

## CHAPTER 6: WATERSHED PLANNING

### IMPLEMENTATION SUMMARY

RECOMMENDATION	STATUS
9.4.1 Watershed management program 9.4.2 Evaluate changes in land use regulations	<ul style="list-style-type: none"> <li>✓ Completed a build out analysis for the Pleasant Bay watershed showing a potential for a 28% increase in the number of single-family homes.</li> <li>➤ Evaluate re-development potential within the watershed.</li> <li>➤ Evaluate possible changes in land use, health or conservation regulations that could be recommended to the towns for sub-watersheds that have the greatest development potential</li> <li>➤ Develop a comprehensive list of direct discharges into the Bay, and locate them using GIS mapping</li> <li>➤ Develop a comprehensive review of applicable zoning regulations</li> <li>➤ Prioritize vacant land parcels for acquisition or protection</li> </ul>
9.4.1 cont.'d Promote public awareness of the impacts of nitrogen on the Bay	<ul style="list-style-type: none"> <li>✓ Developed the <i>Citizen's Guide to Estuarine Protection</i>, a proto-type for public education on the impacts of nitrogen in the Bay.</li> <li>✓ Published a <i>Citizen's Guide</i> for the Arey's Pond watershed</li> <li>➤ Develop <i>Citizen's Guides</i> for The River Complex in Orleans and Muddy Creek in Chatham and Harwich.</li> <li>➤ Publish <i>Citizen's Guides</i> for all sub-watersheds.</li> </ul>
☉ Promote modeling of the entire Bay through the Southeastern Massachusetts Embayment Restoration Program	<ul style="list-style-type: none"> <li>✓ Promote the importance of modeling of the entire Bay system to DEP/SMAST</li> <li>✓ Identified and addressed data needs for modeling</li> <li>➤ Continue data collection and secure local matching funds for modeling</li> <li>➤ Continue to work toward completion of modeling by 2006</li> </ul>

<p>☼ Undertake efforts to understand and control sources of bacterial contamination</p>	<ul style="list-style-type: none"> <li>➤ Identify sources of bacteria in waters with sustained high counts.</li> <li>➤ Encourage implementation of Phase II Stormwater Management Plans.</li> <li>➤ Encourage installation and maintenance of “mutt mitt” dispensers at all public access locations on Pleasant Bay. Promote public awareness of health impacts from pet waste.</li> </ul>
➤ CONTINUED	☼ NEW RECOMMENDATION
	✓ COMPLETED

## OVERVIEW

As the plan was being developed, a decision was made to define the study to include the entire 21,000-acre marine water recharge area for the Bay. This decision reflected the understanding that the health of the Bay is influenced by what happens on land throughout the watershed.

The plan includes a number of recommendations dealing with watershed planning and management. Three direct examples are:

- Development of a watershed management program encompassing nitrogen management, storm water management, fertilizer and pesticide use, and public education;
- Evaluation of the need for changes in land use regulations; and
- Strengthening specific provisions of local wetland protection regulations and review procedures.

**Watershed Land Area By Town**

TOWN	WATERSHED AREA (ACRES)	WATERSHED SHARE (%)
Orleans	8,910	43
Chatham	6,524	31.5
Harwich	2,446	12
Brewster	2,800	13.5
Total	20,680	100

Source: Cape Cod Commission GIS

The Alliance found that a comprehensive assessment of future development potential within each sub-embayment of the Pleasant Bay watershed was needed to evaluate specific actions the towns could take to implement the watershed protection recommendations cited above. The Alliance also recognized that any such actions would be intended to reinforce the local comprehensive plans and wastewater management plans being developed within the towns. The following is a summary of the public education and land use analysis undertaken to implement the recommendations, and proposed future watershed planning activity.

## BUILD OUT ANALYSIS

In 2000 the Pleasant Bay Alliance developed a build out analysis to determine the potential for new residential development within the marine water recharge area (watershed) of Pleasant Bay. As described below, the build out analysis is a key element to be integrated with water quality, hydrodynamic and nitrogen loading analyses to generate a comprehensive view of watershed impacts on the Bay.

The analysis shows that 1,728 new dwellings could be added throughout the watershed on developable lots, an increase of 28%. Nine of the Bay's twenty-one sub-watersheds could see an increase in new dwellings of 40% or more.

The build out analysis was developed with technical support from the Cape Cod Commission GIS Department. The analysis is based on the most current parcel data available from each town's Assessor's records. The development status of each parcel was determined by evaluating:

*State land use classification code:* Classifications codes were used to distinguish the status of parcels (e.g., residential development, vacant land, protected open space, etc.)

*Current development status:* Parcels were evaluated to determine if they contained a dwelling or not. A parcel was further evaluated if it did not have a dwelling, or could accommodate additional lots through subdivision.

*Existing applicable zoning:* Potential development was determined based on the existing applicable zoning designation for the parcel.

*Existence of wetlands:* The area of wetlands on a parcel, if any, was subtracted from the potential area for development to which the zoning requirement was applied.

For example, a developed single-family parcel is considered an existing lot. Potential additional lots are of two types. (1) A vacant parcel able to accommodate a single-family lot is counted as one potential additional lot; (2) An existing parcel with a dwelling(s) built on it, but with potential for subdivision, is counted as the number of potential additional lots that could be subdivided under current zoning, adjusted for the presence of any wetlands.

This analysis does not include expansion of residential dwellings through redevelopment of currently developed parcels.

A map of the Bay's subwatersheds and the build out results for each subwatershed are found in two figures located at the end of this chapter. Key findings from the build out analysis include:

- There are 6,100 existing lots in the watershed and there is potential for an additional 1,728 lots, or a 28% increase. Of the additional 1,728 lots, 679 (39%) are in Orleans, 526 (31%) are in Harwich, 315 (18%) are in Chatham, and 208 (12%) are in Brewster.
- The following sub-watersheds could see an increase of 40% or more in developable lots: Arey's Pond (Orleans, Brewster); Namequoit River (Orleans, Brewster), Quanset Pond (Orleans, Brewster); Little Pleasant Bay (Orleans); Pochet Neck (Orleans), The River (Orleans); Kescayogansett Pond (Orleans); Pah Wah Pond (Orleans); Bassing Harbor (Chatham).
- The following sub-watersheds could see the largest numeric increases in developable lots: Arey's Pond (121); Namequoit River (203); Pleasant Bay (460); Round Cove (84); Upper Pochet Neck (89); The River (68); Frost Fish Creek (81); and Muddy Creek (343).
- Evidence of excessive nitrogen has already been found in waters surrounded by watersheds with significant additional build out potential: Muddy Creek, Arey's Pond, Meetinghouse Pond, Round Cove, Lonnie's Pond, Quanset Pond, Pah Wah Pond, Pochet, Crow's Pond, Frost Fish Creek, and portions of Big and Little Pleasant Bay. This water quality data has been gathered through the Alliance water quality monitoring program, and the Chatham and Orleans wastewater plan processes.
- 785 or 45% of potential new lots are located within a Zone Two, which is an area identified as contributing to public drinking water supplies.

#### **UPDATE RECOMMENDATION**

The Alliance will continue analysis of development potential identified through the build out analysis, and develop recommended municipal actions and strategies, including:

- Evaluating re-development potential within the watershed, and particularly near-shore areas;
- Focusing further evaluation on single or contiguous sub-watersheds that have the greatest development potential and are shared by one or more towns;
- Developing a comprehensive list of direct discharges in the Bay, and locating them using GIS mapping;
- Prioritizing vacant land parcels for acquisition or protection, based on habitat value and ecological importance to the Bay's ecosystem; and
- Developing recommendations for land use, health or conservation measures that could address nitrogen impacts in selected areas of the watershed.

#### **SOUTHEASTERN MASSACHUSETTS EMBAYMENT RESTORATION PROJECT**

In 2002, the Department of Environmental Protection (DEP) announced the Southeastern Massachusetts Embayment Restoration Program. The program is designed

to work with communities using actual water quality, hydrodynamic, and land use data in a model to determine critical nitrogen loads in embayments. The modeling is intended to lead communities to a clear definition of critical nitrogen loads and development of appropriate nitrogen management strategies. When first announced by DEP, the program did not list Pleasant Bay in its entirety as being among the first or second level of priority embayments for modeling. In fact, modeling within the Bay was focused on the Orleans and Chatham sub-embayments, and did not address Big or Little Pleasant Bay.

Over the past year the Alliance has been working with program managers to identify the placement of the entire Bay system within the list of priority embayments, and to share data collected by the Alliance that could be utilized in the modeling process. As a result of these discussions the Alliance has added four new marine monitoring stations and an additional freshwater inflow monitoring station.

#### **UPDATE RECOMMENDATIONS**

The Alliance should continue to work with managers of the Southeastern Massachusetts Embayment Restoration program to ensure that modeling Pleasant Bay is completed by 2006. The Alliance will work with the individual towns to ensure that the local share contribution required for modeling under the program is available.

#### **BACTERIAL CONTAMINATION**

Bacterial contamination is a growing concern for the communities surrounding Pleasant Bay. During the summer of 2001 a number of public swimming areas in Pleasant Bay were closed due to high levels of bacteria. According to the County's *Coastal Resources Protection Update*, the increased incidence of beach closures may have been tied to changes in local testing procedures mandated by the state. Methods used by towns to monitor for bacteria in swimming areas prior to the enactment of the *Massachusetts Beaches Act* in 2001 were not consistent or always rigorously applied. The previously employed method of sampling a "suspect" area over a period of days to determine a sustained high level of bacteria may have revealed a high reading to be a one-time "spike" in bacteria levels. The *Beaches Act* now requires weekly testing of swimming beaches, and closure of a beach after one reading of higher than acceptable bacteria counts.<sup>1</sup>

However the fact remains that higher than acceptable levels of bacteria were measured at the closed Pleasant Bay locations, and the sources of bacteria need to be better understood and managed. The prime indicator of bacterial contamination associated with the beach closings is enterococcus, commonly found in the bowels of warm-blooded mammals. Stormwater and overland run-off may be a contributor of the bacteria. Heavy rains following periods of dry, hot weather may result in excessive run-off carrying fecal matter from birds and quadrupeds down gradient to coastal embayments. Outmoded, malfunctioning or overloaded septic systems – even if located

---

<sup>1</sup> Barnstable County Coastal Resources Committee. Coastal Resource Protection Update. Barnstable, MA. 2002.

close to coastal waters -- are not likely to be a source of bacterial contamination because of the ability of soils to thoroughly filter bacteria. The type and source of bacteria may vary for different waters. Knowing the primary type of bacterial contamination is necessary to pinpoint the source and plan effective mitigation measures and policies.<sup>2</sup>

#### **UPDATE RECOMMENDATION**

In areas experiencing sustained high levels of bacterial contamination, the Alliance will encourage efforts to identify sources of bacteria. Methods used to identify bacteria sources could include detailed sanitary surveys, DNA testing, or other appropriate method of evaluation.

The Alliance will encourage the towns to complete development of and implement Phase II Stormwater Management Plans as required by U. S. Environmental Protection Agency and Massachusetts Department of Environmental Protection (DEP). Components of the plans include mapping the towns' stormwater management system, identifying impacts to resources from stormwater discharges in specific areas; and remediation of negative impacts to resources.

The Alliance will encourage the towns to install and maintain "mutt mitt" dispensers at all public access locations on Pleasant Bay. Signs at public access points as well as other public information efforts should be employed to increase public awareness of the public health and environmental impacts caused by pet waste.

#### **PUBLIC EDUCATION - CITIZEN'S GUIDES**

In 2000 the Alliance produced a *Citizen's Guide to Estuarine Protection* focusing on the watershed of Arey's Pond, which has been identified to have critically high nitrogen levels. In 2002 the Alliance obtained a grant from the Community Foundation of Cape Cod to publish additional editions of a *Citizen's Guide to Estuarine Protection*. Each edition will be targeted to the specific nitrogen loading conditions within a selected sub-embayment and associated sub-watershed of Pleasant Bay. The guides are intended to increase public awareness of the effects of nitrogen on marine eco-systems, and to provide a foundation for community debate and consensus building on water quality goals and strategies for nitrogen management.

#### **UPDATE RECOMMENDATION**

Citizen's Guides should be developed for all sub-watersheds. Funding is in hand to complete guides for the Muddy Creek watershed in Chatham and Harwich, and the northern sub-embayments located in Orleans. Additional funding should be secured for subsequent *Citizen's Guides*. The scope of *Citizen's Guides* should include lawn care practices, proper disposal of animal waste, phosphates, bacterial contamination and testing.

---

<sup>2</sup> Ibid.