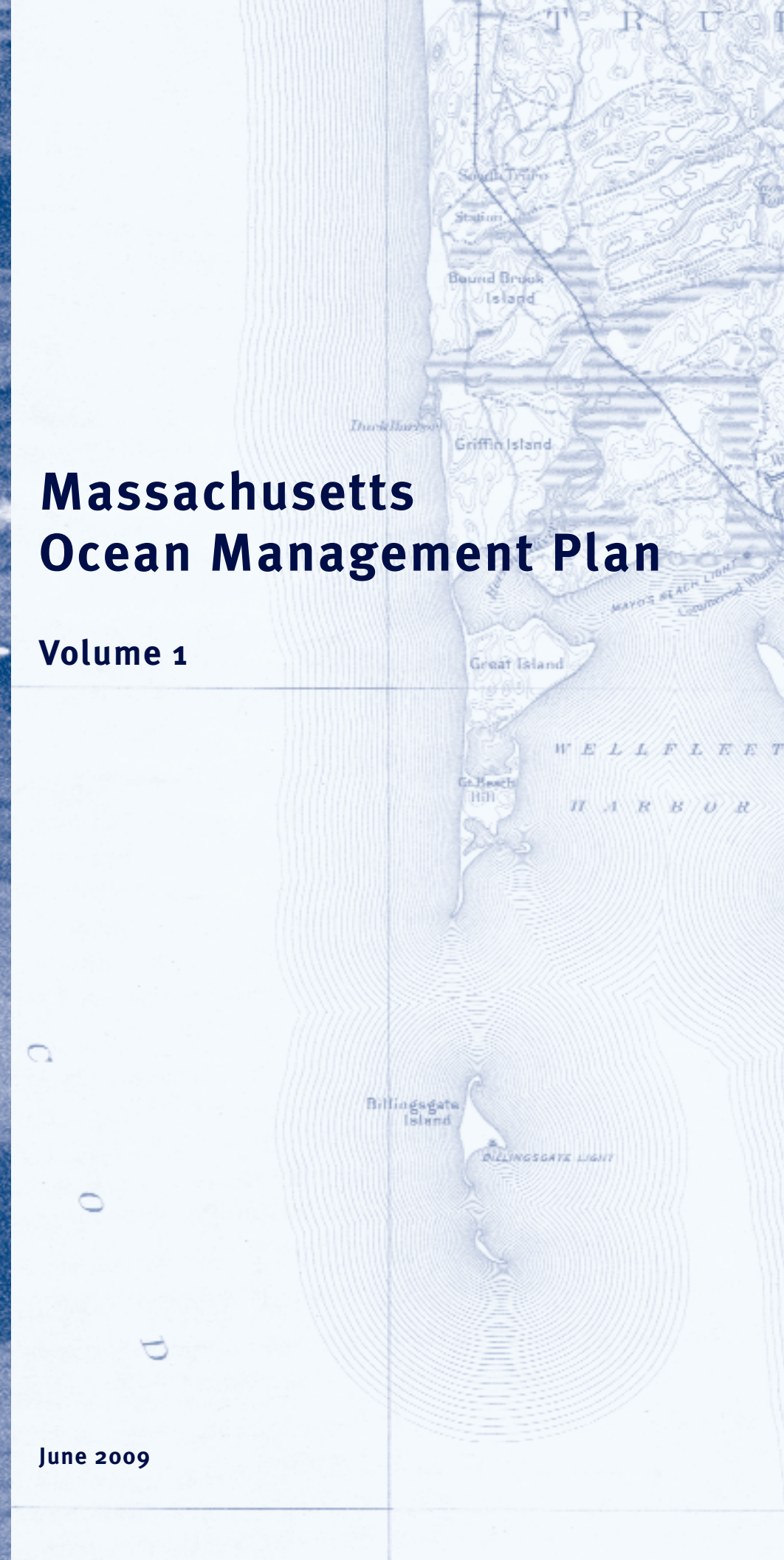


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# **Massachusetts Ocean Management Plan**

**Volume 1**

**June 2009**







*The Commonwealth of Massachusetts*  
*Executive Office of Energy and Environmental Affairs*  
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June 30, 2009

On May 28, 2008, Governor Deval Patrick signed the Massachusetts Oceans Act of 2008, which directed the Executive Office of Energy and Environmental Affairs to develop a comprehensive management plan to serve as the basis for the protection and sustainable use of our ocean and coastal waters. The Commonwealth is blazing a trail under the Oceans Act – we are the first state to undertake such a comprehensive plan and our actions place Massachusetts at the forefront as other states and the federal government move to undertake similar planning in the future.

I am pleased herewith to present the Draft Massachusetts Ocean Management Plan for public review. The draft plan is the product of an extraordinary process – 18 public meetings, 90 stakeholder consultations, and countless hours on the part of private citizens and state officials alike as they brought their expertise to bear on one of our most awesome responsibilities, the management and stewardship of the Commonwealth's ocean waters. I would like to thank the members of the Ocean Advisory Commission and the Science Advisory Council as well as the staff of my agencies, led by Assistant Secretary Deerin Babb-Brott, for all of their work and contributions to this draft. Now this process turns to the public once again, as the draft plan undergoes another six months of scrutiny and revision before final adoption.

The year-long process of consultation and analysis that led to the draft plan has revealed, once again, just what a precious resource we have in our state waters. The three-mile-wide strip of ocean that lines our coast is a busy place, teeming with fishing boats, shipping vessels, and pleasure craft, and it is a natural wonder, providing habitat for a wide variety of species. This mix of uses is nothing new to the Bay State and our deep ties to maritime industry and recreation are part of the fabric of our nation's history. What is evident nonetheless from the draft plan is the magnitude of the challenge before us to balance resource protection and human uses, both traditional and emerging, in a proactive fashion as required by the Oceans Act. In my judgment, the draft plan meets that challenge.

The draft plan represents the state of the art in ocean planning. It applies the best available science and the firsthand knowledge of stakeholders and creates a new template for reviewing projects proposed for state waters. The draft plan establishes special, sensitive, and unique categories for management policies in areas representing more than 60% of Commonwealth waters. The plan also combines spatial designations for certain functions – notably the highly protected Prohibited Area off the Cape Cod National Seashore as well as the designation of two areas for wind energy development – and a performance-based management approach intended to balance competing interests in the rest of the state’s waters. Two percent of state waters are designated for the commercial-scale renewable energy development that is vital to the Commonwealth’s greenhouse gas and environmental goals. Taken together, the draft plan presents a new standard of protection and sustainable use of the public trust resources of our oceans.

I want to thank the members of the public and stakeholder groups who gave of their time and their expertise over the past year to make the Massachusetts Ocean Management Plan an example for the nation and the world. I congratulate them on their contributions, and hope they all take as much pride in the product as I do.

But our work together is not done. Now that the draft plan is complete, I look forward to continued comment and collaboration as we work toward promulgating the final Massachusetts Ocean Management Plan by December 31, 2009.

Sincerely,

A handwritten signature in black ink that reads "Ian A. Bowles". The signature is fluid and cursive, with the first letters of each name being capitalized and prominent.

Ian A. Bowles  
Secretary  
Executive Office of Energy and  
Environmental Affairs

# Acknowledgments

The draft Massachusetts Ocean Management Plan has been prepared for public review through the committed effort of many people. The Executive Office for Energy and Environmental Affairs (EEA) would like to thank everyone who contributed their time, energy, and expertise to this ground-breaking effort, which is the foundation for a new, comprehensive approach to ocean management in Massachusetts.

First, EEA would like to acknowledge the support, guidance, and expert advice provided by both the Ocean Advisory Commission and the Science Advisory Council, whose members fully embraced their charges to assist EEA in developing the plan. EEA would also like to recognize the six technical work groups, made up of state agency staff and members from federal agencies, academia, the renewable energy industry, and non-governmental organizations, which assembled available natural resource and human use data for plan development.

This integrated approach to ocean planning brought together numerous government agencies at the state and federal level. On the state level, this included the Department of Agricultural Resources; Department of Conservation and Recreation; Department of Energy Resources; Department of Environmental Protection; Department of Fish and Game's Division of Marine Fisheries and Division of Fisheries and Wildlife; Massachusetts Historical Commission; Massachusetts Water Resources Authority; and EEA's Office of Coastal Zone Management. In particular, we would like to recognize the members of the Interagency Planning and Regulatory Teams—a core group at the state agency level who provided input and feedback during the ocean planning process—as well as the Ocean Sanctuary Act technical advisory committee who are reviewing the regulatory definitions of “public necessity and convenience” and “significant alteration,” as required by the Oceans Act. EEA would like to especially thank Commissioner Mary B. Griffin of the Department of Fish and Game and Commissioner Laurie Burt of the Department of Environmental Protection for the substantial staff time and resources their agencies contributed to plan development. In addition, we would like to recognize the Division of Marine Fisheries and Director Paul Diodati for the extensive data, analysis, and consultation they contributed to the ocean planning process.

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The following is a complete listing of the many formal groups who contributed to the development of the draft Massachusetts Ocean Management Plan.

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# Executive Summary

Massachusetts waters are rich with natural resources and busy with human activity. Our marine environment supports recreation and tourism, fishing and shellfishing, shipping and trade, and scientific research. The Commonwealth's marine waters also harbor infrastructure that supports the well-being and standard of living of Massachusetts citizens, such as offshore liquefied natural gas facilities, fiber optic and electrical cables, and natural gas pipelines. In addition, new activities in the marine environment are emerging, including deepwater aquaculture and wave, tidal, and wind energy.

Given this array of activity, and the need to protect and enhance the marine environment, the draft ocean plan addresses a fundamental issue: the ocean is a public trust resource, and the Commonwealth must effectively manage the protection and use of its waters on behalf of the public for the benefit of current and future generations.

To this end, the draft ocean plan:

- Sets forth the Commonwealth's goals, siting priorities and standards to ensure the effective stewardship of our ocean waters;
- Identifies and protects critical resources;
- Supports the development of sustainable uses, renewable energy, and necessary infrastructure;
- Establishes measures that minimize conflict between existing uses and new uses; and
- Provides a foundation for ongoing study and evolving management of the ocean environment.

## The Oceans Act

On May 28, 2008, Governor Deval Patrick signed the Oceans Act of 2008. This groundbreaking legislation requires Secretary of Energy and Environmental Affairs (EEA) Ian Bowles to develop a comprehensive ocean management plan, with a draft plan by June 30, 2009, and a final plan promulgated by December 31, 2009. To assist in the planning process, the Act also required Secretary Bowles to appoint a 17-member Ocean Advisory Commission (OAC) and an Ocean Science Advisory Council (SAC).

The Oceans Act directs that the draft ocean plan address the following 15 specific requirements:

- (i) set forth the commonwealth's goals, siting priorities and standards for ensuring effective stewardship of its ocean waters held in trust for the benefit of the public;

and (ii) adhere to sound management practices, taking into account the existing natural, social, cultural, historic and economic characteristics of the planning areas; (iii) preserve and protect the public trust; (iv) reflect the importance of the waters of the commonwealth to its citizens who derive livelihoods and recreational benefits from fishing; (v) value biodiversity and ecosystem health; (vi) identify and protect special, sensitive or unique estuarine and marine life and habitats; (vii) address climate change and sea-level rise; (viii) respect the interdependence of ecosystems; (ix) coordinate uses that include international, federal, state and local jurisdictions; (x) foster sustainable uses that capitalize on economic opportunity without significant detriment to the ecology or natural beauty of the ocean; (xi) preserve and enhance public access; (xii) support the infrastructure necessary to sustain the economy and quality of life for the citizens of the commonwealth; (xiii) encourage public participation in decision-making; (xiv) adapt to evolving knowledge and understanding of the ocean environment; and (xv) identify appropriate locations and performance standards for activities, uses and facilities allowed under the Ocean Sanctuaries Act, including but not limited to renewable energy facilities, aquaculture, sand mining for beach nourishment, cables, pipelines.

In addition, the Oceans Act:

- Directs that the ocean plan be implemented through existing state review procedures, with all licenses, permits, and leases required to be consistent to the maximum extent practicable with the ocean plan;
- Requires that the ocean plan be revised and publicly reviewed at least every five years;
- Establishes commercial and recreational fishing as allowed uses subject to the jurisdiction of the Division of Marine Fisheries; and
- Allows appropriate-scaled renewable energy development.

## Developing the Plan

EEA is developing this ocean plan in the context of an extensive public participation process that included 18 public meetings across the Commonwealth; 90 meetings with stakeholders such as pilots, fishermen, non-governmental organizations, and academia; and five public workshops—as well as OAC and SAC meetings held periodically throughout the planning period. Following the directives of the Oceans Act, EEA is using a three-phased approach to develop the plan:

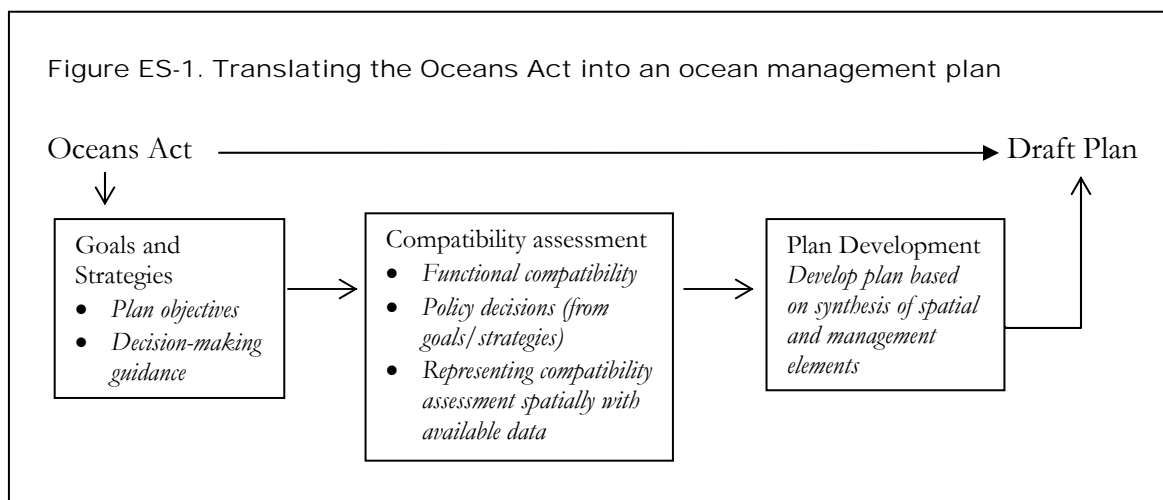
- Phase 1 - Information Gathering—Data gathering was an ongoing part of the ocean management plan, but a particular focus in the early months. At a series of statewide workshops and EEA presentations, OAC, SAC, and public participants reviewed

information gathered and data quality. Information was compiled in three main areas: 1) the goals of the plan and key issues and concerns; 2) general approaches to plan development; and 3) existing science and data regarding ocean resources and uses.

- Phase 2 - Draft Plan Development—In this phase, spatial analysis occurred and options for the management approach were refined, while public participation and expert input continued. This phase culminates with the release of the draft Massachusetts Ocean Management Plan on June 30, 2009.
- Phase 3 - Formal Public Review of Draft Plan—Copies of this draft have been made available as of June 30, 2009, and notice of its availability for public review has been provided in the Environmental Monitor. After the 60-day public comment period, work will continue on revisions, leading to final plan promulgation by December 31, 2009.

## Planning Process

The basic purpose of the ocean management plan is to translate the policy direction and specific requirements of the Oceans Act into a management plan (see Figure ES-1 below). This process entailed: 1) evaluating the Oceans Act and developing plan goals and strategies based on its values; 2) using these strategies to help assess the compatibility and impacts of uses, activities, and facilities allowed under the Ocean Sanctuaries Act with existing uses and marine resources; 3) generating maps that illustrate impacts associated with uses of marine resources; 4) evaluating management options; and 5) developing an ocean plan to accomplish the goals described below that is responsive to the Oceans Act.



The draft ocean plan addresses four goals:

1. Balance and protect the natural, social, cultural, historic, and economic interests of the marine ecosystem through integrated management;
2. Recognize and protect biodiversity, ecosystem health, and the interdependence of ecosystems;
3. Support wise use of marine resources, including renewable energy, sustainable uses, and infrastructure; and
4. Incorporate new knowledge as the basis for management that adapts over time to address changing social, technological, and environmental conditions

Uses, activities, and facilities allowed by the Ocean Sanctuaries Act were analyzed to determine the degree to which they are incompatible with marine resources and other uses, activities, and facilities based on: 1) functional incompatibility (e.g., two uses that cannot physically occupy the same location); 2) the significance of potential impacts to natural resources that have special status under existing law and policy (e.g., a use that could have significant impacts to a Special Aquatic Site protected by the Clean Water Act); and 3) the significance of potential impact to values expressed in the Oceans Act (e.g., areas of high fishing effort and value).

The results of the compatibility assessment were then mapped using available data, and options for management of uses were considered. The management approach selected incorporates both spatial siting standards (where existing data allows) and performance-based measures. On a parallel track, options for identifying and protecting special, sensitive or unique marine and estuarine life and habitats (as required by the Oceans Act) were investigated. State agency staff convened to develop an ecological valuation index (EVI) to identify such areas by systematically evaluating the ecology of Massachusetts waters. To identify and safeguard these special, sensitive or unique areas, the management approach was to protect specific values and functions by limiting the impacts associated with specific uses.

## Management of Ocean Uses and Resources

The ocean plan combines elements of both designated-area and performance standard-based management by establishing three categories of management area: Prohibited, Regional Energy, and Multi-Use. Under this approach, special, sensitive or unique natural resources and important existing water-dependent uses are provided enhanced protection in the siting, development, and operation of new uses, facilities, and activities. Renewable energy facilities are screened through strict compatibility criteria, and—for commercial-scale wind projects—facilities are allowed only in designated areas. The majority of state waters in the planning area remain open to uses, activities and facilities as allowed under the Ocean Sanctuaries Act,

which preserves opportunity for new and emerging uses and flexibility for future changes based on new data and technologies and social values that will change over time.

The draft ocean plan establishes three categories of management area and applies them to Massachusetts ocean waters.

### Prohibited Area

The Prohibited Area is a specific area where most uses, activities and facilities are expressly prohibited by the Ocean Sanctuaries Act, as amended by the Oceans Act.

The Prohibited Area is coincident with the Cape Cod Ocean Sanctuary, within which a variety of uses, activities and facilities are expressly prohibited by the Ocean Sanctuaries Act, as amended by the Oceans Act, and are therefore prohibited under the ocean plan.

### Renewable Energy Areas

Renewable Energy Areas are places specifically designated for commercial wind energy facilities, in recognition of the need to provide opportunity for renewable energy generation at a meaningful scale, but to do so with careful regard for potential environmental impacts. While other renewable energy technologies are allowed in these areas, it does not appear that commercial-scale opportunities for wave or tidal energy exist in the areas given currently available technology.

The draft ocean plan identifies two proposed designated Wind Energy Areas in the vicinity of the southern end of the Elizabeth Islands and southwest of Nomans Land. Adjacent to these areas, EEA has identified potentially suitable locations in federal waters for commercial-scale wind energy development. Comprising 2 percent of the planning area, this territory is capable of supporting 166 wind turbines of 3.6 megawatts each—roughly 600 megawatts total, or enough capacity to power up to 200,000 homes.

### Multi-Use Area

The Multi-use Area is the remainder—and majority—of the ocean planning area, where uses, activities and facilities allowed by the Ocean Sanctuaries Act are managed based on siting and performance standards (associated with specific mapped resources and uses) that direct development away from high value resources and concentrations of existing water-dependent uses.

The majority of the planning area is designated as a Multi-use Area that is open to all uses, activities and facilities allowed under the Ocean Sanctuaries Act except commercial-scale wind energy facilities (11 or more turbines), including but not limited to the following: the extraction of sand and gravel for beach nourishment, aquaculture, cables and pipelines, pilot/community-scale wind energy facilities and wave and tidal energy facilities.

Management in the Multi-use Area is based on specific marine resources that were identified as key components of the marine ecosystem. Management in the Multi-use Area establishes a higher level of protection for special, sensitive or unique resources (SSU) in two ways. First, the ocean plan modifies the MEPA standard of “avoid, minimize or mitigate damage to the environment to the maximum extent feasible” to include a specific siting standard of “avoid, or demonstrate that there is no less damaging practicable alternative, or demonstrate that data does not accurately characterize the resource or use.” Second, the ocean plan prioritizes and maps those resources, providing clear baseline information which will allow proponents, agency staff, and the public to focus on aspects of a given project of greatest potential environmental significance. The draft plan specifies 63 percent of the planning area for protection of these critical marine resources.

For existing water-dependent uses, the Multi-use Area maintains the existing standard of “avoid, minimize or mitigate” but establishes a higher level of review by providing baseline information on concentrations of existing uses, identifying them as significant existing interests, and requiring that potential impacts and mitigation be addressed in MEPA review with the participation of potentially affected interests, as described in the Management Tools section of the plan.

Finally, the Multi-use Area addresses the interests of sustainable uses, renewable energy, and necessary infrastructure by directing them away from impacts to the most significant resources and human activities, but otherwise allowing flexibility in their location and level of regulatory review on a project-specific basis, based on their functional requirements, scale, and potential impacts to existing uses and marine resources. For example, a pipeline project would be required to use the ocean plan’s resource and use maps and identify a route for the project that does not impact whale, eelgrass, intertidal, and hard/complex habitat types; the project would be required to consult with EEA/DMF regarding the site specific fish resource areas associated with potential alternative routes. The project would have the option of demonstrating that it does avoid those resources even in otherwise mapped areas by providing an analysis of the ocean plan’s data, or supplementary data, that indicates that it does not impact the specified resource. If no feasible alternative exists, the project would be required to minimize impacts and provide mitigation for

unavoidable impacts. Similarly, the project would be required under MEPA to evaluate the impacts of alternative routes to areas of high commercial and recreational fishing through characterization of, and consultation with, potentially affected interests within those mapped areas. The project would be required to identify the potential economic impacts of the activity to commercial and recreational fishing as the basis for reviewing alternative routes and compensatory mitigation. Comments from agencies, potentially affected parties, and the public would assist the Secretary in developing an appropriate level of characterization.

## Plan Implementation and Evolution

EEA will continue its leadership role through the implementation of the Massachusetts Ocean Management Plan. The communications and stakeholder processes will continue through plan implementation and evolution. Continued collaboration with the Massachusetts Ocean Partnership will be also pursued. Adapting to evolving knowledge and understanding of the ocean environment will be essential for successful plan implementation. The Science Framework of the Massachusetts Ocean Management Plan provides the blueprint for such adaptive management. It illustrates important information needs and describes the key actions that have been identified to provide the scientific basis for ocean management in the future: ecosystem monitoring, characterization, mapping, and classification; characterizing and mapping human uses and activities; ecosystem models and decision-support tools; applied scientific research; and an integrated data management and communication network.



# Chapter 1 - Introduction

In Massachusetts, rich ocean waters and a spectacular coastline have shaped our history, economy, and way of life. Today, these ecologically and economically vital public resources face unprecedented development pressure and represent potential solutions for new challenges, such as climate change. In addition to traditional ocean uses—recreation and tourism, fishing and shellfishing, and shipping and trade—new proposals for energy, aquaculture, off-shore sand mining, and other activities highlight the need for a comprehensive ocean management strategy.

In response to these challenges, Governor Deval Patrick signed the Oceans Act on May 28, 2008. This ground-breaking legislation requires Secretary of Energy and Environmental Affairs Ian Bowles to develop a comprehensive ocean management plan that balances natural resource preservation with traditional and new uses, including renewable energy. This document presents the draft Massachusetts Ocean Management Plan for public, stakeholder, and Legislative review.

## The Call for Comprehensive Ocean Planning in Massachusetts

In 2003, the Massachusetts Ocean Management Task Force was appointed to examine evolving ocean uses and develop a comprehensive approach to managing ocean resources. Chaired by Susan Tierney, PhD, a former Secretary of Environmental Affairs in Massachusetts and former Assistant Secretary for Policy in the U.S. Department of Energy, the Task Force included 23 private and public sector individuals representing a range of interests, along with representatives of the state Legislature and federal Congressional delegation who participated as ex-officio members.

In March 2004, the Task Force released its final recommendations in the *Waves of Change* report. These recommendations focused on: strengthening state agencies to address environmental, planning, and public trust issues in both state and federal waters; establishing an ecosystem-based protocol to improve management of federal waters; and initiating ocean education and stewardship initiatives.

The Task Force's top recommendation was legislation to require the development of comprehensive ocean resource management plans for Massachusetts ocean waters. This recommendation and the cooperative efforts that followed led to the passage of the Oceans Act of 2008.

## Overview of the Oceans Act

The Oceans Act of 2008 requires the Secretary of the Executive Office of Energy and Environmental Affairs (EEA) to develop an integrated ocean management plan. The following is a summary of the major components of the Act.

### Plan Principles - The "Oceans 15"

The Oceans Act includes 15 directives for plan development, collectively referred to as the Oceans 15. Chapter 3 discusses these directives in more detail. Specifically, the Oceans 15 require that the plan shall:

1. Set forth the Commonwealth's goals, siting priorities, and standards for ensuring effective stewardship of its ocean waters held in trust for the benefit of the public.
2. Adhere to sound management practices, taking into account the existing natural, social, cultural, historic, and economic characteristics of the planning areas.
3. Preserve and protect the public trust.
4. Reflect the importance of the waters of the Commonwealth to its citizens who derive livelihoods and recreational benefits from fishing.
5. Value biodiversity and ecosystem health.
6. Identify and protect special, sensitive, or unique estuarine and marine life and habitats.
7. Address climate change and sea-level rise.
8. Respect the interdependence of ecosystems.
9. Coordinate uses that include international, federal, state, and local jurisdictions.
10. Foster sustainable uses that capitalize on economic opportunity without significant detriment to the ecology or natural beauty of the ocean.
11. Preserve and enhance public access.
12. Support the infrastructure necessary to sustain the economy and quality of life for the citizens of the Commonwealth.
13. Encourage public participation in decision-making.
14. Adapt to evolving knowledge and understanding of the ocean environment.
15. Identify appropriate locations and performance standards for activities, uses, and facilities allowed under the Oceans Sanctuaries Act.

In addition to these provisions, the Oceans Act contains other substantive requirements as discussed below.

## Government Coordination

According to the Act, all state certificates, licenses, permits and approvals for any proposed structures, uses, or activities must be consistent with the plan to the maximum extent practicable. Additionally, the ocean management plan must be incorporated into the Massachusetts Coastal Zone Management Plan. Once incorporated, Massachusetts will have the authority to ensure that federal actions, including permitting decisions, are consistent to the maximum extent practicable with the ocean management plan through the federal consistency requirements of the federal Coastal Zone Management Act. Therefore, in addressing the requirements of the Oceans Act, the ocean management plan must take an integrated approach across levels of government, both in its development as well as its implementation.

## Fisheries Issues

The Act stipulates that the Division of Marine Fisheries (DMF) shall have sole responsibility for developing and implementing any fisheries management plans or fisheries regulations. Furthermore, commercial and recreational fishing shall be allowable uses subject to the exclusive jurisdiction of DMF. In addition, to ensure that the ocean management plan and fisheries management are complementary:

- Plan elements that impact fishing shall minimize negative economic impacts and be reviewed by DMF to develop and recommend to the Secretary of Energy and Environmental Affairs any suggestions or alternatives to mitigate or eliminate any adverse impacts.
- Fisheries management shall be integrated, to the maximum extent practicable, into the plan.

## Appropriate Scale

The Oceans Act amends the Ocean Sanctuaries Act to allow the development of “appropriate scale” renewable energy facilities in ocean sanctuaries (except for the Cape Cod Ocean Sanctuary, where such facilities are not allowed), provided such facilities are also consistent with the Massachusetts Ocean Management Plan. (See Chapter 4 for a definition of “appropriate scale.”)

## Mitigation Fees/Trust Fund

The Act establishes an Ocean Resources and Waterways Trust Fund (“the Fund”) that is to be funded by mitigation fees assessed to ocean development projects,

grants, Legislative appropriations, and income from the investment of amounts credited to the Fund. The fund is intended to restore or enhance marine habitat and resources or compensate for navigational impacts resulting from an ocean development.

Finally, the Oceans Act includes several process-related provisions: It sets the schedule for promulgation of draft and final versions of the plan; includes requirements for formal public review of the draft plan; and provides for an Ocean Advisory Commission and Ocean Science Advisory Committee to assist the Secretary in developing the ocean management plan.

## Marine Spatial Planning and Ecosystem-Based Management

Aspects of two formal methods for developing and organizing information and making management decisions about human uses in the marine environment were used in the development of the Massachusetts Ocean Management Plan: marine spatial planning and ecosystem-based management. The United Nations Educational, Scientific, and Cultural Organization web page on marine spatial planning (<http://www.unesco-ioc-marinesp.be/>) explains that:

Marine spatial planning is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that usually have been specified through a political process. Characteristics of marine spatial planning include ecosystem-based, area-based, integrated, adaptive, strategic and participatory.

Marine spatial planning is not an end in itself, but a practical way to create and establish a more rational use of marine space and the interactions between its uses, to balance demands for development with the need to protect the environment, and to achieve social and economic objectives in an open and planned way.

More than 220 academic scientists and policy experts with relevant expertise signed the *Scientific Consensus Statement on Marine Ecosystem-Based Management*, which was published in 2005 by Communication Partnership for Science and the Sea and written by K.L. McLeod, J. Lubchenco, S.R. Palumbi, and A.A. Rosenberg. This statement defines ecosystem-based management as:

. . . an integrated approach to management that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current

approaches that usually focus on a single species, sector, activity or concern; it considers the cumulative impacts of different sectors.

Specifically, ecosystem-based management:

- emphasizes the protection of ecosystem structure, functioning, and key processes;
- is place-based in focusing on a specific ecosystem and the range of activities affecting it;
- explicitly accounts for the interconnectedness within systems, recognizing the importance of interactions between many target species or key services and other non-target species;
- acknowledges interconnectedness among systems, such as between air, land and sea; and
- integrates ecological, social, economic, and institutional perspectives, recognizing their strong interdependences.

As planning and management disciplines, marine spatial planning and ecosystem-based management have been advanced in alternative configurations that share the common elements of a formalized and iterative process that applies specified deliberative methodologies and information requirements. Principles and practices of marine spatial planning and ecosystem-based management, whether derived from academic expression, conceptual models, or specific application in other ocean management plans, provided one aspect of the basic foundation for the Massachusetts Ocean Management Plan. The plan considered marine spatial planning and ecosystem-based management principles through the prism of other elements of the planning context, including:

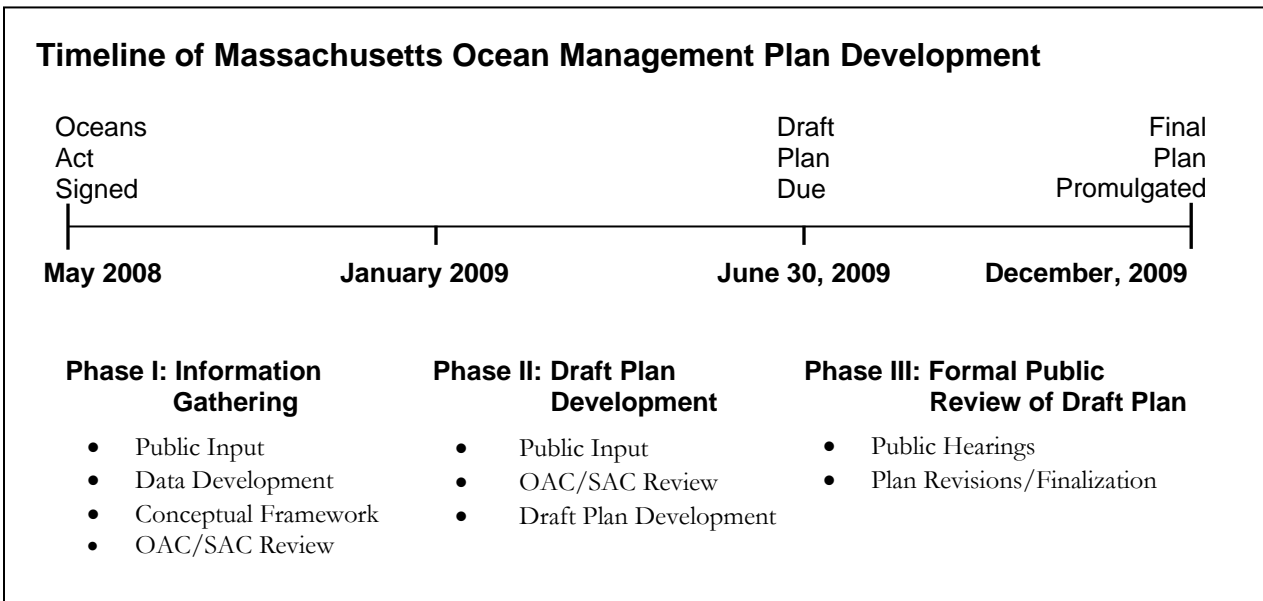
- The Oceans Act as a source for siting priorities and standards.
- Existing state law, particularly the Massachusetts Environmental Policy Act, for siting thresholds and standards.
- Performance standards in Massachusetts agencies' resource and regulatory programs.

Thus, the structure and content of the ocean plan is consistent with, and has been framed carefully to allow for, ongoing incorporation of new knowledge and refined methods relevant to marine spatial planning and ecosystem-based management.

## Overview of the Planning Process

Embracing the charge and intent of the Oceans Act of 2008, EEA developed an inclusive approach to ensure plan development was based on expert input, extensive public

participation, and the best science, data, and information available. The timeline below illustrates the phases and major components of Massachusetts Ocean Management Plan development.



The remainder of this section summarizes the following components of plan development: expert input, state planning staff, public participation, and technical information development.

#### Expert Input

The Oceans Act requires the involvement of two separate panels of experts:

- Ocean Advisory Commission (OAC) - The Oceans Act charged the OAC with assisting the Secretary of Energy and Environmental Affairs in developing the ocean management plan by holding public meetings and making recommendations for the proper management and development of the plan. As directed by the Oceans Act, this 17-member commission includes legislators, agency heads, representatives from a commercial fishing organization and an environmental organization, an expert in offshore renewable energy, and representatives from the coastal Regional Planning Agencies. The OAC provided valuable support in analyzing comments generated through the public participation process; establishing the goals,

strategies, and outcomes for the plan; and reviewing the management approach presented in Chapter 5.

- Science Advisory Council (SAC) - The SAC is made up of nine scientists with expertise in the marine sciences and data management. The SAC was tasked with: reviewing data sources and identifying other viable data, assisting in the development of the baseline assessment and characterization of the ocean planning area, assisting in the development of a set of core indicators of ocean environmental health and plan progress, identifying “big picture” questions to improve understanding of the natural systems and/or human uses and influences, and helping to formulate a long-term strategy for addressing information gaps.

Along with the direct expert input provided to EEA, the open meetings held by the OAC and SAC provided an opportunity for public input into the planning process.

#### State Planning Staff

Staff from EEA and EEA line agencies (Massachusetts Office of Coastal Zone Management, Division of Marine Fisheries, Department of Fish and Game, and Department of Environmental Protection) formed a core group at the state agency level to provide input and feedback during the ocean planning process. A subset of this group focused on developing the management and regulatory measures of the Massachusetts Ocean Management Plan.

#### Public Participation

In addition to the open OAC and SAC meetings, EEA conducted an ambitious public information and participation campaign that included the following:

- Web Sites and Electronic Updates - To provide the public with the necessary information to effectively participate in plan development, EEA launched the Massachusetts Ocean Plan web site. In addition, EEA developed the Public Input Portal for Massachusetts Ocean Planning to provide direct access to video/transcripts of public meetings, an online commenting form, and a log of the public comments submitted. EEA also distributed periodic Ocean Planning Alert emails, available both electronically and in print.
- Public Listening Sessions - In September and October of 2008, EEA held 18 public Listening Sessions in Boston, Eastham, Fall River, Gloucester,

Lowell, Nantucket, New Bedford, Norwell, Oak Bluffs, Pittsfield, Plymouth, Salem, Salisbury, Springfield, West Barnstable, Weymouth, Woods Hole, and Worcester. More than 300 people turned out to give their input on the goals for the ocean management plan. Videos and transcripts of these Listening Sessions were posted on the Public Input Portal to support further public participation, and summaries of the comments provided at the meetings were posted to the EEA Ocean Plan website.

- Ocean Management Planning Principles Workshop - In November 2008, the OAC and SAC held a joint workshop to discuss various aspects of the general practice of marine spatial planning. In addition to OAC and SAC members, 30 individuals participated.
- Data Workshops - In February 2009, twin workshops were held by EEA in Sandwich and Boston to for the public to review draft work group (see below for a description of the work groups) maps and products. More than 40 people participated in the Sandwich workshop and almost 60 participated in Boston.
- Stakeholder Meetings - During the development of the draft plan, EEA held more than 80 meetings with individual interest groups, advocates, industry representatives, and others to answer their questions and solicit their direct input. More than 110 people were interviewed through these meeting and summary reports of their comments were posted on the EEA Ocean Plan website.
- OAC Workshop on Preliminary Plan Components - In May 2009, the OAC held twin workshops in Woods Hole and Boston to discuss preliminary spatial analysis of existing ocean management data, compatibility and impact analysis of ocean uses, and conceptual management measures to be used in the Massachusetts Ocean Management Plan. More than 130 stakeholder representatives attended these workshops.

#### Development of Technical Information

The EEA planning team and agency work groups expended extensive effort in identifying and acquiring available data for plan development. The accuracy, precision, and robustness of these data were continually assessed. A repeatedly asked question was: “Does our level of confidence in these data justify and correlate to the decision we are making?” This rigorous approach allowed all data to be thoroughly vetted and for best professional judgment to be applied in its use.

Much of the existing data was already available through the MORIS, the Massachusetts Ocean Resource Information System, available at [www.mass.gov/czm/mapping/index.htm](http://www.mass.gov/czm/mapping/index.htm). Certain data were available through other agencies and non-governmental organizations; see Appendix 4 for a list of data incorporated into the ocean management plan.

Additional data acquisition efforts, particularly related to recreational activity and commercial and recreational fishing, provided further data for incorporation into the ocean management plan. To collect and analyze this additional information, EEA worked with state agency staff and the Massachusetts Ocean Partnership. Reports stemming from these efforts and detailing their results are available electronically at [www.mass.gov/czm/oceanplan/index.htm](http://www.mass.gov/czm/oceanplan/index.htm) and summarized below.

- Technical Work Group Reports - Work groups made up of state agency staff and members from federal agencies, academia, the renewable energy industry, and non-governmental organizations were charged with assembling available natural resource and human use data to be used in plan development. These work groups were organized topically and covered: habitat; fisheries; transportation, navigation, and infrastructure; sediment; recreation and cultural services; and renewable energy. Much of the data used in the plan stemmed from these work group reports, and members of the habitat and fisheries work groups formed the core staff that worked on the Ecological Valuation Index (described more fully in Chapter 3).
- Qualitative Commercial Fishing Information - EEA staff met with commercial fishermen in meetings up and down the coast to discuss the development of the ocean management plan and concerns of fishermen. At several of these meetings, fishermen used maps and National Oceanic and Atmospheric Administration charts to provide information regarding the locations of particular fisheries in the planning area, type of gear used, and seasonal restrictions.
- Qualitative Recreational Fishing Information - The Division of Marine Fisheries performed a coast-wide survey of recreational fishing interests to identify areas of concentrated recreational fishing activity. While this survey was not designed to be statistically accurate, it provided useful information for planning purposes.
- Qualitative Recreational Use Information - The Massachusetts Marine Trades Association developed a series of maps indicating areas of concentrated recreational activity throughout the planning area.

- Automated Information System (AIS) - The Stellwagen Bank National Marine Sanctuary provided AIS information for the planning area and adjacent federal waters. This data captures the tracks of commercial vessels 300 tons and up. This information was digitized with the assistance of the Massachusetts Ocean Partnership and used to identify areas of the planning area used by commercial vessel traffic.
- Vessel Monitoring System (VMS) - The Gloucester office of the National Marine Fisheries Service provided VMS information for the planning area and adjacent federal waters, which indicates the tracks of commercial fishing vessels that are fishing in federal waters. This information was digitized with the assistance of the Massachusetts Ocean Partnership and used to identify areas of the planning area traversed by commercial fishing vessels fishing in federal waters.
- Assessment of Human Activities in the Planning Area - Through funding provided by the Massachusetts Ocean Partnership, scientists from the National Center for Ecological Analysis and Synthesis at the University of California-Santa Barbara mapped the footprint and preliminarily assessed the impact of certain human activities in the planning area.
- Science Tools to Implement Ecosystem-Based Management in Massachusetts - Through funding provided by the Massachusetts Ocean Partnership, the consulting firm MRAG Americas provided an overview and recommendations regarding the application of ecosystem-based management principles to the Massachusetts Ocean Management Plan. This report also provided an overview of decision support tools and ecosystem models.
- Planning Framework Review - The Massachusetts Ocean Partnership funded a team of consultants to review ocean management efforts outside of Massachusetts to identify applicable aspects for the approach to the ocean management plan. This team provided recommendations for the overall framework for the ocean management plan.
- Development of Mitigation Framework Options - Through funding provided by the Massachusetts Ocean Partnership, the firm IEC reviewed previous ocean development projects in Massachusetts and interviewed involved parties. The purpose of this study was to provide recommendations for developing a framework for how to develop an approach to mitigation for ocean development in the future.

# Chapter 2 - Plan Context

This chapter provides an overview of the existing natural resource, human use, and regulatory factors that form the basic context for the development of the Massachusetts Ocean Management Plan. It includes a description of the ocean management planning area; a brief overview of the natural resources, human uses, marine economy, and regions within the planning area; and a summary of the most pertinent regulations that currently govern management of ocean resources and uses in the Commonwealth.

## Description of the Planning Area

The Oceans Act of 2008 specifies that the ocean management plan “shall include any waters and associated submerged lands of the ocean, including the seabed and subsoil, lying between the line designated as the ‘Nearshore Boundary of the Ocean Management Planning Area’ . . . and the seaward boundary of the commonwealth.” Figure 2-1<sup>1</sup> provides a map of the planning area.

The seaward extent of the planning area is coterminous with the seaward extent of state jurisdiction, which is generally three nautical miles offshore except in certain areas (such as offshore of Boston and north of Cape Cod Bay—see Figure 2-1). The landward limit of the planning area is a line 0.3 nautical miles seaward of mean high water, although it is further from shore in certain places (such as offshore Boston Harbor—see Figure 2-1). By choosing this landward limit, the Legislature explicitly excluded most developed harbor and port areas from the planning area to ensure that the plan was a “blue water” effort focused away from direct harbor- and port-related issues.

Figure 2-2 depicts several jurisdictional boundaries adjacent to and within the ocean planning area. Five designated ocean sanctuaries are present in the ocean planning area. A majority of the ocean planning area is included in an ocean sanctuary, with the exception of the area seaward of Boston Harbor and extending south to Marshfield and then east toward Race Point—see Figure 2-2. Stellwagen Bank National Marine Sanctuary is to the east of and directly adjacent to the planning area in Massachusetts Bay. As indicated on Figure 2-2, the planning area is also bordered by Cape Cod National Seashore and the Boston Harbor Islands National Recreational Area; National Wildlife Refuges are located on Plum Island, in Mashpee, south of Chatham on outer Cape Cod, and southwest of Martha’s Vineyard (Nomans Land).

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<sup>1</sup> For production purposes, all color figures are placed at the end of the Draft Massachusetts Ocean Management Plan.

The deepest areas in the planning area are generally east of Cape Ann and in the eastern part of Massachusetts Bay (Figure 2-3). Much of southern Cape Cod Bay, Buzzards Bay, and Nantucket and Vineyard Sounds are relatively shallow.

## Natural Resources in the Planning Area

The more than 2,000 square miles of ocean waters in Massachusetts contain an abundance of important natural resources. Our understanding of the locations where different species exist or frequent during some part or all of their life (and importance of those locations) is continually evolving and has grown during the development of the ocean management plan. The following pages provide a brief overview of select species, focusing in particular on those species and their habitats with existing data that could be used in the development of the ocean plan. This section is not intended to be an exhaustive overview of all natural resources in the planning area. For additional details, see the Baseline Assessment provided in Volume 2 of the Massachusetts Ocean Management Plan.

Figure 2-4 illustrates selected bird resource areas, including habitat for the federally endangered Roseate Tern (as determined by Massachusetts Natural Heritage and Endangered Species Program biologists), areas important to other tern species of special concern, areas of important Long-tailed Duck habitat, Leach's Storm Petrel important nesting habitat areas, and important nesting habitat areas for colonial water birds. Figure 2-5 depicts fisheries resources, ranked by Division of Marine Fisheries (DMF) biologists in terms of their importance based on DMF's 30 years of fish resource trawls in state waters. Figure 2-6 illustrates shellfish and crustacean resources found in the planning area. Figures 2-7 a, b, and c illustrate sightings data for Fin, Humpback, and North Atlantic Right Whales, respectively, all of which are federally endangered species. Figures 2-7 a, b, and c also illustrate seal haul-out areas.

Seafloor mapping (bathymetry and surficial geology) is occurring in Massachusetts waters through a partnership with the U.S. Geological Survey. The results of this mapping will form a critical component for the identification and classification of benthic habitats. This mapping is still in progress, as is the development of a habitat classification system that will incorporate this data into the development of habitat maps. In the absence of completed habitat maps, other existing data can be used to provide insight into seafloor features and habitats. Figure 2-8 illustrates such data, including surficial sediments, intertidal flats and eelgrass areas, and rugosity (which is a measure of the variation in the sea bottom—areas with high rugosity have more topographical relief).

## Ecosystem Services of Massachusetts Ocean Waters

“Ecosystem services” is the collective term for the uses, goods, and benefits that humans derive from natural systems. As detailed in the Baseline Assessment in Volume Two of the Massachusetts Ocean Management Plan, the services provided by Massachusetts estuarine and marine waters have evolved over time, and many of the uses discussed below currently extend throughout the planning area. As with the natural resource section above, this section is intended to provide a general overview of human uses, focusing on those that became focal points in the development of the Massachusetts Ocean Management Plan.

### Transportation and Navigation

The ocean planning area provides access for an array of transportation and navigational uses. Massachusetts is a primary shipping destination on the Atlantic seaboard, and its ports provide the required facilities for commercial shipping and cargo handling. Products include fuel (of different types), container and bulk goods and products, fish, and other cargo. In addition to commercial shipping, the ports of Massachusetts also offer facilities for cruise ships and passenger handling, serving as important ports of call and providing facilities for the growing cruise ship industry. Ferries and commuter boats provide links to the Commonwealth’s islands and popular tourist and commuter destinations. Figure 2-9 depicts a variety of navigational uses, including shipping lanes, pilot boarding areas, U.S. Coast Guard-designated precautionary areas, and ferry routes. Also shown on Figure 2-9 are Automatic Information System (AIS) and Vessel Monitoring System (VMS) data, representing commercial ship traffic greater than 299 tons and commercial fishing vessels fishing in federal waters, respectively.

### Infrastructure

The ocean planning areas and its adjacent waters and lands support critical infrastructure facilities and appurtenant structures and connections including: several fossil fuel energy generating facilities, a nuclear facility, submarine communications and electric cables, discharges from wastewater treatment plants, industrial process water and stormwater discharges from commercial and industrial facilities, and two permitted ocean disposal areas. Existing infrastructure (cables, pipelines, dredge disposal areas, and lighthouses) is shown in Figure 2-10.

### Commercial Fishing

Commercial fishing by means of mobile and fixed gear (trawls, dredges, longlines, pots, weirs, and gill nets) is extensive in the planning area. The major fisheries in

Massachusetts include shellfish (including scallops, conch, quahogs, and surf clams), finfish, lobsters, crabs, and urchins. New Bedford, Gloucester, Provincetown, and Boston are home to the state's major commercial fleets, but nearly all harbors and inlets in Massachusetts support some type of commercial fishing activity.

Commercial fisheries activity at a broad, statewide level is shown in Figure 2-11, which indicates areas of varying importance to commercial fisheries from the standpoint of effort and value. In addition to this statewide analysis, Executive Office of Energy and Environmental Affairs (EEA) staff met with commercial fishermen to obtain an understanding on a smaller scale (related to an individual port) of the types of fisheries, gear employed, and seasonal restrictions in place. An example of the qualitative results from these meetings is included in Figure 2-12.

### Recreational Boating

Recreational boating includes a wide array of activities such as personal pleasure cruising, destination-based personal navigation, fishing, diving, and wildlife viewing. Recreational fishing occurs throughout the planning area and over a million anglers regularly use the waters of the planning area for recreational fishing, primarily by hook and line. Recreational fishing for lobster and crab using pots, and recreational shellfishing with various handgears in the nearshore areas, are also very popular. Figure 2-13 illustrates areas identified through a DMF survey as important to recreational fishing. Figure 2-14 shows areas important for recreational use, according to results from the Massachusetts Marine Trades Association, along with boat registrations on a town-by-town basis, boating access sites, marinas, and recreational dive sites.

### Renewable Energy

Massachusetts has no fossil fuel reserves but has substantial renewable energy resources. Offshore wind energy will play a significant role in meeting current and future energy needs, strengthening national energy security, and reducing greenhouse gas emissions. The Massachusetts coast and offshore areas offer considerable wind power potential, classified as excellent to outstanding by the U.S. Department of Energy National Renewable Energy Laboratory. With its proximity to major urban demand centers, Massachusetts is a prime candidate in the pursuit of sustainable development of offshore wind resources. Figure 2-15 shows the offshore wind resources in and beyond the planning area. Figure 2-15 also includes proposed tidal energy locations (from Federal Energy Regulatory Commission applications), tidal current information, and the location of the proposed Marine Renewable Energy Center (MREC) test area.

## Aquaculture

Aquaculture is another vital use in the planning area. Currently, Massachusetts's exclusive form of commercial marine aquaculture is shellfish, and several methods of cultivation are used to grow quahogs, oysters, bay scallops, soft shell clams (and to a lesser extent surf clams and blue mussels). Existing aquaculture in the ocean planning area is limited to areas in/around Wellfleet Harbor. With technological advances and improved understanding of oceanographic conditions, offshore aquaculture has considerable promise for the future.

## Sand and Gravel

Extensive sand and gravel resources exist in state waters. Projects to address severe erosion and public infrastructure and safety issues through the extraction of sand and gravel and onshore placement for beach and shoreline stabilization/nourishment have been permitted outside the planning areas, but none has yet occurred within the planning area. With the growing threats of coastal erosion and inundation through the effects of increasing sea-level rise and storm frequency and intensity, however, there will be an increase interest in sand and gravel extraction from the planning area.

## Military

A diverse suite of military activities, from bombing to dredging to ports of call, historically occurred in and over the planning area. While the use of live ordinance has decreased or completely ceased, military training exercises continue by the Air National Guard, Army Corps of Engineers, Coast Guard, and Navy.

## Other Uses

Other important uses of the Commonwealth's estuarine and marine systems include recreation and tourism, educational and scientific activities, historical and archeological sites, and services for aesthetic, cultural, and religious purposes. Figure 2-16 depicts boating access, historic, and submerged shipwreck sites in the ocean planning area.

The information provided above indicates that Massachusetts waters are heavily used. Additional work funded by the Massachusetts Ocean Partnership conducted by the National Center for Ecological Analysis and Synthesis at the University of California Santa Barbara also attempted to look at the cumulative impact of human uses. Preliminary results of this effort are shown in Figure 2-17, which verifies that Massachusetts waters are relatively heavily used and that no location is untouched by human uses.

## Marine Economy

While many uses of ocean waters are important to commerce, trade, and industry, a study prepared by the Donahue Institute of the University of Massachusetts found that five major sectors drive the Commonwealth's marine economy, with a combined total annual output of \$14.8 billion (in 2004 dollars). Information about the major marine economy sectors is provided below. (Unless otherwise specified, all figures are from the Donahue Institute.)

### Tourism and Recreation

Coastal tourism and recreation—which includes recreational fishing and recreational boating—had the highest annual output at \$8.7 billion in 2004. Marine-related recreation and tourism is also a significant employer in the state—the largest marine sector by far. Recreational boating activity is extremely important in this sector, and according to statewide information compiled by the Massachusetts Marine Trades Association, in 2007 there were nearly 200,000 registered recreational boats and Massachusetts boaters spent about \$383 million on boating-related trips. The total economic value of recreational boating—including multipliers—was \$3 billion in 2007.

### Commercial Seafood

The commercial seafood sector has deep cultural and historical roots in the Commonwealth. The 2004 value of commercial seafood sector—comprised of fishing and fishing supplies, marine aquaculture, seafood processing and wholesaling, and retail and food service seafood sales—was \$1.6 billion. As discussed below, commercial fishing is important in each of the five regions of the ocean planning area. According to the National Marine Fisheries Service, in 2007, Massachusetts ranked second only to Alaska in terms of value (by landings) in the United States. New Bedford was the top-ranked port by value with \$268 million, while Gloucester is ranked fourteenth with \$46.9 million. It is believed that these values are conservative, underestimating the value of commercial landings because of their focus on landings of species from federal waters. DMF reports that individual species with more than \$5 million in annual landed value in 2007 include sea scallop, lobster, monkfish, cod, haddock, winter flounder, Atlantic sea herring, yellowtail flounder, skates, and witch flounder. Two species—scallop and lobster—combine to approach 50% of the total landed value of all species. The Massachusetts aquaculture industry is also very important and is a growing trade. In 2006, DMF estimated the aquaculture sub-sector to be comprised of 374 aquaculture farms worth an estimated \$6.3 million in sales.

## Transportation

The 2004 annual output for the marine transportation sector was estimated at \$529 million. Among other services, the sector includes foreign and domestic freight and cargo, water passenger transportation, and towing and tugboat services. There are seven major customs ports in Massachusetts: Boston, Fall River, Gloucester, New Bedford, Plymouth, Provincetown, and Salem. In the past decade, increases in the volume traded at Massachusetts ports have been greater than the general increases seen in volumes traded at all the nation's North Atlantic ports. However, channel depth at Massachusetts ports will limit future growth because of the changing characteristics of the cargo fleet toward significantly larger, deeper-draft vessels. The ships calling now are carrying the maximum load possible given the port's channel depths. Besides commercial shipping, the ports of Massachusetts also offer facilities for cruise ships and passenger handling, serving as important ports of call and providing facilities for the growing cruise ship industry valued in the hundreds of millions.

## Science and Technology

Massachusetts is one of the top ten states in the nation in the marine science and technology industry—and the dominant state in New England—in terms of the concentration of employment and economic activity. Specifically, the marine science and technology sector has an annual output of \$1.2 billion in Massachusetts. In this sector, there are significant value-added products and high-wage subsectors, which generate substantial local buying power and thus additional demand for goods and services within the state. In Massachusetts, the marine science and technology sector has the highest average wages and a very high employment multiplier (e.g., for every job generated in this sector, an additional 1.27 jobs are generated in the state economy). In 2004, sponsored marine research at higher education research institutions in the Commonwealth was valued at more than \$170 million.

## Construction and Infrastructure

Marine-related construction and infrastructure, with annual production of \$2.8 billion in 2004, serves as a foundation for much of the marine industry. This sector provides capacity for other marine economy sectors to expand through such efforts as maintenance and improvement of ports and navigation channels, construction and operation of gas pipelines and electric and telecommunication cables, and the beneficial re-use of dredged material for beach nourishment. In the future, the marine-related construction and infrastructure sector will assume a stronger role because of investments in marine renewable energy and shore protection projects—like dredging for beach nourishment and the construction of seawalls, groins, and jetties.

## Regional Overview

Massachusetts's ocean waters present distinct regional differences. The following is a brief and very general overview of the natural resources, industrial/shipping activities, commercial uses and fisheries, recreational activities, and other major ocean uses in five regions of the ocean planning area: North Shore, Boston Harbor, South Shore, Cape and Islands, and South Coast.

### North Shore

Following the coastline from Salisbury to Revere, the ocean planning area for this region extends seaward to the three-mile limit of state territorial waters around Cape Ann; south of Cape Ann, state waters (and the planning area) extend farther seaward to a state jurisdictional line running from Cape Ann to Scituate.

- **Natural Resources** - North of Cape Ann is generally a sand and flat bottom coast with a significant barrier beach/saltmarsh system, which serves as a stopover on the Atlantic Flyway for migratory birds. South of Cape Ann is characterized by hard bottom and relief. The Great Marsh, which comprises over 25,000 acres of beach/marsh habitat across the Essex Bay and Plum Island Sound area, defines the coastal character of the region and provides habitat for many ocean-dwelling fish species. The Merrimack River is a major run for diadromous fish and contains populations of endangered fish species. Jeffries Ledge north of Cape Ann is a major geographic destination for fishing and boating. Whales and other marine mammals frequent North Shore waters, particularly east and south of Cape Ann. The water quality is good outside of harbors and embayments, but enclosed and/or populated areas typically experience some impairment of water quality in the immediate vicinity of sewage outfalls and, more broadly, following periods of significant rain, leading to temporary closures of shellfish beds.
- **Industrial Activity and Shipping** - In general, only Gloucester and Salem are hubs of industrial activity in the North Shore area of the state's oceans. Both of these ports have industrial shipping activity supported by major federal navigation channels. There is a transitway offshore and parallel to the coast for ships heading north from Boston to destinations in Maine, New Brunswick, and Nova Scotia. Sewage outfalls are located along the coast (Newburyport, Ipswich, Rockport, Gloucester, Manchester, Salem, and Lynn). Salisbury to Gloucester is characterized by a lack of industrial features other than sewage outfalls. The Merrimack River carries industrial effluent, including treated sewage and industrial process water, to the ocean waters of this region.

- Commercial Uses and Fisheries - Commercial fishing (all kinds, including charters, party boats, etc.) and boating (whale watching, kayak tours) occur extensively in the nearshore waters. The Merrimack River, Cape Ann, and Salem Sound areas are homeport to significant fleets of fishing and tourism vessels, and the Annisquam River is also heavily used for tourism and recreational fishing purposes. Gloucester serves as a homeport for many vessels that fish in federal waters; a main transit-way for such vessels extends southeast of Gloucester to Stellwagen Bank. Essex Bay and Plum Island Sound are areas of significant commercial use by ecotourism businesses. While lobster potting occurs in virtually all nearshore waters, it is generally concentrated within the 120-foot depth line. The waters between Nahant and Manchester and between Gloucester and Rockport are the two most productively fished areas in the region, making up a large percentage of the total state lobster catch. Dragging, gillnetting, and lobster potting occur from Eastern Point south through Massachusetts Bay; dragging and scallop dredging occur in Ipswich Bay.
- Recreational Activity - Recreational boating occurs throughout North Shore waters, and every harbor and port supports some level of boating activity. The Merrimack River, Plum Island Sound, Essex Bay, Cape Ann, and Salem Sound are major hubs of recreational activity; the near-shore areas between Boston, Salem, and Cape Ann are heavily used by boaters, including those transiting between locations. The Annisquam River/Blynman Canal is a major recreational feature that connects Ipswich Bay and Massachusetts Bay. Recreational boating destinations include nearshore fishing locations, all of Cape Ann for diving, Stellwagen Bank, and the Isles of Shoals, particularly for boaters out of the Merrimack River. The Great Marsh is a major recreational destination. North of Cape Ann is characterized by public beaches of regional and national significance.
- Other - The U.S. Coast Guard has stations in Newburyport and Gloucester.

During the development process for the Massachusetts Ocean Management Plan, stakeholders in the North Shore raised the following major issues:

- Economic, social, and traditional importance of commercial and recreational fishing to North Shore communities.
- Minimization of conflicts between new and traditional uses of ocean resources.
- Continued viability of tourism and other aspects of the coastal economy.
- Continued public involvement in the development and implementation of the ocean management plan.

- Opportunity for new uses of the ocean to provide jobs and address other policy issues, such as meeting renewable energy goals and providing opportunities for sediment for beach nourishment.

## Boston Harbor/Massachusetts Bay

Covering the coastal communities from Winthrop to Weymouth, state ocean waters in this region extend seaward into Massachusetts Bay to the jurisdictional line running from Cape Ann to Scituate. As stipulated in the Oceans Act of 2008, however, the coastal waters of Boston Harbor (marked by a line running from Winthrop to Hull) are not included as part the ocean planning area (see Figure 2-1).

- **Natural Resources** - Massachusetts Bay is characterized by diverse seafloor environments, including hard bottom and intertidal ledges; areas of gravel, cobble, and sand; and deeper areas where mud and clay accumulate. Despite the high human use of the region, these diverse subsurface characteristics provide important habitat for a variety of species. Most notable are juvenile lobster, which are found in sand and gravel areas. Humpback, finback, and right whales are found in Massachusetts Bay. Fringing Massachusetts Bay are productive and healthy eelgrass beds, which offer refuge and an opportunity for recruitment of lobsters and commercially and recreationally desirable fish (e.g. winter flounder and cod) to the rest of the bay. The Massachusetts Water Resources Authority (MWRA) treatment plant, which treats the sewage from metropolitan Boston communities and releases treated effluent nine miles offshore, has significantly improved nearshore water quality since it began operation in 2000. Monitoring of Massachusetts Bay water quality does not appear to show significant adverse impacts from the outfall, although the potential for chronic impacts continues to be studied. Stellwagen Bank National Marine Sanctuary, which is eastward of the state ocean waters of this region, is highly productive area of nutrient upwelling that provides abundant food for a variety of species of fish, marine mammals, and sea birds. Given the proximity to this important feeding ground, several whale species frequent Massachusetts Bay waters, including the endangered humpback and northern right whales.
- **Industrial Activity and Shipping** - Boston is a maritime industrial hub for New England, and consequently, ocean uses centered around port activity dominate the surrounding waters. The Port of Boston has direct calls by large container vessels from Europe and the Far East, and 14 million tons of bulk cargo enter its waters each year. In 2002, 250,000 cruise passengers and more than 100,000 automobiles came across its docks. Shipping traffic enters

and leaves Boston Harbor from all directions, with the shipping lanes east of Boston Harbor and south to and from the Cape Cod Canal being main traffic routes; vessels also head to the north and northeast out of Boston. The Port of Boston is estimated to have an \$8 billion impact on the economy, producing more than 9,000 direct jobs. The Conley container terminal, the complex of uses on the Mystic River, Logan Airport, and Chelsea Creek are major industrial features. The Fore River Shipyard in Quincy (whose use is discontinued) and Weymouth Back River with its gas pipeline and ships carrying petroleum products are areas of localized industrial activity. The federally designated Massachusetts Bay Disposal Site for dredged material is located just outside state waters on the edge of the Stellwagen Bank National Marine Sanctuary, and historical dumping grounds are noted on National Oceanic and Atmospheric Administration charts and include two prominent areas: the Boston Lightship site and the Industrial Waste Site (IWS). A natural gas pipeline (the Hubline) extends from Weymouth to Salem, and two offshore liquefied natural gas ports have pipelines that connect to the Hubline east of Marblehead.

- Commercial Uses and Fisheries - Boston Harbor supports a major concentration of commercial uses, with the greatest commercial activity occurring around and landward of the Boston Harbor Islands (most of which is landward of the ocean planning area). Commercial fishing vessels, dive charters, and passenger ferries frequent the nearshore waters of the region. Farther offshore, Stellwagen Bank and neighboring waters support whale watching and charter and party boat operations. Major commercial routes crisscross Massachusetts Bay connecting Boston to the Cape Cod Canal, Provincetown, and Stellwagen Bank. Massachusetts Bay is heavily used for commercial fishing, and supports a major lobster fishery, groundfish dragging, gillnetting, and charter and party boats. Generally, dragging occurs where the bottom is flat and open; other gear is used on areas of greater relief.
- Recreational Activity - Recreational boating is significant throughout Massachusetts Bay. Major destinations include Stellwagen Bank for fishing and whale watching and the Boston Harbor Islands for boating, hiking, fishing, and diving. Major recreational routes connect Boston with the Harbor Islands, Cape Cod Canal, Annisquam River, Provincetown, and Stellwagen Bank. Recreational fishing, particularly for striped bass, is an important ocean use throughout the region, and diving occurs at numerous nearshore areas.

- Other - The U.S. Coast Guard has a station in Boston. Military vessels from the U.S. Navy and other countries visit Boston occasionally; some repair/service facilities for military vessels are also available.

Major issues raised by stakeholders in the Boston Harbor/Massachusetts Bay region included:

- Minimizing conflict with existing uses of ocean waters, including commerce (shipping), recreational uses, and commercial fishing.
- Protection of important species and habitats.
- Ecosystem-based management as a foundation for the ocean management plan's approach.
- Acknowledgement of activities and uses outside of the planning area.
- Continued public involvement in the development and implementation of the ocean management plan.
- The potential for ocean sediment resources to provide material for beach nourishment.

### South Shore

Extending from Hingham to Plymouth, this region includes ocean waters along the South Shore that extend seaward to the jurisdictional line from Cape Ann to Scituate, then out to the three-mile limit in the Scituate and Marshfield area, and out into Cape Cod Bay in the southern end of the region.

- Natural Resources - The South Shore coastline is predominantly sand and cobble beaches interspersed between rocky outcroppings and coastal drumlins to the north and high coastal banks to the south. Erosion is an issue, particularly on the beaches and coastal banks. Nearshore gravel and cobble beds support juvenile lobster. Cape Cod Bay is a more protected and less dynamic, although erosion of coastal banks along the edge of the Bay can be considerable. This relatively shallow, flat embayment is characterized by sandy/silty sediments, sandier to the northwest and siltier to the southeast. A large portion of Cape Cod Bay is designated critical habitat for northern right whales, which typically inhabit the waters during winter and early spring, although individual whales may periodically stay on later in the year. Humpbacks, other species of whales, other marine mammals, and turtles also frequent these waters. The water quality is generally good, but in some areas, rain events flush septage from nearshore leach fields and other

nonpoint source pollution from developed areas into coastal waters, leading to temporary and localized closures of shellfish beds.

- Industrial Activity and Shipping - There are relatively few industrial uses on the South Shore and in Cape Cod Bay. Scituate, Marshfield, and Plymouth have nearshore sewage outfalls, and the water-cooled Pilgrim Nuclear Power Station in Plymouth is the only major industrial facility in the region. The Cape Cod Canal supports small- and medium-sized commercial ship traffic to and from Boston and points north; tugs and barges carrying petroleum products represent the majority of the industrial traffic, which runs parallel up the western coast of the bay to Boston and points north.
- Commercial Uses and Fisheries - Commercial boating, including fishing operations (finfish, lobster, and charter), whale watching, sightseeing, and commuter ferry service out of Hingham, are major uses in this region. Lobster potting in South Shore waters account for a significant portion of the state lobster catch. Groundfish dragging and localized scallop dredging occur in Cape Cod Bay and there is significant fishing for tuna, bluefish, striped bass, and shark. The harbors of Marshfield, Scituate, Duxbury, and Plymouth support major commercial fleets, and the remaining harbors and inlets of the region support some level of commercial fishing activity. Duxbury has significant intertidal aquaculture activities and many South Shore towns have shellfish seeding programs to enhance the local shellfish resource for commercial and recreational diggers.
- Recreational Activity - Fishing, diving, and sailing are major uses of South Shore and Cape Cod Bay waters. Marshfield, Scituate, Duxbury, and Plymouth harbors also support major recreational boating activities and supporting infrastructure, such as boatyards, marinas and yacht clubs. Stellwagen Bank is a major destination for recreational fishing and boating. The beach and nearshore areas along the entire periphery of the region are heavily used for swimming, boating, kayaking, strolling, and fishing. Recreational diving and potting for lobster occurs throughout the region.
- Other - The U.S. Navy periodically conducts small fleet maneuvers in the waters between the Cape Cod Canal and Massachusetts Bay off Boston Harbor.

Stakeholders in the South Shore region raised the following major issues:

- Importance of commercial/recreational fishing and recreational uses in the region.
- Reduction of potential conflict between traditional uses of ocean resources and potential new uses.
- Protection of important natural resources.
- Continued public involvement in the development and implementation of the ocean management plan.

### Cape Cod and Islands

This region covers the largest portion of the ocean planning area and includes: Cape Cod Bay from Bourne to Provincetown, the waters of the Atlantic Ocean three miles out from Provincetown to Monomoy, all of Nantucket Sound to the state jurisdictional boundary line, and the area out to the three-mile state limit around the rest of the Cape Cod, Martha's Vineyard, and Nantucket.

- Natural Resources - Cape Cod and the Islands are characterized by sandy barrier beaches backed by coastal dunes and banks along much of the coast, with dozens of coastal embayments and estuarine harbors scattered along the coastline. The surrounding waters vary from the very shallow depths of Nantucket Sound and the Nantucket Shoals, to the deeper waters of Cape Cod Bay and Vineyard Sound, to the ocean depths immediately off the eastern shore of Cape Cod. In this area to the east, the bathymetry quickly reaches depths of 100 feet and more, with the area subject to significant unimpeded wave energy; the shallower and more protected waters along much of the rest of the coastline are much more quiescent by comparison. There are thousands of acres of salt marsh, and the area is significant to several endangered species of birds (including Roseate Terns) and vegetation. The numerous estuaries, embayments, and tidal rivers found in this region provide excellent habitat for a variety of fish and shellfish species, and help support a strong local shellfish industry. The Cape Cod National Seashore includes portions of six of the outer cape towns, and the Cape is also home to the Mashpee and Monomoy National Wildlife Refuges (NWR); Nomans Land southeast of Martha's Vineyard is also a NWR. Billingsgate Shoal, off Wellfleet in Cape Cod Bay, is a major submarine feature and forage ground for gamefish. As mentioned above, Cape Cod Bay is critical habitat for the endangered northern right whale. Other species of whales, marine mammals, and turtles also inhabit the Bay. The water quality is generally good and locally excellent (e.g., Wellfleet Harbor is designated as a body of

Outstanding Resource Water), although there are significant concerns with eutrophication in embayments on the lower Cape.

- **Industrial Activity and Shipping** - The industrial uses of the area are primarily related to fuel transport and storage. There are tank facilities located in Vineyard Haven Harbor on Martha's Vineyard and on Nantucket. Fuel is transported by barge to both of these facilities in significant quantities. Small coastal cruise ships call at Martha's Vineyard, Nantucket, and occasionally Provincetown. There are also industrial transport activities associated with the year-round ferry service to the islands from Hyannis and Woods Hole. Woods Hole also supports a fleet of deep sea research vessels and fisheries vessels operated by the National Oceanic and Atmospheric Administration and National Marine Fisheries Service. The Cape Cod Disposal Site, a state-designated site for dredged material, is located in state waters off Wellfleet. Designated in 1994, the site has been used by municipal and private facilities located in surrounding communities. The site is closed from January to mid-May to avoid impacts with northern right whales.
- **Commercial Uses and Fisheries** - Commercial fishing takes place with various fleet sizes in many of the harbors across the Cape and the Islands. While many smaller day trip boats dock at harbors such as Hyannis, Oak Bluffs, and Menemsha, the most significant efforts take place from Aunt Lydia's Cove and Stage Harbor in Chatham, and from MacMillan Pier in Provincetown. Fisheries include lobster potting; fish, scallop and quahog dragging; and commercial-scale tuna and other finfish efforts. Hyannis, Falmouth, Menemsha, Oak Bluffs, and Nantucket host large charter fishing fleets, and Rock Harbor in Orleans is home to one of the biggest charter fishing fleets in the northeast. Additionally, whale watching and eco-tourism operations embark from several harbors in the region. Shellfish aquaculture is a major nearshore (intertidal) commercial use, particularly along the eastern shoreline of Cape Cod Bay in the Wellfleet area.
- **Recreational Activity** - The entire region is largely dependent on tourism and therefore on the accommodation of recreational activities and the environmental conditions necessary for the support of that economy. The Cape hosts the largest whale watching fleet on the east coast, with the majority of the vessels operating from Provincetown throughout Cape Cod Bay and Stellwagen Bank. Recreational boating popularity has increased substantially throughout the region during the past decade and there are more than 50 boat yards and other boat service facilities located on the Cape and Islands. The Cape and Islands are a very popular destination for cruising

boats, and vessels from all over the world visit the region during the summer months. The region is known for abundant winds, and all forms of sailing activities take advantage of this. Numerous sailing regattas are held annually, attracting sailing vessels from all over New England. Wind surfing and wind kiting have become very popular, and kayaking has become very popular in recent years due to the many estuaries, embayments, and tidal rivers that provide excellent areas for these small craft. Stellwagen Bank and Billingsgate Shoal off Wellfleet are major destinations for recreational fishing boats from the upper Cape, and recreational lobster diving and potting is also significant throughout the region.

- Other - The 23,000-acre Massachusetts Military Reservation (MMR) is located within the towns of Sandwich, Mashpee, Falmouth, and Bourne. MMR is home to units of the Massachusetts Army National Guard, Air Force Reserve, and Coast Guard. In addition to its air field and aircraft support facilities, field training and anti-terrorism training are conducted on the base. As a result of the various military activities over the years, there are several ground contamination sites located on and around MMR and remediation efforts are underway on many of these sites. Nomans Island, off the southwest shore of Martha's Vineyard, was used by the military as a bombing-practice site for decades and is not currently open for public access due to the presence of unexploded ordinance. However, it has been subject to some clean-up efforts and is currently under the management of the U.S. Fish and Wildlife Service as a wildlife refuge. The U.S. Coast Guard has stations in Provincetown, Chatham, Sandwich, Woods Hole, Nantucket, and Menemsha. The region is also home to the Wampanoag Tribes of Mashpee and Aquinnah (Gay Head).

Major issues raised in the Cape Cod and Islands region included:

- Protection of tourism and recreational uses, commercial fishing, and other existing aspects of the economy that rely on ocean resources.
- Protection of important habitat areas.
- Coordination across jurisdictional levels (federal, state, local).
- Continued opportunities for public involvement in implementation of the ocean management plan.
- Need for sound science in the ocean management plan.
- Ensuring that renewable energy is sited responsibly.
- Ability to adapt plan in the future as new science and information is developed.

## South Coast

Covering the coastal communities westward of Cape Cod, this region's ocean planning area includes all of Buzzards Bay.

- **Natural Resources** - Buzzards Bay is a relatively shallow estuary with depths to about 20 meters. Unlike Massachusetts's ocean areas north of Cape Cod, it receives relatively warm waters from the south through the Gulf Stream. This highly productive system includes thousands of acres of salt marsh, tidal flats, and eelgrass beds. The bay has ubiquitous and highly valuable fishing resources (including scup, tautog, blue fish, and striped bass) and is home to some of the richest shellfish resources in the Commonwealth. Buzzards Bay provides vital habitat for endangered and rare species, including piping plovers, leatherback turtles, diamondback terrapins, and more than half of the North American population of the endangered roseate tern. Finally, while the central portion of Buzzards Bay has excellent water quality, many of the smaller sub-embayments along its shoreline exhibit various degrees of nonpoint source pollutants, primarily excess nitrogen and microbial pathogens.
- **Industrial Activity and Shipping** - The industrial ports of New Bedford and Fall River (which is outside of the ocean planning area) are significant economic engines for the region. Focusing on New Bedford, the port is predominated by approximately 400 large fishing vessels, but also receives cargo ships and, increasingly, cruise vessels. New Bedford is also home to a large and vibrant fish processing center that not only processes catch landed locally, but also large quantities of fish from around the globe brought in by freighter and airplane. In addition, there are significant large boat repair operations within the harbor. Ferry operations serving Martha's Vineyard operate year round (and are currently considering providing service to Woods Hole on Cape Cod). Buzzards Bay is the center of extensive shipping activity, serving as the southern funnel to the Cape Cod Canal, through which pass vast quantities of petroleum and cargo bound for Boston and other ports farther north. It is estimated that approximately 2 billion gallons of petroleum products pass through Buzzards Bay each year.
- **Commercial Uses and Fisheries** - Since 2000, New Bedford has been ranked the highest dollar-value fishing port in the nation, with the annual fish landings valued at more than \$268 million in 2007. Small commercial fishing occurs seasonally in Buzzards Bay for lobster, scup, tautog, and other species, which are fished mostly by small boats either working out of local harbors or

brought in by trailer and launched for the day. Party boat activities for sport fish (such as blues, scup, and striped bass) are conducted out of New Bedford Harbor and smaller commercial sport fishing boats are available in many of the harbors throughout the bay. There are also extensive commercial shellfish activities throughout the area.

- Recreational Activity - Buzzards Bay provides significant recreational boating opportunities and is world-renowned for its ideal sailing conditions. In the early 1990s, it was estimated that there were approximately 13,000 recreational boats moored or docked in Buzzards Bay, a relatively high percentage of which were sailboats. Shellfishing and fin fishing are favorite recreational activities for residents and visitors throughout the favorable seasons. The beaches of the region are heavily used throughout the summer. These include many town beaches and Horseneck Beach State Reservation, Demarest Lloyd State Park, Nasketucket Bay Reservation, and Fort Phoenix State Reservation.

In the South Coast region, the following major issues were raised:

- Importance of protecting recreational uses, commercial fishing, and other existing aspects of the economy that rely on ocean resources.
- Minimizing conflicts between new and existing uses of ocean resources.
- The need to ensure continued opportunities for public involvement in implementation of the ocean management plan.
- Protection of important habitats.
- Need for incorporating best available science into ocean management plan.

## Regulatory Context

Several laws and associated regulatory provisions exist in Massachusetts and provide policy direction for, and regulation and management of, ocean resources and uses. The key state and federal statutes are summarized below; the list is not meant to be exhaustive but to provide a summary of some of those statutes directly relevant for the purposes of the ocean management plan. Several of the most pertinent federal statutes and regulatory programs are also summarized. The Cape Cod Commission and the Martha's Vineyard Commission operate at the regional level and have regulatory authority, which is also summarized briefly, along with other regional efforts. Certain state regulations are administered locally, as described below.

## State Statutes, Regulations, and Policies

The following state regulatory mechanisms are most significant in the ocean planning context.

- Ocean Sanctuaries Act - Much of the planning area is included within one of the five designated Ocean Sanctuaries pursuant to the Ocean Sanctuaries Act (OSA) (M.G.L. ch 132A, §12A-16F and 302 CMR 5.00). Prior to the Oceans Act of 2008, the Department of Conservation and Recreation (DCR) administered the OSA; the Oceans Act shifted that responsibility to the Office of Coastal Zone Management (CZM). The OSA sets a baseline for management of uses in Ocean Sanctuaries, as modified by the Oceans Act.
- Oceans Act of 2008 - The Oceans Act (Chapter 114 of the Acts of 2008) requires the Secretary of Energy and Environmental Affairs to develop a comprehensive, science-based ocean management plan. The Oceans Act includes several provisions related to the regulation of ocean uses and natural resources. It amends section 15 of the Ocean Sanctuaries Act to allow for the siting of “appropriate scale” offshore renewable energy facilities in state waters, except for the Cape Cod Ocean Sanctuary (generally offshore from the Cape Cod National Seashore on the Outer Cape), provided that the facility is consistent with the ocean plan. The Oceans Act also requires that all state agency regulatory decisions must be consistent, to the maximum extent practicable, with the ocean management plan. As discussed above under the Ocean Sanctuaries Act, the Oceans Act requires an advisory committee to review the definitions of and standards for the OSA terms “significantly alter” and “public necessity and convenience.” Finally, the Act establishes an Ocean Resources and Waterways Trust Fund (“the Fund”) funded by mitigation fees, grants, Legislative appropriations, and income from the investment credited to the Fund.
- Massachusetts Environmental Policy Act - MEPA (M.G.L. ch 30, §61-62H and 301 CMR 11.00) requires that state agencies study the environmental consequences of their actions, including permitting and financial assistance. It also requires them to take all feasible measures to avoid, minimize, and mitigate damage to the environment. MEPA further requires that state agencies “use all practicable means and measures to minimize damage to the environment,” by studying alternatives to the proposed project, and developing enforceable mitigation commitments, which will become permit conditions for the project if and when it is permitted. MEPA applies to projects above a certain size threshold that involve state agency action.

- Massachusetts Public Waterfront Act (Chapter 91) - Commonly known as Chapter 91 and administered by the Department of Environmental Protection (MassDEP), this law (M.G.L. ch 91 and 310 CMR 9.00) protects the public's interest in waterways of the Commonwealth. It ensures that public rights to fish, fowl, and navigate are not unreasonably restricted and that unsafe or hazardous structures are repaired or removed. Chapter 91 also protects the waterfront property owner's ability to approach his/her land from the water. Chapter 91 regulates activities and structures on both coastal and inland waterways, including construction and dredging and filling in tidelands, great ponds, and navigable rivers and streams.
- Clean Water Act Section 401 Water Quality Certification - The federal Clean Water Act Section 401 (33 USC 1341 et seq., §401; M.G.L. c 21 §26-53 and 314 CMR 4.00 and 9.00) process is administered by MassDEP. The review ensures that projects proposing discharge of fill or dredged materials into jurisdictional wetlands comply with Massachusetts Surface Water Quality Standards and the Massachusetts Wetlands Protection Act, and otherwise avoid, minimize, or mitigate impacts to areas of Massachusetts subject to Section 401. Section 401 applies to any project that is subject to federal regulation under the Clean Water Act. If the project results in minimal fill within wetlands, the local Order of Conditions (see Wetlands Protection Act below in Locally Administered Regulations) can also serve as the Section 401 Water Quality Certificate; otherwise, an individual permit review process by MassDEP is required. Consultation between MassDEP and DMF usually occurs during the Section 401 review process to ensure that impacts to finfish and shellfish and their habitat are minimized.
- Massachusetts Endangered Species Act - The state's Endangered Species Act (M.G.L. Chapter 131A and 321 CMR 10.00) provides for listing of endangered or threatened species or species of concern, and of their habitat. Once listed, the Act prohibits the taking, possession, transport, export, processing, sale or purchase of such species and any other species listed under the federal Endangered Species Act. The Act prohibits any alteration of significant habitat of any protected species that may reduce the viability of the habitat. The Act is administered by the Natural Heritage and Endangered Species Program (NHESP) within the Massachusetts Department of Fish and Game (DFG). The Massachusetts program also coordinates with the federal Endangered Species Act, administered by the U.S. Fish and Wildlife Service.

- Massachusetts Division of Marine Fisheries Aquaculture Regulations - Under M.G.L. c130 §57 and 322 CMR 13.00, the Division of Marine Fisheries (DMF) reviews proposed aquaculture licenses to determine if the license and resulting aquaculture activities will substantially harm shellfish or other natural resources. The scope of the review depends on the type and size of aquaculture.
- Coastal Zone Management Act Federal Consistency Review - Under 16 USC 1451 et seq and 15 CFR 930; M.G.L. c 21A §2, 4 and 301 CMR 20.00, states have the authority to review federal actions (projects or approvals) to ensure that such actions meet standards articulated in the state's coastal zone management plan through a process called federal consistency review. Federal consistency review is required for most projects that are in, or can reasonably be expected to affect a use or resources of, the Massachusetts coastal zone; and/or require certain federal licenses or permits, receive certain federal funds, or are a direct action of a federal agency. In Massachusetts, federal consistency review is administered by CZM.
- Fisheries Management - DMF manages commercial and recreational fisheries in Massachusetts and may adopt, amend, or repeal all rules and regulations necessary for the maintenance, preservation, and protection of all marine fisheries resources within its jurisdiction. The Oceans Act states that this authority is to be maintained.

## Federal Statutes, Regulations, and Policies

Many federal laws, such as the Submerged Lands Act, Magnuson-Stevens Fishery Conservation and Management Act, and National Marine Sanctuaries Act, affect the management of ocean uses and resources. The laws listed below, however, are the most particularly pertinent for the Massachusetts planning context.

- National Environmental Policy Act (NEPA) - NEPA (42 USC §§ 4321 to 4370e and 43 FR 55990) establishes environmental protection as a national policy goal and directs all federal agencies to consider the environmental consequences of their projects and permitting actions. NEPA set up a system for formal evaluation of environmental impacts of the actions of federal agencies, the centerpiece of which is the Environmental Impact Statement (EIS). This document includes an analysis of alternatives to the proposed action, a discussion of impacts from the proposed action, and disclosure of any irretrievable commitment of resources. Typically, a federal agency with an action on a project will prepare an Environmental Assessment. Following

publication in the Federal Register and a comment period, the agency will either issue a Finding of No Significant Impact or will decide to prepare an EIS to more fully examine alternatives, impacts, and mitigation. One federal agency is usually designated as the “lead” agency, and this agency will prepare the EIS. Other federal and state agencies may play an official role in preparation by becoming “cooperating” agencies. At the completion of the EIS process, the lead agency issues a Record of Decision making environmental findings.

- Marine Mammal Protection and Federal Endangered Species Acts - The primary federal legislation that provides for the protection and management of marine mammals is the Marine Mammal Protection Act of 1972 (MMPA; Pub. L. 92-522; 16 U.S.C. §§ 1361 et seq.). Under the Act, the National Oceanic and Atmospheric Administration (NOAA) has responsibility for ensuring the protection of cetaceans (whales, porpoises, and dolphins) and pinnipeds (seals and sea lions), except walruses. The federal Endangered Species Act (ESA; Pub. Law 93-205; 16 U.S.C. § 1531 et seq. 50 CFR 17.00) also provides protection to the five species of great whales and five species of marine turtles in Massachusetts. Under the ESA, the National Marine Fisheries Service (NMFS) has designated critical habitat for the Right Whale in the New England area in Cape Cod Bay and the Great South Channel. The NMFS Office of Protected Species has also created a multi-organizational Northeast Large Whale Recovery Plan Implementation Team. This team examines the causes of human induced mortality to large whales and proposes ways to reduce or eliminate them.
- Rivers and Harbors Act and Clean Water Act Section 404 - The Rivers and Harbors Act of 1899 (33 USC §§ 401-413 and 33 CFR 323) regulates navigation in waters of the United States, although in recent years the application of the Act has broadened to include environmental considerations. Section 10 of the Act regulates placement of structures in navigable waters. Section 404 of the Clean Water Act (33 USC § 1251 and 33 CFR 322) regulates discharges of dredged or fill material into waters of the United States. The U.S. Army Corps of Engineers implements both statutes. For small projects subject to these laws, the Army Corps has issued a Massachusetts Programmatic General Permit, establishing general performance standards for all work. For larger projects, individual permits are required.
- Outer Continental Shelf Lands Act - The Outer Continental Shelf Lands Act (Pub. L. 83–212; 43 U.S.C. §§ 1331 *et seq.*), as amended by the 2005

Energy Policy Act and previous amendments, gives the U.S. Department of the Interior (through the Minerals Management Service) the authority to lease offshore tracts through competitive bidding; collect royalties on production of oil and natural gas; and consider economic, social, and environmental values of renewable and nonrenewable resources in managing the outer Continental Shelf (OCS). In 2005, Congress further amended the Act to grant primary authority to the Minerals Management Service to authorize alternative energy projects on the OCS.

## Regional Planning Agencies

Apart from the Cape Cod and Martha's Vineyard Commissions (discussed separately below), there are three regional planning organizations with geographic jurisdiction that overlaps the coastal zone. These are the Merrimack Valley Planning Commission (MVPC), the Metropolitan Area Planning Council (MAPC), and the Southeastern Regional Planning and Economic Development District (SERPEDD). For these three agencies, the geographic focus of their efforts is typically land based or very near shore, and the only programmatic connection to offshore issues occurs in the form of participation in one of the National Estuary Programs (discussed separately below).

However, both the Cape Cod Commission and Martha's Vineyard Commission have state authority to regulate development within their area of jurisdiction, which potentially includes projects within the ocean planning area. Each commission has been given the authority to designate Districts of Critical Planning Concern (DCPCs) through their regional plan, impose a moratorium on specified development within a proposed district until the designation process is complete, and approve a body of special locally enforced rules to govern the type and manner of development after the moratorium expires. Both commissions are empowered to review (and potentially condition ) projects determined to be Developments of Regional Impact (DRIs), and no local permit may be issued without commission concurrence based, at least in part, on an analysis of a project's consistency with the pertinent regional plan.

## National Estuary Programs

CZM administers two National Estuary Programs (NEPs), both funded by EEA and the U.S. Environmental Protection Agency (EPA). These are the Massachusetts Bays Program and the Buzzards Bay National Estuarine Program (formerly the Buzzards Bay Project). The cornerstone of each of the NEPs is the development and implementation of a Comprehensive Conservation and Management Plan (CCMP) to identify actions that should be taken to maintain and improve the ecological integrity of the environmental resources within the bays and their surrounding

watersheds. Both programs are limited in their relationship to the ocean management plan because the predominant focus of the action plans is on activities that either occur outside the ocean planning area or do not lend themselves to marine spatial analysis.

### Locally Administered Regulations

The following state regulations that are implemented at the local level are significant to ocean management in Massachusetts.

- Massachusetts Wetland Protection Act - The Wetland Protection Act (M.G.L. ch 131 §40 and 310 CMR 10.00) is administered by local Conservation Commissions and MassDEP and is intended to protect wetland resources. The regulations require avoidance, minimization, and mitigation of impacts (including impacts to aquatic vegetation, flood control, and fisheries and wildlife habitat), and establish performance standards that define levels of impact that a project cannot exceed. For projects that meet the performance standards, local Conservation Commissions may issue an Order of Conditions specifying under what conditions a project may proceed. The applicant or any 10 citizens residing in the municipality may appeal the local Order to MassDEP, which then issues a Superseding Order confirming, modifying, or overturning the local decision (a further appeal to an adjudicatory process is possible). For projects that do not meet the performance standards, a proponent must obtain a variance from the regulations from MassDEP, upon a demonstration that the project meets the tests for a variance. The variance tests include provisions that the project serves an “overriding public interest,” that there are no feasible alternatives to the project, and that the project design incorporates substantial mitigation for impacts to wetland resources.
- Chapter 91 10A Harbormaster’s Permit for Bottom-Anchored Structures - This subset of the Chapter 91 licensing process is administered by local harbormasters. Section 10A annual permits are required for temporary moorings, floats, rafts held by bottom anchor, and associated ramps. This provision only applies to bottom-anchored moorings, floats, or rafts. No piles may be placed without proper Chapter 91 authorization from the MassDEP’s Waterways Regulation Program.

# Chapter 3 - Planning Process

The Massachusetts Ocean Management Plan was informed by extensive expert support and public input at all stages of plan development and is based on the best available scientific data and information. This chapter describes the process for developing the plan, beginning with the management framework options reviewed and followed by an overview of the framework selected. It then presents the goals, findings, and outcomes of the plan. Finally, the potential uses in the planning area, a compatibility assessment of the uses, and the management options selected are all presented.

## Management Framework Options

As a first step in the development of the ocean management plan, the Executive Office of Energy and Environmental Affairs (EEA) reviewed planning efforts conducted elsewhere to identify potential frameworks for how to approach the management of ocean resources. The following four aspects of a management framework were considered.

### Organizational/Institutional Structure

A networked approach and the development of a centralized, single authority were the two main options examined for an institutional structure for the Massachusetts Ocean Management Plan. With a centralized single authority, all or most aspects of planning and plan implementation are the responsibility of a single entity or agency. Networked approaches, which typically rely upon a central plan development entity with plan implementation carried out through associated regulatory agencies or programs, are generally more similar to the current Massachusetts setting. Specifically, as required by the Oceans Act, EEA has primary responsibility for development of the ocean management plan, with implementation conducted by existing agency regulatory programs.

### Inter-Jurisdictional Coordination

Three approaches to coordinating across governmental levels were examined: using existing Massachusetts Office of Coastal Zone Management (CZM) program authorities; developing a Special Area Management Plan pursuant to the federal Coastal Zone Management Act (16 U.S.C. §1453); or developing a programmatic general permit. The use of existing coordination mechanisms through the networked Coastal Zone Management Program in Massachusetts would include the use federal consistency, wherein CZM works with federal agencies to ensure that federal decisions are consistent to the maximum extent practicable with state policy. CZM

also coordinates with other state agencies and at the local level through local administration of state regulatory programs (e.g., Conservation Commission implementation of the state Wetlands Protection Act). The second approach was to develop a Special Area Management Plan (SAMP), which is defined in the federal Coastal Zone Management Act as "...a comprehensive plan providing for natural resource protection and reasonable coastal-dependent economic growth ..." (16 U.S.C. §1453. Definitions (Section 304)). Such plans contain policy statements, standards regarding uses of the planning area (typically a specific, localized area), and implementation mechanisms. The third option was to develop a Programmatic General Permit (PGP), which is a type of general permit, issued by the U.S. Army Corps of Engineers and other agencies, that is intended to avoid unnecessary duplication of regulatory programs. In Massachusetts, the Corps has an existing PGP for activities pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbor Act of 1899.

#### Public/Stakeholder Involvement

Several options were considered for stakeholder involvement in plan implementation/revision, including continuing the Ocean Advisory Commission, establishing different stakeholder groups (either statewide or at a regional level), or relying on public participation opportunities in existing processes.

#### Management Approach

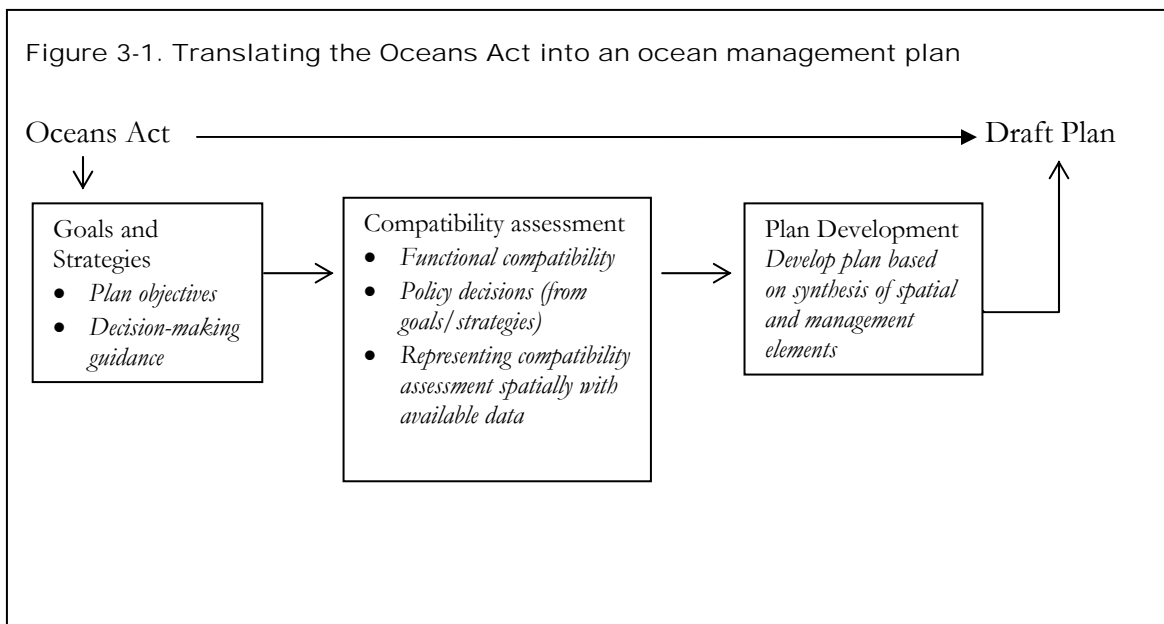
The management approaches considered for the Massachusetts Ocean Management Plan included: marine spatial planning (see Chapter 2 for an overview of this discipline) and the use of siting priorities/performance standards. Through marine spatial planning, areas can be designated to promote, conditionally approve, or prohibit specific uses; such areas can be designated regionally; and/or particular areas suitable for the uses allowed pursuant to the Ocean Sanctuaries Act can be identified. The siting priorities/performance standards option presents a less spatially explicit approach to development of the ocean management plan. Instead, siting priorities provide general statements of policy for certain uses. The performance standards are applied during the review of specific development projects.

This analysis of options provided key insight in the beginning stages of the development of the ocean management plan and direction to the development of the plan's spatial components and management measures. First, the plan acknowledges the existing, networked approach to managing and regulating ocean uses and resources in Massachusetts and uses this networking approach as a coordinating mechanism (see Chapter 4 for additional details regarding the management approach). Second, the plan also is essentially a

SAMP, a designation which will be explored in additional detail with federal agencies. As will be discussed in Chapter 5, continued stakeholder involvement will be an important component of plan implementation. Finally, as discussed in greater detail in the remainder of this chapter and in Chapter 4, the ocean management plan included a hybrid approach to developing management measures, combining aspects of marine spatial planning but also developing performance standards.

## Framework for the Ocean Management Plan

The basic purpose of the ocean management plan is to translate the policy direction and specific requirements of the Oceans Act into a management plan through a logical, sequential process of developing decision-making guidance for use in analyzing existing data (Figure 3-1). The plan was developed by a sequential process that entailed: 1) evaluating the Oceans Act and developing goals and strategies to identify key issues to be addressed based on values expressed therein; 2) assessing the compatibility and impacts of uses, activities, and facilities allowed under the Ocean Sanctuaries Act with marine resources and other uses; 3) applying the strategies as initial planning guidance to identify appropriate and inappropriate locations for specific uses, activities, and facilities; 4) correlating the planning guidance with spatial data and generating maps that illustrate impacts associated with uses of marine resources; 5) evaluating options for managing uses; and 6) developing an ocean management plan that best accomplishes the management plan goals described above.



The overall approach to developing the ocean management plan was therefore framed by the 15 core requirements (known as the Oceans 15) and other substantive and procedural elements of the Oceans Act, including the independent status of commercial and recreational fishing, the requirement that the plan be revised no less frequently than every five years, and the consultative roles of the Ocean Advisory Commission and Science Advisory Council. Important additional considerations included:

- Vested public interest in the development of the draft plan;
- The amount of data and information either immediately available or able to be acquired within the schedule for the draft plan;
- Principles and practices of marine spatial planning and ecosystem-based management;
- Existing law and policy; and
- The degree of change in current management practices necessary to address current challenges, justifiable by available information, and reasonable as a first response to the Ocean Act's comprehensive expression of the public trust doctrine.

To begin developing the ocean management plan and understanding the requirements of the Oceans Act, the 15 requirements of the Oceans Act were organized in generally common themes as illustrated in Table 3-1.

This organization by general theme was further refined by addressing the questions: What central principles does the Oceans Act establish? What are the most specific, important things that the Act requires the plan to do? How can the plan best accomplish those things in the context of the other important considerations described above? To respond to these questions, the following subjects were reviewed: the Oceans Act requirements, the current state of knowledge of the marine environment and its uses, consideration of the preferred management approach (discussed above), and public and stakeholder comment including input from the Ocean Advisory Commission.

This review led to the development of the following framework for the ocean management plan: specific **goals** describe what the ocean plan should achieve; **findings** summarize conditions, issues, and desired future conditions associated with the goals; **strategies** describe the information and process needed to achieve the goals; and **outcomes** define the final product that achieves the goal.

Table 3-1. Categorized Oceans Act requirements

Governance and Management
Set forth the Commonwealth’s goals, siting priorities and standards for ensuring effective stewardship of its ocean waters held in trust for the benefit of the public
Coordinate uses that include international, federal, state, and local jurisdictions
Adhere to sound management practices, taking into account the existing natural, social, cultural, historic, and economic characteristics of the planning areas
Adapt to evolving knowledge and understanding of the ocean environment
Facilitate public participation in decision-making
Preserve and protect the public trust
Natural Ecosystems
Value biodiversity and ecosystem health
Respect the interdependence of ecosystems
Address climate change and sea-level rise
Identify and protect special, sensitive, or unique estuarine and marine life and habitats
Human Uses
Identify appropriate locations and performance standards for activities, uses, and facilities allowed in Ocean Sanctuaries
Foster sustainable uses that capitalize on economic opportunity without significant detriment to the ecology or natural beauty of the ocean
Support the infrastructure necessary to sustain the economy and quality of life for the citizens of the Commonwealth
Reflect the importance of the waters of the Commonwealth to its citizens who derive livelihoods and recreational benefits from fishing
Preserve and enhance public access

The Oceans Act requirements, particularly the Oceans 15, include directives that are specific (“identify and protect special, sensitive and unique areas”) and more general (“respect the interdependence of ecosystems”). The ocean management plan must be responsive to these 15 requirements and, in doing so, must organize and focus these requirements in a manner that acknowledges their varying specificity. Thus, some of the Act’s 15 requirements are reflected in the goals, some as elements of strategies, and some as outcomes. Importantly, the goals, strategies, and outcomes also reflect the constraints imposed by the deadlines established by the Act. Within such constraints, the three broad goals, with four related and specific outcomes, are responsive to all 15 requirements and significantly advance the ocean management “state of the art.”

The strategies of the Massachusetts Ocean Management Plan describe the information and process needed in response to a particular goal to achieve a desired outcome. Certain strategies relate to how various non-spatial elements of the plan will be achieved, such as the implementation of an adaptive framework of the ocean management plan in the future.

Other strategies include “decision guidance,” which helps guide how planning decisions will be made regarding the spatial component of the plan (i.e., location of management areas). As with the goals, development of the strategies incorporated consideration of public comment, level of understanding of the marine environment, and a review of the Ocean Act requirements. Table 3-2 provides an example of how a particular strategy reflects a requirement of the Oceans Act. Strategies for each of the goals are presented in Appendix 1, and the goals, findings, and outcomes are described below.

### Goals, Findings, and Outcomes

The four goals established in the ocean management plan are: 1) integrated ocean management; 2) good stewardship - protection of the marine ecosystem; 3) good stewardship - human use of the marine ecosystem, and 4) an adaptive foundation for ocean management in the future. These goals reflect the highest priority, basic elements needed to be responsive to the Act and provide the basis for ongoing work. For each of the goals, there is an accompanying outcome for the ocean management plan to achieve.

Findings provide summary characterizations of conditions, issues, and desired future conditions associated with each of the goals and also provide a general rationale for the selection of particular strategies. Findings are based on the understanding of the ocean ecosystem, human uses and natural resources in the marine environment, stakeholder comment, and the Ocean Act requirements and other existing laws, policies, and regulations regarding ocean resources and uses.

Table 3-2. Example of Oceans Act requirements reflected in a strategy.

Oceans Act requirement	Strategy	Rationale
Reflect the importance of the waters of the Commonwealth to its citizens who derive livelihoods and recreational benefits from fishing.	Minimize conflicts with commercial fishing by siting development areas outside areas of significant fishing effort and value; minimize conflict with recreational fishing by development outside areas of concentrated recreational fishing activity.	Avoiding areas important to existing uses will avoid impacts associated with new uses.

Each of the outcomes represents a concrete product. Three of the four outcomes reflect the three requirements for tangible products in the Oceans Act: develop an integrated management plan; identify and protect special, sensitive, or unique areas or marine and estuarine life and habitats; and identify appropriate areas for uses in Ocean Sanctuaries. The fourth outcome recognizes that much more data and information is needed to address all of the issues identified through the planning process.

## Goal #1: Integrated Management

The first goal of the ocean management plan is:

*The ocean management plan should facilitate careful and responsible management that balances and protects the interests of the marine ecosystem, including its natural, social, cultural, historic, and economic components.*

The outcome for this goal is an integrated ocean management plan that:

- Is responsive to the Oceans Act.
- Is implemented in coordination across jurisdictional levels.
- Achieves balance through the designation of areas for uses and activities allowed pursuant to the Oceans Sanctuaries Act and in the planning area.

The findings for this goal are:

- Governmental decision-making regarding ocean resources and uses historically has occurred in a single-project or single-resource manner. This has led to important components of the ocean not being considered in certain decisions, resulting in undesirable impacts to oceans resources and uses. An integrated approach to planning and management would help remedy this.
- Recent national and Massachusetts reports on the state of ocean resources and uses have concluded that an integrated approach to ocean management is necessary to ensure continued health of ocean resources and balance of uses. An integrated approach to management is also a component of ecosystem-based management and marine spatial planning.
- The Commonwealth has several existing laws and regulations related to ocean resources and uses, including but not limited to the Massachusetts Environmental Protection Act, the Ocean Sanctuaries Act, Wetlands Protection Act, the Waterways Licensing Program (Chapter 91), Massachusetts Endangered Species Act, and the federal consistency function of the Office of Coastal Zone Management.
- Laws, plans, and regulations related to ocean resources and uses exist at the federal, state, regional, and local levels. Integration across these governmental levels is desirable from a governance standpoint.
- Public comment from stakeholders, the Ocean Advisory Commission, and the Science Advisory Council expressed a desire for an integrated approach

to ocean management across levels of government that considers simultaneously existing ocean resources and uses in developing the ocean management plan.

Implementing this goal will enable the ocean management plan to be responsive to the Oceans Act by:

- Setting forth the Commonwealth's goals, siting priorities, and standards for human uses allowed pursuant to the Ocean Sanctuaries Act and for the protection of special, sensitive, or unique areas of marine and estuarine life and habitat.
- Considering the existing natural, social, cultural, historic, and economic characteristics of the planning areas in development of the ocean management plan.
- Coordinating uses that include international, federal, state, and local jurisdictions.
- Encouraging public participation in decision-making, both through the development of the draft ocean management plan and by ensuring a process for public participation in the future.

Goal #2: Effective Stewardship - protection of the marine ecosystem

The second goal of the ocean management plan is:

*The ocean management plan should facilitate careful and responsible management that recognizes and protects the interests of the marine ecosystem, including biodiversity, ecosystem health, and the interdependence of ecosystems.*

The outcome for this goal is that special, sensitive, unique areas are identified and protected based on the first generation of an ecosystem-based management approach (see Chapter 4 for details).

The findings for this goal are:

- Massachusetts waters are highly productive, include areas that are important to the survival of marine organisms, and support populations of various species that rare and/or of global and regional significance.

- Existing science, monitoring, and survey data indicate that many species of ecological and commercial importance, and the habitats that support such species, are found in Massachusetts waters.
- Under current management practices, potential impacts to natural resources are surveyed on a project- and resource-specific basis, often at level of effort sufficient only to take a “snapshot” of conditions existing at the time of survey, and regulatory decisions are made with an incomplete understanding of the larger temporal and spatial ecological context.
- The ability of resource managers to protect ecological functions and values is limited by an imperfect understanding of both the individual components of the ecosystem and their interrelationships, but tools such as the Ecological Valuation Index help to enhance that understanding.
- Ecosystem-based management requires simultaneous consideration of multiple components of the ocean ecosystem, both when developing a management and regulatory framework and when applying regulations to an individual project. Massachusetts has an existing legal framework with specific regulatory programs that address many aspects of the ocean ecosystem, but there is a need to improve coordination of regulatory programs to enhance protection of the ocean ecosystem. A science-based system of collectively identifying key resources for protection would allow agencies to target their limited resources most effectively when conducting their regulatory function.
- Natural resources in the ocean environment have varying vulnerabilities to specific human uses and activities, as indicated in the compatibility analysis results. Understanding the ramifications of climate change is a necessary first step to developing an appropriate management response.
- Public comment and discussion with the Ocean Advisory Commission and Ocean Science Advisory Council focused extensively on the ecological importance of Massachusetts waters, and the need to protect those areas and resources of particular importance.

Implementing this goal will enable the ocean management plan to be responsive to the Oceans Act by:

- Incorporating existing scientific data to identify and protect special, sensitive, or unique areas of marine and estuarine life and habitats.
- Valuing biodiversity and ecosystem health and respecting the interdependence of ecosystems in developing the management approach and specific management measures.

- Developing a compatibility assessment that considers the requirements of the Oceans Act and the intrinsic nature of various ocean resources
- Recognizing the current state of knowledge of the ocean ecosystem, including the limitations of existing information, in developing the plan's management measures.

Goal #3: Effective Stewardship - human use of the marine ecosystem

The third goal of the ocean management plan is:

*The ocean management plan should facilitate careful and responsible management that supports the wise use of marine resources, including renewable energy, sustainable uses, and infrastructure necessary to sustain the economy and quality of life.*

The outcome of this goal is the identification of use areas and the promulgation of enforceable management measures such that:

- Locations and performance measures for allowable uses and infrastructure are identified.
- Renewable energy development is of appropriate scale.
- Conflicts with/impacts to existing uses and resources are minimized.
- Measures for reconciling use conflicts with fisheries are developed.
- Permitting is streamlined.

The findings for this goal are:

- Massachusetts waters support an important component of the Commonwealth's economy, including traditional uses such as commercial fishing, recreational uses, commerce, and the movement of goods.
- Emerging technology, particularly related to renewable energy (primarily wind power, but also tidal and wave energy technologies) presents Massachusetts with an opportunity to develop sustainable industry that will enhance the Massachusetts economy.
- Climate change predictions are resulting in an increasingly urgent need to develop and implement new, cleaner ways of producing energy to reduce carbon emissions.
- The wind resource in the ocean planning area provides an important opportunity to help the Commonwealth meet its renewable energy goals, provided wind energy projects are appropriately located.

- Smaller-scale, community wind energy projects present different potential for conflict with existing uses and natural resources, compared to commercial-scale wind energy projects.
- Implications of climate change, such as sea level rise, will increase the pressure to extract marine sediments for beach nourishment purposes.
- Public comment, including discussion with the Ocean Advisory Commission and the Science Advisory Council, during the development of the ocean management plan cited the importance of addressing climate change issues, allowing for the continuation for traditional uses in Massachusetts, such as commercial fishing, and reducing the potential for conflict between uses.

Implementing this goal will enable the ocean management plan to be responsive to the Oceans Act by:

- Developing siting criteria and performance standards that minimize conflicts between traditional uses of ocean resources and new uses.
- Developing siting criteria and performance standards that minimize conflicts between allowable uses and natural resources.
- Developing siting standards for renewable energy projects, including standards for ensuring that such projects are appropriately scaled.
- Developing performance standards and siting criteria for other uses allowed pursuant to the Ocean Sanctuaries Act.
- Recognizing the current state of knowledge of the ocean ecosystem, including the limitations of existing information, in developing the plan's management measures.
- Preserving opportunities for public access to ocean resources.
- In development of use criteria and performance standards, recognizing and providing opportunities for sustainable uses of ocean resources.

#### Goal #4: Adaptive Framework

The fourth goal of the ocean management plan is:

*The ocean management plan should incorporate new scientific knowledge as the basis for management that adapts over time to address changing social, technological, and environmental conditions.*

The outcome of this goal is an adaptive framework for the ocean management plan that:

- Establishes the plan as a key driver of future, ocean-related scientific research.
- Provides a basis for sound ocean policy, management, and science in the future.
- Results in science and research in response to identified management and policy issues and continues to engage stakeholders in future plan iterations.
- Provides a foundation to communicate scientific information to the public.

The findings for this goal are:

- Extensive scientific study has been conducted on Massachusetts waters, life, and habitats, and there is a recognized need for additional study to enhance our understanding of the ocean ecosystem.
- Increasing understanding of the ocean ecosystem—and applying such understanding to management—requires a multi-disciplinary approach to scientific advancement and management through study of the ocean’s physical, biological, chemical, and ecological processes and systems. Equally important from a management perspective is the need to be able to quantitatively address the socio-economic impact and importance of human uses of ocean resources.
- The first version of the plan cannot address all the issues identified during plan development; much more data and information are needed. An important piece of the first plan is the outline for ongoing work and identification of priority data needs.
- Discussion with the Ocean Science Advisory Council and the Ocean Advisory Commission, as well as public comment, indicated the importance of ensuring that the ocean management plan was developed incorporating the best available science, data, and information.

Implementation of this goal will enable the ocean management plan to be responsive to the Oceans Act by:

- Incorporating a science framework that identifies and prioritizes science and research needs in the future.
- Presenting a framework for ocean management that is science-based and adaptable in the future as new science is developed.

- Describing the process through which scientific advances will be utilized to improve management of ocean resources and uses.

These goals and their associated strategies and findings provide the foundation for the Massachusetts Ocean Management Plan. The next step in developing the plan, as illustrated in Figure 3-1, was to apply the decision-making guidance supplied by the goals and strategies. This step occurred through the development of compatibility assessment and application of this assessment using existing data, as discussed in the next section.

## Compatibility Assessment

Uses, activities, and facilities allowed by the Ocean Sanctuaries Act, as described below, were analyzed to determine the degree to which they are incompatible with marine resources and other uses, activities, and facilities based on: 1) functional incompatibility (e.g., two uses that cannot physically occupy the same location); 2) the significance of potential impacts to natural resources that have special status under existing law and policy (e.g., a use that could have significant impacts to a Special Aquatic Site protected by the Clean Water Act); and 3) the significance of potential impact to values expressed in the Oceans Act (e.g., areas of high fishing effort and value). Appendix 2 provides detailed results of the compatibility assessments conducted for pertinent uses. While the compatibility assessments included resources of special status under existing law, they did not include “special, sensitive, or unique marine and estuarine life and habitat” *as represented by a defined class*, pursuant to the Act. The study and definition of these resources occurred in a parallel planning process; these resources are discussed in Chapter 4.

The compatibility assessments were organized to characterize the activity, use, or facility. This was done by first developing an understanding of specific siting or operational requirements, analyzing the nature and duration of likely impacts to resources or uses, and then identifying two levels of planning criteria: 1) resources or uses subject to likely or significant incompatibility or impact; and 2) resources or uses subject to potential incompatibility or impact. An example assessment (a portion of the sand extraction assessment) illustrating its rationale is described in Table 3-3.

Once these planning criteria were defined, they were then correlated with data layers to represent the location and extent of human uses and natural resources. Table 3-4 provides an example of the results of this step, continuing the example provided in Table 3-3.

Table 3-3. Compatibility assessment for extraction of sand and gravel for beach nourishment (simplified for illustrative purposes)

Siting requirements	Typical Impacts	Planning criteria: significant incompatibility	Planning criteria: potential incompatibility or impact
Seafloor areas with sand or gravel with grain-size compatible with beach to be nourished	Disruption and displacement of benthic life and permanent physical alteration of benthic habitat; displacement of existing water-dependent uses during extraction operations	Eelgrass	Areas of concentrated recreational fishing activity

Table 3-4. Example of specific data layers associated with identified planning criteria

Planning criteria	Data layer
Significant incompatibility: Eelgrass	Clean Water Act Section 404 Special Aquatic Site from regulatory data layers
Potential incompatibility: recreational fishing surveys	Division of Marine Fisheries and Mass. Marine Trades Assoc. recreational fishing surveys

The compatibility assessment provided specific guidance that was subject to best professional judgment based on consideration of such factors data availability, data quality, or the need for additional data analysis (e.g., Division of Marine Fisheries spatial data related to areas of high, medium, and low fishing activity by effort and value should be refined by organizing the data by gear type, as mobile and fixed gear are incompatible with different kinds of uses).

Combining the compatibility assessments with representative data layers provided the spatial planning tools to illustrate and analyze the human and natural elements of Massachusetts waters.

Uses and special status resources were then mapped by category of potential incompatibility or impact. These initial maps served two purposes: first, they provided the basis for screening and identification of areas suitable areas for large-scale wind energy development; and second, they provided the basis for considering management and regulatory options to be implemented by the ocean management plan.

## Uses in the Ocean Planning Area

General uses in the ocean planning area are governed by the Ocean Sanctuaries Act, as modified by the Oceans Act. Pursuant to the Oceans Act, commercial and recreational fishing are allowable uses, subject to continued oversight provided by the Division of Marine Fisheries (and National Marine Fisheries Service at the federal level, as applicable), and are not the subject of the Massachusetts Ocean Management Plan. The following discussion focused on those uses that would potentially be governed by the plan.

The Ocean Sanctuaries Act, as modified by the Oceans Act, governs uses, activities, and facilities in the majority of the ocean planning area, as described in Table 3-5. Only waters seaward of the Greater Boston coastline are not in an ocean sanctuary. (See Figure 2-1 and note that because the Oceans Act directs the ocean management plan to “identify appropriate locations and performance standards for activities, uses and facilities allowed under [the Ocean Sanctuaries Act]” within the planning area, which does include the waters seaward of Greater Boston, those waters are now subject to management under the plan for uses allowed under the Oceans Sanctuaries Act.)

Table 3-5. Uses, Activities, and Facilities Allowed or Conditionally Allowed in Ocean Sanctuaries\*

Electric generating facilities for emergency and temporary use
Renewable energy facilities of appropriate scale
Activities and facilities associated with the generation, transmission, and distribution of electric power
Laying of cables
Operation and maintenance of existing municipal, commercial or industrial facilities and discharges
Municipal wastewater treatment discharges and facilities
Channel and shore protection projects
Sand and gravel extraction for shore protection or beach restoration
Navigation aids
Harvesting and propagation of fish and shellfish
Educational and scientific activities
Projects authorized under Chapter 91 and deemed to be of Public Necessity and Convenience**
Improvements not specifically prohibited by the Oceans Sanctuaries Act

\*No uses, activities or facilities other than harvesting fish and shellfish are allowed in the Cape Cod Ocean Sanctuary.

\*\*Recent pipelines for natural gas have been permitted under this provision.

## Management Options - Uses

The maps resulting from the compatibility assessment analyses conducted for each category of use, activity, and facility allowed under the Ocean Sanctuaries Act formed the basis for consideration of planning and management options that were reviewed and discussed with the Ocean Advisory Commission. Three general management options were considered:

1. Regulate as now, using ocean data for alternatives analysis and performance standards in permit conditions;
2. Designate specific areas for individual use based on data and compatibility assessment criteria; or
3. Apply a hybrid approach to: 1) designate areas for uses with potentially significant impacts for which EEA has good data; and 2) identify exclusionary areas, defined by resources and uses subject to likely or significant incompatibility or impact, applicable to spatially indeterminate uses or uses for which EEA has limited data.

The management options were evaluated based on their ability to:

- Advance the interests of the Oceans Act;
- Protect the marine environment;
- Avoid and minimize conflict with existing water-dependent uses;
- Provide flexibility for new uses and future changes to management based on an increasing understanding of the marine environment, new technologies, and evolving social values;
- Apply management and regulatory limits that can be substantiated by current data;
- Use and streamline existing law and regulation to allow regulatory decisions appropriate to the scale of potential impact;
- Employ new data and information within an adaptive framework

Each of the management options for uses is discussed below.

### Manage and Regulate as Now

This option would represent the status quo, as informed by a significant amount of data new to regulators and the regulated community. Under this option, the Oceans Act would be implemented as guidance for individual agency regulatory actions and would inform actions such as alternatives analyses and the development of performance standards in permit conditions. This approach would advance the effectiveness of the current management and regulatory process by providing both better information and ocean use policy guidance as the basis for good decision-making. This approach would also provide flexibility for future advances and

changes to ocean management that will occur based on new data, technological change, and changing social values, and would minimize the impacts to developing a management approach that is sensitive to constraints imposed by data quality. It would not represent, and would not achieve the organizational benefits of, an integrated plan as directed by the Oceans Act.

### Designate Specific Areas for Uses

This option would represent a highly organized approach to managing the location of uses, activities, and facilities, which would be allowed only in designated areas identified by applying the compatibility assessment and associated data as screening criteria. This approach has the potential to significantly increase the protectiveness of the underlying Ocean Sanctuaries Act, in that (assuming the designated areas are limited in scale) no uses, activities, or facilities could be located outside the designated area, the effect would be to prohibit all development. This approach would also facilitate more efficient and coordinated review and permitting by all levels of government by locating uses, activities and facilities in areas that, by definition, have avoided, minimized, and mitigated impacts through the siting process. This would provide a significant benefit to the interests addressed by the Oceans Act, including sustainable uses, renewable energy, and necessary infrastructure. However, this approach is challenging to substantiate with currently available ocean planning data and would provide only limited flexibility to respond to future change based on new data, technological change, and changing social values.

### Hybrid of Areas and Performance Standards

This option would blend the benefits and minimize the detriments of the previous approaches. This option would designate areas for uses with potentially significant impacts for which we have good data, and would identify exclusionary areas, defined by resources and uses subject to likely or significant incompatibility or impact, applicable to spatially indeterminate uses or uses for which we have poorer data. The benefits of this approach are that it would allow for the appropriate level of management supported by currently available data, balance protection and use, and preserve, depending on its configuration, significant flexibility for new data, technological change, and changing social values.

All of the management options for uses incorporated spatial data representing the compatibility assessments, from which were derived “exclusionary data” for individual uses, activities, and facilities allowed under the Ocean Sanctuaries Act. Exclusionary data portrayed both functional incompatibilities (where a particular use could not functionally co-exist with an existing use) and incompatibility considerations based upon the Oceans Act

and goals and strategies of the Massachusetts Ocean Management Plan. Under this approach, if a use was not assigned to or prohibited from a specific management area, it could be located anywhere within the planning area where it would not have an impact to significant resources and uses—these significant resources and uses comprised the exclusionary areas.

Additional planning analysis and discussion with the Ocean Advisory Commission determined that, as screening criteria for specific management areas, such an approach is appropriate—but as the basis for management within all of the planning area it would be unnecessarily inflexible in its treatment of human activity. In addition, the exclusionary areas approach was developed on the assumption that special, sensitive, or unique areas of marine and estuarine life and habitat would be designated, based on the output of the Ecological Valuation Index, as discrete areas representing complexes of resources and habitats. Based on the analysis described below, management of individual special, sensitive, or unique species and habitats was determined in consultation with the Science Advisory Council to be the most justifiable approach, given the level of existing data and the current analytic capacity of the ecological valuation process.

As a result of the above considerations, the management option based on a hybrid of designated areas and performance standards was further refined for the ocean management plan. This refinement occurred by developing three management areas.

- A first category of management was developed that designates specific areas where uses, activities, and facilities are prohibited by the Ocean Sanctuaries Act, in acknowledgement of existing law.
- A second category of management area was developed that designates specific areas for commercial wind energy facilities, in recognition of the need to provide opportunity for renewable energy generation at a meaningful scale, but to do so with careful regard for potential environmental impacts.
- A third category of management area designates the majority of the planning area as a multi-use area. Within this area, the uses, activities, and facilities allowed by the Ocean Sanctuaries Act are managed based on siting and performance standards. These standards were in part based on the compatibility assessment, and specific uses were categorized according to their recognition by the Oceans Act. Potential special, sensitive, or unique marine or estuarine resources (described below) were analyzed to determine their vulnerability or incompatibility with specified categories of uses, activities, and facilities allowed under the Ocean Sanctuaries Act.

Based on these analyses, use-specific maps identifying incompatible uses and special, sensitive, and unique resources were developed. To accompany these maps, siting standards and performance standards were assigned to specific uses. In addition to the identification of

special, sensitive, or unique areas (described below), incompatibilities with specific uses were identified for certain categories of uses potentially allowed under the Ocean Sanctuaries Act: commercial fishing, recreational fishing, and areas of direct navigation routes for commerce and commercial fishing (see Chapter 4). The Oceans Act requires consideration of conflicts with such uses, in part because these existing uses contribute to the coastal and ocean economy and could potentially be negatively impacted by new uses in the ocean. These uses, and rationale for their identification, are illustrated in Table 3-6, and the management approach to these uses is described in Chapter 4.

Table 3-6. Uses identified as sources of incompatibility for potential projects.

Use	Rationale
Areas of high commercial fishing activity based on effort and value	Oceans Act requires plan to reflect the importance of the waters of the Commonwealth to its citizens who derive livelihoods and recreational benefits from fishing; Fisheries workgroup identified areas of high commercial fishing activity based on effort and value.
Areas of commerce and commercial fishing traffic	Oceans Act requires plan to preserve and enhance public access and the public trust, including public right to navigation; AIS and VMS data indicate highly used navigation routes for commercial vessels over 299 tons and commercial fishing vessels fishing in federal waters, respectively.
Areas of concentrated recreational fishing	Oceans Act requires plan to reflect the importance of the waters of the Commonwealth to its citizens who derive livelihoods and recreational benefits from fishing. The DMF conducted a coastwide survey to identify areas of concentrated recreational fishing.
Areas of concentrated recreational boating activity	Oceans Act requires plan to preserve and enhance public access and the public trust, including public right to navigation; the Massachusetts Marine Trades Association identified areas of concentrated boating activity through a survey of certain of their members.

### Management Options - Special, Sensitive, or Unique Marine and Estuarine Life and Habitat

As the management options for uses were being developed, in a parallel process, options for identifying and protecting special, sensitive, or unique marine and estuarine life and habitats was conducted (as required by the Oceans Act). This exercise looked at two management options:

- Protect specific values and functions by limiting impacts from specific uses (targeted additional protection); OR

- Protect a complex of values that are represented by the limited data available (comprehensive protection).

These management options were evaluated based on their ability to:

- Advance the interests of the Oceans Act;
- Protect the marine environment;
- Provide flexibility for new uses and future changes to management based on an increasing understanding of the marine environment, new technologies, and evolving social values;
- Apply management and regulatory limits that can be substantiated by current data;
- Use and streamline existing law and regulation to allow regulatory decisions appropriate to the scale of potential impact;
- Employ new data and information within an adaptive framework

Each of these management options are discussed below.

#### Targeted Additional Protection

This option would develop specific protective measures (e.g., performance standards) that are directly related to specific values and functions and would consider impacts of specific uses. This option would in part be reflective of the level of confidence in the data that was available. The benefits of this approach are that specific measures would be developed that would be commensurate with the availability of existing data.

#### Comprehensive Protection

This option would identify an area or areas in the ocean management plan where available data would indicate a complex of values significant enough to warrant comprehensive protection. This would result in identification of areas wherein uses would be prohibited. Identification of such areas would be limited by the available data.

#### Ecological Valuation Index

Members of the Habitat and Fisheries Work Groups convened to develop an approach to address the requirements of the Oceans Act to identify and protect special, sensitive, or unique areas by developing the concept, methodology, and data for an ecological valuation index (EVI). The EVI is an attempt to systematically evaluate the ecology of Massachusetts waters using available data. The EVI was

conceived and developed to be responsive to the directives of the Oceans Act, to incorporate existing ecological knowledge and data (qualitative and quantitative, as available and appropriate), and to be scientifically defensible and rigorous in approach. Not all data compiled by the Habitat and Fisheries Work Groups were used in the EVI development. Some data sets were spatially and/or temporarily incomplete and had limitations that precluded their use in this process.

The document *Development of an Ecological Valuation Index in Massachusetts*, provided in Volume 2 of the Massachusetts Ocean Management Plan, gives a detailed overview of the EVI, including its conceptual basis, methodology, and data incorporated. As a brief overview, the EVI begins with a compilation and analysis of existing spatial data regarding species occurring in the ocean planning area. Data for four marine mammal species, five bird species, five crustacean species, eight mollusk species, and 22 fish species were incorporated into the EVI. Individual datasets were then rated according to a standard set of ecological criteria (major contribution to survival/health of population, spatial rarity, and global and regional importance).

In mapping the results of the EVI, the planning area was gridded into 250-meter cells (called quartiles). Figures 3-2a, b, and c illustrate three options for portraying the output of the EVI using this grid. Figure 3-2a<sup>2</sup> illustrates the values for each cell based on the sum of the rankings of the datasets present in each cell; rankings were then broken into quartile intervals. Because there were many more species of fish represented in the EVI, datalayers also were binned by guild (i.e., all fish datalayers were combined to a single “fish” layer; all marine mammal datalayers were combined to a single “marine mammal” layer, etc.). Figure 3-2b illustrates the results so organized, broken into quartile intervals. Figure 3-2c contains the results of this organization broken into intervals of ten.

The intent of the EVI was to develop a scientifically defensible approach for differentiating areas in terms of their ecological value. Such a differentiation would support efforts to identify locations appropriate for particular uses and to designate “special, sensitive, or unique” areas of life and habitat, pursuant to the Oceans Act. Because it was a multi-species approach by design, it was also a step toward incorporating an ecosystem-based perspective into the ocean management plan.

Limitations of the EVI included data availability (data for certain species or guilds are not available) and the spatial resolution of certain data leading to limitations on the conclusions that could be drawn. Additionally, our understanding of ocean habitats

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<sup>2</sup> For production purposes, all color figures are placed at the end of the Draft Massachusetts Ocean Management Plan.

and species habitat requirements is continually evolving, as are the related data available to managers.

The development of the EVI provided important information for use in the ocean management plan. The process of developing the EVI also provided important insight into the development of the Science Framework, as outlined in Chapter 5.

Additionally, through the compatibility analysis process and identification of exclusionary criteria (described above), individual species were assessed for their vulnerability to particular uses allowed by the Ocean Sanctuaries Act. Special, sensitive, or unique marine and estuarine resources, indicated in Table 3-7, represent a category of resources determined to be vulnerable or incompatible with specified categories of uses, activities, and facilities allowed by the Ocean Sanctuaries Act (see Chapter 4 for additional details).

## Management Approach Summary

For purposes of the Massachusetts Ocean Management Plan, uses were categorized according to their recognition in the Oceans Act and Ocean Sanctuaries Act. Three categories of management areas were developed for these uses: specific areas for commercial wind energy facilities; prohibited areas; and multi-use areas. Through consideration of individual species' vulnerability to impacts resulting from specific uses, special, sensitive, or unique areas of marine and estuarine life and habitats were identified, specific to each use. Siting and performance standards were assigned to specific uses, activities, or facilities and resources, and management maps developed for specific uses, activities, or facilities allowed by the Ocean Sanctuaries Act. Chapter 4 describes these areas and associated siting and performance standards in additional detail.

Table 3-7. Special, sensitive, or unique marine and estuarine life and habitats

Special, sensitive, or unique life or habitat		Rationale
Marine Mammals	North Atlantic Right Whale critical habitat area	North Atlantic Right Whales are state and federally listed endangered species; a significant percentage of the global population relies on areas in planning area as obligate habitat.
	Humpback and Fin Whale important habitat areas	Humpback and Fin Whale are state and federally listed endangered species with important habitat in planning area.
Avifauna	Roseate Tern critical habitat areas	Roseate Terns are state and federally listed endangered species; significant percent of global population relies on parts of planning area as obligate habitat.
	Special concern (Arctic, Least, and Common) tern critical habitat areas	Arctic, Least, and Common Terns are state-listed special concern species and rely on parts of planning area as important habitat.
	Long-tailed Duck important habitat area	Regionally significant populations of Long-Tailed Ducks rely on parts of the planning area as important habitat.
	Leach’s Storm Petrel important nesting habitat areas	Leach’s Storm Petrels are state-listed endangered species; they are pelagic birds with a wide range but only two documented nesting habitat locations in planning area.
	Colonial water birds important nesting habitat areas	A few high concentrations (colonies) of estuarine and marine avifauna in parts of the planning area are important nesting area habitat.
Fish	Important fish resource areas	Areas in the planning area identified as high importance to 22 species considered to be important components of commercial or recreational fisheries.
Abiotic or Biogenic	Areas of hard/complex bottom	Areas with complex benthic habitat structure have greater available surface area for colonization by epiphytic plants and invertebrates and provide significant spawning, foraging, and refuge habitat for fish.
	Eelgrass habitat areas (component of CWA 404 Special Aquatic Site)	Sensitive and highly productive biogenic plant habitat that supports significant spawning, foraging and refuge habitat.
	Intertidal flat habitat areas (component of CWA 404 Special Aquatic Site)	Shallow areas of bays and harbors located between the spring high and low tides; nutrient-rich sediments host large numbers of invertebrates that provide forage habitat for fish, mollusks, crustaceans, and shorebirds.



# Chapter 4 - Management

The materials gathered to create the ocean plan illustrate a theme that was expressed repeatedly in public and stakeholder comments: Massachusetts waters are rich with natural resources and busy with human activity. Massachusetts waters and the life within them support recreational activity and tourism, fishing and shellfishing, shipping and trade, scientific research, and the infrastructure that supports the well-being and standard of living of Massachusetts citizens, including offshore liquefied natural gas facilities, fiber optic and electrical cables, and natural gas pipelines. Emerging uses of the marine environment include aquaculture and wave, tidal, and wind energy.

Given this range of both traditional and emerging uses, the Oceans Act directs the ocean plan to address a fundamental issue: The ocean is a public trust resource and the Commonwealth must effectively manage the assets of the trust on behalf of the public to best protect and use them for the benefit of citizens today and in the future. To do this, management under the ocean plan uses information about ecosystem components and human uses, activities, and facilities to improve our stewardship and management of the ocean environment in and beyond Massachusetts marine waters.

The ocean plan establishes a management framework that addresses natural resources and human uses in the ocean planning area in the context of the goals and strategies developed to guide and direct the ocean planning process to achieve outcomes defined as: 1) an integrated management plan; 2) special, sensitive or unique marine and estuarine life and habitat identified and protected; 3) areas for uses, activities and facilities allowed by the Ocean Sanctuaries Act identified and managed; and 4) an adaptive framework for implementation and on-going planning. The ocean plan is therefore narrowly focused, by design, on managing the interrelationship between specific human activities and specific resources, in response to the requirements of the Ocean Act, which dictate that the plan:

- Identify and protect special, sensitive or unique estuarine and marine life and habitats;
- Identify appropriate locations and performance standards for activities, uses and facilities allowed under the Oceans Sanctuaries Act;
- Reflect the importance of the waters of the Commonwealth to its citizens who derive livelihoods and recreational benefits from fishing;
- Foster sustainable uses that capitalize on economic opportunity without significant detriment to the ecology or natural beauty of the ocean;
- Support the infrastructure necessary to sustain the economy and quality of life for the citizens of the Commonwealth; and
- Preserve and protect the public trust.

Within that framework, the ocean plan combines elements of both designated-area and performance standard-based management by establishing three categories of management area: Prohibited, Renewable Energy, and Multi-Use. Under this approach, special, sensitive or unique natural resources and important existing water-dependent uses are provided enhanced protection in the siting, development, and operation of new uses, facilities, and activities. Renewable energy facilities are screened through strict compatibility criteria, and—for commercial-scale wind projects—facilities are allowed only in designated areas. The majority of state waters in the planning area remain open to uses, activities and facilities as allowed under the Ocean Sanctuaries Act, which preserves opportunity for new and emerging uses and flexibility for future changes based on new data and technologies and social values that will change over time. This chapter describes how new development in the ocean planning area will be managed.

## Management Areas

### Prohibited Area

The **Prohibited Area** (Figure 4-1)<sup>3</sup> is coincident with the Cape Cod Ocean Sanctuary, within which a variety of uses, activities and facilities are expressly prohibited by the Ocean Sanctuaries Act, as amended by the Oceans Act, and are therefore prohibited under the ocean plan. (Note that pursuant to a requirement of the Oceans Act, EEA has convened a technical advisory committee to review certain aspects of the Ocean Sanctuaries Act that will submit recommendations to the legislature.)

### Renewable Energy Areas

Areas designated for renewable energy development are open to wind, wave, or tidal energy development, but, based on current technology, the deployment of large-scale wave and tidal power facilities appears unlikely in the first five-year term of the ocean plan. As such, the ocean plan describes these as Wind Energy Areas. Wave and tidal energy facilities, as well as small-scale community wind energy facilities, are addressed under the Multi-use Area, below.

Wind Energy Areas (Figure 4-1) are areas specifically designated for commercial wind energy facilities, defined as eleven or more turbines, in recognition of the need to provide opportunity for renewable energy generation at a meaningful scale, but to do so with careful regard for potential environmental impacts. Based on the compatibility assessment for wind energy projects and a qualitative analysis of the

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<sup>3</sup>For production purposes, all color figures are placed at the end of the Draft Massachusetts Ocean Management Plan.

likelihood of greater impacts associated with projects of increasing size, EEA determined that eleven turbines or more is a suitable proxy for a project that can be reasonably expected to have more environmental impacts than smaller projects. (See definition of community-scale wind projects, below.)

The identification and designation of Wind Energy Areas does not obviate the need for the future proponent to undergo review under the Massachusetts Environmental Policy Act and obtain all other necessary licenses and permits, but the intent of this designation is to signify that, based on the rigorous environmental screening under the ocean plan, these areas are presumptively suitable sites for commercial-scale wind. Development of commercial-scale wind energy facilities shall be permitted in these areas subject to reasonable conditions.

Two proposed Wind Energy Areas were identified based on the presence of a suitable wind resource and water depth, and the absence of conflict with other uses or sensitive resources, as derived through an environmental screening process that applied exclusionary criteria listed below in Table 4-1 (likely significant impact to incompatible uses or to uses and resources protected by law). Constraint criteria were also developed to identify uses and resources subject to potential impacts; these criteria were applied during the consideration of the relative suitability of potential sites and the designation of final sites. (See Appendix 2 and Figure 4-2.) In addition, to the maximum extent feasible these areas were located at least one mile offshore to minimize conflicts with near-shore activity and reduce visual impacts.

Table 4-1. Exclusionary factors for renewable energy areas

Category	Exclusionary Criteria
Buffer from development and near-coast activities	Areas within 1 mile of shoreline (MLW) of inhabited land
High concentrations of marine avifauna	Core nesting, staging, and critical foraging areas for Roseate Tern
	Special Concern (Arctic, Least, and Common) Tern critical habitat areas
	Long-Tail Duck important habitat
	Colonial water birds important nesting habitat areas
High concentrations of whales	North Atlantic Right Whale core habitat area
Water-dependent marine uses	Coast Guard-designated navigation areas (shipping channels and traffic lanes, precautionary areas, anchorage areas, pilot boarding areas)
	Ferry routes
	Areas of high commercial fishing effort and value
	Direct transit navigation routes for shipping and fishing
Regulated airspace	FAA/MAC designated buffers

After screening to identify potential sites using the exclusionary criteria, EEA considered the overall weight of existing information (including qualitative data, data used in the compatibility assessment, and stakeholder input and public comment). Some areas that passed the screening criteria (which were developed on a use-by-use basis using individual data layers) are characterized by high levels of overall use and/or natural resources. EEA closely examined such areas to determine if the cumulative effect of existing uses and/or natural resources would result in a higher or lower level of compatibility and/or conflict with existing uses or natural resources. This review removed certain areas in Buzzards Bay and Nantucket Sound from further consideration.

Based on the overall analysis, **EEA proposes to designate two Wind Energy Areas**, in the vicinity of the southern end of the Elizabeth Islands and southwest of Nomans Land, respectively (Figure 4-1). These areas—which constitute 2% percent of the planning area’s 2,144.5 square miles—will be subject to additional baseline feasibility analysis for such factors as wave climate and sub-bottom geology. Using generic industry guidelines for spacing, these areas could accommodate approximately 150 3.6 MW turbines at full build-out. Because these areas have not been assessed for technical or economic viability, further analysis may reveal siting constraints that would reduce the sites’ capacity.

Adjacent to these areas, EEA has identified potentially suitable locations in federal waters for commercial-scale wind (Figure 4-3), recognizing that the three-mile limit of state jurisdiction (and the limit of jurisdiction of the ocean plan) is an artificial constraint to considerations of technology, economics, and environmental and social benefits and impacts. EEA is currently screening these areas, using the same criteria used to identify the Wind Energy Areas, to identify combined state/federal areas to evaluate for baseline feasibility. EEA expects to facilitate private-sector initiative in the refined identification and analysis of locations within the two Wind Energy Areas and adjacent federal waters suitable for wind energy development. EEA will continue to engage stakeholders in the ongoing evaluation of the Wind Energy Areas and potential locations in federal locations.

Finally, the ocean plan also identifies three additional locations for commercial-scale wind that, for purposes of this ocean plan, are considered provisional (see Figure 4-3). These areas passed the exclusionary screening process but appear to have potentially more significant technical limitations, cumulative impacts and/or less suitability for wind energy. Therefore, these locations are not proposed for designation as Wind Energy Areas at this time, and are not currently being explored for further feasibility by the Commonwealth. This does not preclude other entities from developing additional information and analysis for the provisional sites, but

such assessments would be subject to review by EEA, and designation of any or all of these sites as Wind Energy Areas would require a modification to the ocean plan consistent with the process described in Chapter 5.

### Multi-Use Area

The remainder—and the vast majority—of the planning area is designated as a **Multi-use Area** (Figure 4-1), which is open to all uses, activities and facilities allowed under the Ocean Sanctuaries Act except wind energy facilities of more than 10 turbines, including but not limited to the following: the extraction of sand and gravel for beach nourishment, aquaculture, cables and pipelines, pilot/community-scale wind energy facilities and wave and tidal energy facilities.

Management in the Multi-use Area is based, as described in Chapter 3, on specific marine resources identified as key components of the Massachusetts marine ecosystem. The vulnerability of each resource to new uses, activities and facilities was determined and ranked through the compatibility assessments. Similarly, management guidance for balancing impacts to commercial and recreation fishing and recreational boating was developed under the planning goals and strategies, and the compatibility of these uses with new uses was determined. Uses, activities and facilities are managed not by spatial designation but on siting and performance standards, associated with specific mapped resources and uses (listed in Table 4-2), that direct development away from high value resources and concentrations of existing water-dependent uses.

The application of these standards to specific uses, activities and facilities is described under Management of Ocean Uses, below. As an example of how management in the Multi-use area is intended to operate, pipelines have been determined to have potentially significant impacts to the following subset of resources and uses:

- North Atlantic Right whale core habitat area
- Fin and humpback whale important habitat
- Areas of hard/complex seafloor
- Eelgrass and inter-tidal flats (Clean Water Act Special Aquatic Sites)
- Important fish resource areas
- Areas of high commercial fishing effort and value
- Areas of concentrated recreational fishing

Table 4-2. Siting and Performance Standards for EIR Projects in the Multi-use Area

Project Location within Areas of Special, Sensitive or Unique Resources:	Siting Standard	Performance Standard
<ul style="list-style-type: none"> <li>• North Atlantic Right Whale core habitat area (Figure 4-4)</li> <li>• Humpback ( Figure 4-5) and Fin Whale (Figure 4-6) important habitat areas</li> <li>• Roseate Tern core habitat areas (Figure 4-7)</li> <li>• Special concern (Arctic, Least, and Common) tern core habitat areas (Figure 4-8)</li> <li>• Long-tailed Duck important habitat area (Figure 4-9)</li> <li>• Leach’s Storm Petrel important nesting habitat areas (Figure 4-10)</li> <li>• Colonial water birds important nesting habitat areas (Figure 4-11)</li> <li>• Areas of hard/complex seafloor (Figure 4-12)</li> <li>• Eelgrass (Figure 4-13)</li> <li>• Intertidal flats (Figure 4-14)</li> <li>• Important fish resource areas (Figure 4-15)*</li> </ul>	<p>Avoid, or demonstrate that there is no less damaging practicable alternative, or demonstrate that data does not accurately characterize resource or use</p>	<p>Meet all applicable permitting standards; minimum baseline standard is avoid, minimize, and mitigate impacts to the maximum extent feasible</p>
Project Location within Areas of Existing Waterdependent Uses:	Siting Standard	Performance Standard
<ul style="list-style-type: none"> <li>• Areas of high commercial fishing by effort and value (Figure 4-16)**</li> <li>• Areas of concentrated recreational fishing (Figure 4-17)</li> <li>• Areas of concentrated commerce and commercial fishing traffic (Figure 4-18)</li> <li>• Areas of concentrated recreational boating activity (Figure 4-19)</li> </ul>	<p>Avoid, minimize, and mitigate impacts to the maximum extent feasible; use mapped areas to guide alternatives analysis and additional project-specific characterization of existing uses and potential impacts. Secretary may require higher siting standard, above, on project-specific review of potential significance of impacts to mapped commercial or recreational activity.</p>	
<p>*Map will refined, as a near-term action, to identify features with greater specificity.  **EEA planning team will evaluate benefit of refining maps of fishing activity based on gear type, as a near-term action, to further characterize/assess compatibility/conflict .</p>		

A pipeline project would be required to use the ocean plan's resource and use maps and identify a route for the project that does not impact whale, eelgrass, intertidal, and hard/complex habitat types; the project would be required to consult with EEA/DMF regarding the site specific fish resource areas associated with potential alternative routes. The project would have the option of demonstrating that it does avoid those resources even in otherwise mapped areas by providing an analysis of the ocean plan's data, or supplementary data, that indicates that it does not impact the specified resource. If no feasible alternative exists, the project would be required to minimize impacts and provide mitigation for unavoidable impacts. Similarly, the project would be required under MEPA to evaluate the impacts of alternative routes to areas of high commercial and recreational fishing through characterization of, and consultation with, potentially affected interests within those mapped areas. The project would be required to identify the potential economic impacts of the activity to commercial and recreational fishing as the basis for reviewing alternative routes and compensatory mitigation. Comments from agencies, potentially affected parties, and the public would assist the Secretary in developing project-specific requirements for an appropriate level of characterization.

Importantly, the resources and uses in Table 4-2 are not intended to represent the exclusive subject matter of MEPA review and agency permitting action. Rather, they have been identified, based on the direction of the Oceans Act, as resources and uses that warrant particular attention through the regulatory review process. The ocean plan does not supersede any existing law, including those that require the assessment of potential impacts to resources and uses not listed above. The Secretary of EEA retains his discretion under the MEPA statute and regulations to scope a project for any issue he deems necessary and appropriate, based on information presented by the project proponent and agency or public comment.

The ocean plan adopts the existing MEPA review thresholds (with minor changes for renewable energy projects as referenced below) because they have already considered and defined graduated levels of review for projects that are most likely to have potentially significant impacts. Projects presumed to have potentially significant impacts require a mandatory EIR, while projects that may have significant impacts require a short-form review in an Environmental Notification Form, to allow agencies and the public to inform the secretary of EEA whether additional review in an EIR is warranted. Impacts associated with projects that do not require an EIR can be addressed at the appropriate level of state, regional, or local government using the ocean plan maps and standards as guidance, as described in the section titled Relationship with State, Regional, Local Regulation Jurisdiction, below.

Management in the Multi-use Area thus establishes a higher level of protection for special, sensitive or unique resources, described in Table 4-2, in two ways. First, the ocean plan modifies the MEPA standard of “avoid, minimize or mitigate damage to the environment to the maximum extent feasible” to include a specific siting standard of “avoid, or demonstrate that there is no less damaging practicable alternative, or demonstrate that data does not accurately characterize the resource or use.” Second, the ocean plan prioritizes and maps those resources, providing clear baseline information which will allow proponents, agency staff, and the public to focus on aspects of a given project of greatest potential environmental significance.

For existing water-dependent uses, the Multi-use Area maintains the existing standard of “avoid, minimize or mitigate” but establishes a higher level of review by providing baseline information on concentrations of existing uses, identifying them as significant existing interests, and requiring that potential impacts and mitigation be addressed in MEPA review with the participation of potentially affected interests, as described in the section entitled Management Tools, below. The mapped areas, and comments from agencies, will guide scoping under MEPA for additional project-specific characterization of existing uses and potential impacts, where the Secretary may require higher siting standard, above, on project-specific review of potential significance of impacts to mapped commercial or recreational activity.

Finally, the Multi-use Area addresses the interests of sustainable uses, renewable energy, and necessary infrastructure by directing them away from impacts to the most significant resources and human activities but otherwise allowing flexibility in their location and level of regulatory review, on a project-specific basis, based on their functional requirements, scale, and potential impacts to existing uses and marine resources.

Overall, management in the Multi-use Area represents an effort to balance the protection of significant existing uses and important environmental resources with the flexibility needed to allow the development of necessary infrastructure, sustainable uses, and new technologies like renewable energy in the context of the limitations of existing data. As discussed in Chapter 5, ongoing analysis of existing data, future data development, and increased understanding of the marine environment and pattern of human uses will result in refined ocean plan maps, particularly for important fish habitat and water dependent uses. The application of the siting standards, and management in the Multi-use Area under MEPA generally should utilize the ocean plan’s maps and the data on which they are based in conjunction with best professional judgment informed by agency expertise and the participation of potentially affected parties.

## Management of Uses in the Ocean Planning Area

### Renewable Energy

- Wind Energy - The state's Global Warming Solutions Act (GWSA) requires that greenhouse gas emissions be reduced 80 percent from 1990 levels economy-wide by 2050, and calls on the Executive Office of Energy and Environmental Affairs to set a 2020 target between 10 and 25 percent below 1990 levels and develop a plan for achieving that reduction. To meet these goals, Governor Patrick has set a goal of developing 2,000 megawatts (MW) of wind-power capacity by the year 2020. Offshore wind resources offer the prospect of considerable renewable energy, free of harmful emissions, and if developed with care and forethought, compatible with other ocean uses and resources. It is a potentially inexhaustible resource that, in many cases, is available in close proximity to regions with the highest electricity demand, minimizing the need for costly new transmission lines. A recent analysis of potential renewable energy generation capacity in Massachusetts by Navigant Consulting identified the theoretical generation capacity from offshore wind energy facilities at 19,000 MW. After factoring for avian and marine mammal habitats, other marine resources, view sheds and shipping routes, the Navigant study identified the technical generation capacity from offshore wind energy facilities at 6,270 MW.

Recent developments in furthering the development of wind energy generation include the establishment of the Marine Renewable Energy Center (MREC) at the University of Massachusetts Dartmouth School of Marine Science and Technology, created to develop in-ocean test sites for energy conversion devices and accelerate the commercialization of new technologies. MREC is currently funding wind (shallow, transition and deep-water) and tidal resource assessment and environmental survey work in Edgartown and Nantucket within a proposed National Offshore Renewable Energy Innovation Zone that would support full scale testing of wave and wind energy devices. The innovation zone is depicted on Figure 4-3.

Massachusetts is also soon to be home to a national Wind Technology Testing Center capable of assessing the large-scale blades used in offshore installations.

Massachusetts is well-positioned to be a leader in clean-energy research and development, offering the economic rewards of technology development, entrepreneurship and jobs.

- Tidal Energy - The current consensus is that Massachusetts has marginal resources for tidal energy, using currently available technology. In general, a peak tidal velocity of 4 knots appears to be the minimum for an economically viable, utility scale project. Only three known locations are currently documented to have tidal velocities that approach 3 knots, including Muskeget Channel between Nantucket and Martha's Vineyard, Vineyard Sound between Naushon Island and Norton Point, within the Cape Cod Canal and to the southeast of Nantucket Island. There are currently three potential projects pending. The Town of Edgartown and a private company, Natural Currents Energy Services LLC, are both pursuing separate projects in Muskeget Channel, while the Oceana Energy Company has proposed a project in Vineyard Sound.
- Wave Energy - The Renewable Energy Workgroup concluded that the prospect for wave energy development in Massachusetts is limited. However, non-utility-scale projects have been proposed, and at least one demonstration project has recently been in operation on the North Shore.
- Appropriate Scale - The Oceans Act amends the Ocean Sanctuaries Act to allow the development of renewable energy facilities "of appropriate scale," provided that the renewable energy facility is otherwise consistent with an ocean management plan. In doing so, the Oceans Act recognized the importance of providing an opportunity to achieve significant social benefits in balance with other social values that must be respected. The Oceans Act addresses these interests by requiring that the seven factors listed in Table 4-3 must be addressed in the definition of appropriate scale. These factors address the same values and concerns as the screening criteria and siting and performance standards developed through the planning process, as shown in Table 4-3.

The ocean plan thus defines appropriate scale as follows:

Appropriate scale is that scale facility capable of being sited in a given location such that, as identified by the ocean plan, the following factors are addressed at a level of detail necessary for the secretary of EEA to designate a Wind Energy Area and/or make a determination of adequacy on an EIR, and, where applicable, for the Department of Environmental

Table 4-3. Appropriate scale

Appropriate-Scale Factor	As Addressed by the Ocean Plan
Protection of the public trust	The exclusionary screening criteria for Renewable Energy Areas and the siting and performance standards associated with renewable energy facilities allowed in the Multi-use Area are designed to avoid, minimize and mitigate impacts to activities associated with fishing, fowling and navigation, in reasonable balance with the siting requirements of renewable energy
Public safety	The exclusionary screening criteria for Renewable Energy Areas and the siting and performance standards associated with renewable energy facilities allowed in the Multi-use Area address public safety by locating Wind Energy Areas away from concentrations of human activities, including shipping and commercial navigation, commercial and recreational fishing, and recreational boating, to the maximum extent practicable
Compatibility with existing uses	The exclusionary screening criteria for Renewable Energy Areas and the siting and performance standards associated with renewable energy facilities allowed in the Multi-use Area are designed to avoid, minimize and mitigate impacts to existing uses while not unduly limiting opportunity for renewable energy development
Proximity to the shoreline	Wind Energy Areas are sited no closer than 1 mile to the shoreline of inhabited land. If a community pursues a project in the Multi-use Area, the determination of proximity will be a factor in community support for the project, as required below.
Environmental protection	The exclusionary screening criteria for Renewable Energy Areas and the siting and performance standards associated with renewable energy facilities allowed in the Multi-use Area are designed to avoid, minimize and mitigate impacts to important resources
Community benefit	For wind energy allowed in the Multi-Use Area (community-scale wind), the project will be required to demonstrate that the host community or communities formally support the project (as demonstrated through letter from Mayor or Board of Selectmen) and, for projects other than test or demonstration-scale projects, must provide an economic benefit to the community.
Appropriateness of technology and scale	“Appropriateness” is a function of the environmental, social and economic interests assessed above, and guides the distinction between community-scale wind (small because it may be located in busier, more visible waters) and Wind Energy Areas (larger, and sited to minimize conflicts)

Protection to authorize the project under the Chapter 91 and Water Quality Certificate regulations:

1. Public trust rights are protected
2. Public safety is protected
3. Significant incompatibilities with existing uses are avoided

4. Proximity to shoreline avoids and minimizes conflicts with existing uses and minimizes visual impact to the maximum extent feasible
5. Impacts to environmental resources are avoided, minimized, and mitigated to the maximum extent feasible
6. For community wind and wave and tidal projects, the host community or communities must formally support the project and, for projects other than test or demonstration-scale projects, must receive an economic benefit from the renewable energy facility (and other conditions below, for community wind)
7. The technology and scale of the facility are appropriate to the proposed location as demonstrated by consistency with 1 through 5, above.

- Siting/Management

- Commercial-scale wind projects of more than 10 turbines are restricted to Renewable Energy Areas. Community-scale wind energy facilities and compatible uses are also allowed within Wind Energy Areas. Projects in Wind Energy Areas are subject to mandatory review in an EIR and approval under other applicable law to avoid, minimize and mitigate impacts within the Wind Energy Area. The community in whose waters the project is located must receive direct economic benefit.
- Community-scale wind projects are allowed within the Multi-Use Area subject to the following conditions: the project will be required to demonstrate that the host community or communities formally support the project (as demonstrated through letter from Mayor or Board of Selectmen), projects other than test or demonstration-scale projects must provide an economic benefit to the community, projects are subject to review as a development of regional importance by regional planning agencies with regulatory authority, and are subject to a determination by the Secretary of EEA, in consultation with the applicable Regional Planning Agency, that they are consistent with the ocean plan. The ocean plan establishes a fixed cap of 10 turbines that may be approved within each coastal area represented by an RPA, to be allocated in a manner to be determined by the individual RPAs. Allocation of additional turbines will require amendment of the ocean plan.
- Commercial-scale (grid-connected) tidal energy and wave energy facilities are allowed in the Multi-use Area, subject to review in a mandatory EIR and the definition of appropriate scale (see Table 4-4 for siting and performance standards). Tidal energy facilities are, currently, functionally restricted to areas with very high tidal velocities. The Renewable Energy Workgroup identified three limited areas with potentially appropriate

Table 4-4. Siting and performance standards for community-scale wind and commercial-scale tidal energy facilities (See Figures 4-20 and 4-21.)

Allowed Use	Siting Standard	Performance Standard	Natural Resource or Water-Dependent Use
Community Wind	Avoid, or demonstrate that there is no less damaging practicable alternative, or demonstrate that data does not accurately characterize resource or use	Meet all applicable permitting standards; minimum baseline standard is avoid, minimize, and mitigate impacts to the maximum extent feasible	<ul style="list-style-type: none"> <li>• Core nesting, staging, and critical foraging areas for roseate tern</li> <li>• Important habitat areas for Long-tail ducks</li> <li>• Important nesting habitat for colonial coastal waterbirds</li> <li>• Core habitat for special concern tern species (arctic, least, common)</li> <li>• North Atlantic right whale core habitat area</li> <li>• Leach’s storm petrel important nesting habitat</li> <li>• Fin and humpback whale important habitat</li> </ul>
	Avoid, minimize, and mitigate impacts		<ul style="list-style-type: none"> <li>• Areas of high commercial fishing effort and value</li> <li>• Direct transit navigation routes for shipping and fishing</li> <li>• Areas of concentrated recreational fishing</li> <li>• Areas of concentrated recreational activity</li> </ul>
Commercial Tidal	Avoid, or demonstrate that there is no less damaging practicable alternative, or demonstrate that data does not accurately characterize resource or use	Meet all applicable permitting standards; minimum baseline standard is avoid, minimize, and mitigate impacts to the maximum extent feasible	<ul style="list-style-type: none"> <li>• North Atlantic right whale core habitat area</li> <li>• Clean Water Act Submerged Aquatic Vegetation</li> <li>• Important fish resource areas</li> </ul>
	Avoid, minimize, and mitigate impacts		<ul style="list-style-type: none"> <li>• Areas of high commercial fishing effort and value</li> <li>• Direct transit navigation routes for shipping and fishing</li> <li>• Areas of concentrated recreational fishing</li> <li>• Areas of concentrated recreational activity</li> </ul>

current speeds, and it does not appear that tidal energy facilities of significant scale are likely to be proposed in other areas. Commercial-scale (grid-connected) wave energy facilities are not envisioned within the five-year term of this plan.

- Pilot or community-scale wave and tidal energy facilities are allowed in Wind Energy and Multi-use Areas subject to the definition of

appropriate scale. Tidal and wave energy technologies are in a developmental phase characterized by a range of scales and configurations. Consequently, it is more difficult to fully assess the potential impacts of such projects, particularly for the smaller, “pilot”-type projects which are most likely in the near future.

#### Extraction of Sand and Gravel for Beach Nourishment and Shore Protection

The Commonwealth has abundant sand and gravel assets, which offer great potential for beneficial use in beach restoration/nourishment and shoreline protection. Massachusetts’ coastal communities are vulnerable to erosion and flooding as the primary coastal hazards that lead to the loss of lives or damage to property and infrastructure in developed coastal areas. In developed areas, especially where engineering structures are used to stabilize shorelines, natural sediment transport processes are interrupted, and under conditions of reduced sediment, the ability of coastal resource areas such as dunes and beaches to provide storm damage prevention and flood control benefits is continually reduced. Climate change and sea-level rise will also contribute to coastal land loss in the Northeast. With an accelerated rate of sea-level rise, low-lying coastal areas will be particularly vulnerable to increased erosion, flooding, and inundation. In addition, these impacts will extend further inland, resulting in greater loss of land and damage to development along the coast of Massachusetts. The combination of rising sea levels, more frequent and intense storms, and increased coastal development will result in greater erosion and flooding impacts over time. As options for climate change adaptation are considered and strategies developed, interest in ocean sand and gravel resources for protection will increase.

While the Commonwealth has ample sand and gravel assets, the extraction of these resources for beach nourishment or shore protection needs to be balanced with the protection of marine ecosystems, with particular attention to sensitive or vulnerable areas like critical spawning or juvenile fish habitat. Efforts to identify areas for suitable sand and gravel for nourishment will require investigations to locate appropriate potential borrow areas, identify sediment quantities, examine sediment characteristics. Existing surficial geology data provides a good general characterization of these resources, but higher resolution data is needed to identify specific areas. In addition, more refined habitat data is needed to characterize the most appropriate location of these areas. The immediate next steps for the management of sand and gravel resources will be to work with state agencies and the United States Geological Survey to refine existing data and identify specific locations for each region of

the coastline that have appropriate sand resources. As part of EEA’s ongoing habitat assessment and refinement of the Ecological Valuation Index, feasible regional locations will be screened to identify those with the least impacts to benthic and demersal resources, and a specific use and management plan will be developed.

- Siting / Management
  - Extraction of sand and gravel is allowed in the Multi-use Area, subject to siting and performance standards (Table 4-5) and other applicable law.

Table 4-5. Siting and performance standards for the extraction of sand and gravel (See Figure 4-22.)

Allowed Use	Siting Standard	Performance Standard	Natural Resource or Water-Dependent Use
Sand and gravel	Avoid, or demonstrate that there is no less damaging practicable alternative, or demonstrate that data does not accurately characterize resource or use	Meet all applicable permitting standards; minimum baseline standard is avoid, minimize, and mitigate impacts to the maximum extent feasible	<ul style="list-style-type: none"> <li>• North Atlantic Right whale core habitat area</li> <li>• Roseate tern core habitat</li> <li>• Fin and humpback whale important habitat</li> <li>• Areas of hard/complex seafloor</li> <li>• Eelgrass and inter-tidal flats (Clean Water Act Special Aquatic Sites)</li> <li>• Important fish resource area</li> </ul>
	Avoid, minimize, and mitigate impacts		<ul style="list-style-type: none"> <li>• Areas of concentrated recreational fishing</li> <li>• Areas of high commercial fishing effort and value</li> </ul>

### Cables and Pipelines

Cables and pipelines are important infrastructure components for the transmission and distribution of electricity, fuels, and telecommunications. The provision of these particular goods and services is connected to national energy and communication supply and security matters. With the development of high-bandwidth fiber-optic cables, these technologies are now replacing traditional wire cabling for communications networks. This linear infrastructure has several installations already in Massachusetts waters including electric and telecommunication connections between both Nantucket and Martha’s

Vineyard Islands and the mainland (Cape Cod) as well as the Hibernia cross-Atlantic communication cable system connected in Lynn.

On the fuel side, the transport of liquefied natural gas (LNG), in particular, through new pipeline systems, has also greatly increased the range of transport and delivery of this principal energy resource. There are currently several pipeline installations in Massachusetts marine waters, including the HubLine high-pressure gas pipeline that transits a route around Boston Harbor from Beverly to Weymouth and connections to the HubLine from the two deep-water LNG ports of Northeast Gateway and Neptune located southeast of Gloucester.

A key issue for cables is the future development of offshore wind energy facilities that will require cable connections to the Massachusetts coast. Because potential offshore locations have not been identified, the ocean plan addresses cables through the siting and performance standards described below. Future studies of options for siting deepwater wind energy facilities and associated potential transmission routes will provide information by which these standards can be refined and incorporated in the ocean plan. For both cables and pipelines, the intent of the ocean plan is to minimize the cumulative impact of future development by requiring that linear infrastructure be ‘bundled’ within common corridors to the maximum extent feasible.

Last, pipelines are not specifically a presumptively approved activity under the Ocean Sanctuaries Act, but instead require a finding that a specific pipeline project is of public necessity and convenience. EEA will propose modifications to the regulatory definition of public necessity and convenience as described in the section titled Consistency with the Ocean Sanctuaries Act, below.

- Siting/Management
  - Cables and pipelines are allowed in the Multi-use Area, subject to siting and performance standards (see Table 4-6) and other applicable law.

Table 4-6. Siting and performance standards for cables and pipelines. (See Figures 4-23 and 4-24.)

Allowed Use	Siting Standard	Performance Standard	Natural Resource or Water-Dependent Use
Cables	Avoid, or demonstrate that there is no less damaging practicable alternative, or demonstrate that data does not accurately characterize resource or use	Meet all applicable permitting standards; minimum baseline standard is avoid, minimize, and mitigate impacts to the maximum extent feasible	<ul style="list-style-type: none"> <li>• North Atlantic Right whale core habitat area</li> <li>• Fin and humpback whales important habitat</li> <li>• Areas of hard/complex seafloor</li> <li>• Eelgrass and inter-tidal flats (Clean Water Act Special Aquatic Sites)</li> </ul>
Pipelines	Avoid, or demonstrate that there is no less damaging practicable alternative, or demonstrate that data does not accurately characterize resource or use	Meet all applicable permitting standards; minimum baseline standard is avoid, minimize, and mitigate impacts to the maximum extent feasible	<ul style="list-style-type: none"> <li>• North Atlantic Right whale core habitat area</li> <li>• Fin and humpback whale important habitat</li> <li>• Areas of hard/complex seafloor</li> <li>• Eelgrass and inter-tidal flats (Clean Water Act Special Aquatic Sites)</li> <li>• Important fish resource areas</li> </ul>
		Avoid, minimize, and mitigate impacts	<ul style="list-style-type: none"> <li>• Areas of high commercial fishing effort and value</li> <li>• Areas of concentrated recreational fishing</li> </ul>

### Fishing and Aquaculture

Fishing in the Commonwealth has a long and deep history. Commercial and recreational fishing are significant drivers of the marine economy and are also important for their indirect economic connections to shoreside business. New Bedford, Gloucester, Provincetown, and Boston are home to the state’s major commercial fleets, but nearly all harbors and inlets in Massachusetts support some type of commercial fishing activity. The Massachusetts marine aquaculture industry is also a very important and growing trade. Although currently focused on shellfish, with technological advances and improved understanding of oceanographic conditions, offshore aquaculture has considerable promise for the future. Recreational boating and fishing are widespread and also represent important marine values of the Bay State.

Fishing is an allowed use managed by the Division of Marine Fisheries (DMF). DMF maintains the sole authority for the opening and closing of areas for the taking of any and all types of fish, and works closely with its Marine Fisheries

Advisory Commission, the New England Fishery Management Council, and Atlantic States Marine Fisheries Commission to manage species on a consistent basis across the region.

As directed by the Oceans Act, the ocean plan reflects the importance of commercial and recreational fishing by identifying areas of high fishing activity and concentrations of recreational fishing activity. To more fully understand and characterize the potential benefits and impacts of uses, activities and facilities to fishing, ongoing work will characterize commercial fishing effort by gear type. This will allow a more refined assessment of the compatibility or incompatibility of specific types of development with different kinds of fishing activities. Similarly, the ocean plan began the process of collecting information from fishermen to characterize and map the details of their fishing activity. This information will assist in evaluating the potential impacts of specific projects. EEA intends to continue and standardize this information capture so it can be used consistently in the regulatory review of proposed development.

Aquaculture is an allowed use managed primarily by the Division of Marine Fisheries. Additionally, the Department of Agricultural Resources provides a variety of services aimed at the promotion and development of Massachusetts aquaculture. DCR's Aquaculture Program, located within the Division of Agricultural Technical Assistance, fosters development of the Massachusetts aquaculture industry through efforts aimed at implementation of the Commonwealth's Aquaculture Strategic Plan.

- Management of Aquaculture Class 4 Facilities
  - Aquaculture Class 4 facilities are regulated by DMF pursuant to 322 CMR 15. Ocean planning maps and siting and performance standards will assist in the site review and regulatory process.

#### Other Uses, Activities and Facilities Allowed under the Ocean Sanctuaries Act

Other projects that may be permitted under the Ocean Sanctuaries Act, and may be of a scale to have potentially significant impacts, include:

- Projects authorized under Chapter 91 and deemed to be of Public Necessity and Convenience
- Municipal wastewater treatment discharges and facilities
- Operation and maintenance of existing municipal, commercial or industrial facilities and discharges

- Channel and shore protection projects
- Improvements not specifically prohibited by the Oceans Sanctuaries Act

If projects not otherwise specifically addressed by the ocean plan but allowed under the Ocean Sanctuaries Act are proposed within the ocean planning area, reviewing agencies shall use the ocean plan maps and associated performance standards as the guidance for their review. The secretary shall exercise his discretion, based on comment from agencies and the public, in determining the applicable siting and performance standards as described in Table 4-2, above.

## Management Tools

One of the main benefits of the ocean plan is that it improves our understanding of resources and activities in Massachusetts waters, providing a significant amount of data and information that will facilitate improved decision-making in the planning, review and permitting of specific projects. The ocean plan thus also provides an opportunity to apply new tools and new information to existing environmental law, building on the key themes of information, analysis, participation of affected parties, and mitigation.

The purpose of the following provisions is to provide clarity and consistency to the assessment of project benefits and impacts, provide information necessary to address requirements of the Ocean Sanctuaries Act for projects that that require a determination of public necessity and convenience (discussed below), and provide information necessary to address the requirement of the Oceans Act that any permit or license issued by EEA or other affected agencies or departments of the Commonwealth be subject to an ocean development mitigation fee as shall be established by the secretary of energy and environmental affairs.

For projects subject to the ocean plan that require an EIR:

- Project proponents will be expected to demonstrate consistency with siting and performance standards associated with SSU resources and existing water-dependent uses, described above, using guidance that will outline the scope and level of effort required to characterize potential impacts. EEA is currently developing these frameworks.
- Project proponents will be expected to characterize the potential economic benefits and impacts of the proposed use, activity and facility to existing water-dependent uses that may be affected by the project. EEA is currently developing alternative impact assessment processes for consideration. (See technical report by Industrial Economics, Volume 3.) EEA envisions that the models will establish a robust and participatory assessment process commensurate with the scale of potential impacts

and benefits associated with the proposed project. EEA will provide a generalized mitigation framework that will outline the process and alternative methodologies for developing compensatory mitigation for impacts to marine resources and existing water-dependent uses. EEA is currently developing these frameworks.

#### Relationship with State, Regional, Local Regulation Jurisdiction

The intent of the ocean plan is to address projects of a scale that have the potential to significantly affect the marine ecosystem. Therefore, the management plan addresses projects that require Environmental Impact Reports under MEPA. In the MEPA review process, the maps and siting performance standards should serve as formal regulatory guidance that governs agency comments and the scope of the environmental impact report. For the review and permitting of uses, activities and facilities allowed by the Ocean Sanctuaries Act that do not require an EIR, the maps shall serve as guidance, to be applied as appropriate by, and at a level of detail commensurate with, the practices and procedures of the agency making a determination that their approval of a use, activity or facility allowed under the Oceans Sanctuaries Act is consistent with the ocean plan.

Upon the secretary's adoption of an ocean management plan, all certificates, licenses, permits and approvals for any proposed structures, uses or activities in areas subject to the ocean management plan shall be consistent, to the maximum extent practicable, with the plan.

#### Consistency with the Ocean Sanctuaries Act

Uses, activities and facilities subject to the ocean plan are by definition subject to the Ocean Sanctuaries Act. The management provisions of the ocean plan have been developed to be consistent with those of the Ocean Sanctuaries Act. The purpose of the Ocean Sanctuaries Act is that:

All ocean sanctuaries...shall be protected from any exploitation, development, or activity that would significantly alter or otherwise endanger the ecology or the appearance of the ocean, the seabed, or subsoil thereof...(M.G.L. c132A §14)

All projects that may be allowable in ocean sanctuaries are therefore subject to performance standards intended to prevent significant alteration of the ecology or appearance of the ocean by avoiding, minimizing, and mitigating impacts. These performance standards do not disallow a use, activity or facility expressly permitted

within an Ocean Sanctuary, but instead require that such use avoid, minimize and mitigate potential impacts to the maximum extent feasible.

One category of conditionally allowable uses, not otherwise defined, applies to projects of public necessity and convenience. The public necessity and convenience standard establishes a test for need, benefits, and impacts. (As an example, liquefied natural gas pipelines have recently been permitted in ocean sanctuaries based on the public necessity and convenience standard.)

Because the interests expressed in the public necessity and convenience standard and the performance standards related to the definition of “significantly alter” relate directly to the interests of the ocean plan (as an overlay to the Ocean Sanctuaries Act), the legislature has directed EEA to recommend modifications to the definitions of “public necessity and convenience” and “significantly alter” that would harmonize the Ocean Sanctuaries Act and regulations and the Oceans Act, as expressed in the ocean plan. EEA is currently working with a technical advisory committee to develop these recommendations, which are due to the legislature no later than December 31, 2009.

#### Modification of Existing Regulations

EEA recommends that changes be made to regulations that govern Chapter 91, 401 Water Quality Certification, the Wetlands Protection Act, the Massachusetts Environmental Policy Act, the Ocean Sanctuaries Act, and the state Coastal Zone Management Program to harmonize existing regulatory programs with the provisions of the ocean plan. EEA expects to initiate rule-making in December 2009.



# Chapter 5 - Plan Implementation and Evolution

The development of the Massachusetts Ocean Management Plan was guided by the goals of integrated management, effective stewardship and protection of marine ecosystems, support for sustainable uses and services, and adaptive management. To carry these goals forward through implementation, important mechanisms must be established to ensure successful execution and continued evolution of the plan. The Oceans Act of 2008 requires the review of the plan and its components—including the baseline assessment and enforceable provisions—at least once every five years. While this formal review is critical, many of the elements described below will provide for more frequent and ongoing integration of vital data and information, expert guidance and stakeholder input, communication processes, and performance measures into the plan.

## Management and Administration

In addition to mechanisms to ensure robust communications, stakeholder processes, and science and information development, the Massachusetts Ocean Management Plan includes the following key elements for effective management and administration. Several steps must also be followed to finalize the plan, as discussed below.

### Steps to Promulgation

The Oceans Act requires the Secretary of the Executive Office of Energy and Environmental Affairs (EEA) to promulgate the final Massachusetts Ocean Management Plan by December 31, 2009. The following steps are envisioned to advance from this draft plan to the final version. Consistent with the Act, copies of this draft have been made available as of June 30, 2009, and notice of the availability of this draft for public review has been provided in the Environmental Monitor.

Formal public hearings on the plan are expected to be held in the following five regions: North Shore, Boston Harbor, South Shore, Cape Cod and Islands, and South Coast. To afford the public, stakeholders, legislators, and others adequate time to review the draft and to avoid summer scheduling conflicts, the hearings are expected to be held in the first two weeks in September. Prior to each hearing, notice will be provided in both the Environmental Monitor and in local/regional papers.

The public comment period for the draft plan will continue for 60 days after the last hearing and is anticipated to close around mid-November. After the public comment

period, work will continue on revisions to the final plan and any associated rule changes.

With the release of this draft plan, coordination will continue with federal agencies as part of pre-application processes associated with the plan's treatment of siting and permitting of uses/facilities/activities and the integration of state and federal authorities. Of particular importance will be efforts to work closely with the National Oceanic and Atmospheric Administration (NOAA) to submit the final plan as a formal component of the Commonwealth's coastal management program.

### Planning and Regulatory Coordination

The Oceans Act vests the authority for oversight, coordination, and planning of the Commonwealth's ocean areas with the Secretary of EEA. The Secretary has responsibility for ensuring that state agency actions that relate to ocean management—including policy development, scientific research, and regulatory decision-making—are consistent with and advance the goals of the ocean management plan. During plan development, an internal team of EEA agency representatives was assembled to provide important input and to ensure that the plan is in step with other state statutory and regulatory responsibilities. Moving into plan implementation and evolution, a similar inter-agency group will serve as the EEA Ocean Team to assist the Secretary in serving his oversight, coordination, and planning authority functions for ocean waters and development. This inter-agency group will provide a vehicle for the Secretary to coordinate the implementation of the ocean management plan, including agency efforts related to the Science Framework (discussed below).

In developing the plan, significant efforts were made to coordinate with representatives of federal agencies to ensure consistency and maximize efficiencies with existing federal regulatory processes and matters. These efforts will continue through several mechanisms, including an inter-agency federal permitting group coordinated by the Army Corps of Engineers New England District, and through valuable dialogue and discussions in the forums provided by the Northeast Regional Ocean Council (NROC) and its working groups.

Coordination with regional planning agencies will continue through the Ocean Advisory Commission (OAC) and through proposed partnerships for regional ocean characterization efforts described below.

## Trust Fund Creation and Operation

The Oceans Act calls for the establishment of a new Ocean Resources and Waterways Trust Fund. The Secretary will serve as trustee of the fund, overseeing its structure, function, and expenditures in close coordination with the Department of Environmental Protection and the EEA Ocean Team. Over the next several months, the EEA Ocean Team will be examining different options for developing standardized compensatory mitigation and/or lease and occupation fees.

## Plan Updates

An important finding through plan development was that while great progress has been made in the understanding of the life, habitat, processes, and services of marine ecosystems, important gaps exist. Key actions have been identified to address some priority information gaps, data integration needs, and management-support tool development in support of the plan. Described in the Science Framework, these actions include ongoing monitoring, mapping, and characterization efforts, like seafloor mapping; important species/resource surveys and assessments; and human use mapping and valuation. As new, valuable information is developed, it should be made available for use within the plan's management framework as swiftly as possible, with necessary notice, review, and revision.

A protocol will be formalized that allows for the following routine updates to the plan:

- New geospatial data/information on uses or resources integrated into the Massachusetts Ocean Resources Information System (MORIS);
- Technical adjustment to correct errata or make language clarifications; and
- Minor changes to specified management area boundaries.

The process for these routine updates will include: appropriate peer review, review by the EEA Ocean Team, public notice and a 30-day comment period, any revisions as necessary in response to public input, and final approval by the Secretary.

A procedure will also be developed to allow for other, non-routine updates to the plan, such as shifts in locations of management areas or changes in performance standards that are deemed necessary for effective and efficient administration of the plan without wholesale revision. The process for these updates would be appropriate peer review, review by the EEA Ocean Team, review by the OAC, public notice and a 60-day comment period, public hearing(s) during the first 30 days of the comment

period, any revisions as necessary in response to public input, and final approval by the Secretary.

#### Five-Year Plan Revision

The five-year revision of the Massachusetts Ocean Management Plan will involve a process akin to the one undertaken to develop the first plan, with intensive efforts for public input and engagement, specific stakeholder discussions, assessments of data and information, and a review of management measures and policies. It is anticipated that the process for formal plan revision will take about a year and a half.

#### Performance Measurement

An important part of the Science Framework is the development and implementation of an assessment/evaluation system with a series of indicators. These indicators will be selected for their effectiveness and efficiency in tracking specific ecological and oceanographic components and processes and assessing selected management options to provide feedback in an adaptive management approach. The development of the indicators is a high priority, and work to compile an operational draft will occur over the next several months with the Ocean Science Advisory Council (SAC). After the assessment/evaluation system has been developed, specific implementation and annual work plans will follow to guide successful execution of the environmental, socioeconomic, and management indicators and integration of results into management assessment, status and trends, and state-of-system reports.

#### Communications and Stakeholder Processes

Adaptive management involves a commitment to continued input, dialogue, and communication with stakeholders and the broader public. This section summarizes the structural organization for continued stakeholder input and expert advice, as well as a set of communication tools that will be employed in ocean management plan implementation.

#### Stakeholder Input and Expert Advice

As envisioned by the Ocean Act, the OAC will be called upon to provide a critical consultative role throughout plan implementation and again in the formal five-year revision. The OAC's diverse membership—including its representatives from the Legislature, regional planning agencies, and various ocean interest groups – allows for broad input to EEA and its agencies. Similarly, the SAC will continue to be called on to provide assistance and guidance in the development of new data and

information. Because there are a number of priority short-term actions that fall under the SAC, smaller issue-specific working groups will be developed and additional expertise sought to assist the EEA Ocean Team. Specifically, these groups and experts will assist in efforts to revisit, refine, and advance an Ecological Valuation Index (EVI); examine marine habitat characterizations and develop and apply classification systems and biotic associations; further develop the information base necessary for improving socio-economic characterizations of human uses; and (as stated above) develop and execute environmental, socioeconomic, and management indicators.

In addition, a stakeholder group will be convened to provide input to the EEA Ocean Team to improve its ability to present sound advice and recommendations to the Secretary and to bring a diverse set of regional stakeholder interests into a participatory planning process. Like the outside experts called upon to assist the ocean planning work groups, this informal advisory group will provide the EEA Ocean Team with first-hand observations and recommendations as new data and information are developed and scenarios are assessed. Suggestions and advice from this group will be vetted by EEA and then brought to the OAC and SAC for their review and discussion. The OAC and SAC will then make final recommendations and/or present options to the Secretary. An example of this coordination arrangement would be the capture of regional and local knowledge and information to refine the existing characterizations of important resources and uses. By working directly in partnership with such representatives from the regional planning agencies, local fishermen, industry, non-government organizations, and others, their input can be captured and used by the EEA Ocean Team through a systematic, transferable approach that would allow for specific information from regions and more localized areas to be incorporated.

Continued collaboration with the Massachusetts Ocean Partnership (MOP)—whose staff, partners, and consultants have provided important support, assistance, and advice in the ocean planning process—will be pursued. As evidenced by its tremendous support and catalyzing efforts in developing the Massachusetts Ocean Management Plan, MOP will continue to be an essential contributor in plan implementation and evolution, working to integrate natural and social sciences and representing wide interests in support of resilient ocean ecosystems, productive economies, and vibrant communities.

#### Communication Tools

In addition to the input provided by and through the bodies and organization described above, the continued opportunity for civic engagement in plan

implementation and evolution is a high priority. EEA, working with MOP, the OAC, and the SAC, will ensure that the public and specific interests are provided with regular, informative updates and afforded substantial opportunity to bring their voice and input into the process. To achieve this, the following represent some of the communication tools that will be employed:

- OAC and SAC meetings will be open to the public and efforts will be made to hold these meetings at varying regional locations.
- Efforts will be made to provide either real-time or archived video documentation of key OAC meetings.
- EEA's Massachusetts Ocean Management Plan Public Input Portal will remain available as a web-based resource intended to facilitate public comment and allow comments to be viewed online.
- Important updates will be made available through such platforms as the Massachusetts Office of Coastal Zone Management's (CZM) monthly electronic newsletter, CZ-Mail, and through email and website updates from MOP.
- The Massachusetts Ocean Resources Information System will serve as the official online repository for ocean management data. MORIS was created by CZM and MassGIS and can be used to search and display spatial data pertaining to Massachusetts ocean and coastal zone. Users can interactively view various data layers over backdrops of bathymetry, political boundaries, natural resources, human uses, or other data. Users can quickly create and share maps and download the actual data for use in a Geographic Information System (GIS).
- Press and media coverage will be pursued as appropriate through press releases and cooperation on issue-specific articles/reports.
- Consideration will be given to the development of an annual Bay State ocean conference where progress on elements such as science, data networks, and management can be shared and discussed.
- Members of the EEA Ocean Team, MOP, and other participants in the planning process will bring the Massachusetts Ocean Management Plan into broader discussions through presentations and panel participation at regional and national conferences and through forums such as NROC.

## Science and Information

Over the last two decades, great progress has been made in the understanding of estuarine and marine ecosystems, and there is now wide agreement that healthy and resilient ecosystems have more capacity to provide the scope and extent of benefits that citizens and

visitors to Massachusetts need and appreciate. Embracing this principle and working with the OAC, the goals of the Oceans Act were used to develop specific strategies and outcomes for the Massachusetts Ocean Management Plan (see Chapter 3). Along with the recognized importance of integrated management and effective stewardship, a major plan goal is the ability to adapt to evolving knowledge and understanding of the ocean environment.

This concept of adaptive management is a critical underpinning of ecosystem-based management. With the SAC, the Science Framework of the Massachusetts Ocean Management Plan was developed to ensure that this conceptual purpose is fulfilled through concrete and achievable tasks. The Science Framework provides the blueprint to ensure that the plan can specifically evolve to incorporate new and enhanced information and understanding in the future. The framework includes summaries of the major marine ecosystem components of the ocean planning area and beyond. Then, organized by six themes, it illustrates important information needs and describes the key actions that have been identified to further the framework's operational objectives. Several of the framework's key actions are summarized below, but the full Science Framework in Volume 2 should be consulted for complete descriptions of the rationale and context for the recommended actions and their connections to an evolving and iterative ocean management plan.

#### Ecosystem Monitoring, Characterization, Mapping, and Classification

Addressing critical information gaps will have direct bearing on important management aspects of the plan, such as developing a robust EVI, quantifying ecosystem values and services, understanding the effects and pace of climate change, and measuring and tracking indicators. Important actions within this theme include the continuation of acoustic seafloor mapping, complementing these efforts with nearshore data and benthic sediment and organism surveys; maintaining current levels of resource assessments and augmenting these assessments as necessary to characterize important biotic components currently not well covered; and ensuring long-term observations and records of water column, atmospheric, and hydrodynamic parameters.

#### Characterization and Mapping of Human Uses/Activities

As with the understanding of ecosystem components, the understanding of human uses and interactions is of critical importance to an integrated management framework. While robust, long-term, spatially explicit information is available on certain uses (such as commercial fishing), others (such as recreational uses including fishing, boating, and diving) lack this level of data. For some of the newer uses/activities, their effects on ecosystem components and functions are not well

known. Additionally, there are short-term steps that can be taken to parse existing information to improve its applicability and utility.

### Ecosystem Models and Decision-Support Tools

The utility of data and information generated through the actions in the two previous themes can be greatly enhanced by the development and application of models and other decision-support tools. A major component of the ocean management plan is the identification and protection of special, sensitive, or unique estuarine and marine life and habitats. A first-cut methodology was developed for the application of an Ecological Valuation Index based upon the framework proposed for the Belgian part of the North Sea. Within the tight timelines prescribed by the Oceans Act, the EVI methodology development was advanced, but there is still more work to do to advance this tool to a point where it can be applied with confidence. The refinement of method and its underlying data are a principal priority. For more information on the draft methodology, see the EVI report in Volume 2 of the Massachusetts Ocean Management Plan.

Two other important actions within this theme are the development of hydrodynamic and ecological models, including those that incorporate understanding of the life histories of important species. These actions will be used to help understand and map the spatial and temporal habitat requirements of key species in their life histories for the identification of habitats of particular importance and/or vulnerability, high diversity, and rarity.

### Applied Scientific Research

Resource assessments and surveys, long-term monitoring, and model predictions are important tools for characterizing estuarine and marine systems, but there are still critical elements and unanswered questions that need to be addressed. With new understanding of ecosystem components, processes, and relationships, uncertainty is reduced and the outcomes of management decisions can be better anticipated. Investigations to increase the understanding of critical species, communities, and/or trophic thresholds—especially within the context of rapid climate change—are important to support decisions with long-term implications for the planning area. Some main thresholds include: shifts in primary/secondary production, ocean circulation/hydrodynamics, and salinity from climate change; effects of pH changes on organisms with calcium carbonate shells (especially commercially important ones); and long-term changes in the frequency of intense storms, which could affect coastal resources and human populations.

## Integrated Data Management and Communication Network

Marine spatial planning relies heavily on current, spatially explicit information, so the Massachusetts Ocean Management Plan needs an integrated data management network that is robust, interoperable, and user-friendly. The Massachusetts Ocean Resource Information System, as discussed above in communication tools, will serve as the foundation for the network. Outside of the data that is stored and managed in MORIS, large and important data holdings of a number of other organizations and institutions should be integrated into the data network to improve information access for managers, scientists, user groups, and other stakeholders, as well as the general public. An important action in this theme is to integrate and coordinate the data network with real-time observation systems, such as the networks in the Northeastern Regional Association of Ocean Observing Systems (NERACOOS). Another important step is continued work on an integrated submerged lands GIS database containing legal, physical, and cultural information in a common reference framework (i.e., “marine cadastre”). Resolving existing boundary issues and the development of this authoritative marine boundary atlas is a priority for the Massachusetts Ocean Management Plan. Finally, as described above, communication of the information and results stemming from the Science Framework will be important to ensure that managers, scientists, user groups, and other stakeholders (including the general public) are connected to current science, policies, and management practices.



# Appendix 1 - Goals, Strategies, and Outcomes

## Goal #1: Integrated management

### *Requirements of the Oceans Act:*

- Set forth the Commonwealth's goals, siting priorities, and standards for ensuring effective stewardship of its ocean waters held in trust for the benefit of the public.
- Adhere to sound management practices, taking into account the existing natural, social, cultural, historic, and economic characteristics of the planning areas.
- Coordinate uses that include international, federal, state and local jurisdictions.
- Encourage public participation in decision-making.

### *Strategies:*

- Define goals, strategies, and outcomes that are responsive to the Act, reflect consideration of public comment, and can be achieved within the Act's timeline based on existing information.
- Review and incorporate as appropriate related/relevant Commonwealth law and policies, such as those related to climate change.
- Characterize the planning area and its component regions through the baseline assessment and regional characterizations.
- Review and consider the policies of regional, municipal, and other formal plans that address ocean waters.
- Accommodate local and regional policies and initiatives that are consistent with the Act and the Commonwealth's ocean management goals.
- Develop criteria for selecting alternative management strategies/actions.
- Identify measures of success or indicators that can be used to measure performance of management strategies in achieving desired outcomes.
- Designate protection and use areas and develop integrated management measures in consideration of international, federal, state, and local jurisdictions.
- Coordinate designation of protection and use areas and measures with federal agencies.
- Coordinate designation of protection and use areas in state waters with review of adjacent federal waters for areas with similar features/values.
- Develop governance structure that maintains Ocean Advisory Commission (OAC) and Science Advisory Council (SAC) functions and coordinates roles and responsibilities of state agencies in integrated ocean management, plan implementation, and advisory capacity to Secretary of Energy and Environmental Affairs.
- Maintain 'networked' governance structure for flexibility and responsiveness to implementation of Act.

*Outcome:* An integrated ocean management plan that:

- Is responsive to the Oceans Act.
- Is implemented in coordination across jurisdictional levels.
- Achieves balance through the designation of areas for uses and activities allowed pursuant to the Oceans Sanctuaries Act and in the planning area.

Goal #2: Effective stewardship/protection of the marine ecosystem

*Requirements of the Oceans Act:*

- Value biodiversity and ecosystem health.
- Respect the interdependence of ecosystems.
- Identify and protect special, sensitive, or unique marine and estuarine life and habitats.

*Strategies:*

- Compile existing data to identify ecologically important areas.
- Review Fisheries and Habitat Work Group reports.
- Review certainty/uncertainty of existing data and available methodologies.
- Develop Ecological Valuation Index (EVI).
- Develop compatibility/conflict matrix.
- Map gradations of ecological value based on EVI.
- Consider connectivity between/among areas of ecological value.
- Overlay existing regulatory protected areas.
- Define “special, sensitive, and unique.”
- Overlay data from other work groups.
- Apply conservative approach to area designated for management areas as proportion of overall planning area.
- Map appropriate Special, Sensitive, and Unique areas.
- Develop/modify regulations to reflect protected status.

*Outcome:* Special, sensitive, and unique areas identified and protected based on the first generation of an ecosystem-based management approach.

Goal #3: Effective stewardship/economic use of marine ecosystem

*Requirements of the Oceans Act:*

- Preserve and protect the public trust.
- Preserve and enhance public access.
- Reflect the importance of the waters of the Commonwealth to its citizens who derive livelihoods and recreational benefits from fishing.
- Foster sustainable uses that capitalize on economic opportunity without significant detriment to the ecology or natural beauty of the ocean.
- Support the infrastructure necessary to sustain the economy and quality of life for the citizens of the Commonwealth.

- Identify appropriate locations and performance standards for activities, uses, and facilities allowed in Ocean Sanctuaries.
- Address climate change and sea level rise.

*Strategy:*

- Map gradations of habitat value.
- Overlay existing regulatory protected areas.
- Overlay use data.
- Apply compatibility matrix.
- Identify potentially suitable use areas (for sustainable uses, infrastructure, renewable energy, and other uses allowed under the Ocean Sanctuaries Act).
- Apply conservative approach to total area designated as use areas as proportion of overall planning area, informed or modified by the following guidance for decision-making, explicit or inherent in the Act and/or illustrated through workgroup report data:
  - Minimize conflict with commercial fishing by siting development areas outside areas of significant fishing effort and value.
    - ✓ Minimize conflict with significant interconnections between homeports and grounds.
    - ✓ For specific projects developed pursuant to the ocean management plan, develop methodology to identify impacted fishery and assess economic impact of specific development projects (apply through Massachusetts Environmental Policy Act [MEPA]).
    - ✓ For specific projects developed pursuant to the ocean management plan, develop framework for mitigation (apply through MEPA).
  - Minimize conflict with recreational fishing by siting incompatible uses outside areas of concentrated recreational fishing activity.
- Preserve/enhance public access by siting use areas to minimize impacts to concentrations of recreational uses.
  - Consider impacts to significant interconnections between shore access points and destination areas.
- Incorporate specific performance standard(s) for deepwater aquaculture criteria in development area.
- Apply performance standard specifically for cables; evaluate management measures for other utilities based on compatibility matrix factors like significance/duration of impact, conflict with other uses.
- Identify appropriate test/pilot project areas for renewable energy development as part of use areas or performance standard overlay.
- For renewable energy facilities, use and resource overlays provide basis for identifying “appropriate scale” and generally appropriate areas, for the following factors from the Act:
  - Protection of the public trust.
  - Compatibility with existing uses.
  - Environmental protection.
  - Public safety.

- Develop performance standards to address:
  - Community benefit.
  - Proximity to the shoreline.
  - Appropriateness of technology and scale.
- “Appropriate scale” incorporates consideration of appropriateness of scale necessary to be responsive to climate change and state renewable energy statutory requirements.

*Outcome:* Use areas identified and enforceable management measures promulgated such that:

- Locations and performance measures for allowable uses and infrastructure are identified.
- Renewable energy development is of appropriate scale.
- Conflicts with/impacts to existing uses and resources are minimized.
- Measures for reconciling use conflicts with fisheries are developed.
- Permitting is streamlined.

Goal #4: Adaptive framework

*Requirements of the Oceans Act:*

- Encourage public participation in decision-making.
- Adapt to evolving knowledge and understanding of the ocean environment

*Strategies:*

- Prioritize key management issues and related science needs for the next iteration of the ocean management plan.
- With the SAC, develop a strategy for addressing prioritized ocean management issues that require additional scientific research and/or data collection.
- Prioritize scientific research and data collection efforts of state agencies to reflect ocean management plan priorities.
- Facilitate the use of science in public outreach and education.
- To assist in implementing the science strategy, enlist the expertise and capacity of the University of Massachusetts, other colleges and universities, federal agencies, non-governmental organizations, and other entities engaged in ocean-related scientific research.
- Institute a process for future amendments to the ocean management plan that adequately responds to the pace of advances in science and technology and economics.
- Ensure public participation as a key part of the ocean plan amendment process.

*Outcome:* An adaptive framework that:

- Establishes the ocean management plan as a key driver of future, ocean-related scientific research.
- Provides basis for sound ocean policy, management, and science in the future.
- Results in science and research in response to identified management and policy issues.
- Continues to engage stakeholders in future iterations of the ocean management plan.
- Provides a foundation to communicate scientific information to the public.

# Appendix 2 - Compatibility Assessment/ Data Screening

This appendix provides the results of the compatibility assessments performed for each of the following uses: wind energy; tidal and wave energy; sand mining; pipelines; cables; and deep-water, non-tidal aquaculture. Separate compatibility assessments were conducted for these uses because they are potentially allowable pursuant to the Ocean Sanctuaries Act, and because individual uses can be differentiated on the basis of their conflicts with existing uses and natural resources.

As described in Chapter 3, the compatibility assessment was a key step in the development of the Massachusetts Ocean Management Plan because it was a main vehicle for developing a spatial representation of plan goals and strategies. The compatibility assessment itself was not the end of the development of the ocean management plan, since its results informed further discussion internally and with the Ocean Advisory Commission regarding the proper approach to development of management measures. Chapter 3 provides further discussion of the compatibility assessment.

The purpose of this appendix is to provide the detailed results of the compatibility assessment, and to indicate the sources of data used to portray those results. (See Appendix 4 for a complete listing/descriptions of data used in plan development.) This appendix is organized by use. For each use, a brief narrative is provided that generally describes the issues associated with each use that relate to potential conflicts with other uses of ocean resources or impacts to the resources themselves. Following this summary, siting criteria for each use are provided. These criteria indicate requirements for siting uses based on current technology, physical restrictions for such uses, and other considerations from the standpoint of the use itself. Following the siting criteria, issues related to exclusions and constraints are listed, along with associated data layers. Exclusions represent those existing uses and natural resources that proposed uses should avoid, and are represented spatially by available data as indicated. Constraints are those existing uses and natural resources that should be avoided by proposed uses and, if not possible to avoid, impacts minimized. For each use there may be certain uses or natural resources that may be compatible with the use in question; these “conditionally compatible” items are also provided.

Chapter 3 provides additional context for the compatibility assessment. Chapter 4 provides the proposed management measures.

## Wind Energy Facilities - Commercial Scale (> 10 Turbines) and Community Scale

Overview: Point-location infrastructure with limited individual footprint; scale/scope of impacts derives from size of overall array (cumulative). Impacts from construction include temporary, localized degradation of water quality; temporary displacement of marine habitat and living resources; acoustic impacts to marine mammals; and temporary exclusion of existing uses from area of construction. Impacts of construction of interconnection cables are similar to cables generally. Permanent impacts include displacement of marine habitat and water occupied by monopiles or truss support structures and erosion control measures such as rip-rap if applicable. Impacts from siting and operation include potential displacement of mobile fishing gear and permanent impacts to marine mammal and avian habitat. Wind turbines alter the appearance of the area in which they are located. Rip-rap scour protection may provide enhanced recreational fishing opportunity.

Siting criteria: Water depth (20 meters monopile/60 meters jacket truss), wind speed, sub-bottom geology

Exclusion (avoid):

- One mile from approximate shoreline (applies to commercial-scale only)
  - Data: CZM baseline mapping
- Coast Guard-designated navigation areas (shipping channels and traffic lanes, precautionary areas, anchorage areas, pilot boarding areas)
  - Data: Navigation Work Group
- CWA 404 Special Aquatic Site
  - Data: Regulatory data layers
- Ferry routes
  - Data: Navigation Work Group
- High concentrations of avian resources: nesting, staging, and critical foraging areas for Roseate Tern; nesting, staging and core foraging areas for Long-tailed Duck, colonial coastal waterbirds, special concern tern species (Arctic, Least, Common)
  - Data: Habitat Work Group, NHESP
- High concentrations of whale populations: Right whale core habitat
  - Data: Habitat Work Group, NHESP
- Areas of significant commercial fishing effort and value: high fishing activity by effort and value [*Minimize conflict with commercial fishing by siting development areas outside areas of significant fishing effort and value*]
  - Data: Fisheries Work Group
- Direct transit navigation routes for shipping and fishing [*Minimize conflict with significant interconnections between homeports and grounds*]

- Data: AIS, VMS
- Regulated airspace
  - Data: FAA/MAC aviation buffers

Constraint (avoid or minimize):

- Areas of medium fishing activity by effort and value [*evaluate conflict with mobile gear in potential wind development areas*]
  - Data: Fisheries Work Group, qualitative maps from commercial fishermen
- High concentrations of avian resources: Leach's Storm Petrel
  - Data: Habitat Work Group; NHESP
- High concentrations of whale populations: fin and humpback whales
  - Data: Habitat Work Group, NHESP
- Direct-transit recreational navigation routes [*Consider impacts to significant interconnections between shore access points and destination areas.*]
  - Data: MMTA recreational fishing/boating survey, DMF recreational fishing survey
- Areas of concentrated recreational fishing activity [*Minimize conflict with recreational fishing by siting incompatible uses outside areas of concentrated recreational fishing activity*]
  - Data: MMTA recreational fishing/boating survey, DMF recreational fishing survey
- Concentrations of recreational uses [*Preserve/enhance public access by siting use areas to minimize impacts to concentrations of recreational uses*]
  - Data: MMTA recreational fishing/boating survey, DMF recreational fishing survey
- Known historic/archaeological resources
  - Data: AWOIS

Conditionally compatible with:

- Fixed commercial gear
- Recreational boating and fishing
- Aquaculture
- Wave and tidal energy facilities
- Linear infrastructure
- Habitat and biota

## Wave and Tidal Current Energy Facilities

Overview: Several technologies have reached varying states of development, and the environmental issues specific to individual technologies vary significantly. Tidal current facilities are near-shore technologies; wave energy technologies are under development for both near-shore and deep-water applications. Commercial-scale facilities do not appear likely in Massachusetts waters in the near-term (0-5 years); however, pilot tidal current sites have received preliminary permits from the Federal Energy Regulatory Commission for three locations within the planning area, and environmental surveys are being conducted to determine the feasibility of tidal current. At least one small, bottom-anchored, deep-water wave energy unit is currently installed for testing (North Shore). Deep-water, commercial-scale facilities will primarily impact commercial and recreational surface navigation and mobile fishing gear; potential significant environmental impacts are limited due to the scale of the projects; for commercial-scale facilities, impacts to fish, marine mammals, and other resources will be highly dependent on the specific technology and proposed location.

Siting criteria for wave facility:

- Highly variable

Tidal facility siting criteria:

- Peak tidal velocities of at least 3 knots, water depths of between 18-40 meters - Renewable Work Group recommends “Areas for further exploration of tidal power potential” – Naushon/Vineyard Sound, Muskeget Channel, Nantucket SE

Exclusionary (avoid):

- Coast Guard-designated navigation areas (shipping channels and traffic lanes, precautionary areas, anchorage areas, pilot boarding areas)
  - Data: Navigation Work Group
- Ferry routes
  - Data: Navigation Work Group
- Direct transit navigation routes for shipping and fishing [*Minimize conflict with significant interconnections between homeports and grounds*]
  - Data: AIS, VMS
- Direct-transit recreational navigation routes [*Preserve/enhance public access by siting use areas to minimize impacts to concentrations of recreational uses. Consider impacts to significant interconnections between shore access points and destination areas.*]
  - Data: To be acquired
- Areas of significant commercial fishing effort and value: high fishing activity by effort and value [*Minimize conflict with commercial fishing by siting development areas outside areas of significant fishing effort and value*]

- Data: Fisheries Work Group
- CWA 404 Special Aquatic Site
  - Data: Regulatory data layers
- Known historic/archaeological resources
  - Data: AWOIS
- Important fisheries resource areas (tidal only)
  - Data: Fisheries Work Group
- High concentrations of whale populations: Right whale core habitat
  - Data: Habitat Work Group, NHESP

Constraint (avoid or minimize):

- Areas of concentrated recreational fishing activity [*Minimize conflict with recreational fishing by siting incompatible uses outside areas of concentrated recreational fishing activity*]
  - Data: DMF recreational fishing survey
- High concentrations of whale populations: fin and humpback whales
  - Data: Habitat Work Group, NHESP

Conditionally compatible with:

- Fixed commercial gear
- Recreational boating and fishing
- Aquaculture
- Wind energy facilities
- Linear infrastructure
- Habitat and biota

## Sand Mining for Beach Nourishment

Overview: Mechanical or hydraulic extraction of sand from the surface of the seabed. Significant impact to bottom habitat (removal) and benthic resources (mortality/displacement) over the extent of the project area. Impacts from construction include temporary, localized degradation of water quality; mortality and temporary displacement of habitat and living resources; temporary exclusion of existing uses from area of construction; temporary impact to bottom fishing from habitat degradation; and permanent alteration of bottom topography. Long-term impact to habitat function has not been documented in Massachusetts.

Siting criteria: Relative proximity to erosional/nourishment areas, marine sand resource of appropriate grain size

- Data: usSEABED, rugosity

Exclusionary (avoid):

- Coast Guard-designated navigation areas (shipping channels and traffic lanes, precautionary areas, anchorage areas, pilot boarding areas)
  - Data: Navigation Work Group
- Ferry routes
  - Data: Navigation Work Group
- Linear infrastructure
  - Data: Infrastructure Work Group
- High concentrations of whale populations: Right whale core habitat
  - Data: Habitat Work Group, NHESP
- CWA 404 Special Aquatic Site
  - Data: Regulatory data layers
- Areas of significant commercial fishing effort and value: high fishing activity by effort and value [*Minimize conflict with commercial fishing by siting development areas outside areas of significant fishing effort and value*]
  - Data: Fisheries Work Group
- Important fisheries resource areas
  - Data: Fisheries Work Group
- Hard/complex benthic habitat
  - Data: US Seabed, rugosity

Constraint (avoid or minimize):

- High concentrations of whale populations
  - Data: Habitat Work Group, NHESP
- Areas of medium fishing activity by effort and value [*evaluate conflict with mobile gear in potential wind development areas*]
  - Data: Fisheries Work Group, qualitative maps from commercial fishermen
- Areas of concentrated recreational fishing activity [*Minimize conflict with recreational fishing by siting incompatible uses outside areas of concentrated recreational fishing activity*]

Conditionally compatible with:

- Mobile and fixed commercial fishing gear
- Direct transit navigation fishing and recreational routes
- Recreational boating and fishing
- Concentrations of recreational uses
- Wave and tidal energy

## Pipelines

Overview: Linear infrastructure installed on or beneath seabed; three recent projects in Massachusetts to transport natural gas. Impacts from construction include temporary, localized degradation of water quality; temporary displacement of habitat and living resources, including demersal fish; temporary exclusion of existing uses from area of construction; and temporary impact to bottom fishing from habitat degradation. Time to complete habitat recovery exceeds five years for one project (Hubline), and has not been determined for two others (Northeast Gateway and Neptune [recent/current construction]). Quality of geotechnical data and construction methods are very important to minimize impacts to habitat, resources, and commercial fishing. Pipelines have less flexibility in route than cables, involve more surface equipment and construction time than cables, and have a larger area and duration of impact.

Siting criteria: soft sediment

- Data: usSEABED, rugosity

Exclusionary (avoid):

- Dredged material disposal sites
  - Data: Infrastructure Work Group
- CWA 404 Special Aquatic Site
  - Data: Regulatory data layers
- Hard/complex bottom areas
  - Data: usSEABED, rugosity
- High concentrations of whale populations: Right whale core habitat
  - Data: Habitat Work Group, NHESP
- Important fisheries resource areas
  - Data: Fisheries Work Group

Constraint (avoid or minimize):

- High concentrations of whale populations
  - Data: Habitat Work Group, NHESP
- Coast Guard-designated anchorage areas
  - Data: Navigation Work Group
- High concentrations of whale populations
  - Data: Habitat Work Group, NHESP
- Known historic / archaeological resources
  - Data: AWOIS

Conditionally compatible with:

- All other uses and resources, subject to alternatives analysis to “avoid, minimize, and mitigate” impacts to resources and uses, and regulatory performance standards

## Cables for Electricity and Telecommunications

Linear infrastructure with several installations in Massachusetts waters. Impacts from construction include temporary, localized degradation of water quality; temporary displacement of habitat and living resources; temporary exclusion of existing uses from area of construction; and temporary impact to bottom fishing. Quality of geotechnical data important to minimize impacts. Scale of impact significantly less than pipelines. Permanent impacts not expected. Minerals Management Service evaluating electro-magnetic field issues associated with electricity transmission.

Siting criteria: soft sediment

- Data: usSEABED, rugosity

Exclusionary (avoid):

- Dredged material disposal sites
  - Data: Infrastructure Work Group
- CWA 404 Special Aquatic Site
  - Data: Regulatory data layers
- Hard/complex bottom areas
  - Data: usSEABED, rugosity
- High concentrations of whale populations: Right whale core habitat
  - Data: Habitat Work Group, NHESP

Constraint (avoid or minimize):

- Coast Guard-designated anchorage areas
  - Data: Navigation Work Group
- Known historic/archaeological resources
  - Data: AWOIS
- High concentrations of whale populations
  - Data: Habitat Work Group, NHESP

Conditionally compatible with:

- All other uses and resources, subject to alternatives analysis to “avoid, minimize, and mitigate” impacts to resources and uses, and regulatory performance standards

## Deep-Water (Non-Intertidal) Aquaculture

Overview: Primary technologies are submersible, bottom-anchored cages for finfish and submersible, bottom-anchored long-line systems for shellfish. Depending on type of technology, varying impacts to commercial and recreational surface navigation and commercial and recreational fishing. Primary potential environmental impact is water quality degradation (increased nutrient loads) and the potential of escaped animals to affect health or genetics of wild stocks.

Siting criteria: Division of Marine Fisheries regulates aquaculture; DMF regulations require site review to avoid and minimize impacts to existing marine resources and uses.

### Exclusionary (avoid):

- Coast Guard-designated navigation areas (shipping channels and traffic lanes, precautionary areas, anchorage areas, pilot boarding areas)
  - Data: Navigation Work Group
- Ferry routes
  - Data: Navigation Work Group
- Direct transit navigation routes for shipping and fishing [*Minimize conflict with significant interconnections between homeports and grounds*]
  - Data: AIS, VMS
- Areas of significant commercial fishing effort and value: high fishing activity by effort and value [*Minimize conflict with commercial fishing by siting development areas outside areas of significant fishing effort and value*]
- High concentrations of whale populations: Right whale core habitat
  - Data: Habitat Work Group, NHESP
- CWA 404 Special Aquatic Site
  - Data: Regulatory data layers

### Constraint (avoid or minimize):

- Areas of concentrated recreational fishing activity [*Minimize conflict with recreational fishing by siting incompatible uses outside areas of concentrated recreational fishing activity*]

### Conditionally compatible with:

- Fixed commercial gear
- Recreational boating and fishing
- Wind, wave, and tidal energy facilities
- Linear infrastructure
- Habitat and biota



# Appendix 3 - The Oceans Act of 2008

## **Chapter 114 of the Acts of 2008 AN ACT RELATIVE TO OCEANS.**

*Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same as follows:*

**SECTION 1.** Chapter 10 of the General Laws is hereby amended by inserting after section 35GG the following section:-

Section 35HH. There shall be established and set up on the books of the commonwealth a separate fund to be administered by the secretary of energy and environmental affairs, as trustee, in consultation with the department of environmental protection, to be known as the Ocean Resources and Waterways Trust Fund. There shall be credited to the fund any revenue from appropriations or other monies authorized by the general court and specifically designated to be credited to the fund, any appropriation or grant explicitly made to the fund and any income derived from the investment of amounts credited to the fund and the proceeds from any ocean development mitigation fees established pursuant to section 18 of chapter 132A. The priority for use of funds derived from compensation or mitigation for ocean development projects shall be to restore or enhance marine habitat and resources impacted by the project for which the compensation or mitigation shall have been received. The funds derived from compensation or mitigation related to public navigational impacts shall be dedicated to public navigational improvements; provided, however, that any funds for the enhancement of fisheries resources shall be directed to conduct fisheries restoration and management programs. Any other amounts credited to the fund shall be used, without further appropriation, only for the purposes of environmental enhancement, restoration and management of ocean resources by the secretary pursuant to section 4C of chapter 21A. No expenditure from the fund shall cause the fund to be in deficiency at the close of a fiscal year. Monies deposited in the fund that are unexpended at the end of the fiscal year shall not revert to the General Fund and shall be available for expenditure in the subsequent fiscal year.

**SECTION 2.** Chapter 21A of the General Laws is hereby amended by inserting after section 4B the following section:-

Section 4C. (a) The ocean waters and ocean-based development of the commonwealth, within the ocean management planning area described in this section, shall be under the oversight, coordination and planning authority of the secretary of energy and environmental affairs, hereinafter referred to as the secretary, in accordance with the public trust doctrine. Notwithstanding any general or special law to the contrary, the secretary, in consultation with

the ocean advisory commission established pursuant to subparagraph (c) and the ocean science advisory council established pursuant to subparagraph (d), shall develop an integrated ocean management plan, which may include maps, illustrations and other media. The plan shall: (i) set forth the commonwealth's goals, siting priorities and standards for ensuring effective stewardship of its ocean waters held in trust for the benefit of the public; and (ii) adhere to sound management practices, taking into account the existing natural, social, cultural, historic and economic characteristics of the planning areas; (iii) preserve and protect the public trust; (iv) reflect the importance of the waters of the commonwealth to its citizens who derive livelihoods and recreational benefits from fishing; (v) value biodiversity and ecosystem health; (vi) identify and protect special, sensitive or unique estuarine and marine life and habitats; (vii) address climate change and sea-level rise; (viii) respect the interdependence of ecosystems; (ix) coordinate uses that include international, federal, state and local jurisdictions; (x) foster sustainable uses that capitalize on economic opportunity without significant detriment to the ecology or natural beauty of the ocean; (xi) preserve and enhance public access; (xii) support the infrastructure necessary to sustain the economy and quality of life for the citizens of the commonwealth; (xiii) encourage public participation in decision-making; (xiv) and adapt to evolving knowledge and understanding of the ocean environment; and (xv) shall identify appropriate locations and performance standards for activities, uses and facilities allowed under sections 15 and 16 of chapter 132A. The division of marine fisheries, pursuant to chapter 130 and any other applicable general or special law, shall have sole responsibility for developing and implementing any fisheries management plans or fisheries regulations. Marine fisheries shall be managed in compliance with the applicable rules and regulations of the division of marine fisheries and federal or interstate fishery management plans issued pursuant to said chapter 130 or any other applicable general or special law and shall be integrated, to the maximum extent practicable, with an ocean management plan.

(b) An ocean management plan shall include any waters and associated submerged lands of the ocean, including the seabed and subsoil, lying between the line designated as the "Nearshore Boundary of the Ocean Management Planning Area", which is depicted on a plan dated January 31, 2006, prepared by the office of coastal zone management and maintained at the executive office of energy and environmental affairs and with the clerks of the house and the senate, and the seaward boundary of the commonwealth, as defined in 43 U.S.C. § 1312. An ocean management plan may take into account the different regional characteristics of the commonwealth's waters. A plan shall include existing municipal, state and federal boundaries and may include recommendations for clarifying those boundaries.

(c)(i) There shall be an ocean advisory commission to assist the secretary in developing the ocean management plan. The commission shall consist of 3 members of the senate, 1 of whom shall be appointed by the minority leader of the senate; 3 members of the house of representatives, 1 of whom shall be appointed by the minority leader of the house of representatives; the director of coastal zone management or his designee; the director of marine

fisheries or his designee; the commissioner of environmental protection or his designee; and 8 members to be appointed by the governor, 1 of whom shall be a representative of a commercial fishing organization, 1 of whom shall be a representative of an environmental organization, 1 of whom shall have expertise in the development of offshore renewable energy, 1 of whom shall be a representative of the Cape Cod commission, 1 of whom shall be a representative of the Martha's Vineyard Commission, 1 of whom shall be a representative of the Merrimack Valley Planning Commission, 1 of whom shall be a representative of the metropolitan area planning council and 1 of whom shall be a representative of the Southeastern Regional Planning and Economic Development District. Members shall be appointed for terms of 3 years, except that, initially, 4 members appointed by the governor shall be appointed for terms of 2 years and 3 members appointed by the governor shall be appointed for terms of 1 year. The appointing authority may fill any vacancy that occurs in an unexpired term. The members of the commission shall be selected with due regard to coastal geographic distribution.

(ii) The commission shall meet at least quarterly and at the discretion of the secretary. The commission shall hold public meetings relative to matters within the jurisdiction of the ocean management plan and shall make recommendations to the secretary for the proper management and development of the plan. The secretary shall consider the recommendations of the commission.

(iii) The office of coastal zone management and division of marine fisheries shall provide technical support to the commission.

(d) There shall be an ocean science advisory council to assist the secretary in creating a baseline assessment and obtaining any other scientific information necessary for the development of an ocean management plan. The council shall consist of 9 members to be appointed by the secretary, 3 of whom shall be scientists from academic institutions, at least 1 of whom shall be from the School for Marine Science and Technology at the University of Massachusetts at Dartmouth and at least 1 of whom shall be from the Department of Environmental, Earth and Ocean Sciences at the University of Massachusetts at Boston; 3 of whom shall be scientists from private, nonprofit organizations, at least 1 of whom shall be a scientist designated by the Massachusetts Fishermen's Partnership; and 3 of whom shall be scientists from government agencies with demonstrated technical training and experience in the fields of marine ecology, geology, biology, ichthyology, mammalogy, oceanography or other related ocean science disciplines, at least 1 of whom shall be from the division of marine fisheries. The secretary shall serve as coordinator of the council. The council shall meet at least quarterly and at any other time that the secretary shall deem necessary to assist him in compiling the scientific information necessary for the development of an ocean management plan.

(e) Upon the secretary's adoption of an ocean management plan, all certificates, licenses,

permits and approvals for any proposed structures, uses or activities in areas subject to the ocean management plan shall be consistent, to the maximum extent practicable, with the plan.

(f) The secretary shall develop and implement a public outreach and information program to provide information to the public regarding the ocean management planning process.

(g) The secretary shall, at least 6 months before establishing an ocean management plan pursuant to this section, provide for public access to the draft plan in electronic and printed copy form and shall provide for a public comment period, which shall include at least 4 public hearings in at least 4 different coastal regions. The secretary shall publish notice of the hearings in the Environmental Monitor within 30 days of the date of the hearing. A notice of the public hearing shall also be placed, at least once each week for the 4 consecutive weeks preceding the hearing, in newspapers with sufficient circulation to notify the residents of the coastal region where the hearing shall be held. The hearing shall be held not sooner than 30 days and not later than 35 days after the notice is published in the Environmental Monitor. The public comment period shall remain open for at least 60 days from the date of the final public hearing. After the close of the public comment period, the secretary shall issue a final ocean management plan and shall file the plan, together with legislation necessary to implement the plan, if any, by filing the same with the clerks of the house of representatives and senate.

(h) The secretary shall promulgate regulations to implement, administer and enforce this section and shall interpret this section and any regulations adopted hereunder consistent with his power to enforce the laws. These regulations shall include provisions for the review of the ocean management plan, its baseline assessment and the enforceable provisions of relevant statutes and regulations at least once every 5 years.

(i) The joint committee on state administration and regulatory oversight, in this subsection called the committee, may review a proposed ocean management plan or regulations proposed or adopted pursuant to this chapter. The committee shall consult with the joint committee on environment, natural resources and agriculture in performing this review. The committee may hold public hearings concerning a proposed ocean management plan or a proposed or existing regulation and may submit to the secretary comments concerning the merit and appropriateness of the plan or regulations to be promulgated and an opinion on whether the proposed plan or regulations are authorized by, and consistent with, this chapter and existing state laws and regulations. The secretary shall respond in writing within 10 days to the committee's written questions relevant to the committee's review of a proposed plan or proposed or existing regulation. The secretary shall provide to the committee, without charge, copies of all public records in the secretary's custody relating to the proposed plan or regulation or action in question within 10 days of a request by the committee. The committee may issue a report with proposed changes to a proposed plan or proposed or existing regulation and shall transmit this report to the secretary. If the secretary does not adopt the proposed changes

contained in the committee's report, the secretary shall notify the committee in writing of the reasons why he did not adopt the changes either at the time he adopts a proposed plan or proposed regulation or within 21 days of receiving the committee's report on an existing regulation.

(j) The ocean management plan shall be consistent with this section and all other general and special laws. The ocean management plan shall not be construed to supersede existing general or special laws, or to confer rights and remedies in addition to those conferred by existing general or special laws.

(k)(1) In the geographic area subject to the ocean management plan, as described in paragraph (b), commercial and recreational fishing shall be allowable uses, subject to the exclusive jurisdiction of the division of marine fisheries. Any component of a plan which regulates commercial or recreational fishing shall be developed, promulgated and enforced by the division of marine fisheries pursuant to its authority under chapter 130.

(2) A component of an ocean management plan which does not have as its primary purpose the regulation of commercial or recreational fishing but which has an impact on such fishing shall minimize negative economic impacts on commercial and recreational fishing. Prior to inclusion in an ocean management plan, a component with such a reasonably foreseeable impact shall be referred to the division of marine fisheries, which shall, in writing and in a timely and efficient manner, evaluate the component for its impact on commercial and recreational fishing and, if possible, develop and recommend to the secretary any suggestions or alternatives to mitigate or eliminate any adverse impacts.

(3) The director of marine fisheries, subject to the approval of the marine fisheries advisory commission, shall have sole authority for the opening and closing of areas within the geographic area described in subsection (b) for the taking of any and all types of fish, pursuant to section 17A of chapter 130. Nothing in this section shall be construed to limit the powers of the director pursuant to section 17 of chapter 130 or any other provision thereto.

**SECTION 3.** Section 12B of chapter 132A of the General Laws, as appearing in the 2006 Official Edition, is hereby amended by striking out the definitions of “Commissioner” and “Department” and inserting in place thereof the following definition:-

“Director”, the director of coastal zone management.

**SECTION 4.** Said section 12B of said chapter 132A, as so appearing, is hereby further amended by inserting after the definition of “Facilities plan” the following definition:-

“Office”, office of coastal zone management.

**SECTION 5.** Section 12C of said chapter 132A, as so appearing, is hereby amended by striking out, in lines 1 and 3, the word “department” and inserting in place thereof, in each instance, the following word:- office.

**SECTION 6.** Section 14 of said chapter 132A, as so appearing, is hereby amended by striking out, in line 2, the word “department” and inserting in place thereof the following word:- office.

**SECTION 7.** Said chapter 132A, as so appearing, is hereby further amended by striking out section 15 and inserting in place thereof the following section:-

Section 15. Except as otherwise provided in this section, the following activities shall be prohibited in an ocean sanctuary:

- (1) the building of any structure on the seabed or under the subsoil;
- (2) the construction or operation of offshore or floating electric generating stations, except: (a) on an emergency and temporary basis for the supply of energy when the electric generating station is otherwise consistent with an ocean management plan; or (b) for appropriate-scale renewable energy facilities, as defined by an ocean management plan promulgated pursuant to section 4C of chapter 21A, in areas other than the Cape Cod Ocean Sanctuary; provided, however, that (i) the renewable energy facility is otherwise consistent with an ocean management plan; (ii) siting of all such facilities shall take into account all relevant factors, including but not limited to, protection of the public trust, compatibility with existing uses, proximity to the shoreline, appropriateness of technology and scale, environmental protection, public safety and community benefit; and (iii) in regions where regional planning agencies have regulatory authority, a regional planning agency may review the appropriate-scale offshore renewable energy facilities as developments of regional impact and the applicant may seek review pursuant to the authority of the energy facilities siting board to issue certificates of environmental impact and public interest pursuant to sections 69K through 69O of chapter 164;
- (3) the drilling or removal of any sand, gravel or other minerals, gases or oils;
- (4) the dumping or discharge of commercial, municipal, domestic or industrial wastes;
- (5) commercial advertising; or
- (6) the incineration of solid waste or refuse on, or in, vessels moored or afloat within the boundaries of an ocean sanctuary.

**SECTION 8.** Section 16 of said chapter 132A, as so appearing, is hereby amended by striking out, in lines 14 and 15, the words “telecommunications and energy” and inserting in place thereof the

following words:- public utilities or the department of telecommunications and cable.

**SECTION 9.** Said section 16 of said chapter 132A, as so appearing, is hereby further amended by striking out, in line 20 and in lines 28 and 29, the word “department” and inserting in place thereof, in each instance, the following word:- office.

**SECTION 10.** Said section 16 of said chapter 132A, as so appearing, is hereby further amended by striking out, in lines 29 and 30, the words “fisheries, wildlife and environmental law enforcement” and inserting in place thereof the following words:- fish and game.

**SECTION 11.** Section 16A of said chapter 132A, as so appearing, is hereby amended by inserting after the word “department”, in line 6, the following words:- of environmental protection.

**SECTION 12.** Section 16B of said chapter 132A, as so appearing, is hereby amended by striking out, in line 26 and in lines 30 and 31, the words “and the division of water pollution control” and inserting in place thereof the following words:- of environmental protection.

**SECTION 13.** Section 16C of said chapter 132A, as so appearing, is hereby amended by inserting after the word “department”, in lines 1 and 5, the following words:- of environmental protection.

**SECTION 14.** Section 16E of said chapter 132A, as so appearing, is hereby amended by inserting after the word “department”, in lines 1 and 2 and line 5, the following words:- of environmental protection.

**SECTION 15.** Said section 16E of said chapter 132A, as so appearing, is hereby further amended by inserting after the word “commissioner”, in lines 13 and 14, the following words:- of environmental protection.

**SECTION 16.** Section 16F of said chapter 132A, as so appearing, is hereby amended by inserting after the word “department”, in line 1, the following words:- of environmental protection.

**SECTION 17.** Said section 16F of said chapter 132A, as so appearing, is hereby further amended by striking out the last sentence.

**SECTION 18.** Section 18 of said chapter 132A, as so appearing, is hereby amended by inserting, after the word “of”, in line 2, the following words:-energy and.

**SECTION 19.** Said section 18 of said chapter 132A, as so appearing, is hereby further amended by striking out, in lines 7 and 8 and line 9, the word “department” and inserting in place thereof, in each instance, the following word:- office.

**SECTION 20.** Said section 18 of said chapter 132A, as so appearing, is hereby further amended by adding the following paragraph:-

Any permit or license issued by a department, division, commission, or unit of the executive office of energy and environmental affairs and other affected agencies or departments of the commonwealth for activities or conduct consistent with this chapter shall be subject to an ocean development mitigation fee as shall be established by the secretary of energy and environmental affairs; provided, however, that no fee shall be assessed on commercial and recreational fishing permits or licenses. All the proceeds of the ocean development mitigation fee shall be deposited in the Ocean Resources and Waterways Trust Fund established pursuant to section 35HH of chapter 10.

**SECTION 21.** Nothing in this act shall be construed to alter the jurisdictional authority of the division of marine fisheries. Nothing in this act shall be construed to prohibit the transit of commercial fishing vessels and recreational vessels in state ocean waters.

**SECTION 22.** Any project that, before the effective date of this act, has: (1) filed a license application under chapter 91 of the General Laws and received a written determination of completeness from the department of environmental protection; (2) if subject to section 61 of chapter 30 of the General Laws, received a certificate of adequacy regarding a final environmental impact report; or (3) if the project is subject to the jurisdiction of the energy facilities siting board, received both a final decision from the energy facilities siting board and a certificate of adequacy regarding a draft environmental impact report, shall not be subject to the requirements of said ocean management plan.

**SECTION 23.** The secretary of energy and environmental affairs shall promulgate a final ocean management plan by December 31, 2009. Upon adoption, an ocean management plan shall formally be incorporated into the Massachusetts coastal zone management program, as referenced in section 4A of chapter 21A of the General Laws.

**SECTION 24.** Section 8 of this act shall take effect upon the adoption of an ocean management plan or by December 31, 2009, whichever occurs first.

**SECTION 25.** The secretary of energy and environmental affairs shall convene an advisory committee for the purpose of reviewing section 16 of chapter 132A of the General Laws and regulations promulgated pursuant thereto. The advisory committee shall review the regulatory definitions of “public necessity and convenience” and “significant alteration”. The secretary shall submit a report, together with legislative recommendations, if any, to the joint committee on environment, natural resources and agriculture by December 31, 2009.

*Approved May 28, 2008*

# Appendix 4 - Data Used in Plan Development

The following table lists the data used in development of the draft Massachusetts Ocean Management Plan. It includes the datalayer name used in MORIS, the Massachusetts Ocean Resource Information System (available at [www.mass.gov/czm/mapping/index.htm](http://www.mass.gov/czm/mapping/index.htm)), the original source of the data (labeled “originator”), and a brief description of the data. More detailed information about specific datalayers can be found in the layer’s metadata record, which can be viewed in MORIS by clicking on the ‘Layer Info’ tab.

Datalayer Name	Originator	Description
Active Disposal Sites	Massachusetts Office of Coastal Zone Management (CZM) and National Oceanic and Atmospheric Administration (NOAA)	These data were created by combining the Cape Cod Bay disposal site created by CZM and active disposal sites (Cape Cod Canal and Cleveland Ledge) selected from the dumping grounds data layer extracted from NOAA's Electronic Navigational Charts(ENC) Direct to GIS web portal.
Anchorage Areas	Massachusetts Office of Geographic and Environmental Information (MassGIS)/CZM and NOAA	This layer was created by combining an anchorage berth dataset digitized from NOAA nautical charts by MassGIS/CZM and selected anchorage areas extracted from NOAA's ENC Direct to GIS web portal.
Automatic Identification System (AIS)	Stellwagen Bank National Marine Sanctuary (raw data)	This dataset documents the density of vessel tracks during 2008 in the Massachusetts ocean planning area for commercial vessels greater than 299 tons. CZM digitized polygons from this dataset to represent areas where greater than 50 vessels were recorded over the duration of the year 2008 in a 250 meter grid cell.
Bathymetry	CZM	These data represent a mosaic of bathymetric datasets of waters off the coast of Massachusetts derived from the most current and accurate sources, including U.S. Geological Survey (USGS) Open File Reports, NOAA Estuarine Bathymetry, and the NOAA Coastal Relief Model. Contour lines for display and analysis were derived from these data.
Bay Scallop	Massachusetts Division of Marine Fisheries (DMF)	DMF identified a subset of bay scallop polygons from their "Shellfish Suitability Areas - November 2008" data layer to represent the highest quality habitat with the densest populations of bay scallops.
Boat Registrations	Massachusetts Environmental Police	These GIS data represent the number of active registrations of Massachusetts vessels in 2006 by vessel storage town and size class: Class I – less than 16 feet; Class II – 16 to 26 feet; Class III – 27 to 40 feet; and Class IV – more than 40 feet. The registration data exclude commercial fishing vessels and personal watercrafts (e.g., jet skis).
Boating Access Sites	Massachusetts Department of Fish and Game (DFG)	The "Office of Fishing and Boating Access Sites - April 2009" data layer shows public locations where boats may be launched. The principal source for this layer was the <i>Public Access to the Waters of Massachusetts</i> , published by the DFG Office of Fishing and Boating Access. Additional sites were digitized from USGS topographic quadrangles.

Datalayer Name	Originator	Description
Cable Areas	NOAA	Cable areas in Massachusetts were extracted from NOAA's ENC Direct to GIS web portal.
Cables	CZM	To create this layer, the CZM datasets, "Harwich Port to Nantucket Harbor electric supply cable (National Grid Nantucket Cable No. 1), Nantucket Sound, Massachusetts, 2005" and "Hyannis to Nantucket Harbor electric supply cable (National Grid Nantucket Cable No. 2), Nantucket Sound, Massachusetts, 2005," were combined with cables CZM digitized from NOAA nautical charts.
Channeled Whelk	DMF	This layer was derived from the DMF Resource Assessment Trawl Surveys from 1978-2007. To create this layer, the survey data were analyzed to create a spatial distribution of abundance of channeled whelk, which was then reclassified into top 25%, middle 50%, and bottom 25%. CZM extracted "high" areas (top 25%) for use in display and analysis.
Colonial Nesting Waterbirds	Massachusetts Division of Fisheries and Wildlife (DFW)	These sites represent areas where more than 100 pairs of colonial nesting waterbirds have been observed during surveys. Observed species may include Common Terns, Least Terns, Roseate Terns, Arctic Terns, Leach's Storm-petrels, Double-crested Cormorants, Herring Gulls, Great Black-backed Gulls, Laughing Gulls, Black Skimmers, Great Egrets, Snowy Egrets, Cattle Egrets, Little Blue Herons, Black-crowned Night Herons, and Glossy Ibis. Sites delineated solely for tern species were excluded since other data captured tern colonies. The sites were buffered 0.3 nautical miles.
Commercial Fisheries Activity	DMF	These data represent areas important to Massachusetts commercial fisheries in terms of fishing effort and landings value. These data were derived from DMF fishermen catch reports, Standard Atlantic Fisheries Information System dealer transaction reports, and National Marine Fisheries Service vessel trip reports. The fishing effort and landings value from all sources were combined and reclassified into top 25%, middle 50%, and bottom 25%. In some instances, CZM extracted "high" and "medium" areas for use in display and analysis.
Eelgrass	Massachusetts Department of Environmental Protection (DEP) Wetlands Conservancy Program (WCP)	The "DEP Eelgrass - February 2006" layer was compiled from data collected in 1995 and 2001. The layer represents eelgrass ( <i>Zostera marina</i> ), which is the most common seagrass present on the Massachusetts coastline, and widgeon grass ( <i>Ruppia maritima</i> ), which is present in areas of lower salinity along the Cape Cod and Buzzards Bay coast.
EVI	Executive Office of Energy and Environmental Affairs (EEA)	These data represent an Ecological Valuation Index (EVI) that illustrates the sum of scores for individual species or geophysical habitats indicating their perceived ecological importance.
EVI (binned by guild)	EEA	These data represent an EVI that illustrates the sum of scores for individual species or geophysical habitats that indicate their perceived ecological importance. The data were normalized by species "guild" or taxonomic group to reduce the effect of inequities in the number of species per guild.
Ferry Routes	Executive Office of Transportation, Office of Transportation Planning (EOT-OTP)	This layer is the EOT-OTP dataset, "Ferry Routes" (updated December 2008).

Datalayer Name	Originator	Description
Fin Whales	NOAA National Centers for Coastal Ocean Science (NCCOS)	This layer is based on cetacean sightings data from 1978-2005 acquired from two sources: (1) the North Atlantic Right Whale Consortium sightings database held at the University of Rhode Island; and (2) the Manomet Bird Observatory database, held at the NOAA Northeast Fisheries Science Center (NEFSC). The data were corrected for sightings-per-unit-effort (SPUE) to calculate probability of detection functions for individual species. In some instances, CZM extracted "core" (or highest SPUE) data for use in display and analysis.
Fisheries Resources	DMF	These data are intended to represent areas important to Massachusetts fisheries resources. This layer was derived from the DMF Resource Assessment Trawl Survey collected from 1978-2007. The survey allocates its sampling effort according to a series of 23 strata, based on five biogeographic regions and six depth zones. To create this layer, 22 species were selected for consideration, based on 2 criteria: 1) they were adequately sampled by the Resource Assessment Trawl Survey, and 2) they were considered to be an important component of commercial or recreational fisheries within the planning area. In some instances, CZM extracted "high" areas for use in display and analysis.
Footprint of Human Uses	Halpern and Kappel	Draft map prepared by Benjamin S. Halpern and Carrie V. Kappel, National Center for Ecological Analysis and Synthesis, University of California, Santa Barbara. These data show the number of co-occurring human stressors. 20 human stressor data layers were included.
Gas Pipelines	CZM	CZM acquired original engineering plans to create these data.
Hard/Complex Bottom	CZM	These data show the combination of hard bottom (classified as hard bottom from the CZM/DMF "Surficial Sediments" data) and high rugosity (classified as >1 standard deviation from the CZM "Rugosity" data).
Horseshoe Crab	DMF	This layer was derived from the DMF Resource Assessment Trawl Survey collected from 1978-2007. To create this layer, the survey data were analyzed to create a spatial distribution of abundance of horseshoe crab, which was then reclassified into top 25%, middle 50%, and bottom 25%. CZM extracted "high" areas (top 25%) for use in display and analysis.
Humpback Whales	NCCOS	This layer is based on cetacean sightings data from 1978-2005 acquired from two sources: (1) the North Atlantic Right Whale Consortium sightings database held at the University of Rhode Island; and (2) the Manomet Bird Observatory database, held at the NOAA Northeast Fisheries Science Center (NEFSC). The data were corrected for sightings-per-unit-effort (SPUE) to calculate probability of detection functions for individual species. In some instances, CZM extracted "core" (or highest SPUE) data for use in display and analysis.
Important Seal Haul-Out Areas	DFW and National Marine Fisheries Service (NMFS), Northeast Fisheries Science Center (NEFSC), Protected Species Branch (PSB)	These data were developed by combining data from DFW and NMFS/NEFSC/PSB. The largest seal haul-out areas in Massachusetts were delineated by biologists from DFW and corroborated by biologists at Mass Audubon's Wellfleet Bay Wildlife Sanctuary. The NMFS/NEFSC/PSB data are twenty point locations of major haul-out sites in southern Massachusetts that they survey during their monitoring flights. All of the data were extended 0.3 nautical miles to maintain consistency with the ocean planning mainland buffer. In some instances, CZM extracted sites with higher concentrations for use in display and analysis.
Inactive Disposal Sites	NOAA	These data were extracted from NOAA's ENC Direct to GIS web portal.
Intertidal Flats	DEP-WCP	The intertidal flats data were extracted from the "DEP Wetlands (1:12,000) - April 2007" data layer. The wetlands were interpreted from 1:12,000 scale, stereo color-infrared photography by staff at UMASS Amherst and field checked by DEP-WCP.

Datalayer Name	Originator	Description
Knobbed Whelk	DMF	This layer was derived from the DMF Resource Assessment Trawl Survey collected from 1978-2007. To create this layer, the survey data were analyzed to create a spatial distribution of abundance of knobbed whelk, which was then reclassified into top 25%, middle 50%, and bottom 25%. CZM extracted "high" areas (top 25%) for use in display and analysis.
Leach's Storm-petrels	DFW	Leach's Storm Petrel is a state-listed Endangered species. Areas delineated are documented breeding areas. Nesting areas were buffered 0.3 nautical miles.
Lighthouses	CZM	This data layer, "Lighthouses - July 2006," shows the current locations of all extant lighthouses on the coastline of Massachusetts. While many of the lighthouses represented are active aids to navigation maintained by the U.S. Coast Guard, others are not and are maintained privately.
Lobster	DMF	This layer was derived from the DMF Resource Assessment Trawl Survey collected from 1978-2007. To create this layer, the survey data were analyzed to create a spatial distribution of abundance of lobster, which was then reclassified into top 25%, middle 50%, and bottom 25%. Per DMF's recommendation, CZM extracted "medium" areas (middle 50%) south of Cape Cod and "high" areas (top 25%) for use in display and analysis.
Long-tailed Ducks	Massachusetts Audubon Society (Mass Audubon)	Long-tailed Ducks were extracted from the Critical Avian Habitat dataset, which was compiled by Mass Audubon for the Massachusetts ocean plan. Mass Audubon ornithologists used their professional judgment and knowledge of the Bird Observer database, which is a compilation of observations by scientists and birders, to determine priority areas for Long-tailed Ducks.
Marinas	CZM	These GIS data show the locations of marinas, boatyards, yacht clubs, and yachting related facilities along the Massachusetts coast. The data were compiled from public lists, databases, and visual inspection of orthoimagery. While not fully comprehensive, these data constitute a majority of the marina-type resources available to recreational yachtspersons.
Massachusetts Aeronautics Commission (MAC) Aviation Buffers	CZM	CZM created this layer by buffering a 10,000-foot radius around the EOT-OTP "Airports" (current as of June 2006) data layer.
MMTA Recreational Fishing and Boating Survey	Massachusetts Marine Trades Association (MMTA)	This data layer represents recreational fishing and boating areas identified by MMTA in the Massachusetts ocean planning area. MMTA marked NOAA charts with boat routes, recreational fishing areas, recreational boating areas, and sail boat race areas as specified by MMTA members.
National Register of Historic Places (NRHP)	National Park Service (NPS)	This data set contains the locations and basic attributes of sites, buildings, objects, structures, and districts listed on the National Register of Historic Places (NRHP). *NOTE: Only properties LISTED prior to the date of this dataset ("beginning of 2007") are contained in this layer. Properties determined eligible, pending nomination, or pending owner objection do not appear in this dataset.
North Atlantic Right Whales	NCCOS	This layer is based on cetacean sightings data from 1978-2005 acquired from two sources: (1) the North Atlantic Right Whale Consortium sightings database held at the University of Rhode Island; and (2) the Manomet Bird Observatory database, held at the NOAA Northeast Fisheries Science Center (NEFSC). The data were corrected for sightings-per-unit-effort (SPUE) to calculate probability of detection functions for individual species. In some instances, CZM extracted "core" (or highest SPUE) data for use in display and analysis.

Datalayer Name	Originator	Description
Pilot Boarding Areas	CZM	Representatives from state pilot associations (Boston Harbor Pilot Association and Northeast Pilots Association) provided the center coordinate of five pilot boarding areas in the Massachusetts ocean planning area. The Boston Harbor pilot boarding area was buffered by a nautical mile radius, and the remaining four pilot boarding areas were buffered by a 0.5 nautical mile radius.
Potential Tidal Resources	CZM	ADCIRC Coastal Circulation and Storm Surge Model is a system of computer programs for solving time dependent, free surface circulation and transport problems in two and three dimensions. The model was used by Applied Science Associates to provide an estimate of the maximum tidal currents experienced in the Massachusetts ocean planning area during a tidal cycle. All areas with a current speed exceeding 2.75 knots were selected and isolated.
Precautionary Areas	NOAA	These data were extracted from NOAA's ENC Direct to GIS web portal.
Proposed New England Marine Renewable Energy Center (MREC) Test Area	CZM	CZM digitized the MREC proposed area for renewable energy research and projects from coordinates provided by MREC.
Proposed Tidal Energy Sites	CZM	CZM digitized the proposed tidal energy sites from relevant Federal Energy Regulatory Commission (FERC) preliminary permit applications.
Qualitative Commercial Fishing Information	EEA	These data on black sea bass, lobster, and winter flounder were generated through an EEA field study to collect information about commercial fisheries in Massachusetts state waters. As part of the study, commercial fisherman were interviewed and asked to identify and record areas of fisheries known to them on NOAA charts, which were subsequently digitized.
Recreational Dive Sites	CZM	This GIS data layer, updated by CZM in July 2007, shows popular dive sites for recreational SCUBA divers including reefs, wrecks, jetties and breakwaters off the coast of Massachusetts. The data were compiled from the Massachusetts Board of Underwater Archaeological Resources (BUAR) and web searches of popular diving locations listed by recreational and commercial groups.
Recreational Fishing Areas	DMF	This data layer represents the recreational fisheries identified in the Massachusetts ocean planning area from the DMF Massachusetts Ocean Planning Recreational Fishing Effort Survey. The field study was designed to collect information about recreational fisheries in four regions in Massachusetts state waters. To create this later, polygons drawn on recreational fishing maps developed by DMF were digitized.
Roseate Terns	DFW	This dataset represents documented Roseate Tern breeding, staging, and foraging areas. The breeding and staging sites were buffered 0.3 nautical miles. Within the foraging areas, DFW biologists identified critical foraging areas, which represent the most important foraging areas, critical to the use of the mapped breeding and staging areas. In some instances, CZM extracted "core" data for use in display and analysis.
Rugosity	CZM	Rugosity is a measure of terrain roughness and is indicative of the amount of habitat available for colonization by epibenthic organisms and shelter and foraging area for mobile organisms. For this dataset, CZM calculated rugosity with an algorithm developed by Sappington et al. 2005 that measures vector dispersion in three dimensions. CZM then reclassified those areas greater than one standard deviation from the mean as "high" rugosity.

Datalayer Name	Originator	Description
Sea Scallop	DMF	DMF identified a subset of sea scallop polygons from their "Shellfish Suitability Areas - November 2008" data layer to represent the highest quality habitat with the densest populations of sea scallops.
Separation Zone	NOAA	Traffic separation zones were extracted from NOAA's ENC Direct to GIS web portal.
Shipping Lanes	CZM	CZM digitized traffic lanes, shipping channels, and recommended routes from current NOAA charts.
Special Concern Terns	DFW	Areas delineated are important breeding, staging, and foraging areas for terns state-listed as species of Special Concern. These species include Common, Least, and Arctic Terns. The breeding and staging sites were buffered 0.3 nautical miles. Within the foraging areas, DFW biologists identified core foraging areas, which represent the most important foraging areas. In some instances, CZM extracted "core" data for use in display and analysis.
Submerged Wrecks	NOAA	The Automated Wreck and Obstruction Information System (AWOIS) is an automated file that contains information on wrecks, obstructions, and other significant charted features in coastal waters of the United States subject to National Ocean Service (NOS) Hydrographic Surveys. CZM removed obstructions from the dataset so that only wrecks are present.
Surficial Sediments	CZM and DMF	Sediment data from the USGS publication, <i>usSEABED: Atlantic Coast Offshore Surficial Sediment Data Release</i> (USGS Data Series 118), in the Massachusetts ocean planning area were spatially interpolated to create a surficial sediment map, resulting in the following four categories: muddy, sandy, gravelly, and hard bottom. Note that the distribution of points in the usSEABED data is not uniform, creating areas where interpolation occurs across far larger distances than others.
Tidal Current Speed >3.0 knots	CZM	ADCIRC Coastal Circulation and Storm Surge Model is a system of computer programs for solving time dependent, free surface circulation and transport problems in two and three dimensions. The model was used by Applied Science Associates to provide an estimate of the maximum tidal currents experienced in the Massachusetts ocean planning area during a tidal cycle. All areas with a current speed exceeding 3.0 knots were selected and isolated.
Vessel Monitoring System (VMS)	NMFS Northeast Regional Office	VMS data are collected by NMFS to track fishing vessel activity for law enforcement (closed areas), safety, and scientific study. This dataset documents the density of fishing vessels from September 1, 2007, to September 1, 2008, using the VMS records available for that period. CZM digitized polygons from this dataset to represent areas where greater than 25 vessels were recorded in a 250 meter grid cell over the duration of the year.
Wind Speed	MassGIS	For this dataset, MassGIS used modeled wind speed data at a height of 70m above ground that was developed by Truewind Solutions, LLC in 2002-2003.

## Color Figures/Maps