

State of Coastal and Marine Management in Maine

The State of Coastal and Marine Management in Maine 2009

By John Abbett and Chris Englert

Executive Summary

The State of Coastal and Marine Management in Maine 2009 is the first chapter in *The State of Maine's Environment 2009*, a report produced by the Environmental Policy Group in the Environmental Studies Program at Colby College in Waterville, Maine. This is the fifth *State of Maine's Environment* report published since 2004.

Maine's coastal and marine (ocean) resources play a vital role in the health of Maine's economy. In 2007, Maine's coastal municipalities employed 55% of the state's population and accounted for 60% of the state's gross domestic product (GDP). The vitality and character of these municipalities are at risk if the state's coastal and marine economic resources are degraded. Presently, threatened resources such as Maine's sea urchin and sea scallop fisheries are managed by the state and federal governments in a series of issue and species-specific management plans. The spatial boundaries of these plans geographically overlap, creating a network of interconnecting regions, management strategies, and authorities. In our assessment, we found that 68% of the geographical area in Maine's state waters is characterized by having 10 or more overlapping management zones and regulatory bodies.

Further regional, federal, and international jurisdictional boundaries combine with these management plans to create a complicated administrative environment. This administrative environment is not conducive to the development and siting of important emerging technologies, like offshore wind farms, requiring the agreement of multiple agencies, interests, and mandates. Because of the importance of Maine's ocean resources, it is imperative for Maine to adopt an effective management and planning policy that can dynamically adapt to new issues and incorporate new technologies. We recommend that Maine adopt an ocean governing structure similar to a proposed National Ocean Council by President Obama's Interagency Ocean Policy Task Force to effectively integrate issue and species-specific plans into ecosystem-based approaches to management.

Introduction

The State of Coastal and Marine Management in Maine is the first chapter in *The State of Maine's Environment 2009*, a report produced by the Environmental Policy Group in the Environmental Studies Program at Colby College in Waterville, Maine. This is the fifth *State of Maine's Environment* report published since 2004.

Background

The world's coastlines and oceans are globally important. Coastlines (commonly defined as areas within 100 km of the land-sea boundary) provide human societies with highly-valued ecosystem services such as erosion control, nutrient cycling, waste treatment, and storm protection (Carter 1988, van der Meulen et al. 2004). These services are estimated to be valued globally at some $\$2.0 \times 10^{15}$ (Martinez et al. 2007). Covering just 10% of the earth's land surface, the coastlines are crowded with over 3.2 billion residents, and rising (Hinrichsen 1998). In the United States alone, coastal populations are expected to increase by 25 million people from 2003 to 2015 (Pew Oceans Commission 2003). As a result, nearly one-third of the coastline in North America is under moderate to high threat from the impact of development (Figure 1.1; Goulder and Kennedy 1997).



Figure 1.1 Coastal population versus shoreline degradation. Areas with higher coastal population generally link to a more altered state of shoreline. Reproduced with permission from Bounford.com and UNEP/GRID-Arendal <http://maps.grida.no/go/graphic/coastal-population-and-shoreline-degradation>

The world's oceans cover approximately 71% of the earth's surface and contain 97% of the planet's water (NOAA 2009). Oceans controlled by the U.S. span an area 23% larger than its land area (Pew Commission 2003). The oceans are valuable to all people, driving vital global environmental services such as the water cycle (USGS 2009), primary oxygen production (Nielsen 1951), and climate regulation (Pew Commission 2003, NOAA 2009). Like the coasts, the world's oceans are threatened by human use. Most of the world's marine fish stocks, 75-80%, are depleted or fully exploited with 20% being moderately exploited (FAO 2009). Advances in fishing technology continue to increase exploitation of ocean resources further offshore, extending the reach of human impact (Courtney and Wiggins 2003). The oceans' waters face threats from eutrophication (Smith 2002), untreated disposal of human sludge, unregulated ballast waters from ships, and invasive species (Gorman 1993, UNEP 2007). Warming global temperatures also result in ocean acidification and rising sea levels from thermal expansion and melting land-ice (IPCC 2007).

Growing concern by governments at the state, national, and international levels over the declining conditions of the world's coastlines and oceans has manifested itself with a series of coastal and ocean management schemes around the globe. International agreements have resulted in jurisdictional boundaries off the shores of coastal countries (UN 1982); national efforts by the U.S. have created agencies and commissions to manage coastal and ocean resources (i.e. Atlantic States Marine Fisheries Commission, and National Marine Fisheries Service); and regional and local efforts by the state of Maine and other Atlantic coastal states have resulted in an assortment of marine management councils, plans, and programs (i.e. Lobster Zone Management Councils, Scallop Advisory Council, and Maine Coastal Program). These have resulted in a variety of management strategies including closed marine areas, limited fishing seasons, and restricted numbers of harvesting licenses.

Focus of This Chapter

"...we have continued to approach our oceans with a frontier mentality. The result is a hodgepodge of ocean laws and programs that do not provide unified, clearly stated goals and measurable objectives. Authority over marine resources is fragmented geographically and institutionally. Principles of ecosystem health and integrity, sustainability, and precaution have been lost in the fray."

Pew Ocean Commission 2003 p. viii

"Given the wide variety of uses and activities in the coastal zone, it is not surprising that there is a complex mosaic of management. Municipal, state and federal authorities often overlap in the same geographic coastal space. The regulation of certain activities may require the involvement of multiple agencies at multiple levels of government."

Maine Department of Marine Resources 2007 p. 14-15

In this chapter, we investigate three questions on coastal and marine management in the state of Maine. First, how are coastal and marine resources important to Maine? In particular, what are the contributions of coastal and marine resources in Maine's economy? Second, who manages Maine's coastal and marine resources, and how do the accompanying laws and regulations interact? And third, how does the current management system affect new use development, specifically, offshore wind farms?

We begin this investigation by discussing the importance of coastal and marine resources in Maine. We then summarize the laws and stakeholders implementing and contributing to coastal and marine resource management. Our initial investigation of these sections revealed a complex, piecemeal, overlapping system of coastal and ocean management similar to the quotes included above. Therefore, we continued our investigation with a focus on the geographical and spatial distribution of this complex regulatory system.

Using our spatial analysis of the regulatory system, we study the impact of the current management framework on the development of new coastal and ocean uses, specifically, offshore wind farms. We also look to the future of coastal and marine policy as a proposed National Ocean Policy is currently working its way through the federal government. We assess Maine's readiness for and possible impact from a transition to a National Ocean Policy by concluding with three scenarios for the future of Maine's coastal and marine policy, and with recommendations from our findings.

Methods

We gathered our data through a thorough literature review using Academic Search Premier, Web of Science, Google Scholar, and additional resources available in the Colby College Library and Interlibrary Loan Network. Our primary sources of data were government reports and documents, with journal articles, books, and agency websites providing supplemental material. At the state level, we used documents published by the Maine Department of Natural Resources (DMR) and the Maine State Planning Office (SPO). At the federal level, we used published documents from the Energy Information Agency (EIA), National Oceanic and Atmospheric Administration (NOAA), and the Interagency Ocean

Policy Task Force, to name a few. In addition, we contacted five relevant government agencies and programs for data and interviews. We spoke personally with George Lapointe, Commissioner of the DMR, regarding the complex management system in the Gulf of Maine. We discussed the inherent difficulties for fisheries management and siting offshore wind farms. Commissioner Lapointe and Seth Barker from the DMR reviewed a draft of our maps and supplied us with additional data to improve the accuracy and effectiveness of these figures. We visited Stonington, Maine to meet with Ted Ames and Walter Reed of the Penobscot East Resource Center. We toured the Stonington fishery in Penobscot Bay aboard Ted Ames' lobster boat, the Mary Elizabeth. We also viewed video and read transcripts of the November 4, 2009 Senate Commerce subcommittee hearing entitled "The Future of Ocean Governance: Building Our National Ocean Policy."

We used Geographic Information System (GIS) to visually represent and analyze spatial data obtained from the Maine Office of GIS including state boundaries and bathymetry. We obtained resource management boundary data from the Maine Department of Marine Resources, NOAA Office of Coast Survey, National Marine Sanctuary Library, and Turnipseed et al. *Science* journal article. Population data were obtained from the US Census Bureau. We used ArcGIS software (ESRI 2009) to digitize and georeference paper maps. We drew management boundaries with polygons to form new layers. We were able to analyze the type, size, and location of management boundaries from our data sources. Using GIS tools, we calculated the areas of overlapping jurisdictions. We encountered differences among the management boundaries between multiple data layers. These are visible in the jurisdictional water's map (Figure 1.5) and our overlapping zone density map (Figure 1.12); however, we feel the spatial analysis based on this figure is sufficiently accurate for the level of analysis we conducted.

Importance of Coastal and Marine Resources in Maine

Coastal and ocean resources are perhaps the most identifiable features of Maine's heritage, economy, and demographics (SPO and DMR 2007). Maine's coast covers more than 5,000 miles with nearly two million acres of public submerged lands. Maine's population density is highest along the coast and continues to grow, but this growth is not even (Figure 1.2). From 1960-2000, the Downeast region, which runs from Penobscot Bay to the Canadian border, has had slow to negative growth, whereas the Mid-coast region from western Penobscot Bay to the northern coastal municipalities of Cumberland county, has had slightly higher growth. The Southern region has the highest rates of growth.

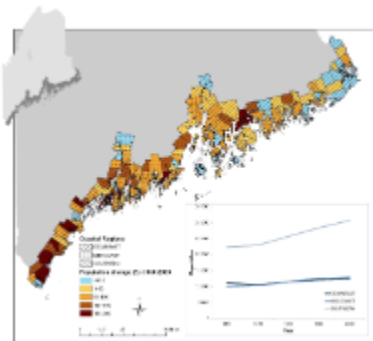


Figure 1.2 Population change in Maine's coastal municipalities. The line graph compares population change from 1960 to 2000 in Downeast, Mid-coast, and Southern municipalities. The Southern region has had the highest amount and rate of growth. (Data source: US Census Bureau).

Maine's waters have always provided its people with food, transportation, and economic growth (SPO 2007). In 2004, the coastal economy of Maine directly employed an estimated 45,685 people and resulted in roughly \$1.2 billion in annual wages (Colgan 2009). In 2007, coastal municipalities accounted for 55% of the state's employment (NOEP 2009). This 55% generated 59% of the wages earned and 60% of the state's GDP. Maine's ocean economy, which includes marine transportation, tourism and recreation, living marine resources, marine construction, ship and boat building, and mineral extraction, grew 185% from 1990-2007 (NOEP 2009). Maine outpaced the rest of New England in the rise of its ocean economy GDP (Figure 1.3).

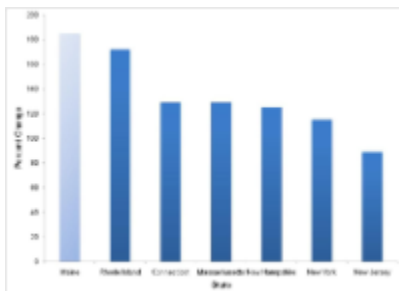


Figure 1.3 New England states' percent change in Ocean GDP from 1990-2007. Maine has the highest growth rate in ocean GDP. (Data source:

NOEP 2009).

Although Maine's ocean economy has the largest growth rate in GDP from 1990-2007, Maine's coastal economy is lagging behind the rest of the nation when it comes to percent change in coastal GDP from 1990-2007 (Figure 1.4). Maine's coastal GDP grew 216% from 1990 to 2007, yet ranks 24th out of 28 amongst all coastal states (including states that border the Great Lakes).

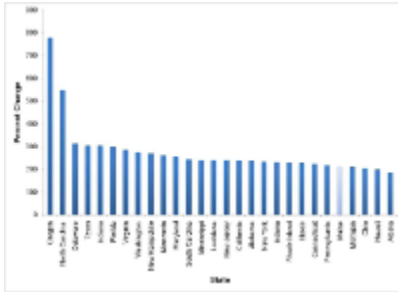


Figure 1.4 Percent change in coastal GDP from 1990-2007. Maine's coastal economy ranks 24th out of 28 states. (Data source: NOEP 2009).

Maine's coastal economy has shifted in the last couple decades. Growth has occurred in the financial, education, health, and business services sectors while coastal communities in Maine have experienced a net decrease in manufacturing, construction, natural resource mining, and other services (NOEP 2009). The largest growth was in the financial sector with an increase of 6.33%, followed by the education and health sectors, which grew at 5.5% from 1990 to 2007. The largest decrease came from the manufacturing sector, which decreased 6%, followed by public administration sector (1.8%) and construction sector (1.6%).

While Maine continues to rely on its coastal communities for economic stability, ocean uses are changing, diversifying, and intensifying (SPO and DMR 2007). In some areas, fishing boats are being replaced by sea kayaks and other recreational watercraft; aquaculture has become economically significant alongside traditional capture methods; second-home buyers and retirees are replacing fishing families; and energy infrastructure is being developed in Maine's waters and coastal communities (State of Maine 2008, SPO and DMR 2007).

Legislation

In this section, we focus on 14 laws that affect Maine's management of its coastal and marine resources; however, these are only a fraction of the more than 140 laws that pertain to the oceans and coasts at the federal level alone (Pew Commission 2003). We selected these laws to supplement our GIS spatial analysis. These laws designate marine jurisdictions, establish state management councils, as well as provide a number of additional management guidelines. The section is broken up into three sub-sections: International Agreements, Federal Laws, and State Laws. Table 1.1 and Table 1.2 summarize the key points of these laws and agreements. These laws directly affect the stakeholders we discuss in the next section.

International Agreements

The first level of regulation we investigate are international agreements. One of these agreements has particular relevance to Maine's coastal and marine resources: the United Nations Convention on the Law of the Sea.

United Nations Convention on the Law of the Sea (1982)

The United Nations Convention on the Law of the Sea (UNCLOS), also known as the Law of the Sea Convention or the Law of the Sea Treaty, is an international agreement resulting from the third United Nations Conference on the Law of the Sea (UN 1982). Of importance to Maine are the agreement's establishments of Exclusive Economic Zones (EEZ), Territorial Seas, and Contiguous Zones, as well as provisions for protection of transboundary fish stocks and highly migratory species, marine mammals, sea turtles, anadromous fish stocks, catadromous species, sedentary species, and marine habitat protection. UNCLOS came into force on November 16, 1994, and as of November 4, 2009, 159 countries had ratified the agreement. A notable exception from the list of ratified countries is the U.S. (UN 2009). Through a number of Presidential Proclamations, however, the U.S. currently recognizes jurisdictional boundary provisions set forth in UNCLOS. Below, we summarize three of these boundaries.

Exclusive Economic Zone

A nation's Exclusive Economic Zone (EEZ) extends 200 nautical miles from the baseline mean low water mark (UN 2009). Within these zones, a coastal nation has sole exploitation rights over all marine resources. Other nations may exercise freedom of vessel navigation and over-flight. The U.S. 200-mile EEZ was established by Presidential Proclamation 5030 on March 10, 1983.

Territorial Sea

The Territorial Sea is recognized internationally as the waters 12 nautical miles out from the mean coastal low-water mark (UN 2009). The territorial sea is considered part of a country's sovereign territory, and therefore the country has rights to the air space, water column, seabed, and subsoil found within the 12-mile limit. Other international laws related to innocent passage, transit passage, and protection of the marine environment apply in these waters. Presidential Proclamation 5928 established the U.S. territorial sea on December 27, 1988.

Contiguous Zone

The contiguous zone extends an additional 12 miles seaward of the territorial sea to 24 nautical miles from the baseline low water mark (UN 2009). The contiguous zone is a buffer zone in which coastal nations may use authority over foreign vessels to prevent infringement of customs, fiscal, immigration, sanitary, and pollution laws and regulations. The contiguous zone helps protect Maine's efforts in marine management from infringement by a foreign country. Presidential Proclamation 7219 established the U.S. contiguous zone on September 2, 1999.

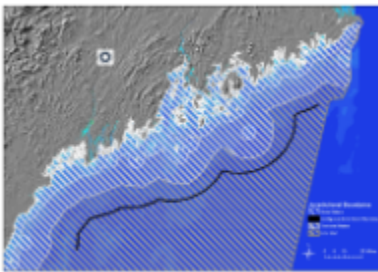


Figure 1.5 Marine jurisdictional boundaries in the Gulf of Maine. State waters extend to three nautical miles, territorial waters extend between three to 12 nautical miles, the contiguous zone extends from 12 to 24 nautical miles, and the EEZ extends to 200 nautical miles. (Data source: Maine Office of GIS, NOAA Coast Survey).

Federal Laws

There are over 140 federal laws that pertain to the oceans and coasts (Pew Commission 2003). In this section, we describe six of these laws that directly pertain to either management boundaries or the regulation of coastal and marine resources.

The Submerged Lands Act (1953)

The Submerged Lands Act (SLA) granted states title to the natural resources (oil, gas, and all other minerals) located within three miles of their coastline (43 U.S.C. § 1301-1315). The federal government maintains the right to regulate offshore activities for national defense, international affairs, navigation, and commerce (NOAA 2009b). This three-mile boundary is visualized in Figure 1.5.

Coastal Zone Management Act (1972)

The Coastal Zone Management Act (CZMA) was enacted by Congress in 1972 (16 U.S.C. § 1451-1456) with the intent to balance coastal natural resource protection with economic development. The legislation provides states with federal assistance for those who develop and maintain a comprehensive management plan for their coastal jurisdiction or a Coastal Zone Management Plan (CZMP) as reviewed by the National Oceanic

and Atmospheric Administration (NOAA) (Klee 1999). A CZMP has to address the CZMA's five objectives: protect and preserve coastal ecosystems, manage coastal development, improve water quality, utilize economic and energy resources, and coordinate and simplify administrative procedures. Maine's most recent edition of its "Maine Coastal Plan" was submitted and approved by NOAA in 2006 (SPO 2006b).

Atlantic States Marine Fisheries Compact (1942)

The Atlantic States Marine Fisheries Compact established the Atlantic States Marine Fisheries Commission (ASMFC) in recognition that fish do not adhere to political boundaries, and therefore no state by itself can effectively protect the interests of its citizens (12 U.S.C. § 4601-4656). The Commission is made up of 15 states, each represented by 3 members. Currently, the chair of the ASMFC Commissioners is the Commissioner of Maine's Department of Marine Resources (ASMFC 2009). The Commission participates in five main policy issues: interstate fisheries management, research and statistics, habitat conservation, sport fish restoration, and law enforcement. The Commission's vision is for healthy, self-sustaining fish populations for all Atlantic coast fish species or to have successful restoration well in progress by the year 2015. Each state must work with the Commission states and the federal government to conserve and manage coastal fisheries. The most recent management programs are the Five-Year Strategy Plan (2009-2013) and the Habitat Program Five-Year Strategic and Management Plan (2007-2011) (ASMFC 2009).

Atlantic Coastal Fisheries Cooperative Management Act (1993)

The Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA) was enacted to ensure that the Atlantic coastal states are compliant with the conservation measures approved by the Atlantic States Marine Fisheries Commission (16 U.S.C. § 5101-5108). ACFCMA provides assistance to the Atlantic States Marine Fisheries Commission in order to support and encourage the development, implementation, and enforcement of effective interstate conservation and management of Atlantic Coastal resources (ASMFC 2009).

Fishery Conservation and Management Act - Magnuson-Stevens Act (1976)

The Magnuson-Stevens Act (MSA) granted federal authority for fisheries management to NOAA's National Marine Fisheries Service (16 U.S.C. § 1801-1884). Eight regional fishery management councils were established to implement regional fishery management plans. Maine falls within the Northeast Regional Office, located in Gloucester, MA.

Sustainable Fisheries Act (1996)

The Sustainable Fisheries Act (SFA) is an amendment to the MSA (16 U.S.C. § 1801-1882). The Sustainable Fisheries Act includes provisions requiring science, management, and conservation action be taken by the National Marine Fisheries Service (Office of Sustainable Fisheries, NOAA Fisheries 2009).

Table 1.1

| Law | Year | Description | Location |
|-----------------------------|------|---|--------------------------|
| Submerged Lands Act | 1953 | Requires a Granted states title to the natural resources (oil, gas, and all other minerals) located within three miles of their coastline | USC Title 43 § 1301-1315 |
| Coastal Zone Management Act | 1972 | Provided states with federal assistance for those who develop and maintain a comprehensive management plan for their coastal jurisdiction or a Coastal Zone Management Plan as reviewed by the National Oceanic and Atmospheric Administration. | USC Title 16 § 1451-1456 |

| | | | |
|--|------|---|--------------------------|
| Atlantic States Marine Fisheries Compact | 1942 | Established the Atlantic States Marine Fisheries Commission in recognition that fish do not adhere to political boundaries, and therefore no state by itself can effectively protect the interests of its citizens. The Commission is made up of 15 states, each represented by 3 members. The Commission participates in five main policy issues: interstate fisheries management, research and statistics, habitat conservation, sport fish restoration, and law enforcement. | USC Title 12 § 4601-4656 |
| Atlantic Coastal Fisheries Cooperative Management Act | 1993 | Enacted to ensure that the Atlantic coastal states are compliant with the conservation measures approved by the Atlantic States Marine Fisheries Commission. Provides assistance to the Atlantic States Marine Fisheries Commission in order to support and encourage the development, implementation, and enforcement of effective interstate conservation and management of Atlantic Coastal resources. | USC Title 16 § 5101-5108 |
| Fishery Conservation and Management Act - Magnuson-Stevens Act | 1976 | Granted federal authority for fisheries management to NOAA's National Marine Fisheries Service. Eight regional fishery management councils were established to implement regional fishery management plans. | USC Title 16 § 1801-1884 |
| Sustainable Fisheries Act | 1996 | Includes provisions requiring science, management, and conservation action be taken by the National Marine Fisheries Service | USC Title 16 § 1801-1882 |

State Laws

Mandatory Shoreline Zoning Act (1971)

The Mandatory Shoreline Zoning Act or the "Shoreline Zoning" law requires all municipalities to create zoning ordinances for areas within 250 feet of the high water line of any body of water, river, wetland, and coastline (MRS Title 38 Chapter 3 § 439-449). If a municipality does not establish its own zoning ordinances, the state holds the right to develop a zoning plan for the area.

Lobster Management Zones and Councils (1995)

The Lobster Management Zones and Councils were established in 1995 through the state legislature with subsequent amendments last being

added in 2007 (MRS Title 12 Chapter 619 § 6446-6477). The zones were created by the Commissioner of Marine Resources to facilitate local or regional management of lobster fishery efforts. Seven management zones were created. Each zone is represented on the Council. The Council advises the commissioner on activities of the department that relate to the lobster industry. On an application for a Class I, Class II, Class III or noncommercial lobster license or a nonresident lobster permit, a person shall declare the lobster management zone in which that person proposes to fish a majority of that person's lobster traps and shall list all other zones in which that person proposes to fish. The license holder must identify the declared lobster zone in which a majority of that person's lobster traps is authorized to fish. A person may not place any lobster traps in a zone that is not identified on that person's license.

Sea Urchin Zone Council (1993)

In 1993, state legislation established the beginnings of a Sea Urchin Zone Council, and established two Sea Urchin Management Zones (MRS Title 12 Chapter 623 6749-X). The legislation was amended in 2007, creating a council of 15 members. Seven of the Council members are elected by the sea urchin industry. The Commissioner of the Marine Department of Marine Resources appoints the remaining eight members. The Council and management zones are described in more detail in the State of Topic section of this report.

Scallop Advisory Council (2003)

The Scallop Advisory Council was formed through Maine legislation in 2003 (MRS Title 12 Chapter 623 § 6729-B). The Council consists of 13 members. Similar to the Sea Urchin Zone Council, the Scallop Advisory Council advises the Commissioner of DMR on issues related to seasons, closings, size restrictions, and daily limits. The Council is described in more detail in the State of Topic section of this report.

Maine Wind Energy Act (2003)

Maine Wind Energy Act (MRS Title 35-A Chapter 34 § 3404(2)(B)) established state goals regarding wind energy. The Maine Wind Energy Act established policy that finds wind energy to be in the best interest of the state thereby making it a priority for state agencies to encourage wind development. It sets the goal to meet or exceed 2,000 megawatts of wind capacity by 2015 and least 3,000 megawatts by 2020. It also sets the goal to for offshore wind, which is 300 megawatts by 2020.

Public Trust Doctrine

The State of Maine holds state-owned submerged lands (lands below mean low-tide line out to 3-mile limit) in trust for the benefit of the people of Maine (SPO and DMR 2007). In accordance with this common law, the State manages these lands and the natural resources in the public interest. The uses and interests recognized by the Public Trust Doctrine include commerce, fishing, navigation, recreation, and conservation. The doctrine establishes the responsibility of the state to manage these public trust assets to preserve and continuously assure the public's ability to fully use and enjoy public trust lands, waters, and resources for certain public uses (CSO 1997).

Table 1.2

| Law | Year | Description | Location |
|--------------------------------|------|--|----------------------------------|
| Mandatory Shoreline Zoning Act | 1971 | Requires all municipalities to create zoning ordinances for areas within 250 feet of the high water line of any body of water, river, wetland, and coastline. The state holds the right to develop a zoning plan for municipalities not in compliance. | MRS Title 38 Chapter 3 § 439-449 |

| | | | |
|---|------|---|---|
| Lobster Management Zones and Advisory Council | 1995 | Seven lobster management zones were created by the Commissioner of Marine Resources to facilitate local or regional management of lobster fishery efforts. Each zone is represented on the Council. The Council advises the commissioner on activities of the department that relate to the lobster industry. | MRS Title 12 Chapter 619 § 6446-6477 |
| Sea Urchin Zone Council | 1993 | Established a Sea Urchin Zone Council, and two Sea Urchin Management Zones. | MRS Title 12 Chapter 623 § 6749 |
| Scallop Advisory Council | 2003 | The Scallop Advisory Council consists of 13 members acting as advisors to the Commissioner of DMR on issues related to seasons, closings, size restrictions, and daily limits. | MRS Title 12 Chapter 623 § 6729 |
| Maine Wind Energy Act | 2003 | Established policy that finds wind energy to be in the best interest of the state thereby making it a priority for state agencies to encourage wind development. | MRS Title 35-A, Chapter 34 § 3404(2)(B) |
| Public Trust Doctrine | | The State of Maine holds state-owned submerged lands (lands below mean low-tide line out to 3-mile limit) in trust for the benefit of the people of Maine (SPO and DMR 2007). In accordance with this common law, the State manages these lands and the natural resources in the public interest. | |

Stakeholders

The sustainability of Maine's coastal and marine resources depends upon successful management. This responsibility falls on many different federal, state, and local agencies along the coast and in the Gulf of Maine. There are also additional regional management partnerships which cross political boundaries and incorporate non-government stakeholders into the management process. There are also non-government stakeholders who are affected by the condition of coastal and marine resources yet do not have an active role in their management.

Government Agencies

In this section, we provide a list of stakeholders that are active in managing coastal and marine resources in the Gulf of Maine. The section is divided into three categories: federal, regional, state, and local. The categories are meant to distinguish between sources of funding and administrative control only, and are not meant to group the stakeholders in any hierarchal order.

Federal

National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA) provides scientific information on oceans and atmosphere for the purpose of

managing marine resources. NOAA has various administrative and management responsibilities over coastal zone management (NOAA 2009).

There are three main NOAA offices that deal directly with issues pertaining to Maine's coastal and marine ecosystems and their management (NOAA 2009). The first office is the Fisheries Service, which includes the Northeast Fisheries Science Center, the Coastal and Marine Resources Program, and the Office of Restoration Center. The Fisheries Service: Northeast Fisheries Science Center, located in Orono, ME, conducts research focused on living marine resources in the Gulf of Maine for NOAA's management purposes. The second office is the Coastal and Marine Resources Program (CMRP), which consists of a number of programs including the Coastal Zone Management Program, the National Estuarine Research Reserve System, the National Marine Sanctuaries Program, the Marine Protected Areas Center, the Coastal Services Center, the Cooperative Institute for Coastal and Estuarine Environmental Technology, and the Coastal and Estuarine Land Conservation Program. These programs work together to manage and protect coastal and marine ecosystems. The CMRP works with a number of different regional NOAA offices, partnerships, and cooperatives around the U.S. to apply ecosystem-based management approaches in accordance with the Coastal Zone Management Act, the National Marine Sanctuaries Act, and the Marine Protected Areas Executive Order. The third office is the Office of Restoration Center, the only NOAA office dedicated to restoring coastal, marine, and migratory fish habitats (NOAA 2009).

Environmental Protection Agency

The Environmental Protection Agency (EPA) is responsible for research, monitoring, standard setting, implementation, and enforcement of federal point source and nonpoint source pollution laws under the Clean Water Act (EPA 2009). Along Maine's coast, the EPA controls standards for developing best management practices for nonpoint source pollution as well as discharges, ocean dumping, and aquaculture. Maine participates in the EPA's National Estuary Program, established by the Clean Water Act Section 320, to improve the quality of estuaries through the Piscataqua Region Estuaries Partnership and the Casco Bay Estuary Partnership. Based upon the research funded through its Loan Grant Program which helps fund studies dealing with watershed protection and restoration as well as the results of pilot projects that test different management approaches in the Great Bay Estuary, the program establishes a Comprehensive Conservation and Management Plan for the Estuary (EPA 2009).

Fish and Wildlife Service

The Fish and Wildlife Service (FWS) controls the Gulf of Maine Coastal Program, located in Falmouth, ME, is one of 21 Coastal Program offices in the U.S. which focuses on identifying, protecting, and restoring threatened and endangered species (FWS 2009). Coastal programs leverage up to 25% of project costs using federal, state, and private funds. Since the early 1990's, the coastal program spent \$43 million on conservation projects in Maine (FWS 2009).

United States Geological Survey

The U.S. Geological Survey (USGS) is a science-based government organization that collects data to support federal and state agencies as well as manage water and natural resource extraction (USGS 2009). The New England Coastal Basins study is one of more than 50 National Water Quality Assessment (NAWQA) Program studies in the U.S. The NAWQA Program's purpose is to monitor the status and trends in surface and ground water quality. NAWQA provides a basis on which regional and national-level policy decisions can be based regarding natural and human disturbances to water quality.

Regional

Gulf of Maine Council on the Marine Environment

The Gulf of Maine Council on the Marine Environment is a U.S.-Canadian partnership of government and non-government organizations whose goal is to maintain and improve the environmental quality of the Gulf of Maine (Gulf of Maine Council 2009). The state and provinces involved are Massachusetts, New Hampshire, Maine, New Brunswick, and Nova Scotia. The Council awards grants and raises public awareness of relevant coastal/oceanic environmental issues.

Gulf of Maine Area Census of Marine Life

The Gulf of Maine Area (GOMA) program performs regional ecosystem research as an arm of the Census of Marine Life (CoML), an affiliate of the non-governmental Scientific Committee on Oceanic Research (SCOR) (GOMA 2009). The goal of the program is to develop an ecosystem-based management plan for the Gulf of Maine. This program is composed of American and Canadian scientists at the University of

Southern Maine and the Centre for Marine Biodiversity.

State

State Planning Office

The Maine State Planning Office (SPO) is responsible for assisting the Governor and legislature by recommending long-term policies for the state including development and conservation plans (SPO 2009). This requires the SPO to conduct assessments of Maine's economy and natural resources. The SPO has two programs that deal specifically with management and planning for Maine's coast. The Maine Coastal Program is administered by the SPO and is a partnership between federal, regional, state, and local agencies (SPO 2009). The program was developed and has been approved under the federal Coastal Zone Management Act (CZMA) since 1978. The Maine Coastal Program addresses Maine's coastal resources and coastal development by focusing on nine stated priorities: public access, coastal hazards, ocean resources, wetlands, cumulative and secondary impacts, marine debris, special area management planning, energy and government facilities siting, and aquaculture (SPO 2009). The Coastal Program provides data and maps, as well as guidance in projecting the effects of growth in municipalities, to municipalities for the purpose of planning for those effects. The other program, the Land Use Planning Program, is responsible for implementing the Growth Management Program, which reviews all land-use plans at the local level (SPO 2009). The Land Use Planning Program provides assistance to local governments when necessary (SPO 2009).

The Land and Water Resources Council was established in 1994 by Executive Order, then reaffirmed by Maine's Legislature through statute (5 MSRA § 3331 (2)), and is composed of the Commissioners and directors of eight state government departments (SPO 2009). The Council was created to coordinate the natural resource management plans of state agencies and serves in an advisory capacity to the Executive and Legislative branches of Maine state government (SPO 2009).

Department of Marine Resources

The Maine Department of Marine Resources (DMR) is responsible for Maine's marine resources (DMR 2009). They conduct and fund scientific research in addition to developing and implementing laws and regulations for marine resources on or under coastal waters. Within DMR, the Office of the Commissioner, Bureau of Sea-Run Fisheries and Habitat, Community Resource Development, Bureau of Marine Patrol, and Bureau of Resource Management all work on ongoing marine policy.

Department of Environmental Protection

The Maine Department of Environmental Protection's (DEP) main function concerning coastal areas is to review and give permits for both point source and nonpoint source pollution control and to monitor coastal wetland areas and shoreland zoning laws (DEP 2009). The DEP's goal is to prevent damage to the environment from pollution and development.

Department of Inland Fisheries and Wildlife

The Maine Department of Inland Fisheries and Wildlife (IWF) is concerned with fish and wildlife from an "intrinsic, ecological, scientific, economic, recreational, and educational point of view" (IFW 2009). In addition to scientific research, the IWF also assesses and reviews all proposed coastal development projects (IFW 2009).

Department of Conservation

The Maine Department of Conservation (MDOC) is in charge of Maine's publicly owned lands and is responsible for managing state-owned land (MDOC 2009). Maine's Ocean Energy Task Force (OETF) determined the MDOC is a key department in the siting and permitting process of offshore wind.

University of Maine

The University of Maine through the Maine Sea Grant funds scientific research that is related to the Gulf of Maine (Maine Sea Grant 2009). Grants

are given to support marine and coastal scientific research and education. It is a state-federal partnership based at the University of Maine and is sponsored by NOAA and the State of Maine.

Local

Coastal Municipalities

Coastal municipalities are affected by all changes to resource management. Members of their communities are diverse and have stakes in coastal and marine resources including the development of those resources.

Non-Government Stakeholders

In this section, we briefly touch upon notable non-governmental stakeholders. These stakeholders do not directly affect our spatial analysis; therefore, we provide a short overview of only three broad stakeholders: fishing industry, offshore wind developers, and coastal municipalities. Non-government stakeholders do not actively manage the jurisdictional and resource management boundaries, but they influence and are directly affected by management related to coastal and marine resources.

Fishing Industry

Fisherman, processors and distributors are affected by changes to fishing regulations and boundaries. They are also affected by the productivity of the fisheries which is a byproduct fishery management strategy.

Offshore Wind Developers

Offshore wind developers are affected by the permitting process of offshore wind farms, controlled by state agencies. Developers are also affected by changes in state and federal subsidies for offshore wind. The Norwegian energy company StatoilHydro is the only commercial developer that has signed onto the proposed demonstration sites (DOC 2009).

State of Topic

Maine's Coastal and Marine Resource Management

In this section, we investigate the spatial distribution of Maine's multiple coastal and marine resource management plans. We begin by providing case studies into three resources: the Green Sea Urchin, the Atlantic Sea Scallop, and the Atlantic Herring. We provide these case studies to highlight the reactionary nature of Maine's management plans. These case studies also focus attention on the variety of implementation strategies currently managing resources in the Gulf of Maine. The laws and stakeholders outlined in the previous sections are the backbone and muscle of these management plans. Our research has identified eleven management plans in the Gulf of Maine (Figure 1.11). We give particular consideration to their overlapping geographical positions. The purpose of this investigation is to examine the complexity inherent in the current system. This section is not meant as an assessment of the health of Maine's fisheries. For a more in-depth look at the state of fisheries in Maine, please refer to the State of Maine's Environment 2008 Report (Casey, Chanin, Dufraigne 2008).

Green Sea Urchins

Maine's green sea urchin fishery is the first of our three case studies. Sea urchins have been successfully harvested in Maine since prehistoric times (DMR 2004). Through the early 1980s, Maine's sea urchin catch was marginal and provided merely small, local markets in and around Boston. However, in 1987, a combination of powerful influences vitalized the urchin fishery. First, collapsing numbers of groundfish, such as the Atlantic cod, lowered the number of sea urchin predators, sparking growth in urchin populations. Second, the Japanese demand for sea urchin meat grew with the yen gaining versus the dollar. Lastly, the advent of overnight shipping allowed harvests in Maine to reach the global sea urchin market (Ganong 2009).

The urchin fishery attracted harvesters like an underwater gold rush. By 1994, there were as many as 2,725 harvesters, yet there were minimal efforts to protect the vitality of the fishery (Clark 2008). Consequently, sea urchin harvests peaked at 41.6 million pounds in 1993 (Figure 1.6).

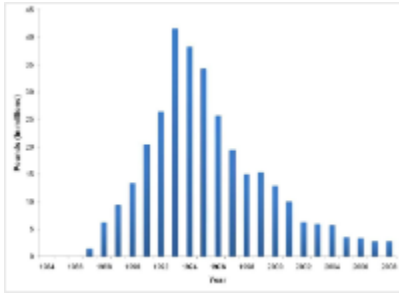


Figure 1.6 Changes in sea urchin harvest in the Gulf of Maine over time. The maximum harvest was 41.6 million pounds in 1993. The harvest has decreased each year since 1993. (Data source: DMR).

The fishery became regulated by Maine statute in 1993, having since been amended six times, most recently in 2009 (MRS Title 12, Chapter 623 §6749-X). The legislation established the Sea Urchin Zone Council, a regulatory body consisting of 15 members. Maine was split into two Sea Urchin Zones (Figure 1.9-C). Seven of the Council members are elected by the sea urchin industry: two hold a current handfishing license (one from each zone), two hold a current draggers license (one from each zone), two hold wholesale licenses (one holds a sea urchin buyer’s permit, one holds a processor’s permit), and one harvester holds a current boat tender’s license. The Commissioner of the DMR appoints the remaining eight members. The Council makes recommendations to the Commissioner concerning the designation of open days for harvesting, research projects and grants funded by the Sea Urchin Research Fund, and other matters of interest to the sea urchin fishery.

Management of the sea urchin fishery has aimed to limit harvesting efforts. This has manifested with shorter harvesting seasons (Figure 1.7) and reduced numbers of harvesting licenses (Figure 1.8). The upcoming 2009-2010 season is seeing the first increase in the number of open days in Zone 1 since the regulations were started after nearly two decades of steady declines.

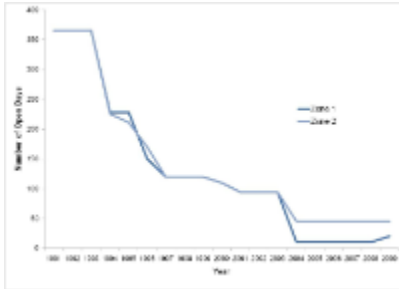


Figure 1.7 Number of open days in sea urchin harvesting season. Sea urchin harvesting days has declined overtime. Before 1994, no regulation was established, making the season 365 days. Difference in open days between zones is the result of stronger urchin resources in Zone 2. (Data source: DMR).

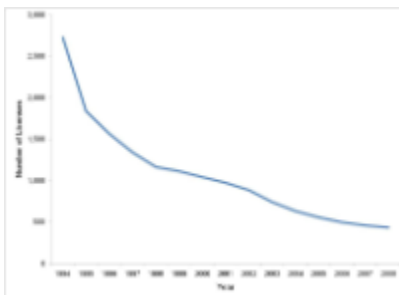


Figure 1.8 Number of sea urchin harvesting licenses in the state of Maine over time. Numbers of licenses has continually decreased since management began in 1994. (Data source: DMR).

Implications of Sea Urchin Management

The rehabilitation efforts of sea urchin management have seen limited success. The sea urchin management plan aims to increase sea urchin numbers with harvesting limits; however, current studies find that urchin numbers are bound-by ecological factors. Overfishing of urchins led to blooms in Irish moss and kelp beds (food for the urchins), with one DMR study concluding that seaweed beds increased from 71% in 2001 to 88% in 2003 (Clark 2008). The reestablishment of seaweed beds has increased shelter for rock crabs and green crabs, known predators of the sea urchins.

Sea scallops

Our second case study is the Gulf of Maine sea scallop fishery. The Gulf of Maine sea scallop fishery occurs primarily in Maine waters within three miles of shore (Hart 2008). Gulf of Maine scallop landings historically averaged about 500 thousand pounds of meat per year, peaking in 1980 with 3.2 million pounds (Figure 1.9). In the last eight years, landings have been low, averaging 203 thousand pounds per year.



Figure 1.9 The amount of sea scallop harvest over time from 1964 to 2008. The harvest peaked in 1980 with 3.2 million pounds. (Data source: DMR).

In 2003, the Scallop Advisory Council was formed through Maine legislation (MRS Title 12, Chapter 623 §6729-B). The council consists of 13 members: four are scallop harvesters holding current hand fishing scallop licenses, four are scallop harvesters holding current draggers licenses, two are wholesale seafood license holders who deal in scallops, two are scientists with expertise in marine resources management, and one is a public member. Similar to the Sea Urchin Zone Council, the Scallop Advisory Council advises the Commissioner of DMR on issues related to seasons, closings, size restrictions, and daily limits. In 2009-2010, the season will be 70 days and will begin December 15, 2009, and close March 24, 2010, with fishing prohibited on Sundays, Mondays, as well as the Fridays of December 25 and January 1. Additionally, there is a number of closure zones developed for the 2009-2010 season (Figure 1.11).

Implications of Sea Scallop Management

Similar to the survey study conducted for sea urchins, DMR completed a sea scallop survey to assess the state of the stock (Kelly 2009). Six different zones were surveyed. Results indicate that scallop numbers remain low and have declined in some areas. One region, between Penobscot Bay and western Blue Hill Bay, showed a slight improvement.

Atlantic Herring

The Atlantic herring fishery is our third and final case study. Atlantic herring is one of the most important fish in the Northeastern U.S for its role in the ecosystem and fishing industry (ASMFC Species Profile 2009). Herring are a highly valued bait fish for commercial fisheries including the lobster fishery. In the 1960s, the fishery was overexploited from foreign fishery development with a consequential fall in harvest in the 1970s (Figure 1.10).



Figure 1.10 Maine's annual Atlantic herring harvest over time. The fishery was exploited in the 1960's with a subsequent fall in harvest in the 1970's. Successful management has brought herring harvest back up in recent years. (Data source: DMR).

The Atlantic Herring fishery is managed by both the Atlantic States Marine Fisheries Commission and the New England Fishery Management Council. The Commission regulates herring in state waters, whereas the Council regulates herring in federal waters. Management is characterized by four measures including spawning area closures, area management schemes (three areas), catch controls, and a Total Allowable Catch in the nearshore fishery (NOAA Fishwatch 2009). Maine falls within the Management Area 1 (subareas 1A and 1B) (refer to Figure 1.11). Management area boundaries are based on herring seasonal distribution and also the location of known spawning grounds.

The closure dates for Management Area 1 will be:

- Eastern Maine: August 15 – September 11
- Western Maine: September 1 – September 28
- Jeffreys Ledge/Stellwagen Bank: September 15 – October 12
- Cashes Ledge: August 1 – September 25

Atlantic herring is currently not exploited or overfished (NOAA Fishwatch 2009). The regional management plan, as well as the ecologically focused determination of closed areas, has allowed for the herring to reestablish itself. However, ASFMC and NEFMC feel the fishery could quickly become overexploited. They have initiated focus for future research on Atlantic herring habitat to better manage their closed areas. These research needs will include:

1. Identifying Atlantic herring spawning areas
2. Collecting data on species distribution and relative abundance in inshore waters (focus and attention have been in the offshore region)
3. Collecting information on how oceanographic factors (e.g. currents) affect distribution of herring
4. Determine the value of using protected areas to conserve and enhance herring stocks

(New England Fishery Management Council 2009)

The complex regulatory schemes we have investigated with our three case studies are further complicated by the remaining marine resource management plans found in Figure 1.11. As we have shown, management plans focus mostly on a single species for management. The Atlantic herring management plan has been the most successful of the three case studies. The Atlantic herring management plan incorporates spawning habitat locations into its designation of restricted access zones, integrating the ecology of the organism into its management plan. The relative failure of the sea urchin management plan is due in part to the plan's lack of ecological solutions (such as removing of kelp beds harboring crabs).

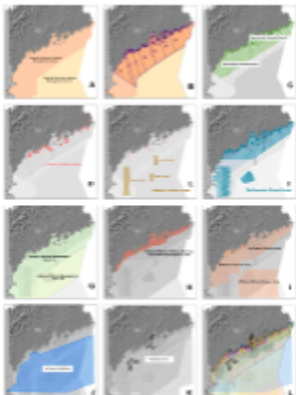


Figure 1.11 Management and use boundaries in the Gulf of Maine. As additional management boundaries are included, the overlap progresses.

Map (A) includes the Atlantic States Marine Fisheries Commission’s American lobster management areas; (B) Maine Lobster Advisory Council Management Zones; (C) Maine Sea Urchin Council Zones; (D) Maine Department of Marine Resources 3-year closed scallop areas; (E) NOAA Year Round Essential Fish Habitat Closure Zones; (F) NOAA Northeast Multispecies Groundfish Closed Areas; (G) New England Fishery Management Council Atlantic Herring Management Zones; (H) National Marine Fishery Service Groundline Exemption Line; (I) National Marine Fishery Service Gillnet Closure Areas; (J) U.S. Navy Operating Area; (K) Shipping Lanes; (L) all layers from maps A to K.

Spatial Analysis of Management and Use Boundaries

The number, location, and size of overlapping management zones in the Gulf of Maine are represented in Figure 1.12. We calculated that approximately 68% of the area within the three-mile state water boundary line holds 10 or more overlapping management zones. Seventy-nine percent of the area within the 200-mile EEZ holds between 6 and 12 overlapping management zones. The full range of spatial overlap values is represented in Table 1.3.

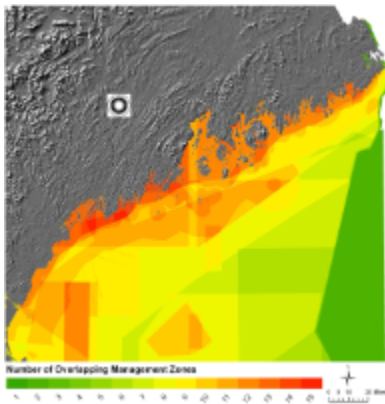


Figure 1.12 Density of jurisdictional and marine resource management zones off the coast of Maine. The Colby College seal represents the location of Waterville, ME. The detailed coast runs from the NH border in the lower left to the Downeast Maine region in the upper right. Areas with a higher number of overlapping zones are represented by a hotter color. Sixty-eight percent of the area within the three-mile state water boundary line contains 10 or more overlapping management zones. Seventy-nine percent of the area within the 200-mile EEZ holds between 6 and 12 overlapping management zones.

Table 1.3 Spatial overlap analysis. The number of overlapping management zones in the Gulf of Maine by area (square miles) and percent of total area within Maine state waters and within the Exclusive Economic Zone (EEZ). Results based off of our GIS spatial overlap calculation in Figure 1.12.

| Number of Overlapping Zones | Area (Square Miles) Within State Waters | Percent of Total Area Within State Waters | Area (Square Miles) Within Federal EEZ | Percent of Total Area Within Federal EEZ |
|-----------------------------|---|---|--|--|
| 1 | 0.0 | 0.0 | 1 | 0.0 |
| 2 | 1 | 0.0 | 2883 | 10 |
| 3 | 4 | 0.1 | 59 | 0.2 |
| 4 | 113 | 3 | 331 | 1 |
| 5 | 272 | 6 | 1913 | 7 |
| 6 | 175 | 4 | 4014 | 14 |
| 7 | 426 | 10 | 1627 | 17 |
| 8 | 189 | 4 | 4840 | 17 |
| 9 | 172 | 4 | 2574 | 9 |
| 10 | 389 | 9 | 2073 | 7 |

| | | | | |
|----|------|----|------|-----|
| 11 | 567 | 13 | 2005 | 7 |
| 12 | 1187 | 28 | 1640 | 6 |
| 13 | 493 | 12 | 527 | 2 |
| 14 | 185 | 4 | 184 | 0.7 |
| 15 | 48 | 1 | 47 | 0.2 |

Offshore Wind Energy

In this section, we evaluated the potential impact of the current regulatory system on the future development of offshore wind in the Gulf of Maine.

Legislative Mandate

In 2003, the Maine Wind Energy Act (MRS 35-A, section 3404(2)(B)) established state goals regarding wind energy. The Maine Wind Energy Act established policy that finds wind energy to be in the best interest of the state thereby making it a priority for state agencies to encourage wind development. It sets the goal to meet or exceed 2,000 megawatts of wind capacity by 2015 and least 3,000 megawatts by 2020. It also sets the goal to for offshore wind, which is 300 megawatts by 2020.

Offshore Wind Potential and Proposed Demonstration Sites

Maine has a large offshore wind potential. At a congressional hearing in July of 2008, University of Maine Professor Dr. Habib Dagher used the term “Saudi Arabia of Wind” to describe the Gulf of Maine’s offshore wind energy potential. Maine’s coastal waters are a vast resource (Figure 1.13), but Maine does not have a constructed offshore wind farms to harness this resource.

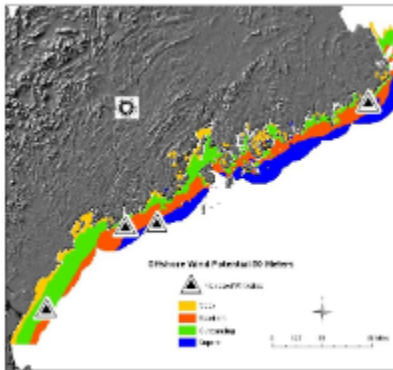


Figure 1.13 Representation of offshore wind potential at 50 meters above sea level. Maine’s coastal waters are characterized by an offshore wind potential of Good to Superb. The triangle markers represent the sites for proposed pilot wind projects. (Data source: NREL)

Barriers to Offshore Wind Energy

There are obstacles preventing offshore wind farms from being economically viable. One of the biggest problems facing large-scale wind farms is that suitable sites are often far from urban centers (OCS 2009). Power is lost in transmission lines; transporting electricity far distances decreases the efficiency and benefits of wind farms. Other uncertainties to wind farms are unproven technology, costs, and possible environmental concerns. Wind technology has been established but not thoroughly tested. For example, even though wind turbines stop rotating at a predetermined speed to avoid spinning too quickly, there is still uncertainty regarding how the turbines will fare in storms and hurricanes. The cost of offshore wind farms in most locations is not economically viable without government subsidies due to the high capital needs and the difficult permitting process (OETF 2009).

Since offshore wind technology and offshore wind farms are relatively new, their environmental impacts are not clear. Research has yet to be conducted on the effects on aquatic wildlife and flight patterns of birds over time. There is fear among fisherman that vibrations in the water around turbines will disrupt local fisheries (Ames 2009). Along with disrupting aquatic life, the vibrations could potentially cause seabed erosion. In

addition, a real challenge for offshore wind farm development is that detailed benthic maps of the majority of Maine's coastal waters do not exist (OETF 2009). Detailed benthic maps would provide developers the ability to recognize suitable substrates for anchoring offshore wind platforms.

We show how additional problems occur for planners and developers of offshore wind with the number of overlapping management boundaries as shown in Figure 1.14. In order to gain the necessary permits, these developers need to get the approval of many agencies associated with the numerous overlapping management boundaries. Each agency has its own interests and mandates, therefore gaining approval can take several years (Lapointe 2009). Therefore, offshore wind farm siting is a contentious issue. There are many environmental, economic, and social concerns that are attached to an offshore wind farm. Lawsuits are a frequent occurrence in the development stages of a wind farm. Some stakeholders are afraid of the loss to the intrinsic value of the seascape from rotating turbines. As can be seen in Figure 1.14, if a wind farm were to be built in state waters, the project would fall into the jurisdictions of multiple different parties causing friction among the different agencies. Friction would occur because an offshore wind farm would affect stakeholders differently. Siting of an offshore wind farm must also take into account the effects on current shipping lanes. Additional challenges include Not-In-My-Back-Yard (NIMBY) opposition and law suits.

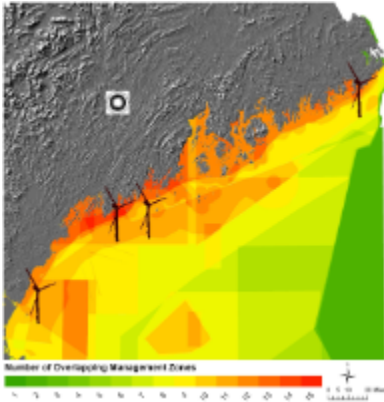


Figure 1.14 Density of jurisdictional and marine resource management zones off the coast of Maine. Areas with a higher number of overlapping zones are represented by a hotter color. Proposed demonstration sites for offshore wind platforms are represented by the windmill graphic.

Implications for Offshore Wind Energy

Even with the barriers we discussed above, there are a number of contributing factors that promise to aid in development of offshore wind energy resources. In November of 2008, Governor Baldacci established the Ocean Energy Task Force (OETF) by Executive Order (20 FY 08/09) and gave the task force the objective of drafting recommendations that the state could follow to meet the goals of the Maine Wind Energy Act (SPO 2009).

Maine state legislature passed the OETF recommendation to streamline the offshore wind permitting process (MRS 270 L.D. 1465 (1)). In order to gain approval for the necessary permits, the streamline process requires reports be filed with the DMR that include field investigations, plans to deal with adverse effects of the turbines, and considerations for commercial fishing and other fish and wildlife as well as navigation plans. This is then subject to a 60-day review process. The developer must also consult with the DMR, the IWF, and the DOC; the Maine Land Use Regulation Commission, SPO; the U.S. Army Corps of Engineers, the U.S. Coast Guard, the National Marine Fisheries Service, the National Park Service and the FWS; the Lobster Management Policy Council and each municipality in proximity to the project. The permitting process takes time and money. Even with the "streamlined" permitting process, there are many challenges facing approval from the DOC, SPO, DMR, DEP, and the IWF.

In addition to the task force and legislative passage of the task force recommendations for streamlining the permitting process, Maine received \$8 million of funding from the American Recovery and Reinvestment Act to test and develop offshore wind turbine platforms (The Free Press 2009). An additional \$14 million in grants from federal, state, university, and private industries will follow the initial \$8 million grant from the American Recovery and Reinvestment Act. As a result of these actions, four wind farms off the coast of Maine have been selected as proposed demonstration projects (Figure 1.13). The proposed demonstration sites are off of Boon Island, Damariscove Island, Monhegan Island, and Cutler. These offshore wind farms will test multiple 10kw turbines and one 100kw turbine. The state's end goal is to achieve 5 GW of electricity from offshore wind farms by 2030 (The Free Press 2009).

A National Ocean Policy

In addition to the complexity of coastal and marine resource management and its impact on development of important new and future technologies in the Gulf of Maine, there is a federal policy issue facing Maine. The federal government is currently re-evaluating its management of the ocean and its resources. Through a Memorandum to the Heads of Executive Departments and Agencies dated June 12, 2009, President Obama called upon an Interagency Ocean Policy Task Force to develop recommendations for a national ocean policy for the protection of our ocean, coastal, and Great Lake resources; the framework in which to make effective coordination of efforts; and an implementation plan (IOPTF, 2009). The Task Force is comprised of 24 senior policy-level officials from a range of executive departments, agencies, and offices across the federal government, and is chaired by the Chair of the Council on Environmental Quality. On September 10, 2009, the Task Force released an Interim Report, which was put up for public comment for 30 days. Maine has played an important role in the debate, with Senator Olympia Snowe co-chairing a Congressional hearing regarding the Task Force.

As a state that is heavily reliant on its coastal and marine resources, Maine will be directly affected by a new National Oceans Policy. We start by summarizing the recommendations of the Task Force, and continue by discussing the implications for Maine based on our analysis.

Policy Coordination Framework

The first goal of the National Ocean Policy will be to consolidate and strengthen the principal and deputy level components of ocean management within a single National Ocean Council (NOC) structure. A second goal is to strengthen the decision-making and dispute-resolution processes by defining clear roles for the NOC. The Task Force also recommends that a Governance Advisory Committee be created to formally engage with state, tribal, local, and regional governance structures. In addition, there will be a need to strengthen the link between science and management by creating an integrated Steering committee of the NOC. Lastly, the framework would work to strengthen coordination between the NOC, the National Security Council, the National Economic Council, the Office of Energy and Climate Change, the Council on Environmental Quality, the Office of Science and Technology Policy, the Office of Management and Budget, and other White House entities.

Although the policy coordination framework was created for the Federal government, a similar structure could be adopted at the state level. Citizens would then be able to learn the state and federal frameworks for ocean policy, alleviating some of the presently inherent confusion.

Through extensive reviews of current science and through a series of public hearings, the Task Force developed nine priority objectives:

1. **Ecosystem-Based Management:** Adopt ecosystem-based management as a foundational principle for the comprehensive management of the ocean and coasts.
2. **Coastal and Marine Spatial Planning:** Implement comprehensive, integrated, ecosystem-based coastal and marine spatial planning and management in the United States.
3. **Inform Decisions and Improve Understanding:** Increase knowledge to continually inform and improve management and policy decisions and the capacity to respond to change and challenges. Better educate through formal and informal programs the public about the ocean, coasts, and Great Lakes.
4. **Coordinate and Support:** Better coordinate and support Federal, State, tribal, local, and regional management of the ocean, coasts, and Great Lakes. Improve coordination and integration across the Federal Government, and as appropriate, engage with the international community.
5. **Resiliency and Adaptation to Climate Change and Ocean Acidification:** Strengthen resiliency of coastal communities and marine and Great Lakes environments and their abilities to adapt to climate change impacts and ocean acidification.
6. **Regional Ecosystem Protection and Restoration:** Establish and implement an integrated ecosystem protection and restoration strategy that is science-based and aligns conservation and restoration goals at the Federal, State, tribal, local, and regional levels.
7. **Water Quality and Sustainable Practice on Land:** Enhance water quality in the ocean, along our coasts, and in the Great Lakes by promoting and implementing sustainable practice on land.
8. **Changing Conditions in the Arctic:** Address environmental stewardship needs in the Arctic Ocean and adjacent coastal areas in the face of climate-induced and other environmental changes.
9. **Ocean, Coastal, and Great Lakes Observations and infrastructure:** Strengthen and integrate Federal and Non-Federal ocean observing systems, sensors, and data collection platforms into a national system and integrate that system into international observation efforts.

We feel the need to highlight that the National Ocean Policy calls for interaction of the federal government with states and regional organizations to perform ecosystem-based management plans. In this interaction, the states and regions will be called upon to locally implement the nine priority objectives. Maine has positioned itself well by having previously involved itself in regional management councils and committees, such as the Atlantic States Marine Fisheries Commission and the New England Fishery Management Council. The state has also conducted two one year studies into management plans similar to those called for by the Task Force. These occurred at Taunton Bay and Muscongus Bay. A goal of the studies was to discover the needed resources to implement more diverse management plans statewide (Bay Management Group, Appendix N Selected Findings).

These two studies found that there is not enough ecological or social data to manage intelligently at a bay level. Also, local groups do not have the capacity to collect the needed information; state assistance is needed. The studies also found that GIS maps were "one of the most prized outcomes of the projects," yet consumed more time and more effort than any other component. State assistance is recommended for future studies. Both studies found that regular communication and coordination with the State was invaluable. Quoting the study, "People generally find state bureaucracy difficult to navigate and appreciate having a point person to go to." The best work was done when it was part of a larger state initiative. The state might think to initiate a state policy framework in which these findings are incorporated.

Scenarios

In this section, we present three potential scenarios that Maine might move towards in the future of its coastal and marine management. These scenarios represent extreme outcomes; however, they are not unrealistic.

Confusion in Numbers: Status Quo

The "confusion in numbers" scenario, or the status quo scenario, would occur if Maine continued down the current track of managing with overlapping single-issue resource plans. As shown in this report, this management system is becoming increasingly difficult to manage because of the sheer number of overlapping zones and the number of agencies involved in managing coastal and marine resources. The process for new developments such as offshore wind has been slow and confusing.

If Maine were to continue with this system, additional overlapping management zones and regulating bodies would be sure to follow when a new issue emerges. An executive order, such as the one that established the Ocean Energy Task Force (OTEF) to "streamline" a process for offshore wind, would be common when it comes to successfully implementing new development.

Like Father, Like Son: Adopt National Ocean Policy

The "like father, like son" scenario would occur if Maine adopted a similar governance structure to the proposed National Ocean Policy by President Obama's Interagency Ocean Policy Task Force. The proposed National Ocean Policy will create a strong central authoritative body to oversee management of coastal and marine resources. The establishment of a strong central body will lessen the current level of competing regulatory bodies. If Maine were to establish a similar governance structure, confusion would be alleviated at the state level. The National Ocean Policy also calls for an ecosystem-based approach to management. Current single-species management programs would be managed together more effectively incorporating a broader range of ecological factors. Maine would need to increase its efforts in research and coordination in order to be successful in this scenario.

Tumbling Down: Top-down Management Approach

The "tumbling down" scenario would occur if Maine increased its top-down approach to management. This approach would limit public review and give more power to regulating agencies to make final decisions. Decisions regarding development of marine resources may be faster using this approach. However, top-down approaches have proved to be ineffective in the past. The sea urchin fishery is an example of top-down management in which the fishery collapsed.

Conclusion

Maine's coastal and ocean economies play a vital role in the health of Maine's economy and GDP. Management of these resources has been

varied in strategy and success. It is important to note that many stakeholders have mandates that focus on a species-specific or issue-specific resource. The result is that many stakeholders conduct research and manage their respective interests independently of one another. However, we have shown in this report how these interests overlap in geographical space.

This administrative environment is not conducive to the development of important emerging technologies like offshore wind platforms. The complicated administrative environment requires the agreement of multiple agencies, interests, and mandates to approve new projects. The difficulties in constructing the demonstration projects have highlighted the need for a new approach to Maine's coastal and marine resource management. The National Ocean Policy Initiative working its way through Congress which could address spatial overlap issues by having one overarching governing body.

Recommendations

The current management system is complicated and does not take into account the interconnected processes of an ecosystem. The top-down approach has proved to be ineffective in some management cases. Success has been shown through bottom-up approaches like the lobster fishery by active communication between fisherman and regulators. Therefore, we recommend that Maine incorporate a similar governing structure to our "like father, like son" scenario and adopt a model similar to the proposed the National Ocean Policy because it effectively integrates single-species management approaches into a larger ecosystem-based management. It balances efficiency with public and agency review. To incorporate the ecosystem-based management of that is inherent with this governing structure, the state should follow the suggestions of its two one-year studies that have expressed the need for state level support in training researchers in GIS and data collection. Additionally, we recommend the state sponsor spatial analysis studies similar to what we have completed in this report to aid in their management of coastal and marine resources.

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