

## Section II. Resource Conditions and Trends

### Section Overview

The spectacular result of natural forces, Pleasant Bay is one of largest estuaries in Massachusetts, and the largest estuary on the east coast of Cape Cod. Pleasant Bay and the surrounding terrain was formed by the advancing, retreating, and subsequent melting of glacial ice that occurred near the end of the Pleistocene Era some 600,000 to 10,000 years ago. The glacial action endowed the region with gravel, clay, sand and other soils and, along with ensuing forces of wind, waves, and currents, sculpted the topography that exist in the region today. The area's prominent barrier beaches and salt marshes were formed after the glacial period, largely from the wind's action on glacial deposits from the Sandwich Moraine, and the Nauset Heights and Harwich Outwash Plains.<sup>1</sup>

An estuary is defined as a part of the seacoast over which the tide ebbs and flows; an inlet or arm of the sea.<sup>2</sup> The Pleasant Bay estuarine system includes two major embayments, two rivers, ten salt and fresh water ponds, 1,100 acres of salt marsh, seventy-one miles of shoreline, and eight small islands. There are nearly 7,000 acres of salt water surface in the Pleasant Bay system at mean high tide.<sup>3</sup> The Bay's salt water bodies are fed by an intricate series of fresh water tributaries originating from inland ponds, bogs, and swamps.

The confluence of salt and fresh water at the shore generates a wide variety of land and water habitats that, in turn, constitute one of the region's most productive ecosystems. Thousands of animal and plant species are spawned or nurtured in the Bay's protected shallow waters, flats and salt marshes. Plant growth from the marsh is transported by the tides to provide a foundation for the food chain. The abundant shellfish, worms and other invertebrates populating the tidal flats provide a rich feeding ground for many species of migratory birds.

The three chapters in this section look closely at natural resource conditions and trends in the Bay. At present, the Bay's natural resources are healthy and productive. However, numerous threats to the vitality of the Bay's resources continue to emerge. Left unchecked, these trends could lead to severe and irreparable degradation of Pleasant Bay's natural resources in the years to come:

- *Chapter 2. Salt Water Resources.* Water quality in the Bay is high. The few instances of problems with water quality are not characteristic of the Bay as a whole. Water quality conditions could be worsened if steps are not taken to control the flow

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<sup>1</sup> Fiske, et al, *A Study of the Marine Resources of Pleasant Bay*. Massachusetts Department of Natural Resources, Division of Marine Fisheries. May, 1967. Also, Wilhelm, Robert W., II. *Report on the Pleasant Bay Water Quality Study Cape Cod, Massachusetts*. The Friends of Pleasant Bay, Inc.. July, 1989.

<sup>2</sup> Webster's New 20<sup>th</sup> Century Dictionary Unabridged 2<sup>nd</sup> edition.

<sup>3</sup> Fiske, et al, *A Study of the Marine Resources of Pleasant Bay*. Massachusetts Department of Natural Resources, Division of Marine Fisheries. May, 1967.

of nutrients generated by land uses in the watershed. Further study is needed to assess the water quality impacts from boating and other Bay activities. The Bay's ability to disperse nutrients and other pollutants will continue to be influenced by its flushing rate. The 1987 Chatham breakthrough increased the Bay's flushing rate and, therefore, its ability to disperse pollutants. However, the continued southward migration of the breakthrough would diminish the Bay's flushing rate, and exacerbate the polluting effects from nutrients and other sources.

- *Chapter 3. Wetland Resources and Aquatic Vegetation.* The Bay's extensive wetland resources are generally quite healthy, but signs of strain are showing. The study area has lost more than one hundred acres of salt marsh over the past three decades. This translates into associated losses of animal habitat, of buffers from erosion forces, and of filters of harmful pollutants flowing into the Bay. The future viability of the Bay's marshes and other wetland resources is threatened by erosion, encroaching land development and, in some cases, by inadequately-sized culverts which restrict flushing.
- *Chapter 4. Shellfish, Finfish, and Wildlife.* Trends in shellfish, fin fish, and wildlife resources point out additional management concerns. The three primary shellfish species have experienced more than a decade's decline in recorded harvests. Several species of finfish, particularly flounder, have all but disappeared from the Bay. Nine animal and plant species in the study area are listed as endangered or of special concern to state regulators. And several habitats important to resident and migratory birds are threatened by competing uses and activities.

The inventory and evaluation of resources found in these chapters is based on past and current studies, field observations, data collection, relevant scientific literature, and observations and perspectives from many individuals who use the Bay for commercial, recreational, or scientific purposes. The information and analysis found in this section, along with the discussion of human use impacts in Section III, provides the foundation for discussing the resource management issues and recommendations found in Section IV.