

Chapter 6. Inland and Shoreline Use and Development

Chapter Summary

The future vitality of the Bay's extensive natural resources, and our ability to enjoy them, will depend largely on how the use and development of land and shoreline in the study area are managed. The designation of Pleasant Bay as an ACEC has motivated the surrounding towns to increase their understanding of the relationship between land and shoreline use and resource conditions. Much is already known about the impacts existing land and shoreline uses have on the Bay's resources:

- Currently one-third of the land in the watershed is developed for residential use, and this share could exceed one-half if developed under current zoning. Increased residential development has the potential to increase the levels of nitrogen entering the Bay through groundwater.
- Land uses around the shoreline of the Bay are intensive, with impacts on land and marine resources. Heavily used public access points create stresses on fragile shoreline properties, and generate land-side traffic and parking problems as well.
- There is the physical potential for the number of docks and piers in the Bay to more than double. A proliferation of docks, piers, and revetments could lead to losses in marsh area and aquatic vegetation, continued erosion of beach area, and possible water quality degradation from boating and other uses they support.

Existing regulations governing land and shoreline uses could be strengthened to adequately and consistently address these impacts. New management policies and strategies are needed to ensure that neither existing uses, nor future uses, jeopardize the Bay's fragile resources.

6.1 Land Uses in the Pleasant Bay Watershed

Land use within the watershed area is perhaps the most important influence on water quality in Pleasant Bay. Studies in coastal communities across the U.S. have concluded that the major sources of fecal coliforms, viruses and excess nutrients to coastal waters may be failed septic systems, direct discharges of improperly treated sewage, fecal material from domestic and farm animals carried by run-off, leaking sewers and sanitary landfills.¹ Only four percent of the land in the Bay's watershed is undeveloped, protected open space. The balance is used for some form of development, or is available for development.

Residential development, primarily of single family homes, is the predominant land use in the study area, accounting for slightly more than one-third of all land in the

¹ Brady, Peg, and Buchsbaum, Robert, PhD.. *Buffer Zones: The Environment's Last Defense*. Gloucester, Massachusetts. 1989.

watershed. Most residences are single family dwellings on lot sizes ranging from one-quarter acre, to one acre or more. All four towns have instituted a one acre zoning requirement for single family homes. However, many smaller lots were created before those regulation were in place, and are now available for development. The underlying zoning for most vacant land, which accounts for sixteen percent of the watershed, is also residential. If developed as residential, the use of vacant land would bring the share of land within the watershed used for residential to more than one-half.

Also important is the concentration of residential development close to the water's edge. As late as 1944, there were only one hundred-fifty shorefront homes between Morris Island in Chatham and Meeting House Pond in Orleans. Now, virtually the entire shorefront of the Bay has been developed, except for a comparatively small amount of land comprised of conservation areas, town landings, and a few remaining vacant parcels.²

Public land, including town landings, schools, town offices, and other municipal properties, accounts for one-quarter of the land in the watershed. Commercial and industrial uses account for four per cent. And land used for agriculture, golf courses, and marinas, accounts for two per cent.

Land use is managed through local zoning laws which vary considerably among the four towns. A comprehensive study of zoning regulations applicable to the land surrounding the Bay was completed in 1989.³ The study recommended a number of changes to by-laws in Orleans, Chatham, Harwich and Brewster to protect against negative impacts from overly-dense residential development. Specific recommendations included:

- adding a conservancy district in Harwich to strengthen wetlands protection;
- formulating floor area ratios for the four towns;
- encouraging cluster development in Orleans;
- distinguishing the use category “group dwelling” from “dormitory”, as a way to control residential occupancy;
- coordinating building height measurements and use of residential lot coverage maxima in all four towns; and
- adopting consistent definitions for “structure”, “building”, “essential service”, “cottage”, “colony”, “duplex”, and “accessory building” in all four towns.

For the most part, these recommendations have not been implemented.

6.2 Town Landings, Conservation Areas and Other Public Access Points

² *Pleasant Bay Area of Critical Environmental Concern Nomination Report*. August, 1986.

³The Friends of Pleasant Bay, Inc.. *A Comparative Zoning Study of Brewster, Chatham, Harwich and Orleans*. December, 1989.

There are some twenty-eight public access points along the shore of the Pleasant Bay study area. Twenty-five of these are town landings, owned and maintained by the towns of Orleans, Chatham, and Harwich, respectively. In addition to the landings, public access is afforded at the Fish Pier, and Lighthouse overlook in Chatham, Bay Road Beach in Harwich, and Kent's Point in Orleans. These shoreline access points are heavily used by residents and visitors for boat launching and mooring, shellfishing, scenic viewing, and shore access for other activities. Slightly more than half of respondents to the survey of Bay residents said they use the landings for shore access, and slightly less than half said they use the landings for boating.

The heavy use of the Bay's public access points poses numerous resource management issues. Land use concerns include heavy traffic on narrow access roadways generated by landings during the peak summer season. Most landings have small, unmarked, unpaved parking areas. Parking areas for all landings combined can accommodate fewer than three hundred cars. As a result, cars and trailers park along local access streets, often posing a public safety hazard. Heavy use of access points also endangers the Bay's shoreline and water resources. Shoreline vegetation is frequently trampled, and banks eroded, by boats, cars, trailers, and pedestrians using access points. Water quality impacts arise from uses facilitated at the landings, including the use of motorized vessels, and run-off from adjacent parking areas.

Public access is also afforded on the eight small Bay islands owned by public or private conservation trusts. In Orleans, Pochet, Little Pochet, Sampson's, and Hog Islands are owned by a private conservation trust; Sipson's Island is privately-owned, and Little Sipson's Island has been deeded to the Orleans Conservation Trust. Strong Island in Chatham is owned by a mix of public and private conservation groups. Tern Island in Chatham is owned by the Massachusetts Audubon Society. Combined, the islands comprise thirteen miles of shoreline, and the bulk of protected, undeveloped open space within the watershed. The Bay islands serve as important wildlife habitats, and can be used by the public for recreation. However, the islands remain unknown and inaccessible to most residents and visitors. Increased public awareness of and access to the islands, while desirable, would need to be balanced with protection of habitat areas.

6.3 Shoreline Structures

Structures on or near the shoreline pose a unique set of resource management issues because they can have direct and indirect impacts on the marine environment, as well as impacts on land use and ownership. Laws governing the licensing of shoreline structures in Massachusetts have a long and complicated history. In the 1600's the state determined that seashore property ownership extended to the low water mark, rather than the high water mark that prevailed in other colonies. At the same time, the state ruled that structures could not be built in such a way as to impede public access to the intertidal zone for fishing, fowling or navigating. In the 1800's the state enacted a law, commonly known as "Chapter 91", which requires a property owner to obtain a license from the state Waterways Program, administered by the Department of Environmental

Protection, Division of Wetlands and Waterways, to build a structure below mean high water.⁴ Local approvals are also required for structures due to their impacts on land use and wetlands resources.

Pleasant Bay is within the Cape and Islands Ocean Sanctuary, one of five ocean sanctuaries established by the Massachusetts Legislature between 1970 and 1976. The Ocean Sanctuaries Act and the regulations (302 CMR 5.00) for this Act administered by the Department of Environmental Management are designed to protect coastal resources below mean low water by prohibiting activities that could be environmentally or aesthetically damaging. In practice, the provisions of the Act and regulations apply mainly to large commercial structures.⁵

State and local licensing requirements are intended to ensure that public access rights are adequately protected in the private use of tidelands. However, conflicts over public access to the shoreline, and heightened awareness of the impacts structures can have on natural resources, are raising concerns about whether current licensing requirements are adequate to protect the public's rights, and natural resources, in the long-term.

The resource management plan for Pleasant Bay focuses on two types of shoreline structures. *Docks and piers* are a class of structures frequently constructed by private property owners and used for boating.⁶ They can be either permanent or seasonal. *Erosion control structures* encompass so-called hard and soft structures used for protecting shoreline areas from erosion and sea level rise. There are many other types of shoreline structures not addressed in this plan. Boathouses, for example, are often built above the mean high water mark and therefore do not require state licensing. However, the potential proliferation of boathouses suggests that further monitoring of these structures and their potential impacts should be reviewed. Marine railways have not been included in this plan because their numbers or collective impact on resources is believed to be negligible. Ramps and piers at public landings are discussed in the plan in terms of public access issues.

6.3.1 Docks and Piers on Pleasant Bay

⁴ The Division of Waterways has a schedule of low and mean high water marks for the entire coastline of the state.

⁵ The regulatory provisions of the Ocean Sanctuary Act that relate to the licensing of private docks and piers are addressed through state (Chapter 91) reviews, and have been used as a basis for recommendations found in Chapter 11.

⁶ For the purposes of the resource management plan, the definition of a "dock" or "pier" is an elevated structure used to access fresh or salt water or traverse fresh or salt meadow, marsh, meadowbank, dune or beach, and which extends beyond Mean Low Water (MLW) or beyond the Natural High Water Mark of a fresh water body.

There are roughly 165 docks and piers in the Pleasant Bay study area. Of this total, 115 or seventy per cent are located in Orleans. Chatham has forty-five docks and piers, accounting for twenty-seven per cent of the Bay total. Harwich has only five docks and piers in the study area, and Brewster has none. Nearly two-thirds of the docks and piers in the Bay are located in salt ponds, sub-embayments, or their respective entrance channels. The remaining one-third are located primarily in the open areas of shoreline in Big and Little Pleasant Bay.

Currently, pursuant to the state Waterways (Chapter 91) Regulations, there is a moratorium on the licensing of new private docks and piers within the ACEC, until an ACEC resource management plan is adopted by the towns and approved by the Secretary of Environmental Affairs. The resource management plan must set forth sound guidelines and a resource-based framework for the siting and licensing of future structures within the ACEC. However, except for the Waterways Regulations moratorium mentioned above, there is significant physical potential for construction of new docks and piers in the Bay. There are 486 privately-owned, waterfront parcels on the Bay without structures that have adequate frontage for a dock or pier. If structures are built on only one-third of these parcels, there will be a one hundred per cent increase over the current number of docks and piers on the Bay. This increase is more pronounced when considering that many of the parcels with potential for new structures are located in areas where existing docks and piers are already concentrated.

There is evidence to suggest that the demand for new docks and piers is very strong. The number of waterfront property owners interested in building a dock is believed to be very high following the eight year moratorium. Orleans officials have fielded inquiries from twenty-five to fifty property owner over the past year alone. However, there is virtually nothing in state or local regulations to limit the number of docks and piers built in the Bay, or to encourage multiple property owners to share structures.

Shoreline Structures in the Pleasant Bay Study Area

Structure	Orleans	Chatham	Harwich	Brewster	Total
Docks/Piers	115	45	5	n/a	165
Bulkheads	9	13	3	n/a	25
Revetments	25	62	15	1	103
Soft Solutions	5	n/a	n/a	n/a	5
TOTAL	154	120	23	1	298

Source: Towns of Orleans, Chatham, Harwich, Brewster, respectively

6.3.2 Erosion Control Structures on Pleasant Bay

The forces of erosion can be influenced by many factors, such as wind direction and velocity, and the fetch (distance) over which the wind can cause waves to build. Even in a relatively protected area such as Pleasant Bay, some areas are more vulnerable to storm events than others. To property owners, the process of erosion poses a direct threat to homes and property. Waterfront properties facing north-northeast, or south-southeast, for example, are hard hit by winter nor'easters and autumn hurricanes, respectively. For this reason, much of the northeast and southeast facing areas of Big Pleasant Bay's shorefront already have erosion control structures installed.

Prior to the 1987 break-through, the western shore of Pleasant Bay had been a relatively stable, vegetated coastal bank with a limited number of erosion control structures in place. Following the formation of the new inlet, the one foot increase in tidal range combined with in some areas with stronger currents and eroded vegetation to overcome existing erosion control structures and increase the vulnerability of the shore and coastal banks to erosion forces. Consequently, many more properties on the western shore have had new erosion control structures installed, and many old structures were increased in mass and height. Recent storm events have bolstered interest in erosion control among other shorefront property owners, even in more protected areas of the Bay.

Currently, approximately 22,627 feet, or eight per cent, of Pleasant Bay's shoreline is protected by erosion control structures. Erosion control structures encompass a wide variety of technologies designed to protect the shoreline from the erosion forces of wind, waves and tidal flow. Erosion control structures are often grouped into two categories based on the type of materials used. Hard structures, which account for virtually all such structures on the Bay, are typically made of stone, wood, or concrete. These include bulkheads, revetments, and riprap, which are built parallel to the shore and are meant to protect the upland area from erosion caused by waves and currents. Groins and jetties are hard structures built perpendicular to the shore to control the flow of sand along the shore. Soft solutions generally include the use of vegetation or vegetative materials to protect or reconstruct eroding areas. Soft solutions include planting dune grass, beach nourishment, and use of discarded Christmas trees. Soft solutions, of which there are only five on the Bay, also include engineered structures such as sand bags, and fiber rolls.

Hard structures make up the preponderance of erosion control structures in the Bay. Although use of hard structures may be required in some areas of the Bay, there is concern that continued use of hard structures could diminish the Bay's natural erosion and nourishment processes, resulting in a loss of beach height and vitality, and vegetated marsh. Another set of concerns centers on the impacts these structures can have in diminishing the public's rights to access the shoreline.