

# CHAPTER 4: ECOLOGICAL INVENTORY AND HABITAT PROTECTION

## IMPLEMENTATION STATUS

RECOMMENDATION	STATUS
9.2.1 Ecological Inventory & Monitoring Program	<ul style="list-style-type: none"> <li>✓ Intertidal Habitat and Sediment Assessment Study is underway</li> <li>✓ An assessment of rare and endangered species and animal habitats around freshwater ponds in the ACEC is completed</li> <li>➤ Undertake monitoring programs for intertidal and freshwater habitats.</li> </ul>
9.2.2 Areas of Critical Marine Habitat (ACMH)	<ul style="list-style-type: none"> <li>✓ Ten ACMH identified in the plan were kept free of moorings, structures and aquaculture cultivation.</li> <li>➤ The ACMH will be evaluated based on the results of the intertidal habitat and sediment assessment study. Changes in the designation of ACMH, or management policies for those areas may be recommended.</li> </ul>
9.2.3 Species/habitat protection program	<ul style="list-style-type: none"> <li>➤ Continue monitoring of species such as eelgrass and horseshoe crabs.</li> <li>➤ Evaluate use of wildlife corridor overlay districts.</li> <li>⊕ Inventory undeveloped parcels and prioritize for habitat value.</li> </ul>

➤ CONTINUED      ⊕ NEW RECOMMENDATION      ✓ COMPLETED

## OVERVIEW

The plan identifies and documents the biodiversity and significant habitat values of Pleasant Bay and its watershed. It also points out that, despite the Bay's attraction for researchers and scientists, earlier technical studies tended to focus on single facets of the Bay's eco-system and most are many years outdated. Virtually none of the existing studies could have foreseen the variety of human use and environmental factors that influence the ecology of the Bay today.

The plan listed recommendations aimed at developing a better understanding of Bay's habitats, and establishing interim steps to protect special habitats while further

study is undertaken. A priority recommendation of the plan was to design and begin to implement an ecological inventory and monitoring program to assess the status of natural resources and habitats within the Bay.

The focus of implementation efforts has been in the following areas:

- The study of the dynamics and conditions of the Bay's intertidal habitats so important to macroalgae, shellfish and birds;
- Interim controls on activities in selected intertidal areas, called Areas of Critical Marine Habitat, pending the results of the intertidal study;
- Continued awareness of trends in the health of eelgrass as monitored through the State Department of Environmental Protection; and
- An assessment of plant and animal species surrounding the Bay's freshwater ponds.

Future implementation activities will center on completing these studies, integrating findings with management policies and regulations, and on-going monitoring of selected areas.

## **INTERTIDAL HABITAT AND SEDIMENT ASSESSMENT**

When the Alliance set out to establish an ecological inventory and monitoring program, intertidal habitats were quickly identified as a natural starting point for several reasons. There was widespread agreement that information on sediments in the Bay was unavailable yet desirable because of its relation to many types of vegetation and animal habitats.

Second, a deeper understanding of intertidal areas was necessary to move forward on the plan's recommendations to enhance the natural shellfishery, and develop guidelines for shellfish aquaculture. Finally, a greater understanding of the types and functions of intertidal areas was necessary to further evaluate the ten intertidal areas designated in the plan as *Areas of Critical Marine Habitat*.

The *Intertidal Habitat and Sediment Assessment Study* -- funded by the Sudbury Foundation, the Edward Bangs Kelley and Ezra Kelley Foundation, Inc. and the towns -- was designed around these information needs. The project is the first phase of a comprehensive inventory and monitoring program for habitats within the Pleasant Bay estuary recommended in the plan. The study will classify and evaluate the variety of intertidal habitats in the Bay, inventory the plant and animal life that inhabit these areas, and monitor the dynamics of these areas in light of environmental and human use factors.

Information generated from the project will be used by local officials to evaluate and manage competing uses of tidal flats, and will also provide baseline data needed to

design a longer-term project to monitor the health of the Bay's intertidal resources. In instances where state permitting is required, the information will also be used to inform coordinated review by state agencies. Research findings will be relied upon to develop guidelines for locating public and private shellfish aquaculture projects, evaluate the impacts of shorelines structures (e.g. docks, revetments) on intertidal habitats, develop fisheries management strategies, monitor trends in the horseshoe crab population, and protect the migratory fly-way.

As part of the study the team of scientists are evaluating atmospheric "drivers" such as winds, tidal flushing and currents to determine significant patterns in the formation of intertidal areas. Through a series of on-the-ground and in-the-water surveys they are classifying the various types of intertidal habitats in terms of sediment type, vegetative cover and resident populations of macro-invertebrates, birds, horseshoe crabs and shellfish. The third part of the study is the design of an on-going monitoring program to detect significant changes or threats to habitat types.

#### **UPDATE RECOMMENDATIONS**

Complete the intertidal habitat and sediment assessment study and begin a monitoring program for selected intertidal areas. Pending the outcome of the study, identify needs for further research of selected intertidal or sub-tidal areas.

Evaluate Areas of Critical Marine Habitat (ACMH) based on study results. The Alliance will rely on the intertidal study as a basis for re-evaluating the designation of Areas of Critical Marine Habitat, and other intertidal areas addressed in the intertidal study. The Alliance may develop detailed recommendations for managing these areas pending the outcome of the study. The Massachusetts Department of Environmental Protection and Department of Environmental Management will be consulted if changes in the designation of ACMH or local regulation of these areas affect the implementation of Chapter 91 regulations.

## **RESOURCE ASSESSMENT OF FRESHWATER LAKES AND PONDS IN THE ACEC**

Estuaries are places where freshwater and marine resources converge. The health of freshwater lakes and ponds in the ACEC is important because they help filter groundwater and provide critical habitat areas. Through a grant from the Community Foundation of Cape Cod, the Alliance undertook a resource assessment of freshwater ponds within the ACEC. The assessment responds to two priority recommendations of the Pleasant Bay plan:

- To complete the inventorying of critical habitat areas in the Pleasant Bay study area, and to develop strategies to monitor their health; and

- To develop guidelines for permitting structures, particularly docks and piers, located on the shoreline of freshwater lakes and ponds.

There is relatively little information available concerning the current status of freshwater ponds within the Pleasant Bay ACEC. These ponds are important as community freshwater resource areas, and links to the region's groundwater supply. They are also important because of their direct hydrologic connection to Pleasant Bay.

The assessment provides a "snapshot" profile that identifies and documents the presence and distribution of rare, endangered, indigenous and invasive species of plants and animals within one hundred feet of the water's edge of the respective freshwater bodies, including submerged and emergent species. Freshwater bodies evaluated by the assessment include:

- Lover's Lake, Chatham,
- Stillwater Pond, Chatham,
- Mill Pond, Chatham,
- Minister's Pond, Chatham,
- Fox Pond, Chatham,
- Sarah's Pond, Orleans,
- Crystal Lake, Orleans,
- Pilgrim Lake, Orleans,
- Little Quanset, Pond, Orleans,
- Gould Pond, Orleans, and
- Uncle Seth's Pond, Orleans.

Highlights of the study, conducted by Horsley & Witten, include:

- Presence of rare species was documented at four ponds: Crystal Lake, Gould Pond, Uncle Seth's Pond, and Mill Pond. The presence of Plymouth gentian at Mill Pond was the first identification of the species at that location;
- In addition, Gould Pond, Crystal Lake, Lover's Lake, Minister's Pond and Stillwater Pond are mapped for Priority Habitats of Rare Species; and
- Mill Pond, Crystal Lake and Gould Pond exhibit characteristics of Coastal Plain Pond Shore areas, which are a habitat of global significance. White cedar swamp habitat, another regionally and globally significant habitat, was also identified among the ponds.

The report also identifies current threats to important habitats including: overloading of nutrients, erosion and sedimentation caused by road runoff and recreation impacts. Information from the assessment will be used to develop guidelines for permitting docks and piers in freshwater ponds within the ACEC.

## **UPDATE RECOMMENDATIONS**

Use the freshwater assessment to develop guidelines for permitting docks and other structures on the shore of freshwater ponds in the ACEC. (See Chapter 8)

Design and implement other management recommendations based on the results of the assessment. The Alliance will review the results of the freshwater assessment, including identified threats to important freshwater habitats, and will develop recommendations or guidelines for towns to consider in the management of the resource areas. The Alliance may also identify additional research, monitoring activities or remediation steps to protect the health of freshwater ponds and their associated habitats.

## **SPECIES AND HABITAT PROTECTION**

### **EELGRASS**

Eelgrass is a form of wetland vegetation that is critical to Pleasant Bay's role as a spawning and feeding area for several marine species. The history of eelgrass in the Bay has largely followed trends along the eastern seaboard that have been influenced by periodic episodes of wasting disease. The plan notes that the distribution of eelgrass in the Bay has not changed significantly over the past twenty-five years, yet its health has improved in some areas due to greater flushing allowed by the Chatham breakthrough. Still, recurring wasting disease, and reductions in water quality in some areas of the Bay, poses threats to this fragile and important resource. Of particular concern is the reduction in light penetration needed for the photosynthesis of these and other aquatic plants that results from an oversupply of nutrients in the water.

The distribution of eelgrass in Pleasant Bay, as identified in a study conducted by the Department of Environmental Protection (DEP) in 1997, is shown in a figure at the end of this chapter. The figure is based on an interpretation of aerial photography taken in 1993 and 1994, and subsequent field verification. DEP is in the process of updating the study based on aerial photography and field verification conducted in 2000. A full report and analysis of DEP's updated eelgrass study is expected in 2003.

### **UPDATE RECOMMENDATION**

Continue to monitor trends in eelgrass density throughout the Bay.

The Alliance will continue to track trends in the density and distribution of eelgrass throughout the Bay, based on the analysis by DEP. As part of the assessment, the Alliance will seek to identify factors driving changes in eelgrass.

## HORSESHOE CRABS

Horseshoe crab habitat for spawning feeding and nursery ground likely exists throughout the Bay, particularly located with along the eastern edge of the Bay along the backside of North Beach from the southeastern shorelines of Sampson and Hog Islands to the northeast of Strong Island.<sup>1</sup>

Over the past five years the regulation of horseshoe crabs has come under intense scrutiny due to perceived pressures on the species from harvesting for bait, biomedical applications and scientific research. The Alliance has commented in proceedings sponsored by the Division of Marine Fisheries and the Atlantic States Marine Fisheries Commission.

In the context of regulatory discussions and public concerns about the status of horseshoe crabs, two studies were undertaken. *Population Demographics and Spawning Densities of the Horseshoe Crab, Limulus polyhemus, within the Cape Cod National Seashore and Monomoy National Wildlife Refuge*, was undertaken by the National Park Service Boston Support Office. The study compiled and analyzed two years of data on spawning densities, spawning indices, sex ratios and size and age structures for spawning horseshoe crab populations within these specified areas. One purpose of the study was to provide a basis for developing protocols for monitoring of horseshoe crabs.<sup>2</sup>

The Boston University Marine Program and Marine Biological Laboratory, with support from the Friends of Pleasant Bay, Inc., studied the affects of harvesting on the horseshoe population in Pleasant Bay<sup>3</sup>. Specifically the study examined:

1. The magnitude of horseshoe crab harvest in Pleasant Bay;
2. What segment of the population is affected by each harvest;
3. How harvest might affect the structure and reproductive success of the Pleasant Bay population; and
4. A comparison of harvest pressure in Pleasant Bay with harvest pressure in two other Cape Cod embayments.

Study findings include:

- Total harvest in 2001 accounted for approximately 1-2% of total annual adult mortality;

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<sup>1</sup> Carmichael, Ruth and Valiela, Ivan. A status report on the Atlantic Horseshoe Crab and Studies Planned in Pleasant Bay, MA. Boston University Marine Program, Marine Biological Laboratory. Woods Hole, MA.

<sup>2</sup> James-Piri, Mary-Jane, et al. Population Demographics and Spawning Densities of the Horseshoe Crab, *Limulus polyhemus*, within Cape Cod National Seashore, Cape Cod Bay, and Monomoy National Wildlife Refuge, Massachusetts. Department of the Interior, National Park Service, Boston Support Office, Boston, MA.

<sup>3</sup> Rutecki, Deborah; Carmichael, Ruth; and Valiela, Ivan. Magnitude of harvest of Atlantic horseshoe crabs, *Limulus polyphemus*, in Pleasant Bay, MA. Boston University Marine Program, Marine Biological Laboratory. Woods Hole, MA.

- Harvest for biomedical was considerably larger than harvest for bait or scientific research, and accounted for 22% of all harvest for biomedical research on the Atlantic coast; and
- Bait harvest was the smallest of the three harvests, and has declined from 1999 to 2001.

Importantly, the study examines the differing effects of harvests for different purposes on the sustainability of the horseshoe crab. The study is intended to provide a basis of sound scientific data for future discussions about management of horseshoe crabs in the Bay.

#### **UPDATE RECOMMENDATION**

The Alliance will continue to support research on horseshoe crab trends in the Bay.

#### **OTHER WILDLIFE HABITATS**

Pleasant Bay and the surrounding area are renowned for an abundance of terrestrial and avian wildlife. There are nine state-listed rare plant and animal species that occur in the Pleasant Bay area. Animals found in the Pleasant Bay area include four species listed as threatened or endangered, and 248 species of birds, including many migratory species. The Bay's varied topography and vegetation – including stands of pitch pine, scrub oak, and cedar -- provide a number of significant, and increasingly rare, habitats. Several of the Bay's intertidal flats and woodland habitats are threatened by encroaching land uses, or impacts from noise and pollution. There is also concern that use of tidal flats for aquaculture may diminish the effectiveness of those areas as feeding grounds for migratory birds or other marine species.

#### **UPDATE RECOMMENDATIONS**

Develop an inventory of undeveloped parcels prioritized for their habitat value.

The Alliance will work with the Compact of Cape Cod Conservation Trusts to build on the Compact's analysis of vacant parcels in the Pleasant Bay watershed in terms of their ecological significance and habitat value. The inventory would provide a valuable tool for Planning Boards and Land Bank Committees. The project will be used to develop and support strategies to acquire or otherwise protect priority undeveloped land parcels. The inventory will provide a context for evaluating the creation of wildlife corridor overlay districts, as recommended in the plan, to protect upland habitats from adverse impacts.