.

5. AH-Zone

AH-zones are those portions of Land Subject to Coastal Storm Flowage which are subject to shallow flooding, usually ponding resulting from overwash, where average water depths are between one and three feet.

6. Overwash

That portion of storm wave uprush that carries over the crest of a berm, dune, or man-made structure, oftentimes depositing sediment or other storm laden material.

7. Naturally Vegetated Buffer Strip

(a) an area within Land Subject to Coastal Storm Flowage that is left in a natural, undisturbed vegetative state; or

(b) an area within Land Subject to Coastal Storm Flowage that has existed in a primarily natural, undisturbed state, but has been enhanced with indigenous plantings conducive to improved wildlife habitat according to a plan approved by the issuing authority; or

(c) an area within Land Subject to Coastal Storm Flowage that has been disturbed, but is revegetated with indigenous planting conducive to improved wildlife habitat according to a plan approved by the issuing authority.

B. Boundary & Boundary Modification Procedure

1. The boundaries of the V-, AO-, AH- and A-zones within Land Subject to Coastal Storm Flowage shall be determined by reference to the most recently available flood data prepared for the community within which the work is proposed under the National Flood Insurance Program. The boundaries shown on the Flood Insurance Rate Map (FIRM) for the community shall be

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presumed accurate. This presumption may be overcome only by credible evidence, such as engineering calculations performed by a registered engineer or other professional competent in such matters.

2. The landward boundary of the 10 year floodplain is the estimated maximum lateral extent of the flood water which will theoretically result from the statistical 10 year storm. Said boundary shall be determined utilizing the 10 year stillwater elevation as published in the community Flood Insurance Study.
3. Where NFIP flood data are unavailable, the boundary of any zone within Land Subject to Coastal Storm Flowage shall be the maximum lateral extent of flood water typical of that zone which has been observed or recorded.
4. In the event of a floodplain boundary conflict, the issuing authority may require the applicant to determine the boundary by engineering calculations which shall be:
 - (a) based upon the 100-year stillwater flood elevation published in the effective Flood Insurance Study for the community for the affected shoreline reach or a revised 100 year stillwater flood elevation calculated to account for hydrologic changes occurring subsequent to the effective date of the community Flood Insurance Study;
 - (b) based upon the appropriate wave height or wave run-up methodology for the affected shoreline reach as set forth in the FEMA Publication, Guidelines and Specifications for Wave Envelope Determination and V-Zone Mapping, FEMA, 1989; and
 - (c) prepared and certified by a registered professional engineer.
5. The seaward boundary of Land Subject to Coastal Storm Flowage shall be mean low water.

C. Critical Characteristics

1. The topography, soil characteristics (i.e. composition, size, shape & density of material), vegetation, erodibility, and permeability allow for the dissipation of storm wave energy and, therefore, are the physical

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characteristics of Land Subject to Coastal Storm Flowage which are critical to the protection of the statutory interests of flood control and storm damage prevention. In addition, for areas in AH-zones that are subject to ponding or A-zones that are hydraulically constricted areas, the ability to store a volume of flood water is a critical characteristic. Hydraulically constricted A-zones are those in which the base flood elevation is lower on the landward side of the constriction.

2. In addition to the above cited critical characteristics, the proximity of floodplain areas to water bodies and other wetland resources, makes them critical to prevention of (non-point source) pollution of these abutting resource areas (EPA, 1993).
3. Plant community composition and proximity to other wetland resource areas are critical to the protection of wildlife habitat.
4. In order to protect existing wetland resource interests, the geographic extent/area of the resource must be maintained. Thus, in order to maintain the ability of a resource area to migrate landward in response to relative sea level rise without loss of area the critical characteristics of Land Subject to Coastal Storm Flowage are topography; frequency, depth and duration of inundation; and proximity to a wetland resource.

PRESUMPTIONS

Where a project involves removing, dredging, filling or altering of Land Subject to Coastal Storm Flowage, the issuing authority shall presume:

(A) that said area is significant to the interests of flood control and storm damage prevention;

(B) that it is likely to be significant to the prevention of pollution in those areas within the 100 year floodplain that are within 100 feet of any other wetland resource; and,

(C) that it is likely to be significant to the protection of wildlife habitat for those areas that are within the 10 year floodplain and within 100 feet of any other wetland resource area.

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These presumptions may be overcome only upon a clear showing that the area is not significant to the interests cited above. If the presumption is overcome, the issuing authority shall make a written determination to this effect, setting forth its grounds on Form 6, at 310 CMR 10.99.

GENERAL PERFORMANCE STANDARDS

- A. When the issuing authority determines that Land Subject to Coastal Storm Flowage (A, AO, AH and/or V zones) overlays other resource areas listed in these Regulations, the applicable performance standards for each resource area shall be independently and collectively applied and the project shall be appropriately conditioned to protect all stated interests.
- B. When Land Subject to Coastal Storm Flowage (A, AO, AH and/or V-zones) is significant to the interests of flood control and storm damage prevention, the following performance standards shall apply:
1. Any activity shall not have an adverse effect by increasing the elevation or velocity of flood waters or by increasing flows due to a change in drainage or flowage characteristics (e.g. change in direction) on the subject site, adjacent properties, or any public or private way.
 2.

(a) Relative sea level rise and the landward migration of resource areas in response to relative sea level rise shall be incorporated into the design and construction of structures and other activities proposed in Land Subject to Coastal Storm Flowage.

(b) At a minimum, for activities proposed in A-zones, the historic rate of relative sea level rise in Massachusetts of 1 foot per 100 years shall be incorporated into the project design and construction.

(c) At a minimum, for activities proposed in the V-zone, a two foot elevation per 100 years shall be incorporated into the project design and construction. (see IEP, Inc. 1990, p. 18)

(d) Any activity within the 10 year floodplain of Land

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Subject to Coastal Storm Flowage shall not have an adverse effect by impeding the landward migration of other resource areas within this area of the floodplain.

C. When the AH-zone (or an A-zone which is hydraulically constricted: see note at end of this document, p.16) is significant to the interests of flood control or storm damage prevention, the following additional performance standards shall apply:

1. A proposed activity shall not result in flood damage due to filling which causes lateral displacement of flood waters that, in the judgement of the issuing authority, would otherwise be confined within said area; unless,
2. Compensatory storage is provided for all flood storage volume that will be lost as the result of a proposed project within this area when, in the judgement of the issuing authority, said loss will cause an increase or contribute incrementally to an increase in the horizontal extent and level of flood waters.

Compensatory flood storage shall mean a volume not previously used for flood storage and shall be incrementally equal to the theoretical volume of flood water at each elevation, up to and including the 100 year flood elevation, which would be displaced by the proposed activity. Compensatory flood storage shall be provided within the same general area as the lost area and must maintain or create an unrestricted hydraulic connection within said area.

D. When Land Subject to Coastal Storm Flowage is significant to wildlife habitat the following performance standard shall apply:

1. A proposed activity shall not impair the capacity of those portions of Land Subject to Coastal Storm Flowage that are significant to wildlife habitat to provide important wildlife habitat functions. Except for activities which would adversely affect vernal pool habitat, a proposed project(s) on a single lot, for which Notice(s) of Intent is filed on or after [date] that (cumulatively) alter(s) up to 10% of the lot or 5,000 square feet (whichever is less) of land in this resource area found to be significant to the protection of wildlife habitat,

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shall not be deemed to impair its capacity to provide important wildlife functions, provided that a naturally vegetated buffer strip (NVBS) is maintained, originating at the most landward edge of any coastal or freshwater wetland resource area. The NVBS shall be a minimum of 50 feet in width (see Desbonnet, et al., 1994, p. 33, Table 7: & Castelle, et al., 1992, pp. 48 & 49), or the maximum NVBS width possible when there is a clear showing that alteration of up to 5,000 square feet or 10% of the lot does not allow for the 50 foot NVBS and no reasonable alternatives exist that provides for the 50 foot wide NVBS.

The requirement for the NVBS shall not preclude access through the NVBS provided that said access shall not exceed two pathways for each 100 foot length of NVBS, and provided that the aggregate width of such pathways shall not exceed eight feet.

Additional alterations beyond the above threshold, or altering vernal pool habitat, may be permitted only if they will have no adverse effect on wildlife habitat, as determined by evaluation procedures contained in 310 CMR 10.60(1). (NOTE: 10.60 specifies 'inland': may need to change 10.60 to include 'coastal'.)

E. When Land Subject to Coastal Storm Flowage is significant to prevention of pollution, the following performance standard shall apply:

1. for those areas within 100 feet of another wetland resource area, activities shall minimize adverse effects to the critical characteristics of this area so as to maintain the capability to remove suspended solids and other contaminants from runoff before entering into other wetland resource areas; and
2. for those areas within 15 feet of another wetland resource area, there shall be no adverse effect on the capability to remove suspended solids and other contaminants. (see Desbonnet, 1994, p. 33, Table 7)

The following activities proposed within Velocity zones of

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Land Subject to Coastal Storm Flowage are likely to have an adverse affect on the protected interests;

Construction of:

1. new structures, including buildings, sheds and garages, and additions and substantial improvements to existing structures supported on a solid foundation or proposed below the base flood elevation;
2. new parallel/shear walls or vertical walls for existing structures;
3. impermeable paving for new roads, driveways and parking lots;
4. new or proposed expansions of coastal engineering structures;
5. new mounded septic systems.

G. A proposed project within a Velocity-zone of a beach, dune, barrier beach, or coastal bank shall not destroy or otherwise impair the function of any portion of said landform and/or shall not have an adverse effect on adjacent wetland resources. Activities and their ancillary uses in Velocity zones which result in alterations to vegetative cover, interruptions in the supply of sediment to other wetland resources, and/or changes to the form or volume of a dune or beach will have an adverse effect on said landform's ability to provide storm damage prevention and flood control and are, therefore, prohibited. These activities include, but are not limited to:

Construction of:

1. new structures, including buildings, sheds and garages, and additions or substantial improvements to existing structures;
2. foundations other than open pilings or columns;
3. new or proposed expansions of roads, driveways or parking lots, or impermeable paving for existing unpaved roads, driveways or parking lots;

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4. new or proposed expansions of coastal engineering structures;
5. new septic systems.

The following activities proposed within the AO-zone of a beach, dune or barrier beach of Land Subject to Coastal Storm flowage are likely to have an adverse effect on the protected interests:

Construction of:

1. new structures, including buildings, sheds and garages, and additions and substantial improvements to existing structures supported on a solid foundation or proposed below the base flood elevation;
2. new parallel walls/shear walls, vertical walls or breakaway walls, foundation piers, grade beams, or foundation/structural slabs for existing structures;
3. new or proposed expansions of roads, driveways or parking lots, or impermeable paving for existing unpaved roads, driveways or parking lots;
4. new or proposed expansions of coastal engineering structures;
5. new septic systems.

Where presumptions of significance are stated, the presumptions may be overcome only upon a clear showing that the proposed activity will not have an adverse impact on the protected interests.

I. Notwithstanding the provisions of 310 CMR 10.__(A - H), the issuing authority may permit the following activities provided that the applicant demonstrates, to the satisfaction of the issuing authority, that best available measures are utilized to minimize adverse effects on all critical characteristics of Land Subject to Coastal Storm Flowage, and provided that all other performance standards for underlying resource areas are met:

1. Beach, dune and bank nourishment and restoration projects, including fencing and other devices

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designed to increase dune development and plantings compatible with natural vegetative cover;

2. Elevated pedestrian walkways and elevated decks with appropriate height and spacing between planks to allow sufficient sunlight penetration;
 3. Boat launching facilities, navigational aids, piers, docks, wharves and dolphins;
 4. Improvements necessary to maintain the structural integrity/stability of existing coastal engineering structures;
 5. A project which will restore, rehabilitate or create a saltmarsh or freshwater wetland;
 6. Projects that are approved, in writing, or conducted by the Division of Marine Fisheries that are specifically intended to increase the productivity of land containing shellfish, including aquaculture, or to maintain or enhance marine fisheries;
 7. Projects that are approved, in writing, or conducted by the Division of Fisheries and Wildlife that are specifically intended to enhance or increase wildlife habitat.
- J. Notwithstanding the provisions of 310 CMR 10.__(A - I), no project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.

JOC(MCZM)/Task Force/joc

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Coastal Floodplain Task Force Members:
(see page 19 for affiliations and addresses)

1. Jim O'Connell, MCZM, Chair
2. Liz Kouloheras, DEP, SERO
3. Jim Mahala, DEP, SERO
4. Jim Sprague, DEP, NERO
5. Rich Zingarelli, DEM, FHMP
6. Eric Carlson, DEM, FHMP
7. Mike Goetz, FEMA
8. Graham Giese, WHOI
9. Stan Humphries, FM Inc.
10. Bob Sherman, Mashpee ConCom Agent
11. Lois J. Bruinooge, DEP, (formally MCZM)

Copies of in-development updates were sent to:

1. Peg Brady, Director, MCZM (and former MCZM Directors)
2. Arlene O'Donnell, Assistant Commissioner, DEP, BRP
3. Carl Dierker, (former) Director, DEP, DWW (& former DWW
Directors)
4. Bob Golledge, Acting Director, DEP, DWW
5. Rich Tomczyk, DEP, DWW

Additional notes, comments and/or requirements:

1. ** note regarding General Performance Standards, Section C (p. 9), based on the following quote: "or an A-zone which is hydraulically constricted". In the opinion of Task Force members, areas landward of a hydraulic constriction in a coastal A-zone have the consideration of compensatory storage requirements at the elevation of the authorized fill, if fill is allowed. However, the TF could not determine a simple method of identifying hydraulically constricted areas in coastal A-zones for conservation commissions or the Department. Many questions on determining/delineating hydraulically constricted A-zones should be anticipated, if this language is incorporated. Therefore, two options appear available: 1. incorporate language leaving it to the discretion of the issuing authority; or, 2. remain silent on the issue. This issue requires further discussion.
2. ** Section G(4), page 11, prohibits coastal engineering structures in a Velocity zone of a beach, dune, barrier beach, and

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coastal bank. The TF clearly and strongly supports this statement, except we would like to keep a discussion with the Department open for consideration of an end groin associated with an 'engineered' beach nourishment project. This suggestion runs contrary to Policy #5 of E.O. 181. It is important to note that we would consider this option open for discussion ONLY for an 'engineered' beach nourishment project, i.e. large, well designed beach nourishment project designed by a professional proficient and experienced in beach nourishment design. For example, the project must have pre- and post-construction profiles, a designed and calculated life expectancy, have a positive benefit/cost ratio calculated, have no adverse impact on downdrift areas, and a provision/condition for incrementally or totally removing the groin as the nourished material erodes, or adverse impacts are noted. This discussion and potential option does NOT include convenient disposal of dredged material or other non-engineered disposal of material on beaches, dunes, barrier beaches, and coastal banks. Groins most often have adverse down-drift impacts, even when filled to entrapment capacity, so this issue should not be taken lightly.

3. ** recommend correcting the definition of LSCSF at 310 CMR 10.04 to match definition in this document.
4. ** may need to add the word 'coastal' to 10.60

(f:LSCSF-CO.96)

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COASTAL FLOODPLAIN TASK FORCE MEMBERS

The scientific recommendations for standards by which to review proposed activities in the wetland resource Land Subject to Coastal Storm Flowage were prepared by the following Coastal Floodplain Task Force members:

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