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Managing Maine's Nearshore Coastal Resources

Report of the Bay Management Study

Prepared by the Maine State Planning Office
and the Maine Department of Marine Resources

For the Land & Water Resources Council

January 2007

Funding for printing of this report was provided by the U.S. Department of Commerce, Office of Ocean and Coastal Resource Management, under the Coastal Zone Management Act (CZMA) of 1972, as amended under appropriation #NA06NOS4190188. CZMA is administered in Maine by the State Planning Office's Maine Coastal Program.



Managing Maine's Nearshore Coastal Resources

Report of the Bay Management Study
 To the Joint Standing Committee on Marine Resources
 in response to PL 2003, c. 660, Part B



A Resource of Vital Importance

Maine's identity is tied to the ocean. With over 5,000 miles of coastline and nearly two million acres of public submerged lands, Maine's coastal waters have provided people with bountiful food, transportation, and spiritual inspiration. In 2004, it was estimated that Maine's coastal economy employed 45,685 people and resulted in \$1.2 billion dollars in annual wages.

Growth and Change

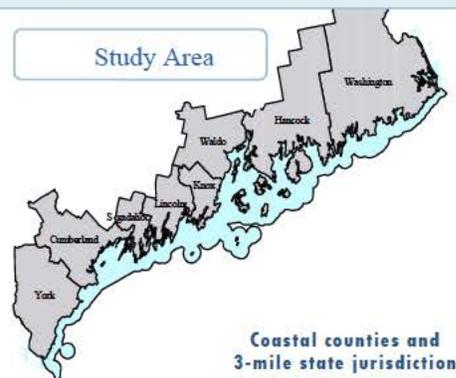
Our uses of the sea are changing and intensifying. Aquaculture has joined traditional fisheries as an economically significant use. Sea kayaks and other types of recreational watercraft have joined fishing boats at town landings. More second-home buyers and retirees have joined coastal communities that, for generations, have been home to families that earn their living on the water.



Oyster aquaculture raft, Damariscotta



Kayakers at Pretty Marsh Harbor



Examples of user conflicts along Maine's coast

Activity-based Conflicts	Perspective-based Conflicts
Competition at public boat ramps, especially between recreational boats and commercial users	Some waterfront owners oppose commercial uses of water such as aquaculture
Lobster gear in channels presents challenges to boaters and trawlers	New water access sites often opposed by local residents
Increase in recreational boaters with no safety training creates hazard for other boaters and swimmers	The siting of nearshore energy development projects is contentious

With Maine's coastal waters under growing pressure, user conflicts and environmental degradation will likely increase. At the same time, there are signs that Maine's current methods of nearshore management need improvement. Without embarking on these improvements to management, the health of the marine environment, the livelihoods and recreation that depend on it, and the essence of Maine's character may be at risk.

The “Nearshore”

Bays, or embayments, are relatively shallow, semi-enclosed coastal water bodies. Maine has many types and sizes of bays, as well as open coastal areas. The term “nearshore” is used in this study to be more inclusive of both bays and open coastal areas, and refers to both the water and land immediately adjacent to the coast.



Jasper Beach, Machias

Pilot Projects

Two community-based groups were each provided \$20,000 and a staff liaison for a year.

The Friends of Taunton Bay compiled data and maps about the bay and its uses, and developed management principles.

The Quebec-Labrador Foundation, Inc. formed the Muscongus Bay Committee to identify regional concerns and create maps.

Lessons learned from these projects helped advance understanding of place-based nearshore management in Maine.



Map review, Muscongus Bay Forum, Waldoboro

Are We Managing Effectively for Present and Future Challenges?

At the direction of the Maine Legislature, an interagency staff team from the State Planning Office and the Department of Marine Resources engaged with coastal stakeholders, assessed two local pilot projects and conducted research over a two-year period to examine questions such as:



Public Meeting, Ellsworth

- ◆ How are nearshore resources currently used? What are anticipated trends?
- ◆ What concerns do Maine’s citizens have about coastal resources?
- ◆ How do federal, state and local entities currently manage nearshore resources?
- ◆ What can Maine learn from other models of innovative management?
- ◆ What improvements in data and information are needed for effective management?
- ◆ How can limited state resources finance needed improvements? What new resources are needed?

A diverse, eight member citizen steering committee provided advice to staff and the commissioners of state resource-related agencies (the Land and Water Resources Council) provided direction and approved the study for submittal to the Legislature.

Key Findings

- ◆ Coastal management could be improved by using a regional scale. Yet, there is currently no recognized forum to advance regional nearshore management.
- ◆ Supporting regions to discover and act on their own issues (in accordance with clear state goals) will permit nearshore management to respond to regional differences rather than be a one-size-fits-all approach.
- ◆ There is a major gap in nearshore data and information. The data that does exist is very difficult to locate and gather.
- ◆ Seven state agencies, six federal agencies and coastal towns all have major roles in nearshore management. This can be confusing to the public (see diagram on page 4).
- ◆ Existing coastal programs are working with limited budgets. Efforts to improve coastal management should not divert from existing programs.



Machias Lodge Lighthouse

Taking Steps Towards A New Vision

In the Future...

- ◆ Maine's coastal and marine resources are among the most healthy, productive, and resilient natural systems in the world.
- ◆ Effective management and active citizen stewardship achieves a balance between conservation and development that ensures the sustained use and enjoyment of coastal resources by current and future generations.
- ◆ Human impacts on coastal ecosystems are managed in a holistic way that addresses multiple stressors on a complex and dynamic ecosystem.
- ◆ Comprehensive, up-to-date data and information informs public and private management decisions.



Harvesting mussels at Pretty Marsh Harbor

"Nearshore Management"

In this study, the term "nearshore management" refers to a combination of existing and new programs and regulations, with a focus on regional coastal management.

The term "bay management" was found to be confusing, meaning different things to different people. This study does not recommend a new bay-by-bay management structure or a division of the coast into management districts. Rather, it recommends a suite of changes to the State's approach to nearshore management that will better protect the integrity of Maine's nearshore areas for use by current and future generations.

Study Recommendations

To realize this vision, Maine's current methods of nearshore management need improvement in four core areas:

Move towards regional management of nearshore waters

Regional nearshore initiatives provide a method to examine issues at relevant ecosystem and social scales, and to engage local stakeholders in the management of nearshore areas.

The State should encourage and support regional initiatives with:

- ◆ limited support (e.g., workshop design and facilitation; data collection and interpretation; writing a management plan)
- ◆ funding or sustained support for specific projects; and
- ◆ encouraging interlocal agreements.

Increase the amount, availability and accessibility of nearshore data and information

In order to address the limitations in nearshore data that constrain efforts to improve coastal management, the State should:

- ◆ create and implement a long-term coastal marine science plan to identify and acquire needed data; and

- ◆ enhance information exchange and marine geographic information systems.

Improve the state's framework for nearshore management

A strengthened framework for nearshore management will help Maine achieve its coastal vision and support regional initiatives. The State should:

- ◆ implement interagency coastal strategic planning;
- ◆ establish a policy-level oversight committee;
- ◆ improve outreach; and
- ◆ conduct ongoing evaluation of nearshore management.

Increase the amount and diversity of funding sources

To support the implementation of the recommendations, the State should:

- ◆ maintain current funding for existing priorities; and
- ◆ secure additional support for enhanced programming (e.g. create partnerships with NGOs to secure new funding sources).

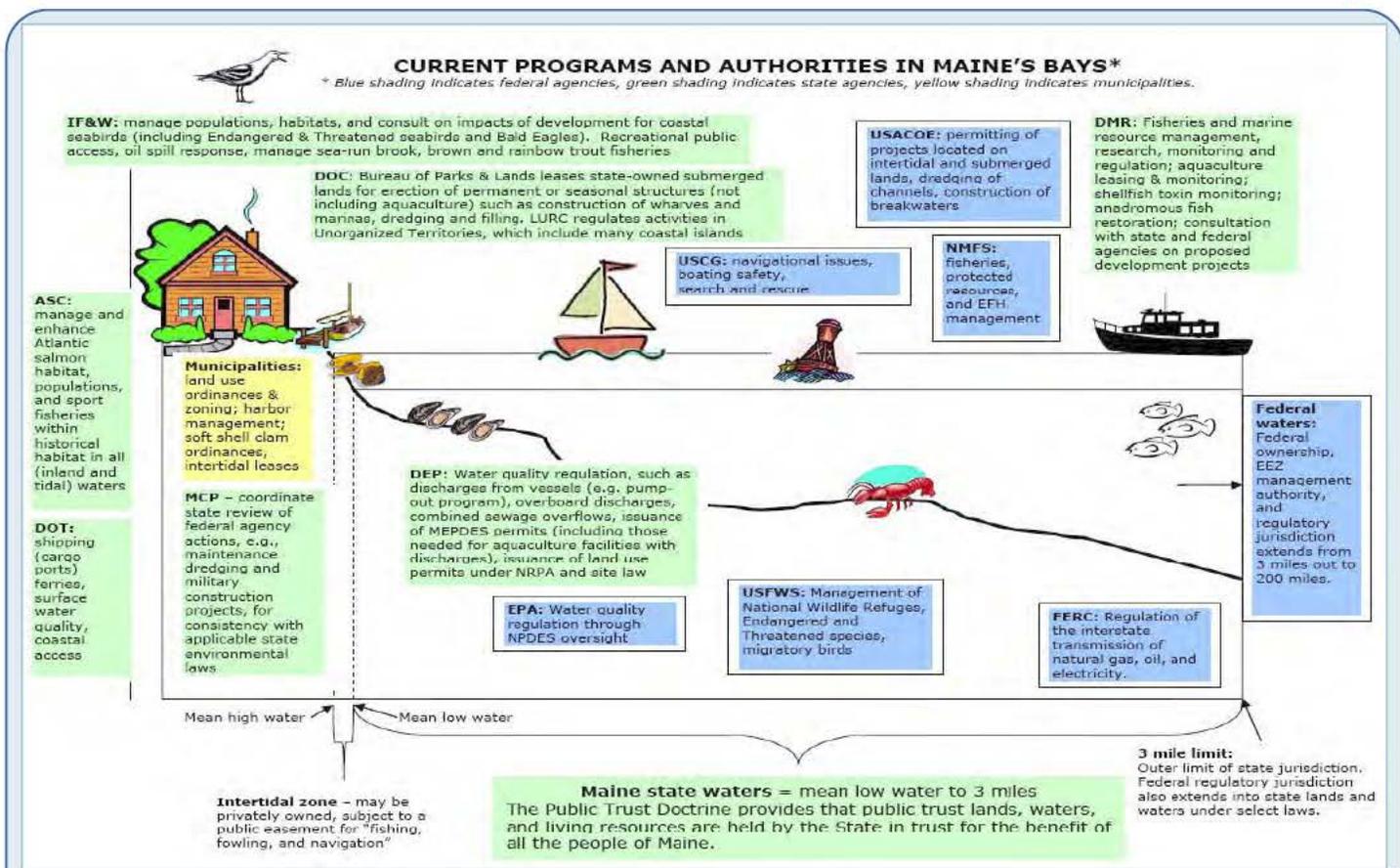


Stonington Pier

Criteria for Regional Initiatives

To be eligible to receive funding or staff support, a project should:

- ◆ Support state nearshore management goals
- ◆ Demonstrate appropriate stakeholder participation
- ◆ Demonstrate sufficient capacity to carry out tasks
- ◆ Conduct work on a regional scale
- ◆ Use best available data and information



Nearshore resources are currently managed by a complex mosaic of state, federal and local entities. A key recommendation of this report is to improve the framework for coastal management to encourage interagency strategic planning, create a state-level policy oversight committee, and conduct periodic evaluations.

A Beginning...

The improvements to nearshore management recommended by this study are purposefully incremental in nature given current capacity, funding and available information. They are intended to be the first steps in advancing towards integrated, ecosystem-based nearshore management in Maine in an effort to protect the valued qualities of Maine's coast.



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A compiled set of the Appendices are printed under separate cover. It can be downloaded at <http://www.maine.gov/dmr/baystudy/baystudy.htm>. Hard copies are available by calling 207-287-1486 or emailing Lorraine.Lessard@maine.gov.

MANAGING MAINE'S NEARSHORE COASTAL RESOURCES

Final Report of the Bay Management Study

EXECUTIVE SUMMARY



Introduction

Maine's nearshore¹, coastal waters are under increasing pressure from a variety of influences. The potential exists for both increased user conflicts and for further environmental degradation. At the same time, there are signs and symptoms that Maine's current methods of nearshore management need improvement. Without embarking on enhancements to nearshore management, the health of the marine environment, the livelihoods and recreation that depend on it and the essence of Maine's character may be at risk.

The Maine Legislature directed the Land and Water Resources Council ("LWRC") to undertake a two-year study (through PL 2003 c. 660, Part B (LD 1857) "to explore and document potential new and innovative concepts for the management of Maine's embayments." This report is a product of that effort.

Context

There is nothing perhaps as integral to Maine's identity, its past, its present, and its future, as its ocean. Lying along over 5,000 miles of meandering coastline and over nearly two million acres of public submerged lands, Maine's nearshore waters are part of one of the most productive and rich ecosystems in the world, the Gulf of Maine. Since long before colonial times, these waters and the lands beneath them have provided people with bountiful food, transportation, and spiritual inspiration. As the primary steward and trustee of the public resources in Maine's nearshore environment, the State manages these resources for the benefit of both current and future generations. In 2004, it was estimated that the Maine's coastal economy employs 45,685 people and results in \$1.2 billion dollars in annual wages.²

While the sea remains a constant source of sustenance, the lifeblood of Maine, the uses which our society makes of this diverse and complex resource are changing, diversifying, and intensifying. Aquaculture has joined traditional capture fisheries as an economically significant use in a number of areas. Sea kayaks and other types of recreational watercraft, large and small, have increasingly joined

¹ As used in this report, the term "nearshore" or "coastal waters" refers to marine areas within three nautical miles of the shore that are under the jurisdiction of and, with few, limited exceptions owned by the State of Maine.

² Colgan, C. *The National Ocean Economics Program*. 2004.

fishing boats at town landings. More second-home buyers and retirees have joined coastal communities that, for generations, have been home to families that earn their living on the water. With changes in national and world energy markets, Maine is now a proposed host for regionally significant energy infrastructure, including terminals for liquefied natural gas. These changes and trends provided a strong call to action to undertake this study and implement its recommendations.

Study Process and Scope

The Maine Legislature directed the Land and Water Resources Council³ (“LWRC”) to undertake this two-year study “to explore and document potential new and innovative concepts for the management of Maine’s embayments” and submit a final report by January 15, 2007 to the Legislature’s Joint Standing Committee on Marine Resources.⁴ An interagency staff team from the State Planning Office and the Department of Marine Resources carried out the study at the LWRC’s direction. As directed in the study legislation, a project steering committee was formed to advise project staff. The staff team carried out the study through consultation with the steering committee and members of the public, completion of two pilot projects, policy research, discussions with state natural resources agencies, and feedback from the LWRC at its quarterly meetings.

Following an initial review of the issues facing Maine’s coastal areas and an exploration of management alternatives, this study focused on whether and how regional management could be applied to coastal governance in Maine. Given this scope, the following topics were investigated:

- Current uses and anticipated trends in use – What are the major uses along Maine’s coast? How are they changing? What new uses are emerging?
- Existing nearshore governance system – What is the current mix of federal, state and local legal authorities over coastal waters? What significant marine and coastal resources management projects are state agencies now undertaking or planning? How are state agencies working together now?
- Models of innovative nearshore management – Are there models from other countries, states or other Maine programs that might serve as models for improvement?
- Public comments and concerns – What are the major concerns of the public and stakeholders that use and enjoy Maine’s coastal resources? What ideas do they have for addressing them?

³ The LWRC is made up of the Commissioners of the Departments of Marine Resources, Environmental Protection, Agriculture and Rural Resources, Inland Fisheries and Wildlife, Economic and Community Development, Transportation, Health and Human Services, and Conservation and the director of the State Planning Office, who serves as chair. The LWRC was created in statute to advise the Governor and Legislature and help coordinate agency actions on natural resources policy-related matters.

⁴ PL 2003 c. 660, Part B (LD 1857) is included in Appendix A of the main body of this report

- Results of bay management pilot projects – What are the major lessons learned from the two pilot projects, conducted in Taunton Bay and Muscongus Bay?
- Data and information needs – What nearshore data and information are available? How is data and information shared and exchanged?
- Budgetary considerations– What state financial and budgetary considerations should guide policy recommendations?

Findings

The study's major findings include:

- Effective coastal and nearshore management frequently involves collaborating beyond local political boundaries at a regional scale. Yet, while there are federal, state, and local processes for nearshore management, there is currently no recognized forum to advance comprehensive marine and coastal management efforts on a regional scale.
- Strong state priorities are needed in order to make sure that the public trust is protected and that coastal management achieves desired goals. However, the nature and types of concerns vary from place to place along the coast. Encouraging and supporting regions to discover and act on their issues in partnership with the State will permit coastal management to respond to regional differences, rather than be a one-size-fits-all approach.
- There are many types of nearshore data that do not currently exist, are out-dated, or are at the wrong scale to be useful. It is very difficult to locate and gather existing information, and there has been no concerted effort to create a robust marine GIS. Therefore, it is difficult to ascertain a complete understanding of current coastal conditions and subsequent changes over time.
- Seven state agencies, six federal agencies and coastal towns have major roles in various aspects of nearshore management. The existence of multiple and sometimes overlapping jurisdictions has proven confusing to the public, and often requires concerted efforts among staff to coordinate activities and programs.
- Existing state agencies and programs for coastal and marine management are already working with limited resources. Any new efforts to improve the State's stewardship of coastal waters should complement and not divert or diminish existing efforts and resources.

Recommendations

Envisioning a future for Maine's nearshore is essential to guide this study's recommendations.

A Vision for the Future of Maine's Nearshore

Maine's coastal and marine resources are among the most healthy, productive, and resilient natural systems in the world. Effective, coordinated management and active citizen stewardship achieves a careful balance between conservation and development that ensures the sustained use and enjoyment of coastal resources by current and future generations. Human impacts on coastal ecosystems are managed in a holistic way that addresses multiple, cumulative stressors on a complex, dynamic and ever-changing ecosystem. Comprehensive, up-to-date data and information informs public and private management decisions. Management at effective scales reflects ecosystem boundaries and allows for improved citizen participation.

Enabling regional nearshore management is the most promising first step in moving towards this vision of integrated, inclusive and ecosystem-based coastal governance in Maine. The four recommendations in this report - supporting regional initiatives; providing needed data and information; improving a coordinated State framework, and ensuring adequate funding - are all geared to this end. The goals and associated recommendations are:

- A. Move towards regional management of nearshore waters** – The State will encourage and support regional initiatives to address locally-relevant issues by providing information, staff assistance and/or funding and by encouraging interlocal agreements. The State will also provide eligibility criteria to ensure that state investment is directed to initiatives that are contributing to the state's coastal priorities.
- B. Increase the amount, availability and accessibility of nearshore data and information** – The State will create and implement a long-term coastal marine science plan to identify and acquire needed data, and to enhance information exchange and marine geographic information systems in Maine.
- C. Improve the state's framework for nearshore management** – The State will implement interagency coastal strategic planning, and will institute several coordination mechanisms to improve interagency cooperation and communication. Periodic summaries, evaluations, and modifications will ensure continued progress towards a regional, ecosystem-based coastal management system.
- D. Increase the amount and diversity of funding sources** – In order to support the implementation of the recommendations under each of these goals, the State will maintain current levels of funding for existing state priorities while securing additional sources of support for enhanced programming.

This approach – geared to developing regional capacity for place-based management, creating scientific data and information, and improving the State's approach – is fiscally-sound, practical, and well-suited to Maine at this time.

INTRODUCTION

This is a moment of unprecedented opportunity. Today, as never before, we recognize the links among the land, air, oceans and human activities. We have access to advanced technology and timely information on a wide variety of scales. We recognize the detrimental impacts wrought by human influences. The time has come for us to alter our course and set sail for a new vision for America, one in which the oceans and coasts...are healthy and productive, and our use of their resources is both profitable and sustainable. – An Ocean Blueprint for the 21st Century, U.S. Commission on Ocean Policy, September 2004.

The Maine coast is an asset of immeasurable value to the people of the State and the nation, and there is a state interest in the conservation, beneficial use and effective management of the coast's resources. – The Maine Coastal Policies Act, 38 MRSA §1801

The Maine Legislature directed the Land and Water Resources Council⁵ (“LWRC”) to undertake a two-year study (through PL 2003 c. 660, Part B (LD 1857) – see Appendix A) “to explore and document potential new and innovative concepts for the management of Maine’s embayments⁶.” This report of the LWRC to the Legislature’s Joint Standing Committee on Marine Resources is the product of the two-year effort.

Background

The Importance of Maine’s Nearshore Environment

Maine’s identity, its past, its present, and its future, are tied to the ocean. Lying along over 5,000 miles of meandering coastline and over nearly two million acres of public submerged lands, Maine’s nearshore waters are part of one of the most productive and rich ecosystems in the world, the Gulf of Maine. Since long before colonial times, these waters and the lands beneath them have provided people with bountiful food, transportation, and spiritual sustenance. Commercial fisheries, boat-

⁵ The LWRC is made up of the Commissioners of the Departments of Marine Resources, Environmental Protection, Agriculture and Rural Resources, Inland Fisheries and Wildlife, Economic and Community Development, Transportation, Health and Human Services, and Conservation and the director of the State Planning Office, who serves as chair. The LWRC was created in statute to advise the Governor and Legislature and help coordinate agency actions on natural resources policy-related matters.

⁶ Embayments are relatively shallow, semi-enclosed coastal water bodies. In Maine the openings from bays to the larger Gulf of Maine are characterized by an irregular and complex shoreline.

building and related marine industries have shaped the locations, traditions and values of our coastal communities and nourished our natural resource-based economy. Maine ports and harbors have handled the world's commerce. Maine's beaches, coves and rocky coast have long been a national and international destination of choice for travelers, and our sea and shores an ever-renewing source of inspiration for painters, writers and other artists. In 2004, it was estimated that the Maine's coastal economy employs 45,685 people and results in \$1.2 billion dollars in annual wages⁷. Maine's coastal resources continue to offer promise and opportunity to people and communities inside Maine and beyond.

Increasing and Intensifying Uses

While the sea remains a constant source of sustenance, the lifeblood of Maine, the uses which our society makes of this diverse and complex resource are changing, diversifying, and intensifying. Long a frontier, and in many ways a true public commons, our nearshore ocean environment is becoming increasingly settled and populated in the wake of these many changes. Aquaculture has joined traditional capture fisheries as an economically significant use in a number of areas. Sea kayaks and other types of recreational watercraft, large and small, have increasingly joined fishing boats at town landings. More second-home buyers and retirees have joined coastal communities that have been for generations home to families that earn their livings on the water. With changes in national and world energy markets, Maine is now a proposed host for regionally significant energy infrastructure, including Liquefied Natural Gas terminals. These changes and trends in coastal uses (Appendix B) provided a strong call to undertake this study and implement its recommendations.

State Responsibility for the Public Trust Resources

This study was conducted and its' recommendations are offered in light of the central importance of Maine's nearshore environment to its economy and way of life. It is also recognized that the long-term sustainability of this environment depends on maintenance and enhancement of the integrity of its ecological systems. The State is the primary steward and trustee of the public resources in Maine's nearshore environment, which are held in trust by the State for the benefit of current and future generations.

National Context

Maine's bay management study takes place in the context of renewed national attention on our ocean resources and how they are managed. The federally appointed U.S. Commission on Ocean Policy submitted recommendations for creating a coordinated and comprehensive ocean policy in 2004 in its report titled "An Ocean Blueprint for the 21st Century." The Pew Ocean Commission's privately funded analysis of similar topics was completed in 2003 in their report, "America's Living Oceans: Charting a Course for Sea Change." While these reports focus on the national and multi-state regional scale, they present a vision of healthy, resilient marine ecosystems to which we strive to contribute in Maine. In doing so, the Maine study, although different in structure and scope, joins other recent state-level efforts in Massachusetts, California and New York to improve coastal and ocean management.

⁷ Colgan, C. *The National Ocean Economics Program*. 2004.

Study Purpose and Methodology

Problem Statement

Maine's nearshore, coastal waters are under increasing pressure as both user conflicts and environmental degradation increase. At the same time, there are signs and symptoms that Maine's current methods of nearshore management need improvement. Without embarking on enhancements to coastal management, the health of the marine environment, the livelihoods and recreation that depend on it and the essence of Maine's character may be at risk. Thus, the purpose of this study, as directed by the Legislature, was to assess innovative improvements to the management of bays. After exploring various concepts, the study evolved to examine the potential for a regional approach to coastal governance as a method to address identified problems.

Methods

Department of Marine Resources and State Planning Office staff carried out this study at the LWRC's direction and in consultation with a project steering committee made up of eight public members⁸ with expertise in relevant fields as directed in the study legislation. Year one of the study focused primarily on idea and information gathering, and year two on development of recommended policy options. Three primary methods by which staff carried out this study - public participation, pilot project support and assessment, and policy research - were complemented by consultation with state agencies and the steering committee, and oversight by the LWRC. Highlights of major activities are as follows:

Public Participation

- Developed a website <http://www.state.me.us/dmr/baystudy/baystudy.htm> and an e-mail list of interested parties;
- Performed a public participation survey and developed a public participation plan;
- Hosted five public meetings at different locations on the coast and briefed four statewide stakeholder groups to get early public input into the study;
- Facilitated a mid-course workshop at which twelve stakeholders presented their concepts for improvement of nearshore management;
- Sponsored sessions at Maine Fishermen's Forum in three consecutive years;
- Considered public comments at project steering committee meetings; and,
- Solicited and reviewed public comments on draft recommendations through briefings of non-governmental and industry stakeholder organizations, a public meeting, and a posting of the report online for written comments.

⁸ The steering committee members are: Paul Anderson, *Director, Maine Sea Grant Program*; Kathleen Billings, *Chair, Maine Soft Shell Clam Advisory Council, and Town Clerk, Town of Stonington*; Heather Deese, *Marine Science and Policy Consultant*; Dewitt John, *Director of Environmental Studies Program, Bowdoin College*; Evan Richert, *Associate Professor, Muskie School of Public Service*; Jim Salisbury, *Retired CEO, Supreme Alaska Seafoods*; David Schmanska, *Harbormaster, Town of St. George*; Barbara Vickery, *Director of Conservation Programs, Maine Chapter of the Nature Conservancy*

Pilot Project Support

- Supported two, one-year pilot projects each with a \$20,000 grant and a staff liaison. These pilots explored nearshore management issues concepts in Taunton Bay (Friends of Taunton Bay) and in Muscongus Bay (The Quebec-Labrador Foundation, Inc. and Muscongus Bay Project Committee);
- Assessed lessons learned from these projects in order to advance understanding of the opportunities and challenges inherent in place-based nearshore management.

Policy Research

- Conducted policy research in four principal areas: uses and related trends in Maine's nearshore environment, current nearshore management in Maine, other states and other countries; and marine data and information needs.

Study Oversight

- Planned and supported eleven steering committee meetings (Appendix C) to solicit advice related to information collection and development of policy options;
- Delivered quarterly progress reports and briefings to the Land and Water Resources Council; and;
- Sponsored three state interagency meetings.

Geographic Extent and Context

The Legislature's study directive used the terms "bay" and "embayment" to describe the geographic extent of the study. During the course of the study, it was found that not only does Maine have many types and sizes of embayments (Appendix D), but also that there are concerns about management along open coastal areas. Thus, study participants came to interpret the Legislature's intent as a call to look regionally at nearshore waters and the land immediately adjacent to the coast.

Nearshore areas are different, both ecologically and socially, than land or open water areas. Less is known about this environment, especially the land-water interface. A broad array of recreational, commercial and other types of activities take place in state waters. And while land-based activities can impact marine uses, there is not always a mechanism for those who most directly rely on the health of bays (e.g., commercial fishermen) to assist in addressing many of the land-based factors that affect nearshore resources. State waters are held in trust for the public, yet leasing of submerged lands for commercial and residential use, placement of fixed fishing gear and assignment of private moorings have created formal and informal private interests in certain areas of ocean bottom. In addition, there are many nearshore management entities but there is no overarching governance structure or explicit state management plan for the nearshore. Thus, this study, in examining Maine's nearshore areas, considered a suite of complex ecological, social and management parameters.

Study Limitations

This study was not a comprehensive assessment of Maine's coastal management system in its entirety, but focused instead on the potential improvements that a regional approach could make to the management of nearshore coastal uses. Evaluation of the management of broader marine resources and uses such as commercial ocean fisheries and shipping, which must take place on a larger geographic scale and in a national or even international context, were beyond the scope of this study. Similarly, the study does not attempt to evaluate the scientific or technical basis of standards by which coastal uses or resources are managed.

Several efforts examining needed reforms to other aspects of state governance were taking place at the same time as the bay management study, including an evaluation of Maine's Comprehensive Planning and Land Use Regulation Act and a review of the Site Location of Development statute. Those evaluations will likely augment the recommendations of this report, as related to regional planning. Appropriate linkages to these other efforts are discussed in the text of this report.

Moving Forward

Enabling regional nearshore management as outlined in this report is the most promising first step to help the State better carry out its responsibility to ensure a healthy marine ecosystem that supports multiple uses. The recommendations presented here, although incremental in nature, will lay the groundwork to eventually support integrated, inclusive and ecosystem-based coastal governance in Maine. Due to limited financial and technical capacity at the local, regional and state levels, this report takes the approach of supplementing existing state nearshore resources management efforts with new, well-targeted and regional management efforts. These recommendations are fiscally-sound, practical, and well-suited to Maine at this time. Furthermore, they will yield lasting significant benefits and put the State in the position to take additional, well-informed actions in the future to support regional nearshore ecosystem-based management.

The remainder of this report presents the analysis of information collected, findings based on that analysis, a vision and principles for advancing coastal management in Maine, and recommendations for improvement. The recommendations form three pillars of support to coastal management by: encouraging regional management; providing needed data and information; and establishing a state framework for collaboration, strategic planning and accountability for nearshore resources.

ANALYSIS OF INFORMATION COLLECTED

Throughout the course of the bay management study, staff collected and assessed information regarding nearshore uses, conditions and governance through public meetings, two pilot projects, and staff policy research. This analysis section presents a synopsis and analysis of that research, and informs the findings and recommendations found in this report.

Maine’s Nearshore Waters: Current Uses and Anticipated Trends

In order to provide background information and context for evaluating approaches to nearshore governance, SPO prepared a report to assess current and anticipated uses of Maine’s nearshore waters. This report, *Maine’s Nearshore Waters: Current Uses and Anticipated Trends* (SPO, October 2006), (“trends report”) is attached as Appendix B. The report contains a discussion of the following uses: marine aquaculture, commercial fisheries, marine transportation, marine recreation, energy facilities and related development, coastal dredging and ocean disposal of dredged materials, water pollution control, and marine conservation. To the extent practicable given available information, the report identifies current and future trends in use, the expected geographic location(s) of certain activities, and potential conflicts among uses. The summary table (reproduced below) provides an overview of the trends in nearshore activities.

The trends report finds a variety of factors that are likely to contribute to increasing diversification and intensification of human uses and related pressures on coastal ecosystems. Principal factors include technological innovation; conditions supportive of development of renewable energy sources; increased demand for seafood products; continued growth in Maine’s resident coastal population; and continued growth in coastal tourism and recreation. Given the diversity and level of activity, it is reasonable to expect increased conflicts among user groups and concerns about adverse environmental impacts. In addition, the trends report suggests that the composition, nature and pace of change and the degree of potential conflict among uses will to continue to vary markedly in different places along the coast.

Table 1: Maine’s Nearshore Waters: Current Uses and Anticipated Trends Summary Table

Use	Has there been an increase or a decrease in this use, or has it remained stable over the past 5 years?	Is this use likely to increase, decrease or to remain stable over the next 5 years?*	Where in Maine will the increase in the use take place, (if applicable)?*
Aquaculture	Decrease in finfish Increase in shellfish	Increase – both finfish and shellfish	<ul style="list-style-type: none"> • Finfish – primarily Downeast. • Shellfish – could be coast-wide in places where conditions are suitable
Lobster Fishing	Increase in the amount of gear, decrease in the number of fishermen	Increase in the amount of gear, decrease in the number of fishermen	Statewide increase in traps with the greatest increase likely occurring in Downeast Maine

ANALYSIS

Use	Has there been an increase or a decrease in this use, or has it remained stable over the past 5 years?	Is this use likely to increase, decrease or to remain stable over the next 5 years?*	Where in Maine will the increase in the use take place, (if applicable)?*
Urchin Fishing	Decrease	Difficult to determine	Difficult to determine
Sea Scallop Fishing	Decrease in the number of licensed fishermen	Difficult to determine	Difficult to determine
Sea Cucumber Harvesting	Stable	Stable	Will likely continue to be primarily a Downeast fishery
Blue Mussel Harvesting	Decrease in the number of licensed fishermen	Stable or decrease – depends on the resource	Not applicable (increase not predicted)
Horseshoe crab Harvesting	Decrease (No recorded harvest since 2003)	Stable (unless seasonal closure is lifted)	Not applicable (increase not predicted)
Soft Shell Clam Harvesting	Decrease in the number of licensed fishermen	Difficult to determine	Difficult to determine
Shrimp Fishing	Decrease in number of licensed fishermen	Difficult to determine	Depends on the shrimp population but will likely continue to take place between Kittery and St. George
Marine Worm Harvesting	Stable	Difficult to determine	Will likely continue to take place primarily between midcoast and Downeast Maine
Periwinkle Harvesting	Difficult to determine	Difficult to determine	May continue to be primarily a Washington County fishery
Seaweed Harvesting	Decrease in the number of licensed harvesters	Difficult to determine.	Difficult to determine
Herring	Decrease in the number of licensed fishermen	Difficult to determine	Unless resource changes, will likely remain an offshore fishery
Marine Research and Education	Difficult to determine	Increase	Difficult to determine
Cargo Port Traffic	Increase	Increase	Primarily at 3 major ports: Portland, Searsport, Eastport
Cruise Ships	Increase	Increase	<ul style="list-style-type: none"> Increased traffic possible at Portland and Bar Harbor Possible growth in visits to small ports by smaller cruise ships
Ferry Service	Slight increase in ridership	Slight increase in ridership	No areas have been identified at this time
Boating and Boating Facilities	Increase	Increase	<ul style="list-style-type: none"> Statewide increase for boating, and demand for moorings Increase in marinas will likely occur first in southern- and mid-coast

Use	Has there been an increase or a decrease in this use, or has it remained stable over the past 5 years?	Is this use likely to increase, decrease or to remain stable over the next 5 years?*	Where in Maine will the increase in the use take place, (if applicable)?*
Docks, Piers, Wharves	Increase	Increase	Statewide
Sea kayaking	<ul style="list-style-type: none"> • Increase in people using recreational kayaks** • Increase in short (half day) kayak trips** • The number of people using traditional kayaks and going on extended tours has remained stable** 	<ul style="list-style-type: none"> • Increase in the number of people using recreational kayaks 	<ul style="list-style-type: none"> • Some increase in Downeast use • Most growth will likely take place in the islands that are already seeing a lot of use
Wildlife Sightseeing	Stable**	Slight increase	Difficult to determine
Saltwater fishing	Slight decrease	Stable	Not applicable (increase not predicted)
Energy Facilities	Increase	Increase	Dependent on type of energy resource
Coastal Dredging and Dredge Disposal	Difficult to determine	Difficult to determine	Difficult to determine
Sand and Gravel Mining	Stable (currently not occurring)	Difficult to determine	Difficult to determine
Marine Managed Areas	Increase	Increase	Difficult to determine

Summary Table: Water Pollution

Type of Waste Disposal/Pollution	Has this been on the increase, decrease or remained stable over the past 5 years?	Is this likely to increase, decrease or remain stable over the next 5 years?*	Where in Maine will the increase take place (if applicable)?*
Point Source Pollution	Decrease of some sources, including Overboard Discharges (OBD's)	Decrease of some sources, including OBD's	Difficult to determine
Non-Point Source Pollution	Increase	Increase	Statewide issue
Marine Debris	Persistent problem	Will continue to be a persistent problem	Statewide issue
Toxic Pollution	Increase in some substances, decrease in others	Increase in some substances, decrease in others	Difficult to determine

* = An estimation based on best available data

** = Assessment comes primarily from anecdotal evidence

Maine’s Existing Nearshore Governance System

This section provides a synopsis of the current mix of legal jurisdictions and authorities over coastal waters. Broad guidance is provided for coastal resources management by the Public Trust Doctrine and Maine’s Coastal Management Policies, and these obligations are fulfilled by the municipal, state and federal entities entrusted with managing Maine’s coastal resources.

Public Trust Doctrine

In accordance with the common law Public Trust Doctrine, the State holds state-owned submerged lands (those lands below the mean low-tide line to the three-mile limit of state ownership) in trust for the benefit of the people of Maine. The Public Trust Doctrine recognizes a wide range of public uses of state-owned submerged lands, including navigation, commerce, fishing, recreation and conservation, and states’ rights to protect and manage such uses in the public interest. The Public Trust Doctrine itself does not assign priorities among these uses⁹. As trustee, the State manages these lands and related natural resources in the public interest through exercise of its regulatory authority (e.g., issuance of licenses and permits) and its proprietary authority (e.g., state authorization of private uses of state-owned submerged lands through lease or easement).

Coastal Policies

The Maine Coastal Management Policies Act (38 MRSA §1801) (Appendix E) provides that, “the well-being of the citizens of this State depends on striking a carefully considered and well reasoned balance among the competing uses of the State’s coastal area.” The Coastal Management Policies Act articulates a basic policy-level framework for management of the State’s nearshore embayments and other coastal areas.¹⁰ The Act provides that “state and local agencies and federal agencies as required by the United States Coastal Zone Management Act of 1972, PL 92-583, with responsibility for regulating, planning, developing or managing coastal resources, shall conduct their activities affecting the coastal area consistent with the following polices to:”

“1. Port and harbor development. Promote the maintenance, development and revitalization of the State’s ports and harbors for fishing, transportation and recreation;

2. Marine resource management. Manage the marine environment and its related resources to preserve and improve the ecological integrity and diversity of marine communities and habitats, to expand our understanding of the productivity of the Gulf of Maine and coastal waters and to enhance the economic value of the State’s renewable marine resources;

⁹ Hildreth, Richard G. 1989. The Public Trust Doctrine and Conflict Resolution in Coastal Waters: West Coast Developments. *Proceedings of the Sixth Symposium on Coastal and Ocean Management*, ASCE, July 11-14, 1989, Charleston, SC.

¹⁰ The Act defines the “coastal area” as “all coastal municipalities and unorganized townships on tidal waters and all coastal islands. The inland boundary of the coastal area is the inland line of coastal town lines and the seaward boundary is the outer limit of the United States territorial sea” 38 MRSA §1802, sub-1. When the law was enacted, the U.S. asserted a three mile territorial sea. Subsequently, by Executive Order, President Reagan extended the U.S. territorial sea to 12 miles in accordance with emerging international law norms. This change did not affect or extend state jurisdiction. Consequently, it is reasonable to understand the Coastal Policies Act as referring to the three mile limit of state ownership in keeping with the Legislature’s evident intent.

3. Shoreline management and access. Support shoreline management that gives preference to water-dependent uses over other uses, that promotes public access to the shoreline and that considers the cumulative effects of development on coastal resources;

4. Hazard area development. Discourage growth and new development in coastal areas where, because of coastal storms, flooding, landslides or sea-level rise, it is hazardous to human health and safety;

5. State and local cooperative management. Encourage and support cooperative state and municipal management of coastal resources;

6. Scenic and natural areas protection. Protect and manage critical habitat and natural areas of state and national significance and maintain the scenic beauty and character of the coast even in areas where development occurs;

7. Recreation and tourism. Expand the opportunities for outdoor recreation and encourage appropriate coastal tourist activities and development;

8. Water quality. Restore and maintain the quality of our fresh, marine and estuarine waters to allow for the broadest possible diversity of public and private uses; and

9. Air quality. Restore and maintain coastal air quality to protect the health of citizens and visitors and to protect enjoyment of the natural beauty and maritime characteristics of the Maine coast.”

Implementation of these policies is achieved through agencies’ enforceable resource management laws and regulations and other programmatic efforts. In those instances where a permit or lease must be issued, agencies typically have decision criteria which clearly specify which existing uses must be considered when making the permit or lease decision (Appendix F).

Coastal municipalities, when preparing comprehensive plans under the Comprehensive Planning and Land Use Regulation Act, are required to address each of the coastal policies and to create strategies that implement them. Eighty-one of Maine’s 136 coastal towns have adopted comprehensive plans that have been determined to be consistent with state goals.

As directed by 38 MRSA §1803, on January 1, 1989, SPO reported accomplishments related to these policies to the Legislature. No further progress reports specific to the Coastal Policies Act were required by the Legislature.

Statutory and Regulatory Programs and Authorities

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. The figure and accompanying text in Appendix G provide an overview of all the entities that play a role, and some information about their basic responsibilities.

Current Nearshore Management Initiatives in Maine

Each state agency responsible for nearshore management conducts programs and initiatives that are integral to efforts to strengthen nearshore management. Many of these programs are already in the process of being reviewed and improved, as described below. Some of these initiatives are also specifically referenced in the most recent five year Maine Coastal Program Strategic Plan (2006-2011), required by Section 309 of the Coastal Zone Management Act (CZMA) and submitted to the National Oceanic and Atmospheric Administration (NOAA). NOAA approved this plan and will provide funds to help conduct the program strategies. Activities that are in the Section 309 plan are noted below.

Management of intertidal and submerged lands

- *Protecting eelgrass habitat.* In consultation with the mussel harvest industry, DMR is identifying conservation areas that will be protected from dragging and which will be periodically reviewed and revised, and is working to develop harvest techniques and technology that minimize harm to the non-target communities. In addition, subject to available funding, DMR plans to fund necessary research to characterize and quantify the ecological value of eelgrass in the context of the overall surrounding area. DMR's work on eelgrass issues has been identified in the Maine Coastal Program 309 Plan.
- *Minimizing adverse impacts of docks and piers.* There are concerns regarding the efficacy of current laws and rules in addressing the adverse effects of temporary, seasonal docks (e.g., impacts of resting on flats at low tide and disturbance when docks are installed and removed) and the potential for significant cumulative adverse effects to scenic values, waterfowl and habitat values. Tools to address these concerns include: technical and financial assistance to encourage siting of common docks; better natural resources-related information; and grants to support management of harbors and related nearshore resources subject to municipal jurisdiction. In consultation with DEP and the Bureau of Public Lands, SPO has been working on development of this guidance. Evaluating the impact of development (such as of docks and piers) on nearshore habitats is a priority in the Maine Coastal Program 309 plan.

Wildlife and habitat management

- *Understanding and minimizing impacts of aquaculture on seabirds.* Aquaculture operations can potentially disturb nesting seabirds, entangle migratory birds in protective netting, and disturb bald eagle nests (e.g., where the 1/4 mile setback required is over open water). For the past two years, DMR has engaged seabird biologists at DIFW, USFWS, and USACOE and

the finfish aquaculture sector to develop a research priorities list and seek funding to begin answering questions related to disturbance. Study results may be useful in developing amendments to the aquaculture leasing statute and/or DMR's implementing rules, if and as necessary, to address study findings. This effort is included in the Coastal Program 309 Plan.

- *Assisting municipalities to consult with DIFW about "essential wildlife habitat."* In some cases, improvements need to be made in the timing of municipal consultation with DIFW regarding activities that may adversely affect habitat critical to threatened or endangered species ("essential habitat"). Subject to available funding, SPO, in consultation with DIFW, intends to evaluate and support additional outreach, education and technical assistance on this issue through SPO's code enforcement officer (CEO) training program.
- *Improving Nearshore Fisheries Management.* Over the past decade, co-management structures have been put into place for Maine's lobster, sea urchin and scallop fisheries. Each of these fisheries faces unique challenges, some of which may require statutory and regulatory changes. For example, the intense level of effort in the lobster fishery has prompted concerns about interference with other fisheries as lobster gear proliferates. This project, as described in the Coastal Program 309 Plan, aims at: identifying options for lobster trap reduction; developing and implementing new urchin management measures; and developing a new management framework for the inshore scallop fishery.

Water quality

- *Improving marine water quality.* DEP conducts programs to improve marine water quality including wastewater treatment plant construction programs, combined sewer outfall abatement efforts, grant programs for removal of overboard discharge systems and replacement of malfunctioning septic systems, redevelopment of former industrial sites ("brownfields"), and stormwater management planning. SPO and DEP collaborate to assist to towns to carry out Maine's Coastal Nonpoint Pollution Program (which includes technical assistance and grants to coastal watershed groups for surveys, planning, capacity building and pollution remediation), to run the Clean Marinas and Boatyards program, and to run the Nonpoint Education for Municipal Officials Program.
- *Developing total maximum daily loads (TMDLs) for state waters.* On a prioritized basis, DEP is currently involved in the complex process of establishing total maximum daily loads (TMDLs) for state waters that inform decisions regarding water quality management. Establishment of TMDLs for river systems must precede efforts to set TMDLs for nearshore waters into which those rivers flow. After completion of the riverine phase of its TMDL effort, DEP may calculate TMDLs for individual bay and estuarine systems, subject to available funding and assessment of agency priorities.
- *Assisting municipalities to maintain catch basins.* MaineDOT routinely implements its maintenance practices for catch basins to prevent discharges of pollutants to coastal waters.

MaineDOT, in conjunction with the SPO-led coastal nonpoint source project, intends to develop and distribute guidance for municipalities regarding maintenance of catch basins.

- *Identifying and remediating septic systems which contribute to beach closures and other coastal water quality issues.* Malfunctioning or inappropriately sited septic systems continue to present water quality issues that adversely affect recreational and commercial harvest opportunities in some coastal areas. Through SPO's Healthy Beaches program and other state authorities, SPO, DEP, the Department of Health and Human Service (DHHS), and affected municipalities have worked to address septic-related problems. SPO, DHHS and DEP are currently exploring ways in which further progress can be made to address septic and other water pollution issues facing beaches.

Invasive species control and management

- *Addressing marine invasive species issues.* Existing state approaches regarding marine invasive species may be inadequate in a number of areas. Yet effective approaches to marine invasives efforts may be more dependent on coordinated action at the regional and national level than additional unilateral state efforts. Consequently, DEP and DMR are continuing to monitor and participate in Northeast regional efforts to address marine invasives issues. In addition, DMR and DEP intend to address as and when practicable, additional agency recommendations in their 2006 report to the Legislature's Marine Resources Committee, which are focused on research and monitoring, rapid response protocols, outreach and education, and regional ballast water management plans. See http://www.maine.gov/dep/blwq/report/marine_invasive2006.pdf

Maintenance and enhancement of ports and harbors

- *Identifying and addressing dredging policy issue.* In some circumstances, the high cost of sediment testing, dredging, and dredged material disposal, due in part to federal testing requirements, may inhibit private investment and development of piers, marinas and related waterfront infrastructure and commerce. Decreases in federal funds available for maintenance dredging of federal navigation projects makes it increasingly difficult for relatively small federal navigation projects in Maine and elsewhere in New England to compete for funding nationally. The interagency dredging team, jointly staffed by SPO, DEP and MaineDOT and overseen by the Land and Water Resources Council, provides an on-going means for the State, in consultation with stakeholders and counterparts in other states to identify and address dredging policy issues.

Promoting regionally-based land use planning

- *Considering regional impacts and benefits of development projects.* A development proposal in a single community may have both potential economic benefits and adverse environmental effects that should be considered from a regional perspective. SPO and DEP are currently evaluating options, in coordination with the work of the Community Preservation Advisory

Committee for amendment of the Site Location of Development Act (“site law”), Growth Management Act, and other current state laws to ensure that this regional perspective is adequately considered.

Coordination Among State Agencies Involved in Nearshore Management

Coordination in nearshore management can refer to many different types of mechanisms such as regular and open communication channels within an agency, between staff at different state agencies, or between state agency staff and town officials. Staff from multiple agencies might work together on a specific problem or policy initiative or create streamlined processes for permit applications. Furthermore, coordination occurs at all levels from on-the-ground interaction with the public to conceptual-level policy initiatives. Existing examples of state agency coordination include:

Table 2: Examples of state agency coordination

Type of Coordination	Current Programs	Timing
Information sharing	Interagency meetings, sponsored by Maine Coastal Program and others	Occasional
Efficient and effective permitting and licensing; permit streamlining	Ad hoc interagency teams for large-scale developments (e.g., LNG); Coordination of state agency comments	As needed
Joint work program development	Maine Coastal Program federal grant application	Annual
Interagency collaboration on projects via teams	Numerous examples including: dredging; clamflats; public access	Ad hoc; some formally established like Public Access Work Group
Coastal assessment and strategy development	Interagency development of the Maine Coastal Plan under Section 309 of the CZMA	Every 5 yrs; 2006- most recent ME Coastal Plan
Interagency policy development	Land and Water Resources Council Natural Resources Subcabinet	Quarterly Monthly
Interagency reviews of compatibility with state policies & criteria	Review of municipal comprehensive plans; Review of grant applications for distribution of state funds (e.g., Working Waterfronts)	As needed
Collective measurement of success	Maine Coastal Program performance indicators; NOAA review of the MCP	Annually Every 3-5 years

Coordination within and among governments is a complex issue and not one that was meant to be resolved within the context of the bay management study. Rather, the study focused on identifying coordination most relevant to nearshore management. Staff organized a meeting, held in September 2006 to solicit ideas from state agency staff on improving interagency coordination when addressing issues from a regional perspective. See Appendix H for a synopsis of comments from this meeting. In summary, participants noted many examples of coordination, but these examples were not usually focused on specific nearshore regions.

While it was beyond the scope of this study to survey the satisfaction of municipal officials and communities regarding their experience with state agency coordination, some participants in the study noted the confusion of dealing with multiple state agencies in the nearshore environment. While it is not prudent at this time to undergo large scale restructuring of state government to consolidate nearshore governance, such comments point to the need for improved articulation of agency programs and goals for the nearshore. In addition, they suggest the need for a more formal council for marine policy coordination through the State's Land and Water Resources Council.

Models of Innovative Nearshore Management

The Legislative directive regarding the bay management study charged staff to, “drawing on national and international examples, define a range of approaches for bay management that is feasible for use in Maine.” Staff reviewed examples of innovative nearshore marine management both nationally and internationally, explored models proposed during public meetings, and investigated models about which members of the Steering Committee had specific knowledge. Staff used this information to develop a range of approaches for consideration in improving nearshore management in Maine. Models that were explored include:

International:

- European Union: Integrated Coastal Zone Management
- Ireland: Bantry Bay; Coordinated Local Area Managements (CLAMS)
- Scotland: Cromarty Firth Liaison Group; Fair Isle Marine Environment and Tourism Initiative; Firth of Clyde Forum; Forth Estuary Forum; Moray Firth Partnership; Solway Firth Partnership; Tay Estuary Forum
- New Zealand: Regional Coastal Plans; Oceans Policy
- Australia: Oceans Policy; Great Barrier Reef Marine Park
- Tasmania: Coastal Policy; Marine Protected Areas; Derwent Estuary program
- Canada: Eastern Scotian Shelf Integrated Management; Integrated Coastal Management in Nova Scotia; British Columbia Coastal Planning Process

National:

- Federal: Bureau of Land Management Advisory Council; National Estuary Program
- Massachusetts: Coastal Zone Management; Massachusetts Ocean Management Initiative
- Washington: Coastal Zone Management; Northwest Straits; Shoreline Master Program
- Oregon: Coastal Zone Management
- Rhode Island: Coastal Zone Management
- New York: New York Ocean and Great Lakes Ecosystem Conservation Act
- California: Ocean Protection Council
- Hawaii: Coastal Zone Management - Ocean Resource Management Plan process

Staff also considered the following structures currently in place in Maine that are either successful in engaging users or stakeholders in management or managing at more local or regional levels:

- Fisheries co-management structures: Lobster Zone Councils, Sea Urchin Zone Council
- Zoning tools: Land Use Regulation Commission (LURC)
- Existing mechanisms for increased local control: Shoreland Zoning Act, Growth Management Act, Municipal Shellfish Conservation programs, Municipal Shellfish Aquaculture permit, interlocal cooperation
- Resource Centers: Penobscot East Resource Center, Cobscook Bay Resource Center

While it is instructive to examine innovative structures for nearshore management, it is also important to recognize that there is not an existing model that could be adopted wholesale for immediate implementation in Maine. Examination of these models provided a better understanding of the range of structures that could be adapted for use in Maine. This range included: improved fisheries management; marine protected area development and management, regulatory structures, non-regulatory structures, planning and zoning.

Based on analysis of this range of examples, staff developed a preliminary set of options for nearshore management in Maine:

- Enhancements to the Existing Governance System, including:
 - ways to address gaps identified in the current management system.
- Regional approaches to management, including:
 - regional councils recognized in statute and with specific authorities,
 - locally based regional initiatives supported by the State,
 - regionalizing state government.
- Bay planning, including:
 - comprehensive bay plans,
 - advisory plans for selected uses,
 - resource management plans,
 - action plans.

Co-management in Maine’s fisheries

In “Co-management,” some authority is shared between the government that holds public trust responsibilities for resources and the stakeholders, such as fishermen, who use the resources. Co-management contrasts with traditional, top-down governance structures and has not been widely used in fisheries management. Maine has successfully implemented a form of co-management in its lobster fishery, through the formation of lobster management policy councils.

In 1995 the Maine Legislature gave the Commissioner of Marine Resources the authority to create lobster management zones. By rule, the Commissioner established seven zones, each of which has its own council of members democratically elected by fishermen. Originally, the zone councils were given authority by the Legislature on three management measures: limits on the number of traps per fisherman, limits on the number of traps on a trawl, and limits on days and times when fishing is allowed. Additional authorities were later granted by the Legislature, including the authority to survey a zone and make recommendations regarding the entry/exit ratio for the issuance of new licenses.

The original interest in moving toward co-management in the lobster fishery was because of the difficulty in making management decisions that were appropriate over the entire range of the resource. Co-management allowed for development of rules on a smaller ecological and human scale.

While the existing co-management structures (e.g. Lobster Zone Councils) do not need to be changed, the concepts behind this process may provide useful lessons for developing new types of improved nearshore management structures.

- State Boards, including:
 - appellate
 - planning
 - conflict resolution
 - permitting.

This initial list of options was then further refined, resulting in the recommendations contained in this report.

Public Participation in the Bay Management Study

Both the general public and specific stakeholder groups provided input throughout the course of the study through three primary methods: public meetings; 11 Steering Committee meetings; and direct consultation with stakeholder groups, boards and individuals. The stakeholders represented a range of interests from aquaculture and conservation groups to fisheries and municipalities.

Sharing Public Waters: A Community Discussion (January - March 2005)

To kick off the bay management study, a series of public meetings entitled “Sharing Public Waters: A Community Discussion” was held in five coastal towns: Eastport, Ellsworth, Rockland, Portland and Wells. The information collected in these meetings (Appendix I) provided a snapshot of the issues present at the time. It is expected that the problems faced by an area will continue to evolve, and that nearshore management should be structured to anticipate, to the degree possible, future needs. In summary, the major themes and ideas that emerged include:

- A large number of issues and concerns were identified along the Maine coast. These include ecological impacts of land- and marine-based activities on the marine environment, and user conflicts when multiple users impact each other or have different ideas about the appropriate use of the coast.
- When asked to identify what does and does not work in terms of coastal management, people were often not familiar with what coastal management entails. The concepts of ‘local input’ and ‘science-based decisions’ spurred more discussion than other aspects of management.
- One of the underlying ideas that emerged at each meeting was the need to pay more attention (in both governance and science) to the relationship between land and water. What happens on land is understood to impact nearshore environments and users, and vice versa, but there seems to be little documentation of this or consideration of it in decision-making.
- Although some issues are common to many bays, as one might intuitively expect, the specific mix and prioritization of problems is unique to each specific area or bay.

Steering Committee Work Session and Public Meeting (February 2006)

A joint Steering Committee work session and public meeting was held to provide an opportunity for those who had followed this study to share and explore specific ideas about changes they wanted to

see in stewardship and management of our nearshore waters (Appendix J). Close to 60 participants shared their ideas during this full day meeting. Some of the major ideas were:

- Regional council systems could comprehensively address multiple issues in a bay. It was difficult, however, to specify the logistics, authority and funding for this type of proposal.
- Issue-specific ideas ranging from eelgrass restoration to urchin fishery management suggest that some people see improved nearshore management as a way to consider managing specific resources with a more holistic perspective.
- Finally, some proposals focused on state-level improvements such developing data standards for nearshore data or creating a state resource management board.

Review of Draft Study Recommendations (November - December 2006)

Four meetings were held to present and hear reactions to the draft study recommendations from both specific stakeholder groups as well as the general public, and the report was posted online. Comments were compiled (Appendix K) and the report was revised as deemed necessary.

Summarized Results of Two Bay Management Pilot Projects

Two community-based groups were funded for one year (Winter 2005-2006) to carry out bay management pilot projects. The Taunton Bay pilot project was carried out by the Friends of Taunton Bay (FOTB). Taunton Bay, a small, enclosed bay surrounded by three towns, is located in the upper part of Frenchman's Bay. The FOTB is a conservation advocacy group that, in the past, had mostly conducted volunteer monitoring and advocated for conservation of their bay's resources through local and legislative avenues. During the course of its project, the FOTB was successful in collecting and compiling a tremendous amount of data and maps, in conducting limited community outreach and in providing specific management principles. The organization was challenged by internal conflicts, having a small group with limited resources to do proposed activities, and being perceived negatively by some members of the local community (See Appendix L).

The Muscongus Bay pilot project was run by the Maine office of the Quebec-Labrador Foundation, Inc., (QLF), a non-profit organization focused on conservation and community development. QLF did not have much of a known presence in the area before the project, and it created a Muscongus Bay Project Steering Committee made up of local professionals in the conservation field to advise the project. Muscongus Bay is a larger, open bay in the Midcoast region that is surrounded by 10 towns. The QLF project was successful in introducing the concept of Muscongus Bay as an identity for towns and citizens in the area, creating GIS maps, and in using innovative engagement techniques. Its primary challenges were related to having only one full-time staff person and no volunteers, and not having a clear goal for the final product of their project (See Appendix M).

The following is a summary of some of the lessons learned from the pilot projects. See Appendix N for a complete staff analysis of the pilot projects.

1. The pilot projects did not represent their communities as a whole and certain voices (especially harvesters and municipal officials) were underrepresented. Certain topics require involvement by specific groups (i.e. harvesters in fisheries issues, municipalities in water access issues).
2. Pilot project participants voiced an interest in “having more say” over activities in their areas but fell short of suggesting a transfer of authority over managing certain uses. Only those interested in community-based fisheries management expressed a desire for some transferred authority. A more appropriate role for regional groups at this time is improving coordination at a regional level and carrying out discrete projects rather than exercising authority.
3. While almost any issue could be examined and managed at a regional level, both pilot groups found that different issues require different management approaches. Some things are best dealt with at a town level or state level, and the appropriate regional scale depends upon the issue at hand.
4. The State needs to enable community groups to carry out regional initiatives by providing clear guidance, scientific data, and coordination, without imposing a strict structure.

User Conflicts and Methods for Resolution

Maine’s Nearshore Waters: Current Uses and Anticipated Trends (Appendix B) documents the use conflicts now evident in many areas along the Maine coast that are expected to grow. Other examples of use conflicts were voiced during the first round of public meetings (Appendix I). In general, user conflicts can be grouped into two categories:

1. Situations where two or more users want to use the same area for different activities. For example: lobster gear and recreational boaters in confined harbor areas; recreational users and commercial fishermen at public landing areas.
2. Situations where two or more users have conflicting perspectives on appropriate use of the coast. For example: coastal property owners in opposition to aquaculture and other commercial uses; objections to docks and piers due to aesthetic impacts.

Methods for reducing user conflicts were examined throughout the bay management study. Staff researched several formal methods for limiting conflicts such as ocean zoning or the pre-identification of sites for certain marine uses. However, such an approach was deemed neither practical nor feasible for Maine at this time. Staff also assessed the experience of the bay management pilot projects. While it was originally intended that both pilots would address regional user conflicts, the experience of these groups was that they needed additional expertise from professional facilitators and mediators to navigate difficult discussions. Finally, staff compiled methods currently used to both prevent and mitigate user conflicts in Maine. These include general alternative dispute resolution techniques (Appendix O) as well as methods specifically tailored to coastal issues:

Prevention of Conflicts

- establishment of fishing areas and protection of these areas from encroachment;

- negotiation over the siting of, and conditions for, new projects during hearings;
- establishment and implementation of preferences for marine dependent uses of coastal waters and adjacent shorelines (established in state statute and can be contained in local ordinances);
- establishment and implementation of harbor plans and ordinances.

Mitigation of Conflicts

- facilitated discussions among user groups (e.g., DMR convened Casco Bay fishermen and Portland Pilots Association, resulting in voluntary no buoy zone and rotating safety zones to minimize conflicts);
- development of guidelines for use of public access points by different user groups;
- the use of formal mediation (Monhegan Island Lobster Zone); and
- legislation (Monhegan Island Lobster Zone).

It was determined that it is unlikely that any one new mechanism would eliminate user conflicts along Maine's coast, and therefore, the established methods discussed above will remain relevant. However, fostering regional stakeholder initiatives could create forums that, with facilitation or mediation assistance, could help resolve current conflicts and set the stage for advance identification of potential future problems. Through the formation of cohesive groups and the subsequent establishment of relationships and trust, regional groups may:

- further identify specific current and anticipated use conflicts;
- articulate a desired vision for the future; and
- work in partnership with state government, users and others to help solve priority problems.

Budgetary Considerations

While the bay management study contemplates a variety of enhancements to Maine's methods of nearshore management, the ability to pay for program improvements and new initiatives with existing resources is limited. Any such improvements or initiatives should be considered in light of the current state budget context within which all state natural resource programs are operating. Maine faced a half million dollar gap in the 2006-2007 biennial budget. Maine's general fund budget for all programs other than education decreased by .5% in 2006 and is anticipated to decrease by 1.2% in 2007 due to increased state aid to education. Newly established state spending caps also place limits on growth in state spending. To reach a balanced budget in recent years, Maine has relied on federal relief funds, instituted a hiring freeze, eliminated state positions, deferred expenditures, increased the cigarette tax and made spending cuts.

There are already many critical unmet needs in the area of natural resource and environmental protection. One example is an estimated need for approximately \$290 million in wastewater treatment facilities to replace outdated systems over the next five years. Decreases in available

federal matching funds (cut by \$5 million for this program in 2006) and a stalemate over the authorization of bond funds have significantly affected this program in recent years.

In terms of federal funding, Maine's coastal zone management grant from the NOAA has been capped for at least the last eight years. Federal funds that previously supported grant programs to municipalities have increasingly been used to support state functions. Relatively new programs like the Coastal Nonpoint Pollution Program have been funded only sporadically, even though several national reports indicate that pollution from diffuse sources is one of the top threats to coastal water quality.

Current and anticipated budgetary considerations suggest that an incremental approach may best ensure progress in achieving the regional nearshore management recommended in this report. Any significant additional state agency responsibilities to address this report's recommendations should be matched with additional resources in order to avoid creating unreasonable public expectations or diverting resources from other important and currently funded efforts. Decisions regarding budgeting and allocation of state resources to support implementation of this report's nearshore management recommendations must be tempered by consideration of other state responsibilities and related public needs and priorities.

Potential nearshore management partners in municipal government, non-governmental organizations, business, industry and the public face comparable constraints on their ability to take on new initiatives while maintaining important current commitments. While in many ways an impediment to improving nearshore management efforts, the limited scope of public and private resources available and the shared need to invest such resources prudently may help ensure the state-municipal-private cooperation and collaboration that are needed to address key issues effectively on a regional basis.

MAJOR FINDINGS



These findings are derived from analysis of information collected throughout the course of the study and form the justification and basis for the study's recommendations. For details about the research upon which these findings are based, refer to the 'Analysis' and 'Appendix' sections.

A. Context: Ecological and Social Problems in the Nearshore

- Despite existing state nearshore management initiatives, there are indications that Maine's current methods of nearshore management need improvement, including:
 - Degraded environmental conditions (e.g., depleted fisheries, loss of eelgrass) and associated reduction in opportunities for sustainable harvest
 - Increase in use conflicts
 - Contentious permitting processes (creating uncertain business climate)
 - Public action (e.g. citizen-lead legislation for increased protection)
 - Lack of approaches to assess and address cumulative effects of activities (e.g., siting of private docks and piers).
- A variety of factors are likely to contribute to growth in both traditional and new, emerging uses that are dependent on nearshore resources. Increased diversification and intensification of human uses and subsequent pressures on Maine's coastal ecosystems are likely to result in increased conflicts among user groups and concerns about adverse environmental effects.
- The interface and relationship between the land and nearshore waters is often not explicitly considered in governance or in scientific inquiry. There is a greater need to understand and govern how land-side regulations, programs and uses impact marine health and use, and how marine regulations and use impact environmental and social conditions on land.

B. Need for Regional Nearshore Management

- Effective coastal and nearshore management frequently involves working beyond local political boundaries at a regional scale. Yet, while there are federal, state, and local processes for nearshore management, there is currently no recognized forum in Maine to advance coastal management efforts on a regional scale.

- It is necessary to balance both state priorities and regional issues when improving nearshore management. Strong state priorities are needed to make sure that public trust resources are protected and that coastal management achieves desired goals. However, the nature and types of issues are expected to vary markedly in different places along the coast. Allowing regions to discover and act on issues in partnership with the state will permit coastal management to respond to regional differences, rather than be a one-size-fits-all approach.
- Regional groups should be encouraged to work in the area most relevant to their issues and they should also define the regional scale that is most appropriate for their projects. Thus, establishing formal boundaries for regional nearshore efforts is not suggested at this time.
- Participants in the study's two pilot projects concluded that although stakeholders "want more say over what happens in their area" they do not currently have the ability to take on formal authority for nearshore management. Similarly, while there is great potential for municipalities to participate in nearshore management, they are currently hesitant because their roles are unclear and they have limited capacity. Thus, while delegation of authority is not generally proposed at this time, methods should be sought to engage and build capacity for towns and organizations to carry out regional nearshore initiatives.
- As evidenced by participation in this study, Maine people want to be engaged in nearshore projects, planning and management in varying ways and to different degrees. Some people are only likely to be involved when it intersects with their direct interests, needs or livelihoods. Others are motivated to participate in broader, visioning and policy-level debates and are interested in crafting innovative nearshore governance methods. As support of regional initiatives evolves, it is important to recognize that different topics are likely to draw different groups to the table and different levels of engagement in the process.
- While cooperative management mechanisms that have been specifically designed for nearshore fisheries management provide useful lessons and examples for other types of nearshore management efforts, these established methods do not need to be altered to allow for new types of nearshore regional efforts.

C. Need for Improved State Framework for Coordination of Nearshore Governance

- Seven state agencies, six federal agencies and coastal towns have major roles in nearshore management. The existence of multiple and sometimes overlapping jurisdictions, disparate outreach and reporting programs from each agency, and the lack of a single nearshore oversight body has proven confusing to the public.
- Although some state agency staff are organized on a regional basis, fostering more regional initiatives will necessitate enhanced state agency support at the regional level. At the same time, staff support of regional initiatives will need to be balanced with other responsibilities.

- Improvements of state coastal management may help avoid and minimize some use conflicts but will not eliminate all conflicts. Nor will they eliminate dissatisfaction with state policies and decisions. It is not possible to foresee all potential future complexities regarding Maine's nearshore resources, and ongoing debate over coastal and marine resources policy is healthy, especially when management structures are flexible enough to accommodate change. Thus, while the recommendations in this report may help alleviate some user conflicts, current formal and informal methods of conflict resolution, including alternative dispute resolution will likely continue to need to be employed.

D. Need for Improved Nearshore Data and Information

- There are many types of nearshore data that do not exist, as well as many existing data sources that are out-dated or at the wrong scale to be useful. Available nearshore data are scattered in topic and geographic area of focus. Therefore, it is difficult to ascertain a complete understanding of current coastal conditions and subsequent changes over time (Appendix P).
- Marine Geographic Information Systems (GIS) in Maine are limited in their ability to facilitate understanding and decision-making regarding nearshore environments. GIS data acquisition in Maine has been dominated by land-side data and issues. There has been no concerted effort on the part of marine-focused organizations to create a more comprehensive marine GIS.
- It is extremely difficult to locate and gather existing nearshore data. State and federal government websites are generally inadequate in making data available. Non-governmental organizations are scattered, and some lack capacity to make their data easily available. In addition, all entities may be reluctant to share data for a variety of reasons, including: desire for ownership or credit; concern that data might be misused or misinterpreted; belief that data is confidential or sensitive; or knowledge that data collection or analysis is still in progress.

E. Funding for New Nearshore Approaches

- The lack of resources to inventory, monitor, research, enforce and implement existing regulatory tools is a significantly greater concern than the adequacy or a lack of regulatory tool(s).
- New sources of revenue will be needed to fully implement the bay management study recommendations. It is important that recommendations do not create unreasonable public expectations for existing programs (particularly if no new resources are provided) or divert resources from other important and currently funded efforts.

F. Conclusion

- Although there is no one single crisis that is a priority for all of coastal Maine, there are a variety of regionally-relevant problems in Maine's nearshore waters. In addition, there is a persistent and pervasive sense that past and potential cumulative changes in the nearshore environment warrant improvements in the current systems of resource protection, governance and public involvement.
- There are many ongoing projects that are currently working to improve the condition of Maine's nearshore resources that need to continue. The most important, additional improvements needed in Maine's methods of nearshore management at this time are: a movement towards regional management; the development of new science and data; a tightening of the state's collaboration, coordination and oversight mechanisms; and the establishment of new funding resources to support improved management. Thus the type of improved nearshore management that is appropriate for Maine is a mix of both existing and new activities tailored to the needs of different geographic areas.
- This approach to improvements in nearshore management is purposefully incremental in nature given local, regional and state capacity, the realities of existing and potential new funding, and the amount of information available to inform our efforts. The recommendations are intended to be the first steps in advancing towards integrated, ecosystem-based nearshore management in Maine.

DEFINITION, VISION, PRINCIPLES AND GOALS FOR IMPROVED NEARSHORE MANAGEMENT

The Legislature's directive to the Land and Water Resources Council included a charge to develop a definition, principles and goals for improved nearshore management. These products, drawn from analysis of staff research and input from the public, pilot projects and the project steering committee, help inform the study recommendations.

Definition of Nearshore Management

This study confirmed that the issues, opportunities, and challenges facing Maine's coastal areas vary considerably from place to place, and that a regional approach to management of certain coastal issue would be beneficial. However, during the course of this study it became evident that the term 'bay management' (indeed, even the term 'bay' itself) can and does mean many different things to many people, often implying a new, additional layer of bay-by-bay regulatory control that is not being proposed at this time. Instead, the term "nearshore management" is used throughout the study, and is defined as a network of existing and new regulatory and non-regulatory techniques that, when used together, better protect the integrity and sustainability of Maine's nearshore areas for use by current and future generations.

A Vision for Maine's Nearshore Environment

A vision provides an image for the future of Maine's coast, an ideal set of characteristics to strive towards as coastal management is improved. The following vision statement was crafted by staff, based on the ideas and sentiments expressed by the study participants:

Maine's coastal marine resources are among the most healthy, productive and resilient natural systems in the world. Effective, coordinated management and active citizen stewardship achieves a careful balance between conservation and development that ensures the sustained use and enjoyment of coastal resources by current and future generations. Human impacts on coastal ecosystems are managed in a holistic way that addresses multiple, cumulative stressors on a complex, dynamic and ever-changing ecosystem. Comprehensive, up-to-date data and information informs public and private management decisions. Management at regional scales reflects ecosystem boundaries and allows for more effective citizen participation.

As recommended in this report, this vision and its more detailed principles below are to be used by state agencies with nearshore responsibilities as part of strategic planning exercises. The vision and principles are also recommended to be incorporated into guidance for funding for regional projects, as discussed later in this report.

Principles for Management of Maine’s Nearshore Waters

These principles are the fundamental concepts and values that underlie improved nearshore management policies and programs. As such, they assist in understanding the intent of this report and recommendations.

Ecological Protection

- Achieve healthy marine ecosystems and protect vital ecosystem functions
- Recognize that coastal systems are naturally dynamic and change over time and space
- Recognize the ecological links between terrestrial and marine systems
- Obtain and incorporate the best available science at appropriate ecosystem scales

Resource Use and Management

- Accommodate marine-dependent uses along the coast in a fair and responsible manner
- Promote innovation that supports new and existing marine industries consistent with protecting ecosystem health
- Maintain a working waterfront that supports marine-dependent uses
- Ensure that nearshore uses do not damage ecosystem health so that resources are available for future generations to use and enjoy
- Employ adaptive management to adopt to changing circumstances in resource conditions and use

Good Governance

- Uphold the State’s overarching Public Trust responsibilities
- Utilize a flexible, transparent and accountable management regime
- Promote interagency cooperation and collaboration and high quality service to the public
- Maintain a process that is affordable and efficient for state and local governments and volunteer organizations
- Work across political jurisdictions to address ecosystem challenges
- Enhance public input and participation at all levels of planning and decision making
- Encourage respectful, constructive, and earnest dialogue and collaboration
- Value the contribution of local knowledge as a critical complement to other sources of information

Goals for the Management of Maine's Nearshore Waters

Broad statewide goals for improved nearshore management were the area of focus in this study. The purpose in focusing at this level was to concentrate on a manageable number of improvements that would address core, underlying problems. Goals for an individual waterbody or section of the coast are better established through stakeholder dialogue in partnership with the state, as discussed later in this report. Goals for specific state agency programs in the nearshore can be created through interagency strategic planning exercises, also discussed later in the report.

The state-wide goals for improved nearshore management are to:

1. *Move toward regional management of nearshore waters* -- Encourage and support regional initiatives to address locally-relevant issues by providing information, staff assistance or funding and by encouraging interlocal agreements;
2. *Increase the amount, availability and accessibility of nearshore data and information* -- Create and implement a long-term coastal marine science plan to identify and acquire needed data, and enhance information exchange and marine geographic information systems;
3. *Improve the state's framework for nearshore management* -- Implement interagency coastal strategic planning, establish a policy-level oversight committee, develop improved outreach programs, and conduct ongoing evaluation of nearshore management; and
4. *Increase the amount funding and the diversity of funding sources for nearshore activities* -- Maintain current levels of funding for existing state priorities while securing additional sources of support for enhanced programming

The specific recommendations and tasks to achieve each of these goals are enumerated in the recommendations section of this report.

RECOMMENDATIONS



Goal A: Move towards Regional Management of Nearshore Waters

Effective coastal and nearshore management frequently involves working beyond local political boundaries at a regional scale. Yet there is currently no recognized forum in Maine to advance nearshore management efforts on a regional scale. This set of recommendations aims to provide both support and overarching guidelines for regional initiatives.

Regional approaches have proven successful in Maine. The Maine Lobster Zone Councils are hailed as a structure that tailors lobster management to a more effective scale. Similarly, cooperative agreements on shellfish management, such as the Damariscotta River Regional Management Program or the Georges River Clam Project, provide mechanisms for harvesters to work together to create and maintain productive clam flats. While the examples above illustrate the gains that can be made by coordinated efforts focused on a single marine species, it is also possible to imagine a broader spectrum of regional stakeholders working together to better understand and manage the effects of multiple activities in a bay. Other examples of successful regional efforts are listed in Appendix Q.

In addition to working at a more effective scale in a coordinated way, regional initiatives provide opportunities for individuals and groups to become involved in the management of coastal waters. The State could foster regional efforts, improve their chances for success and, in doing so, make significant advances in improving the management of Maine's nearshore marine environment. The two pilot projects (Taunton Bay and Muscongus Bay) provide examples of how state guidance and support benefited regional projects (See Appendices L and M).

The State will encourage and support regional initiatives to address locally-relevant issues, and provide criteria for a group to receive support. This will ensure that support is directed to initiatives that are contributing to the state priorities for coastal waters. In addition, recommendations B-2 and C-3 (in later sections of this report), which aim to provide information about nearshore resources and programs, may also help enable regional efforts.

Recommendation A-1: Provide limited-duration, issue-specific support to regional efforts

Emerging regional efforts and established initiatives may need short term support from, or limited consultation with state agency staff. Under this scenario, a staff person from the appropriate agency(s) will assist a group on a specific issue by providing information, presenting materials at a meeting, conducting a workshop, or participating in a short-term planning effort (see

RECOMMENDATIONS

Recommendation C-3 for the types of outreach materials that will be made available). State staff might assist in developing a study design for a volunteer monitoring effort, helping interpret and apply existing scientific data, presenting information about coastal land use planning, or mediating a conflict between marine user groups. Limited assistance by state staff could also help with shellfish management plans, eelgrass or other types of habitat restoration plans, harbor management and public access plans.

Task 1: Conduct interagency discussions to create effective support for regional initiatives.

SPO will lead discussions with other state agencies to a) understand how and if their nearshore programs could be enhanced through working at the regional level; b) to clarify the degree and amount of support that the agencies have available to regional coastal initiatives; c) to prioritize which regions receive support; and, d) to decide whether new mechanisms, such as formalized interagency teams or the designation of single points of contact, are needed.

Task 2: Assess the needs of regional planning commissions, fisheries resource centers, regional land trusts and other existing organizations that provide support to towns and citizen groups.

Regional organizations with sufficient technical capacity can often provide more effective support (training, GIS support, etc.) to bay-level efforts than state government. However, it is likely that existing organizations' services will need to be enhanced to provide support to regional nearshore management initiatives. Thus, a first step is to assess and address the needs of regional organizations that can provide support.

Task 3: Create partnerships to improve regional service delivery.

Enhanced partnerships between state agencies and existing regional service providers could result in better products such as presentations, training modules and technical assistance materials. Examples include training modules on topics such as: facilitation, nearshore marine science, linking town planning with nearshore water quality, capacity building, and sustaining local efforts. Specifically, SPO will lead discussions with potential partners to provide coastal trainers that would assist regional groups in collecting, analyzing and using data, and in building consensus or mediating conflict between stakeholder groups.

Timeframe and Costs for Recommendation A-1

June 2007	Complete discussions with state agencies and needs assessments for existing regional efforts
December 2007	Publicize the availability of issue-specific support for regional coastal efforts
Cost:	1 existing FTE SPO will conduct assessments State agencies will participate in assessments within existing resources Additional areas of focus could be added to SPO's contracts with Regional Planning Commissions Additional resources might be needed

Recommendation A-2: Provide support in the form of funding and/or staff assistance to one or more regional initiatives

The bay management study pilot projects provide the best example of the levels of support needed for focused regional efforts. Two organizations each received one-year grants from SPO, and a staff member served as a state agency liaison with the group, occasionally assisting with meeting planning and facilitation. The regional groups carried out activities such as: compiling and creating GIS map layers, identifying conflicts and issues in their region, and leading community discussions on improved local management. Because both pilot projects were limited by the small amount of monetary support available and the one year duration of the grant support, two years of support at higher levels should be considered, provided federal funds are available.

Task 1: Create guidelines and criteria for regional projects and apply them to regional efforts that receive state funding and/or staff support.

Formally establish criteria in requests for proposals, contract documents and memoranda of understanding. Additional detail on the criteria suggested below is included in Appendix R. Projects eligible to receive staff and funding support should:

- Demonstrate consistency with state nearshore management goals
- Demonstrate adequate stakeholder participation
- Demonstrate sufficient capacity to carry out proposed tasks
- Conduct work on a regional scale
- Minimize duplication of or conflict with similar efforts
- Commit to and be capable of using best available and appropriate information

Task 2: Determine state regional nearshore management priorities and create a Request for Proposals.

These priorities will guide assistance towards the type of projects most needed to improve nearshore management and to further ecosystem-based management principles.

Task 3: Fund and/or provide staff support to grantees.

At the end of the funding, assess success of the project, lessons learned and next priorities.

Timeframe and Costs for Recommendation A-2

March 2007	Determine funding available
June 2007	Determine regional priorities
July 2007	Issue RFP
Sept 2007- 2009	Conduct regional projects
December 2010	Assess results, determine next steps
Cost	Minimum \$25,000 annually for each funded project (CZM funds)

Recommendation A-3: Encourage formal, multi-town cooperative management of nearshore resources

One potential approach to more effective nearshore management involves encouraging municipalities to work together, possibly with state agencies, to manage or plan for nearshore activities at a regional level through the use of interlocal agreements (see Appendix R for background on interlocal agreements). As contrasted with initiatives undertaken by non-governmental organizations, this approach ensures that municipalities, and thus elected local officials, are vested participants with the ability to implement recommendations and political accountability to affected communities. By way of example, two or more municipalities could agree to joint, regional management of certain nearshore activities, including mooring locations, public access, waterfront development, shoreland zoning, shellfish management, permitting of docks and piers or other coastal matters over which the municipalities currently have jurisdiction. Interlocal agreements can only be used for the joint exercise of existing authorities.

One or more municipalities could also enter into an agreement with one or more state agencies to jointly exercise authority that is currently only exercised by a state agency. For example, if broadly interpreted, a state agency could share its authority to issue leases or permits or do submerged lands planning with municipalities that are parties to the agreement, or create a third, regional entity, with state and local representation, to make leasing, permitting or planning decisions.

Task 1: SPO will collect or develop model ordinances or other advice to assist towns in creating interlocal agreements regarding nearshore resources.

Task 2: Assess barriers to municipal involvement and reasons for past engagement. Explore possible incentives to encourage towns to use interlocal agreements.

While some towns have formed interlocal agreements for joint management of coastal resources (such as clam flat management), this method has not been widely embraced. Incentives informed by reasons for or barriers against involvement could increase participation in interlocal agreements. Related to this, Coastal Program staff at SPO and DMR will participate in discussions about reform of Maine's Growth Management Act, which, based on a 2005 study by SPO, suggests promoting multi-municipal regional planning regarding developments that have regional economic and environmental effects.

Task 3: Conduct legal analysis and sponsor meetings to determine the ability and extent to which state agencies are willing to jointly exercise certain authorities with towns through interlocal agreements.

Because a provision of the interlocal agreement statute (30-A MRSA §2203, sub-§8, ¶B) bars delegation of "essential legislative powers" to a joint authority, the scope of state agency authority that may be shared and the manner in which that authority may be shared pursuant to an interlocal agreement may not be entirely clear.

Timeframe and Costs for Recommendation A-3

2007	Collect and develop model ordinances Assess barriers and explore incentives
2007-2008	Conduct legal analysis
Cost	SPO .8FTE existing DMR .5FTE existing \$5,000 for model ordinances Sea Grant Law Center proposal pending for legal analysis and related outreach

Goal B: Increase the Amount, Availability and Accessibility of Nearshore Data and Information

Limitations in scientific data about the nearshore are major constraints in moving forward with improved nearshore management. Data availability, data exchange and marine GIS all need significant improvement if Maine is to manage for a healthy nearshore system. Appendix P (*Data and Information Needs Report*) and Appendix T (*Marine GIS Needs Assessment*) inform these recommendations. Except for in-kind staff support from DMR for Task B-1, #1 below, all the tasks in this section would require additional resources.

Recommendation B-1: Create a Long-Term Coastal Marine Science Plan

DMR should lead an initiative to bring together representatives from DEP, DMR, MGS, SPO, IFW, DOC, municipalities, universities and NGOs who work in the marine environment to develop a long-term plan for coastal marine science. The purpose of this science plan would be to identify common needs and priorities to support regional nearshore management and develop a strategy to address them. While some institutions, like DMR and Sea Grant have a set of research priorities, not all organizations that work in coastal waters have them nor were all plans developed to look at marine science in a regional coastal management context. This long-term coastal marine science plan would attempt to integrate agency priorities and other initiatives (e.g. Sea Grant research plans, Gulf of Maine Council's Environmental Monitoring Plan, and EPA's National Coastal Assessment) when creating a coastal research plan.

Task 1: Establish a science advisory committee.

A multi-disciplinary committee with emphasis on nearshore management and science will be established to provide advice on tasks as outlined in this recommendation.

Task 2: Conduct sector-specific and cross-sector research needs assessments.

The assessment will identify and prioritize top research and monitoring needs from various marine and nearshore entities (state and local governments, industry, non-profits). In addition, this assessment will determine research and monitoring needs of multi-sector issues such as cumulative impacts and carrying capacity. The research and monitoring needs assessment will put Maine in a strong position to obtain funding through grants, programs, and partnerships. More importantly, it

will guide agency policy makers and program managers by identifying priority needs in the context of Maine's coastal communities.

Task 3: Develop a human use and resource atlas.

Nearshore management suffers from lack of information on the location and condition of coastal resources and their uses. This GIS-based atlas will compile information from various sources and incorporate both quantitative and local knowledge. It will be useful in setting priorities and identifying ecological relationships, especially between habitat requirements and species and their vulnerability to human exploitation. Once the base atlas has been developed, it can be periodically updated as new data from the larger coastal monitoring program is gathered.

Task 4: Establish long-term monitoring stations.

Distinguishing natural variability from that caused by humans is important. Trying to manage natural events is futile and resources are better spent on addressing those impacts that are truly manageable. Long-term monitoring, although not glamorous, is essential for creating long time series that documents the ebbs and flows of nature. A network of index stations would monitor changes in living resources and physical and chemical parameters of sediments and water. Opportunities exist to integrate this long-term network into other ongoing and supported programs such as the Integrated Ocean Observing System, EPA's National Coastal Assessment, and NOAA's Status and Trends Program. However, to serve the needs of coastal management, the long-term network would place more emphasis on nearshore coastal waters and the land-sea interface.

Task 5: Compile information on historical baseline conditions.

There is already much information that has been collected on the condition and quality of coastal resources. However, much of this is in the form of paper files, agency reports, and inaccessible archival material. For example, the Maine State Archives contains Critical Areas Program files that characterize intertidal benthic communities along the entire coast from the 1970s. Older data need to be made available digitally to measure natural variability, identify sensitive habitats and biological communities, and enhance our ability to assess environmental impacts after human or natural events. Funding is needed to prioritize, catalogue and digitize earlier publications and data sets so that the information contained is accessible for use by resource managers and scientists.

Timeframe and Costs for Recommendation B-1

2007:	Establish a science advisory committee
Timeframe	Conduct research needs assessments (1 year, with ongoing review)
contingent on	Develop a human use and resource atlas (5 years, with ongoing review)
funding:	Establish long-term monitoring stations (once started, ongoing)
	Compile information on historical baseline conditions (1 year)
Cost:	Research needs assessment: 1 FTE equivalent, or \$60,000 to start and \$10,000/year thereafter
	Human use and resource atlas: 1 FTE - \$60,000/yr
	Long-term monitoring stations: \$200,000/yr. (multi-agency and NGO partnership)
	Historical baseline conditions: 1 FTE - \$60,000

Recommendation B-2: Enhance Information Exchange and Marine Geographic Information Systems in Maine

DMR should lead an initiative to identify information exchange needs and develop information management, delivery and exchange mechanisms that will provide wide access to coastal marine data. DMR should also take the leadership role in coordinating and advocating for better Marine Geographic Information Systems (GIS). Together with a coordinated coastal Maine science plan, information management and exchange is a powerful tool for regional management.

Task 1: Develop a nearshore information portal.

A portal similar to that used by Chesapeake Bay Program (<http://www.chesapeakebay.net/>) will be developed to provide access to available information and foster communication among those interested in nearshore management. The portal should provide simple tools for data and information access, as well as background and updates on regional nearshore management initiatives. It should be integrated with InforME (<http://www.maine.gov/informe/>) and also take advantage of innovative regional and national information technology such as those being explored by the Gulf of Maine Ocean Data Partnership, and existing state systems such as the MGS coastal atlas.

Task 2: Engage in a focused effort to develop marine GIS data layers, standards and exchange.

There is currently not enough marine ecological or social GIS data at a bay level. Only through a concerted and specific focus will Maine be able to develop a marine GIS robust enough to aid in coastal understanding and decision making. The Marine GIS Needs Assessment (Appendix T), concluded that most GIS needs would benefit from better coordination and planning by DMR and that the Maine GeoLibrary and MEGIS could offer the organizational structure to fully integrate marine GIS with other GIS activities in the state.

The State can help by collecting and compiling marine GIS data in a way that enables bay level organization. To make data exchange most useful, spatial and non-spatial data must be created with common standards and associated with good documentation or metadata. Data standards such as those developed by the Maine GeoLibrary for parcel data will need to be established for marine data sets and accompanied by Federal Geographic Data Committee (FGDC) compliant metadata. As data are developed according to established standards, the marine GIS could be integrated into the MEGIS and the GeoLibrary so that it is easily accessible. The State should develop Web Mapping Services such as ArcIMS applications or other OpenGIS services that can be used in support of marine GIS. Additional GIS staff based at DMR are needed to manage and coordinate this effort.

Task 3: Provide support to existing community GIS centers.

Several GIS needs assessments and both bay management pilot projects pointed to the need to have regional GIS resource centers to support regional initiatives (for more detail on the assessments, see Appendix S). Most local groups do not have the capacity and knowledge to find and analyze data on their own and state staff cannot dedicate sufficient time needed to help individual groups. A community GIS center is one way to provide this link. The Maine Coast Protection Initiative has provided trial support to three such GIS centers, and the Applied Geographics County Needs Assessment suggested using county government offices for such centers (although no work has

begun on this yet). The State should evaluate the effectiveness of and provide additional support (training, funding, and data) to those pre-existing GIS centers most able to assist regional nearshore management initiatives. If a gap exists along the coast (e.g., Frenchman’s Bay area), the State could support an existing group to become a GIS resource center.

Timeframe and Costs for Recommendation B-2

Timeframe	Develop a nearshore management information portal (3 years)
contingent on	Engage in effort to develop marine GIS data layers, standards and exchange
funding:	(3 years)
	Provide support to existing community GIS centers (once started, ongoing)
Cost:	Nearshore management information portal: \$100,000/year
	Marine GIS data layers, standards and exchange: \$150,000/year
	Support to existing community GIS centers: \$150,000/year

Goal C: Improve and Implement a State Framework for Nearshore Management

Maine state government alone has seven agencies and tens of individual programs that plan for and manage some aspect of coastal and nearshore development, conservation and protection. While Maine has a networked coastal zone management program (the Maine Coastal Program), a coastal policies statute that requires an integrated approach by state and local government, and a variety of interagency communication mechanisms, our state framework for nearshore management¹¹ needs to be strengthened and implementation improved. In light of the findings and other recommendations contained in this report, Maine’s framework needs to ensure that the state’s nearshore management programs:

- Help achieve a desired future vision;
- Embody nearshore management principles; and
- Are responsive to, and supportive of regional efforts

Components of this strengthened state framework, as further discussed below, are: a focused interagency coastal strategic planning effort; establishment of a policy-level oversight committee; development of improved, linked outreach programs, institution of ongoing evaluation and assessment and periodic consultation with stakeholders.

Recommendation C-1: Improve Advance Planning and Collaboration on Coastal Issues By State Agencies

Maine’s federally approved coastal program was established in 1978 as a “networked program,” where responsibilities for sound management are distributed across different state agencies (in partnership with federal and local government) and coordinated by the State Planning Office. To

¹¹ As used here, “state framework” means a basic structure or system that supports and guides collective and individual state agency efforts.

help guide the formation and implementation of the Maine Coastal Program (MCP), the Coastal Management Policies Act (“Act”), 38 MRSA §1801, *et seq.*, (<http://janus.state.me.us/legis/statutes/38/title38sec1801.html> see also Appendix E) provided a basic policy framework and established goals for management of the State’s nearshore embayments and other coastal areas. The Act states that local, state and federal agencies should manage the coastal area consistent with the Policies and in a way that strikes a “carefully considered and well reasoned balance among the competing uses of the State’s coastal area.” While individual agencies created rules, guidance and new programs as part of the creation of the MCP to address the specific coastal policies within their purview, there is no formal, ongoing mechanism for state agencies to look at the confluence of the intersecting and sometimes competing coastal policies. Successful implementation of the Act requires ongoing planning and collaboration on the part of state agencies. To be effective over time, the broad policy statements in the Act need to be further interpreted with goals, measurable objective and specific actions. This recommendation proposes the creation and implementation of a series of interagency plans as a method to institutionalize advance planning and collaboration on coastal issues among state agencies.

Task 1: Develop an issue-specific interagency nearshore strategic plan.

SPO (with DMR, DEP, DOC and IF&W) should create an interagency strategic plan for a high priority coastal issue, such as shellfish bed closures or swim beach health. The plan should outline an interagency approach to the coastal issue that:

- Helps achieve the vision for nearshore resources;
- Is consistent with relevant Coastal Policies (such as Marine Resources, Cooperative Management and Water Quality);
- Embodies the nearshore management principles;
- Establishes an approach to working in high priority regions; and,
- Includes interagency goals; measurable objectives and specific activities.

This pilot issue-specific strategic plan will be assessed for lessons learned regarding: desired level of detail, information needed, level of staff effort required, obstacles to effective strategic planning, benefits to agencies of the effort, and methods for effective integration of topics.

Task 2: Evaluate the effectiveness of the initial strategic plan and expand interagency strategic planning to other coastal and nearshore topics.

Based on lessons from the first interagency planning effort and on an assessment of priorities, build on the first effort by developing a succession of additional issue-specific interagency plans.

Task 3: Compile issue-specific plans and assess for gaps and next steps.

The limited scope, issue-based plans should continue to build on each other such that the issue-based plans together result in more robust, multi-issue nearshore interagency strategic plan. An assessment of this effort should examine how well issue-based plans address the charge of the Coastal Policies Act, and determine gaps where additional interagency efforts are needed.

Task 4: Incorporate results into the production of the Maine Coastal Plan Assessment and Strategy. The issue-based plans will be incorporated in the Maine Coastal Plan Assessment and Strategy, which is developed every 5 years. The current plan was adopted in 2006; the next Plan will be completed in 2010.

Timeframe and Costs for Recommendation C-1

Spring-Fall 2007	Completion of initial interagency plan
Winter 2007	Assess lessons learned from initial planning process
2008 - 2009	Develop successive issue-specific interagency plans
Winter 2009	Compile plans and assess for gaps and next steps
2010	Develop Maine Coastal Plan
Cost	\$20,000 CZM

Recommendation C-2: Create a Coastal and Nearshore Subcommittee of the Land and Water Resources Council

The Land and Water Resources Council (“LWRC”) formerly had a subcommittee on marine policy that was disbanded in the 1990’s. In order to track the progress of the bay management study and to review study outcomes in a more focused way, the LWRC established a subcommittee of management staff from SPO, DEP and DMR. It is recommended that this subcommittee be reconstituted to ensure an ongoing, policy-level forum for consideration of nearshore issues.

Task 1: Convene the coastal and nearshore subcommittee of LWRC, create goals, list of issues and meeting schedule.

This subcommittee will meet at the LWRC’s direction, and staff will be provided to the subcommittee. They will meet for purposes such as:

- networking and information sharing
- assessment of coastal trends
- examination of coastal problems or conflicts
- creation of new coastal policies and proposals
- planning for emerging coastal uses
- resolution of agency conflicts
- oversight of progress on coastal communication and coordination
- establishment of interagency teams, as needed, based on area-specific assignments or issue-area assignments

Task 2: Include a summary of the subcommittee’s annual activities into the LWRC’s annual report.

The LWRC submits its annual report to the Governor and the Legislature’s Natural Resources Committee pursuant to 5 MRSA §3331, sub-§4. This reporting mechanism provides an additional means to assist policy makers in tracking and assessing progress in implementing this report’s recommendations.

Timeframe and Costs for Recommendation C-2

Spring 2007	Convene coastal and nearshore subcommittee of the LWRC (meetings continue quarterly or as needed)
Winter 2007	Include subcommittee’s activities in LWRC’s annual report (reporting continues on a yearly basis)
Cost:	Staff support (SPO and DMR)

Recommendation C-3: Improve Coordination of Agency Outreach and Information Efforts

While some of the existing nearshore programs have established coordination mechanisms (e.g., the Overboard Discharge Removal program at DEP and the Shellfish Classification Program at DMR), other programs are not similarly coordinated. Because programs are operated by different agencies and publicized in separate print materials and websites, there is also a lack of high quality, comprehensive information to help the public understand how programs work in conjunction to protect and improve coastal environmental quality. Even state agency staff are not always aware of disparate programs, funding sources and contacts. Thus, this recommendation is intended to improve coordination through education of staff at relevant state and local governments, as well as the general public.

Task 1: Inventory existing outreach materials and websites of nearshore programs and projects.

The box to the right provides examples of nearshore programs.

- | |
|--|
| <p>Example nearshore programs</p> <ul style="list-style-type: none"> • State pump out facilities plan • Development of Total Maximum Daily Loads (TMDLs) for coastal areas • Designation of no-discharge areas • Water quality classification system • OBD removal program • Septic system replacement efforts • Dredging Management Action Plan • Port and waterfront development • Cruise ship visitation development • Intermodal transportation plans • Public access planning and facility development • Energy facility siting • Marine economic development |
|--|

Task 2: Create an improved outreach strategy.

Create an outreach strategy to consist of print materials (e.g. Citizens’ Guide), internet sites, and simple matrices that include program descriptions, laws and regulations, funding and other resources, and contact information. In addition, communicate interagency plans and LWRC subcommittee efforts.

Timeframe and Costs for Recommendation C-3

December 2007	Inventory existing materials
December 2008	Create outreach strategy
Cost:	\$5000 CZM for inventory; \$10,000 CZM for outreach strategy

Recommendation C-4: Adapt and Improve Maine’s nearshore and coastal governance systems over time

The bay management study results represent only a snapshot in time. The number and diversity of uses in our nearshore waters, the complexity of environmental problems and society’s viewpoints will continue to change over time. Likewise, the practice of nearshore ecosystem-based management will evolve as more states and nations learn how to adapt these principles into

governance measures. The recommendations in the report are, by design, incremental in nature, meaning that while important steps have been highlighted in this study, others are expected to be needed over time in order to lead Maine towards an integrated, ecosystem-based coastal management system.

Task 1: Assess the implementation of this report's recommendations and prepare periodic updates.

The Land and Water Resources Council should assess the implementation of recommendations and provide updates to relevant legislative committees. The update process should be used to monitor effectiveness, successes and challenges, provide new information and trend analysis and to suggest adaptations as needed.

Task 2: Host annual nearshore management meetings to advance integrated, ecosystem-based coastal management.

Along with regional grantees, interested stakeholders and others, hold a biennial meeting to assess progress and to further develop in-state knowledge of the application of ecosystem-based management to nearshore systems. In alternate years, assist with the newly established Coastal Waters Conference.

Timeframe and Costs for Recommendation C-4

December 2008	Assess implementation of report (and biennially thereafter)
Beginning in 2008	Host annual meeting or conference
Cost:	Staff time; \$2,500 CZM funding for meeting

Goal D: Increase the Amount and the Diversity of Funding Sources

While implementation of a number of this report's recommendations could be accomplished within current projections of existing budgeted resources, others will require identification of new sources of support. Table 1, on the following pages, provides an overview of state capacity and funding needs and potential sources of support to address the report's recommendations. Federal Coastal Zone Management Act (CZMA) grant funds may be available to support implementation of some of the report's recommendations. Some CZMA grant funds (CZMA Section 306) may be budgeted annually to support select nearshore management activities. Funds available under Section 309 of the CZMA must be used for changes to improve the State's coastal program in accordance with the State's five-year coastal plan. The current five year plan, approved by NOAA in July 2006 already includes several nearshore management projects, as detailed in "Current Nearshore Management Initiatives" in the Analysis section.

Reasonably available federal CZMA funds alone are not adequate to implement this study's recommendations. Under the oversight of the Council's coastal and nearshore subcommittee, state agencies should explore additional funding support options. Identification of such options and provision for them in agencies' budgets is important to ensure continuing progress and productive collaboration on nearshore management. Potential options include changes in lease fees, use of mitigation funds or penalties and fines generated through the regulatory process, and state grants

under the growth management program to support regional initiatives. Progress on funding for improved nearshore management should be periodically reviewed by the LWRC.

Recommendation D-1: Maintain Current Levels of Funding for Existing State Priorities in the Areas of Coastal, Environmental and Marine Resource Management.

Task 1: Work with nongovernmental partners to build support for maintenance and enhancement of current budgets for coastal and marine management.

Timeframe and Costs for Recommendation D-1

Timeframe: Ongoing
Cost: SPO Staff time

Recommendation D-2: Secure Additional Sources of support for enhanced programming.

Task 1: Work with state and federal agencies and the NGO community to identify additional sources of revenue for nearshore studies, monitoring, planning and management.

Potential new sources of funding and partnerships are included in the budget tables on the following pages.

Task 2: Work with the Department of Conservation’s Submerged Lands program to use funds made available from changes to its leasing program and fee structure , as appropriate.

PL 2005 c. 550, section 8, directs the Department of Conservation “to review the rent structure for leases under the submerged lands program” and report its recommendations, including “options for increasing lease revenue significantly”, to the Legislature’s Agriculture, Conservation and Forestry Committee in January 2007. The Department should include in its recommendations to the Committee equitable increases in submerged lands lease fees sufficient to provide a sustainable source of state support for harbor management and resource mapping and related data collection activities that would facilitate avoidance and minimization of use conflicts and protection of traditional, Public Trust- related uses of state-owned submerged lands and coastal waters. The first part of this task is to submit a summary of nearshore data and information needs to DOC. The second part of the task is to work with DOC, the Submerged Lands Advisory Committee and the Legislature’s Joint Standing Committee on Agriculture, Forestry and Conservation during discussions about potential restructuring of lease fees and programs that might be funded with an additional revenue stream.

Timeframe and Costs for Recommendation D-2

January 2007 on Continue to identify additional sources of revenue
December 2006 Submit summary of nearshore data and information needs
January - March 2007 Discussions with Submerged Lands Advisory Committee and the Joint Standing Committee on Agriculture, Forestry and Conservation
Cost: SPO staff time

TABLE 3: BUDGET TABLE AND TIMELINE

Goal A: Move Toward Regional Management of Nearshore Waters					
<u>Recommendations</u>	<u>Task & Description</u>	<u>\$ Amount Needed</u>	<u>Existing Resources Available to Accomplish Task?</u> <i>(if yes, cite source)</i>	<u>New Resources Needed to Accomplish Task?</u> <i>(if yes, cite potential sources)</i>	<u>Task Timeline</u> <i>(TBD indicates the timeline will be determined when funding is secured.)</i>
A-1. Provide limited duration, issue-specific support to regional efforts	1. Conduct interagency discussions to create effective support for regional initiatives	Staff support SPO/CZM	Yes – Agency participation formalized via MOUs	No	February-June 2007
	2. Assess needs of regional organizations that provide support to towns/groups	Staff support SPO/CZM	Yes – SPO Project position, CZM funded	No	February-June 2007
	3. Create partnerships to improve regional service delivery	TBD	Partial – SPO contracts with Regional Planning Commissions	May need additional funds for creation of new materials, trainings, etc. Private grant? NOAA?	December 2007
A-2. Provide funding or staff support to one or more regional initiatives	1. Create and apply criteria to regional efforts that receive state funding or staff support	Staff support only	Yes	No	July 2007-December 2010
	2. Determine state regional nearshore management priorities and create a request for proposals	Staff support only	Yes – SPO project position	No	March-July 2007
	3. Fund and provide support to grantees	\$25,000 to \$50,000 annually	Partial – CZM	Yes Submerged lands lease fees? State Fund for Regional Efficiencies? Regional projects secure additional funds? State Growth Management regional pilot funds	July 2007-December 2010
A-3. Encourage multi-town cooperative management of nearshore resources	1. Collect or develop model ordinances to assist towns in creating interlocal agreements	Staff time SPO, DMR \$5,000	Partial – CZM	Also pending grant proposal to National Sea Grant for Tasks 1-3 in this section	2007 (materials) 2008-2010 (work with towns)
	2. Assess barriers to and explore incentives for towns to use interlocal agreements	Staff time	Partial – CZM	See above	2007
	3. Conduct legal analysis to determine state agency ability to exercise joint authorities	Staff time SPO, OAG, DMR, DEP	Partial – CZM	See above	2007-2008

RECOMMENDATIONS

TABLE 3: BUDGET TABLE AND TIMELINE

Goal B: Increase the Amount, Availability and Accessibility of Nearshore Data and Information					
<u>Recommendations</u>	<u>Task & Description</u>	<u>\$ Amount Needed</u>	<u>Existing Resources Available to Accomplish Task?</u> <i>(if yes, cite source)</i>	<u>New Resources Needed to Accomplish Task?</u> <i>(if yes, cite potential sources)</i>	<u>Task Timeline</u> <i>(TBD indicates the timeline will be determined when funding is secured.)</i>
B-1. Create a long-term coastal marine science plan	1. Establish science advisory committee	Staff time DMR	Yes	No	As needed
	2. Conduct sector-specific and cross-sector research needs assessments	\$60,000 for one year; \$10,000/yr thereafter	Partial – Sea Grant and DMR effort under discussion	Yes Sea Grant? CZM?	2007
	3. Develop a human use and resource atlas	\$60,000/yr for 5 years	No	Yes Submerged lands lease fees? State R&D funds? Outdoor Heritage Program?	TBD
	4. Establish long-term monitoring stations	\$200,000 annually; ongoing	No	Yes Partnership with GoMOOS? NSF, EPA, NOAA?	TBD
	5. Compile information on historical baseline conditions	\$60,000 for one year	No	Yes Submerged lands lease fees?	TBD
B-2 Enhance information exchange and marine geographic information systems	1. Develop a nearshore information portal	\$100,000/yr for 3 years	No	Yes Cooperative projects with NOAA, EPA, IOOS, others? State R&D funds?	Begin planning in July 2007 with existing staff
	2. Engage in a focused effort to develop marine GIS data layers, standards and exchange	\$150,000/year for 3 years	No	Yes Submerged lands lease fees; partnership with GoMOOS?; State R&D funds?	Discussions to begin in January 2007, with potential for state GIS improvements in January 2008
	3. Provide support to existing community GIS centers	\$150,000/annually; ongoing	No	Yes Private grants?	TBD

RECOMMENDATIONS

TABLE 3: BUDGET TABLE AND TIMELINE

Goal C: Improve and Implement a State Framework for Nearshore Management					
<u>Recommendations</u>	<u>Task & Description</u>	<u>\$ Amount Needed</u>	<u>Existing Resources Available to Accomplish Task? (if yes, cite source)</u>	<u>New Resources Needed to Accomplish Task? (if yes, cite potential sources)</u>	<u>Task Timeline (TBD indicates the timeline will be determined when funding is secured.)</u>
C-1. Improve advance planning and collaboration on coastal issues by State agencies	1. Develop an issue-specific interagency strategic plan	Staff support Agency participation formalized via MOUs	No	N/A	February to November 2007
	2. Evaluate the effectiveness of the initial planning effort and expand process to other nearshore and coastal topics	Staff support	No	N/A	Winter 07/08
	3. Compile successive issue specific plans and assess for gaps, next steps	Staff support	No	N/A	2008-2009
	4. Incorporate results into the <i>Maine Coastal Plan Assessment and Strategy</i>	\$20,000 CZM	No	N/A	2010
C-2. Create a coastal and nearshore subcommittee of the Land & Water Resources Council	1. Convene the group, create goals, issues and meeting schedule	Staff support	No	N/A	
	2. Include summary of annual activities in LWRC's annual report	Staff support	No	N/A	
C-3. Improve coordination of agency outreach and information efforts	1. Inventory existing outreach materials and websites of nearshore programs and projects	\$5,000 contractor	Yes	SPO/CZM	July-December 2007
	2. Create outreach strategy	\$10,000 contractor and products	Could potentially be a larger project requiring additional funds	Private grant? Maine Outdoor Heritage Fund?	January-December 2008
C-4. Adapt and improve Maine's nearshore governance systems over time	1. Assess the implementation of the reports' recommendations and prepare periodic updates	LWRC with staff support SPO, DMR & partner agencies	No	N/A	December 2007 and biennially in subsequent years
	2. Host annual nearshore management meetings to advance integrated, ecosystem-based coastal management	\$2,500 CZM	No	N/A	Annually, beginning in December 2008

RECOMMENDATIONS

TABLE 3: BUDGET TABLE AND TIMELINE

Goal D: Increase the Amount and the Diversity of Funding Sources					
<u>Recommendations</u>	<u>Task & Description</u>	<u>\$ Amount Needed</u>	<u>Existing Resources Available to Accomplish Task?</u> <i>(if yes, cite source)</i>	<u>New Resources Needed to Accomplish Task?</u> <i>(if yes, cite potential sources)</i>	<u>Task Timeline</u> <i>(TBD indicates the timeline will be determined when funding is secured.)</i>
D-1. Maintain current levels of funding for existing state priorities in the areas of coastal, environmental and marine resource management	1. Work with nongovernmental partners to build support for maintenance and enhancement of current budgets for coastal and marine management	Staff time SPO/CZM DMR	Yes	No	Ongoing
D-2. Secure additional sources of support for enhanced programming	1. Work with state and federal agencies and the NGO community to identify additional sources of revenue for nearshore studies, monitoring, planning and management	Staff time SPO/CZM DMR	Yes	No	Ongoing; progress on new funding for implementation reported to LWRC
	2. Work with the Department of Conservation's Submerged Lands program to try to secure funds from a restructured lease fee program	Staff time SPO/CZM DMR DOC/BPL	Yes	No	January-March 2007; then possible study in 07/08

RECOMMENDATIONS

APPENDIX A
STUDY DIRECTIVE

BAY MANAGEMENT STUDY DIRECTIVE

Excerpted from LD 1857 – An Act To Implement the Recommendations of the Task Force on the Planning and Development of Marine Aquaculture in Maine.
P.L. 2003 Chapter 660

PART B

Sec. B-1. Bay management study. The Land and Water Resources Council established in the Maine Revised Statutes, Title 5, section 3331, referred to in this Part as "the council," shall undertake a study of bay management. The intent of this study is to explore and document potential new and innovative concepts for the management of Maine's embayments through a 2-year pilot initiative.

Sec. B-2. Study oversight. The council shall begin the study no later than September 1, 2004. The study must be carried out under the direction of the council with work performed by an interagency staff work group with input from a project steering committee. The project steering committee must include members of the public with expertise in relevant fields of interest such as marine resources, fisheries, natural resource conservation, aquaculture, economic development, planning, tourism and marine recreation uses.

Sec. B-3. Staffing assistance; technical assistance. The Executive Department, State Planning Office and the Department of Marine Resources shall provide staff services to the council. The council may also seek or contract for technical assistance from any other agency or institution and any individual or group that it determines appropriate to support the study.

Sec. B-4. Issues to be considered. In developing its recommendations on bay management, the council shall:

1. Establish definitions, principles, goals and objectives for bay management in the State;
2. Drawing on national and international examples, define a range of approaches for bay management that is feasible for use in Maine;
3. Establish clear criteria and standards for bay management, including guidelines to inform voluntary planning efforts by citizen groups;
4. Identify data and information needs, mapping needs and information transfer needs for bay management;
5. Identify authorities that govern near-shore waters and identify changes needed to regulatory structures, including but not limited to statutes, regulations and grant programs;
6. Identify opportunities to create limited local authority for bay management; and
7. Identify state, local and volunteer resources and capacity needed for bay management.

Sec. B-5. Pilot projects. The council shall create one or more pilot projects of limited duration in a representative region or regions of the State where groups of marine resources users and other affected stakeholders investigate and discuss desired uses for specific land and water areas and determine methods for resolution of user conflicts. The council shall use the results of these pilot projects to shape the council's recommendations for bay management efforts.

Sec. B-6. Public meetings. When held, council meetings are open to the public for purposes of public input. The interagency staff work group shall meet to the extent necessary to fulfill its duties, including but not limited to work on pilot projects, in different regions of the State expressly for the purpose of receiving public comment and testimony on its work.

Sec. B-7. Reports. The interagency staff work group with the assistance of the project steering committee shall submit reports and updates on its work to the council as determined by the council. The council shall submit an interim report to the joint standing committee of the Legislature having jurisdiction over marine resources matters no later than January 15, 2006 updating the committee on the status and progress of the council's work. The council shall submit its final report and recommendations to the joint standing committee of the Legislature having jurisdiction over marine resources matters no later than January 15, 2007.

Sec. B-8. Funding. The Director of the State Planning Office shall use funds from the State Planning Office's existing resources and other outside sources for the costs incurred in carrying out the purposes of this Part.

APPENDIX B

MAINE'S NEARSHORE WATERS: CURRENT USES AND ANTICIPATED TRENDS

Maine's Nearshore Waters

Current Uses and Anticipated Trends

Maine Bay Management Study
December 2006



Maine State Planning Office
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INTRODUCTION

Maine's nearshore waters (tidal waters within nautical three miles of the coastline) cover more than 1.8 million acres. This vast, resource-rich area has historically supported a variety of diverse human activities, including commercial fishing, maritime commerce and transportation, and recreational boating. Today, in addition to those "traditional" uses, Maine waters support new economic development such as aquaculture, whale-watching, kayak touring and cruise ship visitation. New technology and innovation, along with other influences such as demand for seafood and a desire for new sources of domestic energy will continue to influence the marine economic sector. In addition, projected growth in Maine's coastal population and growth in coastal tourism and recreation will also affect development adjacent to and use of nearshore waters. Thus, given numerous pressures, there continues to be the potential for both growth in "traditional uses" and the potential for new, emergent uses of Maine's coastal waters. Given this diversity and level of activity, problems may arise, including environmental effects and conflicts among user groups. Many of the sectors researched for this report are expected to increase in intensity over the coming years, thus furthering the potential for user conflicts and cumulative environmental impacts.

This report was written to provide information on current and anticipated uses of Maine's nearshore waters and to highlight issues that are likely to arise given anticipated trends. Specifically, this report is intended for use in Maine's bay management study, a two year effort (2005-2007) to analyze, and potentially recommend changes to, Maine's approach to management of coastal waters.

Given the length of this report, the summary table, presented as part of this introduction to the report, is meant to provide an "at-a-glance" look at current and anticipated trends in nearshore activities. The body of the report contains a discussion of various use sectors, divided into the following categories: Marine Aquaculture, Commercial Fisheries, Marine Research and Education, Marine Transportation, Marine Recreation, Energy Facilities and Related Development, Coastal Dredging and Ocean Disposal of Dredged Materials, Sand and Gravel Mining, Water Pollution, and Marine Conservation. Where possible for each topic, we attempted to identify current and future trends in use as well as identify the geographic location(s) of the activity. In addition, a discussion of some of the conflicts associated with each topical area follows each major section in the report.

Methodology and Limitations

Information contained in this report was obtained primarily from interviews with state agency staff and through internet research. Other sources of information included individuals who could provide unique insights, such as harbor masters, kayak industry representatives and a charter boat captain, for example.

Limitations to this report include the fact that in many cases, there was little data available on certain sectors. For certain topics, the only information available was anecdotal in nature. Consequently, this report is not intended to provide an exhaustive or empirical study of nearshore uses and their impacts. Instead it is meant to provide a general understanding of types and levels of activity, anticipated trends and potential associated conflicts.

One additional limitation concerns the fact that several marine dependent industries, such as boat-building, ship building and defense, were not included in this report given that they were peripheral to its scope. However, issues associated with these industries such as disposal of dredged materials and water quality are covered in other areas of the report.

Maine's Nearshore Waters: Current Uses and Anticipated Trends Summary Table

Use	Has there been an increase or a decrease in this use, or has it remained stable over the past 5 years?	Is this use likely to increase, decrease or to remain stable over the next 5 years?*	Where in Maine will the increase in the use take place, (if applicable)?*
Aquaculture	Decrease in finfish Increase in shellfish	Increase – both finfish and shellfish	<ul style="list-style-type: none"> • Finfish – primarily Downeast. • Shellfish – could be coast-wide in places where conditions are suitable
Lobster Fishing	Increase in the amount of gear, decrease in the number of fishermen	Increase in the amount of gear, decrease in the number of fishermen	Statewide increase in traps with the greatest increase likely occurring in Downeast Maine
Urchin Fishing	Decrease	Difficult to determine	Difficult to determine
Sea Scallop Fishing	Decrease in the number of licensed fishermen	Difficult to determine	Difficult to determine
Sea Cucumber Harvesting	Stable	Stable	Will likely continue to be primarily a Downeast fishery
Blue Mussel Harvesting	Decrease in the number of licensed fishermen	Stable or decrease – depends on the resource	Not applicable (increase not predicted)
Horseshoe crab Harvesting	Decrease (No recorded harvest since 2003)	Stable (unless seasonal closure is lifted)	Not applicable (increase not predicted)
Soft Shell Clam Harvesting	Decrease in the number of licensed fishermen	Difficult to determine	Difficult to determine
Shrimp Fishing	Decrease in number of licensed fishermen	Difficult to determine	Depends on the shrimp population but will likely continue to take place between Kittery and St. George
Marine Worm Harvesting	Stable	Difficult to determine	Will likely continue to take place primarily between midcoast and Downeast Maine
Periwinkle Harvesting	Difficult to determine	Difficult to determine	May continue to be primarily a Washington County fishery
Seaweed Harvesting	Decrease in the number of licensed harvesters	Difficult to determine.	Difficult to determine
Herring	Decrease in the number of licensed fishermen	Difficult to determine	Unless there is a change in the resource, this will likely remain a primarily offshore fishery
Marine Research and	Difficult to determine	Increase	Difficult to determine

APPENDIX B
MAINE'S NEARSHORE WATERS – CURRENT USES & ANTICIPATED TRENDS

Use	Has there been an increase or a decrease in this use, or has it remained stable over the past 5 years?	Is this use likely to increase, decrease or to remain stable over the next 5 years?*	Where in Maine will the increase in the use take place, (if applicable)?*
Education			
Cargo Port Traffic	Increase	Increase	Primarily at 3 major ports: Portland, Searsport, Eastport
Cruise Ships	Increase	Increase	<ul style="list-style-type: none"> • Increased traffic possible at Portland and Bar Harbor • Possible growth in visits to small ports by smaller cruise ships
Ferry Service	Slight increase in ridership	Slight increase in ridership	No areas have been identified at this time
Boating and Boating Facilities	Increase	Increase	<ul style="list-style-type: none"> • Statewide increase for boating, and demand for moorings • Increase in marinas will likely occur first in southern and mid-coast Maine
Docks, Piers, Wharves	Increase	Increase	Statewide
Sea kayaking	<ul style="list-style-type: none"> • Increase in the number of people using recreational kayaks** • Increase in the number of short (half day) kayak trips** • The number of people using traditional kayaks and going on extended/overnight tours has remained stable** 	<ul style="list-style-type: none"> • The greatest increase will be among people using recreational kayaks 	<ul style="list-style-type: none"> • Some increase in Downeast use • Most growth will likely take place in the islands that are already seeing a lot of use
Wildlife Sightseeing	Stable**	Slight increase	Difficult to determine
Saltwater fishing	Slight decrease	Stable	Not applicable (increase not predicted)
Energy Facilities and Related Development	Increase	Increase	Dependent on type of energy resource
Coastal Dredging and Ocean Disposal of Dredged Materials	Difficult to determine	Difficult to determine	Difficult to determine
Sand and Gravel Mining	Stable (currently not occurring)	Difficult to determine	Difficult to determine
Marine Managed Areas	Increase	Increase	Difficult to determine

Summary Table Continued: Water Pollution

Type of Waste Disposal/Pollution	Has this been on the increase, decrease or remained stable over the past 5 years?	Is this likely to increase, decrease or remain stable over the next 5 years?*	Where in Maine will the increase take place (if applicable)?*
Point Source Pollution	Decrease of some sources, including Overboard Discharges (OBD's)	Decrease of some sources, including OBD's	Difficult to determine
Non-Point Source Pollution	Increase	Increase	Statewide issue
Marine Debris	Persistent problem	Will continue to be a persistent problem	Statewide issue
Toxic Pollution	Increase in some substances, decrease in others	Increase in some substances, decrease in others	Difficult to determine

* = An estimation based on best available data

** = Assessment comes primarily from anecdotal evidence

MARINE AQUACULTURE

Aquaculture is an important marine-dependent use of Maine's coastal waters and has historically focused on Atlantic salmon, American oyster, and blue mussel cultivation (Maine Coastal Program, Final Assessment and Strategy 2006). As noted by the Maine Department of Marine Resources (ME DMR), Maine's location is ideal for supporting marine aquaculture because of favorable coastal conditions and its proximity to some significant markets (2004).

Although Maine's finfish sector is a very small part of a much larger, highly consolidated global industry representing less than 1% of salmon produced worldwide and less than 5% of the U.S. market, it is important to many Maine families. For example, in 2000, Maine ranked as the number one marine aquaculture producer in America (based on farm gate sales) (Maine Sea Grant 2003). That year, salmon aquaculture produced \$75-80 million in sales revenue. By 2004, the total value (sales revenue) of salmon aquaculture in Maine had declined approximately 50% to about \$40 million due to a combination of economic, political and biological factors including global saturation of markets, court orders, disease, and the sale of companies. However, even with this decline, salmon aquaculture remains an economically important Maine fishery, second only in value to lobster (ME DMR).

Finfish and shellfish aquaculture sites cover 1,262 acres in Maine, or less than 0.07 percent of Maine's coastal waters (ME DMR). However, the distribution is not uniform. For example, a third of finfish aquaculture is concentrated in Cobscook Bay and about a third of shellfish aquaculture is in the Damariscotta River (Figure 1). Additionally, lease acreage overstates the amount of space that is actually occupied by aquaculture gear (John Sowles, ME DMR, personal communication). On some sites, as little as one-quarter of the lease acreage may be filled with aquaculture pens or rafts due to lease space needed for mooring systems. In 2006, about half of finfish aquaculture lease sites are inactive or fallow for various reasons. Most of the smaller operations have been inactive in recent years due to current market conditions and changes in permitting that make it less economically feasible for small operations to survive. Other operators let their lease sites lay fallow to manage for disease (Samantha Horn Olsen, ME DMR, personal communication).

Marine aquaculture directly supports between 300 and 500 jobs. In 2005, more than 50% of Maine's leased coastal waters were standard leases for finfish aquaculture, and 43% were standard leases for shellfish aquaculture (Figure 2). However, in 2006 that trend has reversed, and there is now more acreage lease for shellfish culture than for finfish. Considerably less acreage was granted for both

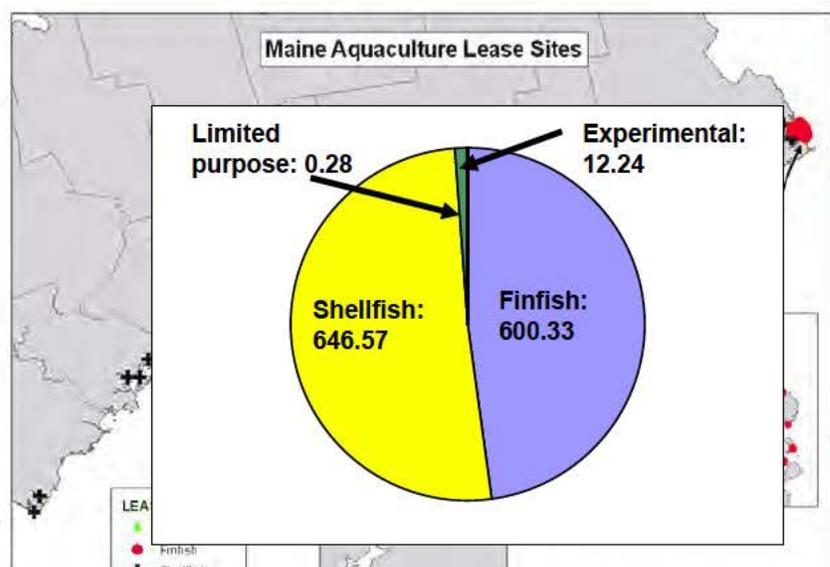


Figure 1. Locations of lease sites in Maine as of 6 January, 2006, minus limited purpose licenses. Figure by M. Nelson, Dept. of Marine Resources.

experimental leases¹ and limited-purpose licenses² (Figure 2).

Finfish aquaculture (virtually consisting of only Atlantic salmon) is centered in Washington County, both in Cobscook and Machias Bays (Figure 1) (Maine Coastal Program, Final Assessment and Strategy 2006). Leases are held by relatively few individuals (Table 1).

Figure 2. Number of acres leased for aquaculture for Maine's marine waters, categorized by lease type (2006).
Source: Maine Dept. of Marine Resources; figure by Elizabeth

Following a court order and difficult disease and market conditions, the three largest salmon companies sold to Cooke Aquaculture of New Brunswick, Canada, who now own a total of 24 of the 30 current finfish lease sites available (Table 2) (M. Costigan, ME DMR, personal

Table 1		
Type of Lease/License, Number of Sites, and Number of Holders for Marine Aquaculture in the State of Maine, 2005		
<i>*Note: 7 of these 11 companies have recently been acquired by Cooke Aquaculture</i>		
Type of Lease/License	Number of Sites	Number of Holders
Experimental Lease	8	7
Standard Finfish Lease	30	11*
Standard Shellfish Lease	69	56
Limited-purpose License	28	20

communication).

Shellfish aquaculture sites are scattered all along the Maine coast. However the highest concentration of sites is in the Damariscotta River (Figure 1). This sector is characterized largely by

¹ Experimental lease – a lease of up to 2 acres in size for up to 3 years, non renewable unless for scientific research.

² Limited purpose license – a lease of up to 400 square feet for 1 year for 5 specific shellfish species.

small-scale, owner-operated farms. The value of this sector is estimated at approximately \$3-5 million (Maine Coastal Program, Final Assessment and Strategy 2006).

Table 2	
Leaseholders, Number of Leases, and Total Acreage for the	
Finfish Aquaculture Sector in the State of Maine, 2005	
(Leaseholders in Red Indicate those Companies Purchased by Cooke Aquaculture)	
Lease Holder	Number of Leases
Atlantic Salmon of Maine, LLC	5
Cates, Robert A.	2
Phoenix Salmon, Inc.	4
G.C. Inc.	2
Harris, Lee M. & George S. Harris, Jr.	1
Island Aquaculture Corp.	3
L.R. Enterprises, Inc.	1
Maine Coast Nordic	3
Maine Salmon, Inc.	1
Stolt Sea Farm Maine, Inc.	5
Treats Island Fisheries, Inc.	3
Total	30

Within Maine’s marine aquaculture industry, there has been an increase in the number of lease/license sites, and total acreage between 1992 and 2006. A closer look reveals, however, that despite a trend of an increasing number of lease sites, the acreage has not grown dramatically over the past 14 years. Over this period the number of sites has more than doubled from 65 to 137, however, the acreage has increased only 8% from 1,165 to 1,293 acres. Some of the increase in the number of sites, is attributable to the issuance of experimental licenses, a program that started in 2003. Furthermore, the increasing trend of fallowing sites for management of disease and environmental impacts may create a modest need for additional acreage to use while alternate sites lay fallow (Sebastian Belle, Maine Aquaculture Association, personal communication).

With ten pending aquaculture leases as of September 2006, it looks like aquaculture in Maine will continue to experience slow, but steady growth over the coming years (John Sowles, personal communication). This growth will be driven by market demand from a growing human population, recent recognition of the health value of fish, and the continued regulation of wild fisheries. Other drivers include state policies that encourage aquaculture development as well as new technologies that lessen impacts and thus make aquaculture suitable for more areas of the coast. Limitations to growth of aquaculture in Maine are discussed further below and include surface use conflicts, environmental conflict and negative public perception of the industry.

Ecologically, Maine’s coastal waters can safely support many more aquaculture sites than currently exist (John Sowles, personal communication). Site location is limited in part by the environmental conditions needed for each specific type of aquaculture, such as, temperature, water exchange, dissolved oxygen, nutrients, phytoplankton, absence of toxic contaminants, and public acceptance

(John Sowles, personal communication). In terms of feasibility, a site would need to be in reasonable proximity to shore-side infrastructure such as boat launches and processing plants, transportation, labor force, and would also need protection from severe storms.

Growth of salmon aquaculture is likely to be restricted to the Downeast region outside of Cobscook Bay where temperatures are neither too warm nor too cold (John Sowles, personal communication). However, pockets outside of this region that also have proper environmental conditions for salmon aquaculture and environmental carrying capacity may see some aquaculture development. Additionally, there may be development of aquaculture facilities farther offshore as technology improves cage structure integrity. Shellfish aquaculture has the potential to grow in many areas along the coast but is unlikely to move soon to very deep waters where growing conditions are less than ideal (John Sowles, personal communication).

According to Sebastian Belle, Executive Director of the Maine Aquaculture Association, Maine has significant potential to increase its aquaculture production with a fairly modest increase in leased acreage. In the coming years, there may be growth in the cultivation of species such as halibut, cod, haddock, scallops and urchins whose tolerances and requirements match the environmental conditions in a variety of areas along the Maine coast (Maine Coastal Program, Final Assessment and Strategy 2006). New facilities at the University of Maine in Orono and at the USDA office in Franklin have resulted in Maine having the most extensive marine aquaculture research and development infrastructure in North America (Sebastian Belle, personal communication). Mr. Belle notes that these facilities have already partnered with more than 20 private companies on applied commercial aquaculture projects. He states that “Maine has become a place to invest in and grow an aquaculture enterprise.”

One other area which will likely continue to develop is the use of Multi-trophic Integrated Aquaculture (a form of polyculture) which involves raising different species together such as finfish, shellfish and seaweed to lessen overall environmental impacts of the operation. It seems that Maine aquaculturists embrace the idea of polyculture (Sebastian Belle, personal communication). However, Maine is currently behind in this area for a number of reasons, including state and federal disincentives to polyculture that may be addressed in the near future. Despite these issues, research into this type of aquaculture is moving forward. Researchers at the University of Maine have recently begun the first pilot studies examining the feasibility of culturing native species of the marine alga, *Porphyra spp.* on and around finfish farms. These plants can exploit particulates and other nutrients exuded by salmon, thereby potentially reducing these negative impacts, and may provide significant commercial benefit in the long-term, should these pilot studies prove economically viable.

Aquaculture Use Conflicts

Environmental Concerns

Water quality and habitat impacts from aquaculture have been a concern in Maine since the 1980s. Impacts range from those caused by feces and waste feed, use of antifoulants, antibiotics and pesticides, to eutrophication and smothering of benthic habitats. The Maine Department of Marine

Resources (ME DMR) and others have investigated those impacts for over 20 years and found that while finfish culture has the greatest potential to impact water and habitat; shellfish and seaweed culture can also cause harm. However, studies by ME DMR document that impacts are very localized and are reversible.

All aquaculture in Maine, regardless of size or species reared, is highly regulated and inspected to ensure that impacts are not detrimental to the overall health of our coastal waters and habitats. Industry changes have also reduced impacts. For example, today, vaccines and husbandry techniques (e.g. fallowing and stocking schedules) control disease and parasite populations where once antibiotics and pesticides were the primary line of defense. Feed formulations and practices have significantly reduced the amount of waste released to the environment. In sum, impact on water quality and habitats from today's salmon farm is a fraction of what it was 15 years ago. Water quality and benthic impacts have been addressed by federal and state permits. While ME DMR is continuing to participate in implementing the provisions of those permits and will always look for improved methods of farming and monitoring, these are no longer the most pressing research and regulatory issues we face.

Salmon finfish aquaculture has been identified as a moderate threat to restoring wild salmon to Maine's historic salmon rivers. Interbreeding of escaped and wild salmon is believed to threaten the genetic integrity of the few remaining wild salmon resulting in a reduction of their fitness and survival. The industry follows a "belt and suspenders" approach involving regulatory measures to ensure minimal exposure of wild fish by farmed fish. Strict cage containment measures and on site audits are designed to prevent escapes. If an escape should occur, fish are marked so that they may be removed if they enter wild salmon rivers. And lastly, all Maine fish are required to be of North American strain so that if interbreeding does occur, genetic drift is limited.

Disease, particularly infectious salmon anemia (ISA), has recently presented significant problems for the salmon industry. There it has caused significant economic loss prompting new husbandry and processing biosecurity practices. While there has not been evidence of transmission of disease from farmed to wild stocks in Maine (ISA has been in Maine for over 100 years), it is important to control and minimize disease at farm sites to prevent the build up of disease and thus reduce the risk (probability) of exposure to wild fish. Less is known regarding disease in the shellfish industry and even less in marine plants. As the shellfish sector expands and seaweed cultivation takes hold, assessing disease potential and developing management techniques to minimize disease, especially the spread of disease, is a priority.

Any work in the marine environment has the potential to conflict with wildlife resources. More research is needed to better understand what the specific impacts of different types of aquaculture projects are on wildlife resources such as marine mammals and seabirds, and to identify strategies to enhance habitat value in the vicinity of aquaculture operations. As new species are tested and stocked in Maine waters, great care must be taken to not introduce invasive species that negatively impact our native marine communities.

In other parts of the world, aquaculture has become an integral part of sustainable, integrated coastal management, providing solutions to problems such as pollution caused by non-aquaculture activities. Done correctly marine aquaculture can also relieve some of the pressure off and impacts

of wild fisheries. In the future it is possible that aquaculture may come to be seen as a valuable part of ecosystem-based management in Maine.

Human Use Conflicts

The early and volatile conflicts between traditional wild fisheries and aquaculture have diminished. Commercial fishermen continue to express concerns when there are proposals to site aquaculture operations in their fishing territories. However, these concerns tend to abate after the operation is in place. Other conflicts concerning aquaculture arise from competing visions of sound coastal development in Maine. Aquaculture is a relative newcomer to the state and as such it has stimulated some controversy about what constitutes an appropriate commercial use of Maine's coastal waters.

Property owners, municipal leaders and other stakeholders have opportunities to express their viewpoints about these issues during the aquaculture lease application process. Included in the process is a public scoping session, a public hearing and a separate meeting between the applicant, Maine Department of Marine Resource representatives and officials of the relevant municipality. This revised process, which was instituted in its current form in May 2005, seems to be allowing for better conflict resolution. In particular the scoping sessions have helped applicants see how they might amend their application to improve public acceptance, have helped prepare interested local residents to give meaningful input, and have created an environment where hearing testimony can be more reasoned and thought out in advance (Samantha Horn Olson, personal communication).

COMMERCIAL FISHERIES

Commercial fishing continues to be an important part of Maine's coastal economy. In 2004, the total number of licensed fishermen was 16,200 and the value of landings was approximately \$405 million (ME DMR). The 2001 report on "Fishery, Farming and Forestry" indicated that the Maine seafood industry provided a total of 26,000 jobs and an economic impact of \$777 million dollars to the state economy (Maine State Planning Office).

As seen in Figures 3 and 4, herring make up the majority of landings by pound. However, most herring are used as bait for the lobster industry which is by far the most valuable fishery in Maine. Groundfish, which used to be a vital part of Maine's fisheries, have been depleted by

overexploitation and now make up only a small portion of the landings by pounds and by value. Currently, the majority of groundfish are caught outside of state waters (Kevin Kelly, ME DMR, personal communication).

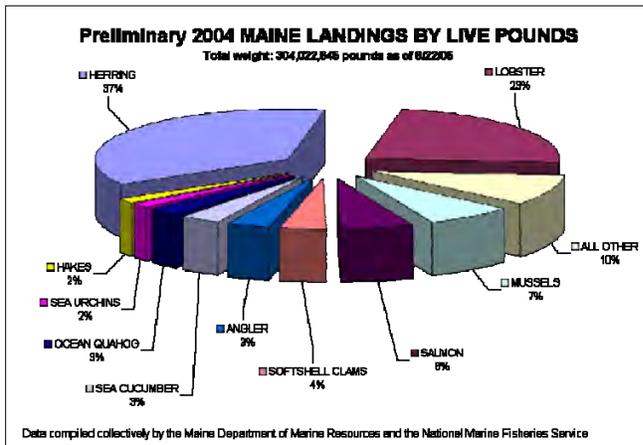


Figure 3. Source: Maine Dept. of Marine Resources Commercial Fisheries web page.

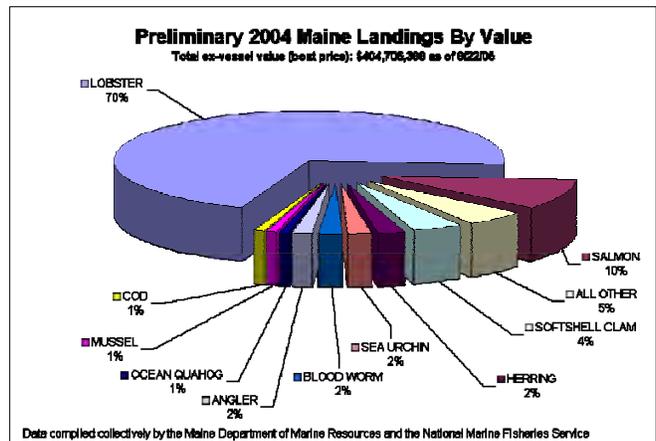


Figure 4. Source: Maine Dept. of Marine Resources Commercial Fisheries web page.

Lobster

The lobster fishery is an important part of Maine’s coastal economy. As noted above, lobsters are the number one fishery in Maine in value. In 2004, the landed value of lobsters was 286 million dollars (Figure 5). There is an additional economic impact when accounting for multiplier effects.

Given the importance of the lobster fishery to Maine, for the past decade, members of the industry, the Department of Marine Resources and Maine’s Legislature have worked to effect major

changes in how Maine regulates this fishery. Statutory changes over the past decade include limits on who may obtain a lobster license, an individual trap limit, a trap tag program, lobster zones and councils, the apprenticeship program, owner-operator requirements, and limited exit to entry ratios by zone.

The lobster resource in the Gulf of Maine has recently been assessed as having relatively high overall stock abundance, with fishing mortality comparable to that in the recent past. Additionally, high exit to entry ratios have meant that the number of licensed lobstermen has decreased in recent years. However, the level of effort in the fishery is still regarded as potentially too high. The amount of gear in the water is expected to increase as many lobstermen build up to the allowed 800 traps. In 2005, there were 3.2 million trap tags issued in Maine (see Figure 6 for the spatial distribution of these traps). If every lobsterman built up to 800 traps, there would be 4.7 million trap tags issued. Much of the recent increase in trap tags sold can be attributed to Zone A, in eastern Maine. Significant potential for continued build-up remains in that region (Deirdre Gilbert, ME DMR, personal communication). It is important to note that lobstermen often have more trap tags than they do traps in the water. Furthermore, not every lobsterman will want to build up to 800 traps. Nonetheless, these numbers do suggest the potential for having a lot of traps in the water. Additionally, the long-term average catch for this fishery could be obtained with far less gear than is currently being utilized. Should landings return to more historical levels, the fishery is significantly over-capitalized. In addition to the economic inefficiency this presents, it also causes social problems (gear conflict) and poses the risk of depleting the resource to lower levels in times of decline (as fishermen struggle to continue to cover the cost of their investment).

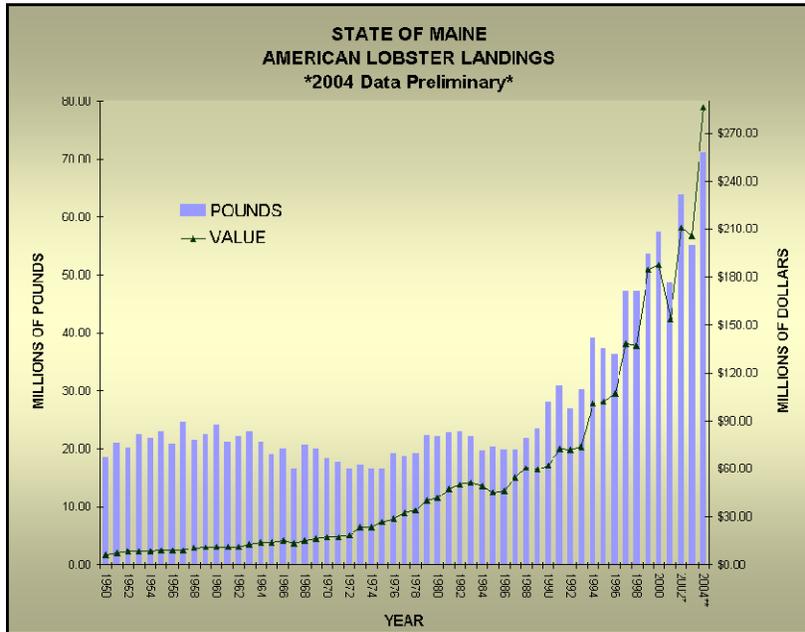


Figure 5. Source: Maine Dept. of Marine Resources

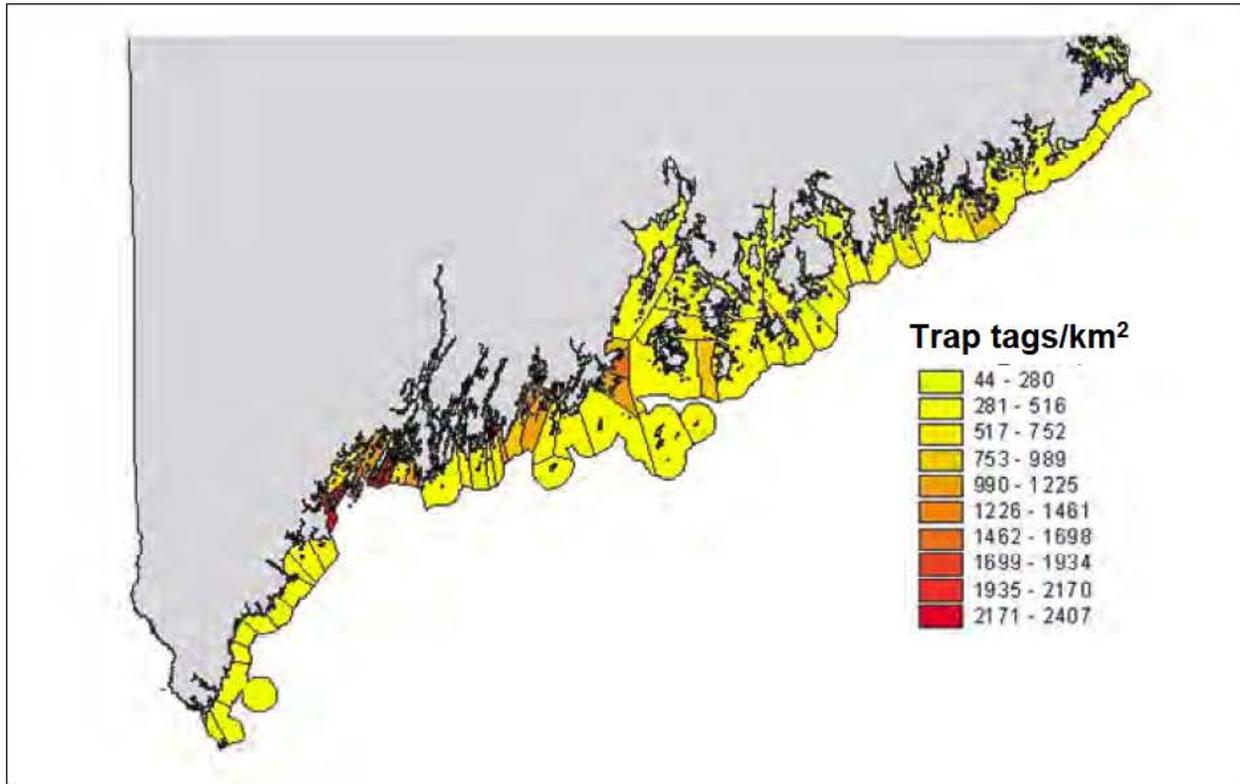


Figure 6. The number of trap tags per square kilometer, by lobster district. The number of traps in the water is likely less than the actual number of trap tags. Additionally, lobster traps are not evenly distributed along the coast. However, this map provides a good estimate of relative effort on Maine's coastline. *Source: Carl Wilson, Maine Dept. of Marine Resources*

Therefore, despite the favorable review of the status of the resource, the Lobster Advisory Council and the Lobster Zone Councils remain committed to exploring methods for reducing future effort (traps in the water) in this fishery. Some aspects of effort in the lobster fishery will need to be discussed on a statewide basis, and some management measures may need to be uniform statewide, as a matter of policy. Other aspects of effort reduction may be tailored to a specific lobster zone.

Extensive work has already been done to document industry ideas regarding effort reduction needs in the lobster fishery. An analysis of the impact of various approaches is currently underway and proposals are being refined with input from the Zone Councils and the Lobster Advisory Council. One proposal involves instituting exit to entry ratios that incorporate the number of traps leaving the fishery. Specifically, a new lobsterman could not enter the fishery until a certain number of traps (rather than fishermen) left the fishery. This proposal is being drawn up as a bill to be submitted to the first regular session of the 123rd Legislature (January 2007) (Deirdre Gilbert, personal communication).

Urchins

The green sea urchin fishery began in Maine in the 1980's and developed rapidly into the 1990's with the expansion of export markets (Taylor 2004). Peak landings of 39 million pounds were recorded in the 1992-1993 season (Figure 7) and the value of the fishery hit \$36 million in 1994-1995, second only to the lobster fishery (Taylor, 2004). Landings have decreased dramatically over the last decade due to overexploitation. It is estimated that urchin biomass in Maine's coastal waters has decreased from 61,000 tons in 1987 to 11,000 tons in 2004 ("Maine's Sea Urchin Fishery," Maine Department of Marine Resources). This decline began in southwest Maine in the early 1990's and subsequently spread to eastern Maine (ME DMR).

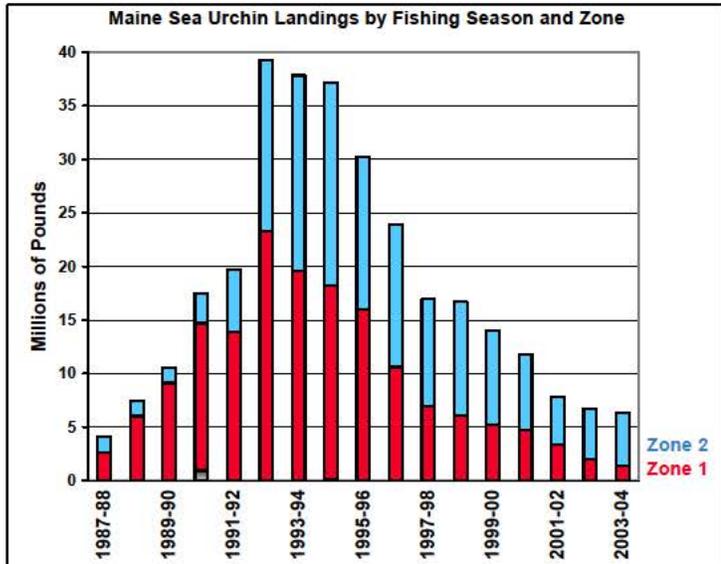


Figure 7. Sea Urchin Landings by Zone. Zone 1 extends from Kittery to Rockland. Zone 2 ranges from Vinalhaven to Eastport. Source: Maine Dept. of Marine Resources

Depletion of sea urchins has led to a reduction in the number of licensed harvesters from 2,725 in 1994 to 742 in 2003 and to 634 licenses in 2004. In the last couple of years, only about half of those licensed fishermen have been actively harvesting urchins. About 30% of these active fishermen harvested urchins with dragger boats and the rest harvested by diving. The contraction in the industry has been most dramatic in the area between Kittery and Rockland known as Zone 1 (Figure 8). The health of the resource in Zone 1 is considered to be poorer than in Zone 2 which extends from Vinalhaven to Eastport (ME DMR 2004). In the 2004-2005 fishing season there were only about 35 active fishermen in Zone 1 and approximately 250 in Zone 2 (Margaret Hunter, ME DMR, personal communication).

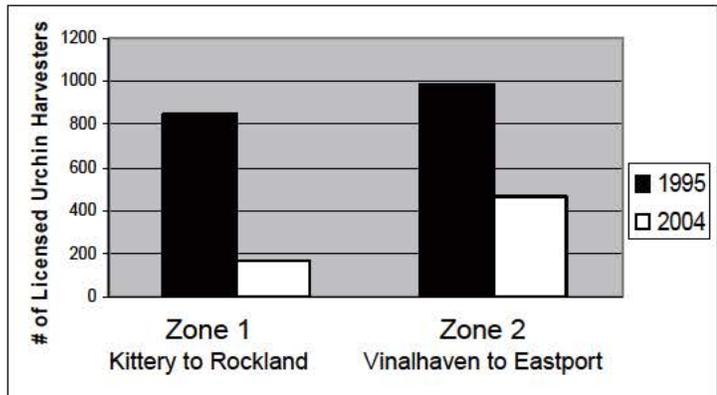


Figure 8. Source: Maine Dept. of Marine Resources, "Maine Sea Urchin Licenses, 1992-2004," figure by Elizabeth Stephenson.

Growing concerns over the depletion urchins lead to the establishment of The Maine Sea Urchin Zone Council (SUZC) in 1995. The Council which is comprised of harvesters, dealers, and

independent scientists, was established to advise the resource managers. Since the Council was formed, many management measures have been instituted including a limit on the number of harvesting licenses, a reduced season, the establishment of two exclusive fishing zones, and minimum and maximum legal size limits (ME DMR 2004). Despite these measures, the urchin population has continued to decline.

Studies suggest that the urchin population has been fished down to a level from which it may be difficult for the species to recover. As the urchin population has been pushed down, the kelp on which the urchin grazes has made a resurgence in Maine. Kelp provides shelter for crabs and other organisms that eat juvenile urchins (ME DMR 2004). Thus, once an urchin bed has been transformed into a kelp bed, it becomes difficult for the urchins to reestablish themselves in this new, inhospitable environment (ME DMR 2004). According to the Maine Department of Marine Resources (2004), "There are now areas in southwestern Maine that have been devoid of urchins for the past 8 to 10 years that have not recovered even though there has been no recent fishing there. This loss of urchin habitat is creeping eastward, and is no longer just a Zone 1 problem." The urchins may recover only if some of them are left undisturbed at high enough densities to reproduce and to prevent their habitat from being overgrown with kelp. State regulations have not yet been effective in preserving the necessary density of urchins (ME DMR 2004).

Given the continued, severe state of decline of this fishery, Maine's Department of Marine Resources recently led an intensive collaborative effort to improve management measures for this fishery. One of these measures, passed in 2003, allowed for Maine's two urchin zones to be managed separately. Other measures prohibited any new entry into the fishery and further limited the harvest season in each zone. In the 2004-2005 and 2005-2006 seasons, the season was 10 days in Zone 1 and 45 days in Zone 2, reflecting the serious depletion of the resource.

Sea Scallops

Sea scallops occur in western north Atlantic waters from North Carolina to Maine. Although they do occur in deep waters offshore, seventy-five percent of the landings in the Gulf of Maine come from state territorial waters (National Marine Fisheries Service). The scallop season in Maine is from December 1st to April 15th. Scallop harvesting is conducted primarily with dredges and otter trawls, but there is also a dive fishery. Although scallop fishing occurs statewide, some of the best fishing in the state is found in the Downeast region. The scallop fishery in the U.S. is managed through the New England Fishery Management Council's Fishery Management Plan for Atlantic Sea Scallops (NMFS).

The number of commercial scallop licenses (including draggers, divers and tenders) in 2005 was 647, down from a peak of 1,152 in 1996 (ME DMR). Out of the 647 scallop fishermen, 519 are draggers, 124 are divers and 4 are scallop tenders. In addition there are currently 442 non-commercial scallop licenses in Maine.

According to the Department of Marine Resources, scallop landings have exhibited boom and bust cycles. Landings increased in the 1980's but have been steadily declining since the 1990's and have recently been moving towards an all time low (Figure 9) (ME DMR). This decrease in landings may be one of the causes for the decrease in scallop licenses over the same time period.

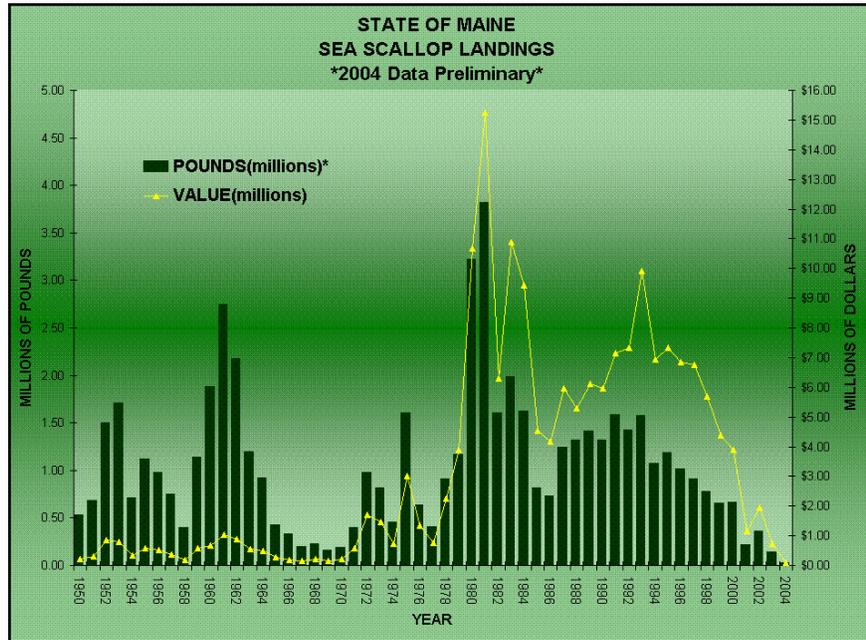


Figure 9. Source: Maine Dept. of Marine Resources, "Maine Scallop Fishery Information" web page.

Given the concerns over depletion of the fishery, the Maine Department of Marine Resources led a multi-year, collaborative process to develop a management plan for a sustainable and economically viable fishery. As a result of this effort ME DMR has enacted legislation to raise license fees to support a dedicated research fund. This will provide roughly \$100,000 for research per year and provide information to inform additional management measures such as closed areas, gear modifications and resource enhancement. The DMR has also enacted legislation to create a 13-member Scallop Advisory Council. The Council provides advice on expenditures from the research fund, and provides continued input to management discussions.

The DMR has also adopted the following measures through rulemaking: increase of the scallop minimum size, modification of the dredge configurations to allow for lighter gear, and expansion of the Cobscook Bay "cull before cut" rule statewide. This latter modification prohibits the cutting of scallops before the catch has been culled of all scallops below the minimum size.

Sea Cucumbers

The sea cucumber fishery has developed rapidly over the past 15 years. Although a modest fishery began in 1988, the industry took off in 1994 with the availability of markets in Asia where sea cucumber meat is highly prized. Sea cucumbers are harvested primarily in eastern Maine, between Mount Desert Island and Eastport where there is ample supply of the cucumber's preferred rocky bottom habitat. Maine cucumber fishermen use 12-30 meter long boats equipped with light urchin drag gear or scallop chain sweeps (Bruckner 2005).

Cucumber landings in Maine increased dramatically in the late 1990's to 2000 (Figure 10). There was a decrease in the year 2001 possibly due to the closure of two major processing plants (Bruckner 2005). Landings recovered and have continued to increase in recent years. The value of the fishery in 2004 is reported as being approximately half a million dollars (Bruckner 2005).

The number of people fishing for cucumbers is relatively small. Over the past few years, the number of fishermen harvesting cucumbers varied between 10 and 13 (Bruckner 2005). In 2006, 15 sea cucumber licenses were issued (Ann Tarr, ME DMR, personal communication).

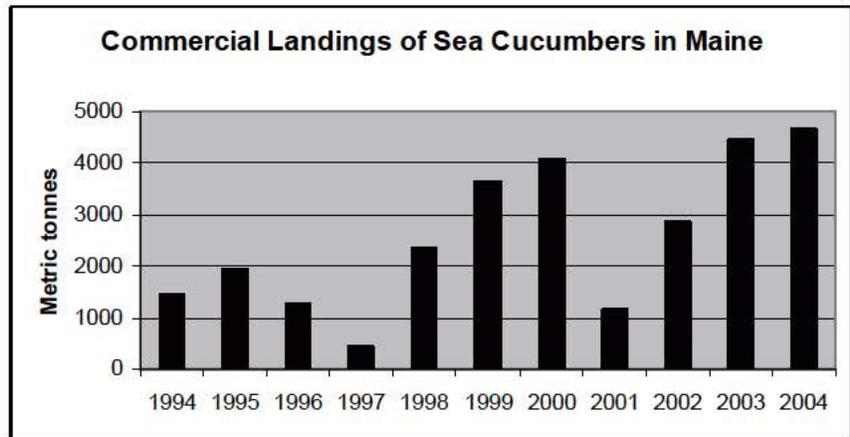


Figure 10. Source: Bruckner 2005. Figure by Elizabeth Stepbenson.

Concerns for overexploitation in this rapidly developing fishery lead to the creation of management rules via the Sustainable Development of Emerging Fisheries Act, passed in 1999 (12 M.R.S.A. §6171-B) (Maine Department of Marine Resources). Management measures include limits on the fishing season, definition of gear size and a requirement for fishermen to record their catch statistics in log books (Bruckner 2005).

It is unlikely that there will be a significant increase in the number of licensed sea cucumber fishermen over the coming years. Any fisherman wanting to enter the fishery today has to have already had some history with the fishery. Specifically, fishermen need to have been licensed to fish sea cucumbers at some point since 2000 and to have caught at least 100,000 pounds of cucumbers in the years 2002, 2003, or 2004 (Glenn Nutting, ME DMR, personal communication). One of the reasons for this limited entry is the fact that although scientific surveys have been done, it is difficult to assess the health of this fishery, due in part to the patchy nature of the resource (Glenn Nutting, personal communication).

Blue mussels

The following paragraph is excerpted from the Department of Marine Resources fact sheet, "The Blue Mussel in Maine": In Maine, commercial mussel beds are found a few feet above and below mean low water between Casco Bay and Jonesport. Wild mussels can be harvested all year, but most fishing is in the winter when the quality of the meat is best. They are taken by hand with a rake or from a boat with a drag. A license is required from the Department of Marine resources to harvest mussels by either method. A mussel drag is essentially a framed mouth with an attached bag. Department of Marine Resources regulations (Chapter 12), restrict the width of mussel drags and the size of the product that can be harvested.

There are currently 57 licensed mussel harvesters in Maine, which includes 36 who fish with drag gear and 19 who harvest by hand (Ann Tarr, personal communication). This number is down from 88 total mussel harvesters in 1998.

As can be seen in Figure 11, mussel landings appear to go through high and low cycles. In the past couple of years, blue mussels have been in a low cycle and it is becoming increasingly difficult to find mussels for aquaculture seed or for wild harvest (Pete Thayer, personal communication). In addition, fishermen who drag for wild mussels are concerned that the collection of juveniles for aquaculture seed may be depleting their commercial harvest (Pete Thayer, personal communication). Currently, representatives from the drag fishery, the mussel aquaculture industry and the Department of Marine Resources are meeting to discuss this issue.

Given the increasing difficulty in finding adequate quantities of mussels to harvest, the fishery is becoming less lucrative. Consequently, it is likely that the number of people in the fishery will either stay the same or decrease over the coming years (Pete Thayer, personal communication).

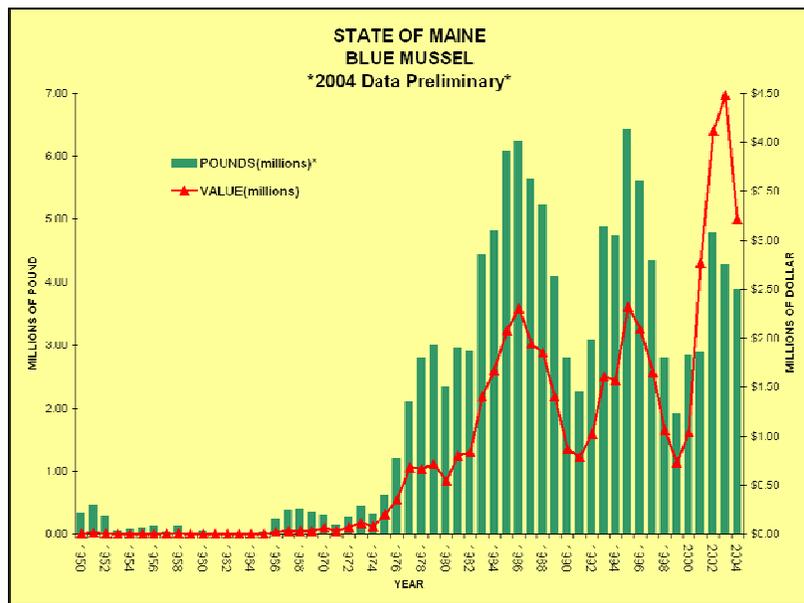


Figure 11. Source: Maine Dept. of Marine Resources.

Horseshoe Crabs

The following information was provided by Pete Thayer and Heidi Bray of the Maine Department of Marine Resources:

Horseshoe crabs are used as bait for freshwater eels and conchs. Their blood is commercially important to the biomedical industry, and they are utilized for scientific research on vision and vascular physiology. The harvest may be conducted by hand or with nets. In the 1990's there was an increase in harvesting of Maine horseshoe crabs following resource depletion in the Mid-Atlantic States. Concern over depletion of horseshoe crab populations in Maine led the Department of Marine Resources to institute a closure in 2003 that prohibits catch and possession from May 1 to October 31 each year. The closure ensured that the crabs were protected during their spawning period, which is also when they are most vulnerable to harvest. For the remainder of the year, catch is limited to 25 crabs per person per day. These regulations have made horseshoe crab harvesting

less desirable in Maine. Consequently, there have been no applications for horseshoe crab permits since 2003 and no recorded harvest since that time.

The health of the horseshoe crab population is monitored through an annual survey of crab abundance conducted by ME DMR along with assistance from several coastal volunteer monitoring groups. Anecdotal information and results from initial surveys helped to identify some important spawning sites for the crabs in Maine. These areas include Middle Bay and Thomas Point Beach in Brunswick, Great Salt Bay and Day's Cove in Damariscotta, the Bagaduce River in North Brooksville and Hog Bay in Franklin (Thayer, 2005). Some of these sites are monitored each year by ME DMR survey during peak spawning times.

Anecdotal reports suggested a general decline in the horseshoe crab population over the past decade. However, horseshoe crab surveys have reported an increase in numbers over the past two years and at some sites, the increase has been dramatic. If data continue to come in that appear to confirm recovering populations, there will undoubtedly be interest in re-opening the harvest of horseshoe crabs. Maine DMR would need to address whether to allow a harvest and how to ensure sustainable harvest levels.

Soft Shell Clams

The soft shell clam fishery is conducted on intertidal mud flats throughout the Maine coast. Some areas of the coast such as Washington County are more productive than others mainly due to an abundance of clam flats. These regional differences are reflected in the data showing the average landings by county (Figure 12).

Although it is possible to harvest clams mechanically, Maine statute requires that the clams be harvested through digging by hand or with a clam fork to protect the resource from over-harvesting and to protect the intertidal habitat from gear impacts (Denis Nault, ME DMR, personal communication).

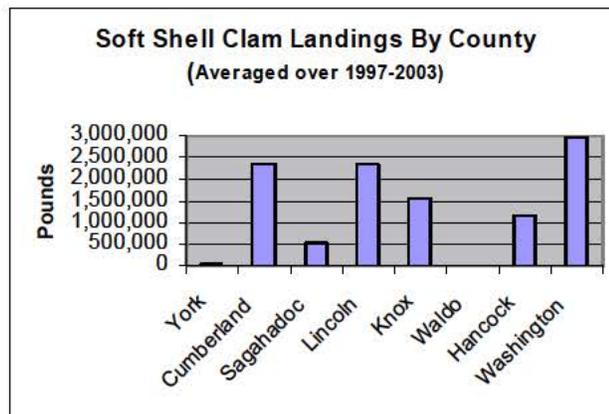


Figure 12. Source: Maine Dept. of Marine Resources.
Figure by Elizabeth Stephenson.

In many towns, clam flats are co-managed by the Maine Department of Marine Resources and the municipality. Co-management of the soft-shell clam resources has existed for over 40 years in some municipalities. In the last 15 years, the number of municipalities in the program has increased approximately 60%. Currently, there are over 70 municipalities participating in the program (ME DMR). Some of the management measures instituted by towns include clam flat seeding, and limiting the number of licenses that can be sold. It is possible that these measures have in part led to the relative stability in the landings over the past decade (Figure 13) (Denis Nault, personal communication).

Despite this relative stability in the statewide landings, there are a couple of factors that can cause a dip in landings on a local level. Specifically closures of clam flats due to red tide events or elevated bacteria levels can have a negative impact on annual harvest. Large scale, extended flood or red-tide events (such as the red tide event of 2005) can lead to lower landings on a statewide basis (Denis Nault, personal communication).

Presently, there are 1668 fishermen licensed to harvest soft-shell clams in Maine (Ann Tarr, personal communication).

This number is down from a 10 year high of 2213 in the year 2000. Increases in hardships from closures due to recent flood and red tide events may, in part, be responsible for this decline. Additionally, there was a noticeable decline in licensed shellfishermen in 2004, when the price of a commercial shellfish license increased from \$63 to \$115. This fishery is not limited, thus there is no incentive for fishermen to hang on to a license if they are not actively using it (Deirdre Gilbert, personal communication).

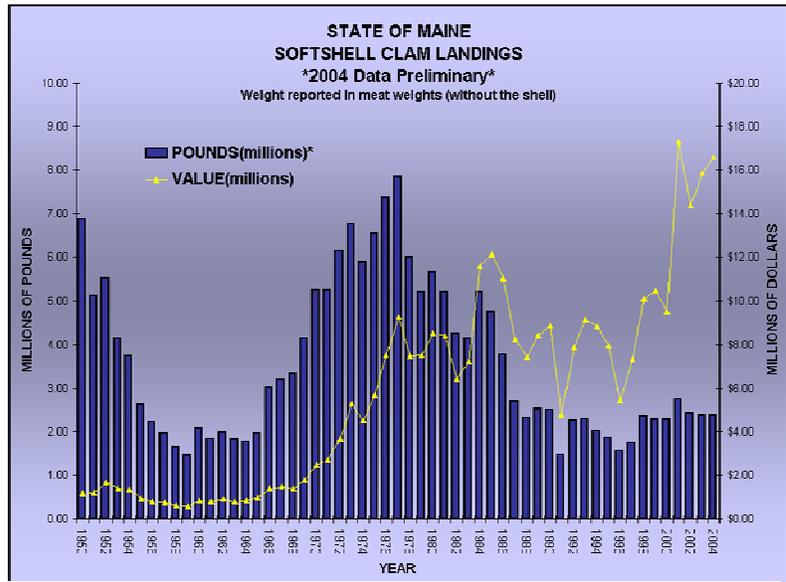


Figure 13. Source: Maine Dept. of Marine Resources.

Shrimp

The shrimp fishery represents a small but important component of Maine’s coastal fishing industry. Shrimp fishing currently takes place in the winter and early spring. In the early part of the season, December and January, shrimp fishing takes place in both nearshore and offshore waters. In late winter and early spring, most of the fishing takes place outside of state waters. The majority of the fishing occurs in southern and mid-coast Maine, between Kittery and St. George (Margaret Hunter, ME DMR, personal communication).

Shrimp fishing is conducted primarily through the use of drag boats that tow nets along the ocean floor. Of the 120 registered shrimp fishermen in Maine, 82 used drag boats to harvest the shrimp (Margaret Hunter, personal communication). The tow lines used by the shrimp fishermen have been mapped by the Maine Department of Marine Resources (Figure 14). The other 28 boats harvest shrimp with traps, a practice that is growing in Maine (Margaret Hunter, personal communication). Shrimp trapping is primarily conducted by lobstermen in the winter when many of them are not actively lobster fishing. The states of Maine, Massachusetts and New Hampshire cooperatively manage the Gulf of Maine shrimp fishery under the Northern Shrimp Fishery Management Plan which was adopted by the Atlantic States Marine Fisheries Commission (ASFMC) in 1986. The plan allowed managers to implement gear limitations and established shrimp fishing

seasons which were to be set each fall (ASFMC 2002). Since 2004, the fishery has been managed under Amendment 1. This amendment allows fisheries agencies in Massachusetts, New Hampshire in Maine to use new indices such as biomass threshold to inform management measures (ASFMC 2002).

Information on the health of the fishery is provided through landings data and also through a long-term state and federal Gulf of Maine Northern Shrimp Trawl Survey. Established in 1983, the purpose of the survey is to collect data on the relative abundance, biomass, size structure (year class strength) and sex of the Gulf of Maine shrimp stock (ASFMC 2002). The survey monitors shrimp in the summer when they are in offshore waters. Each year the results of the survey help managers to set regulations such as length of the shrimp season (ASFMC 2002). Recently, the length of the season has varied dramatically from 40 days in 2004 to 140 days in 2006.

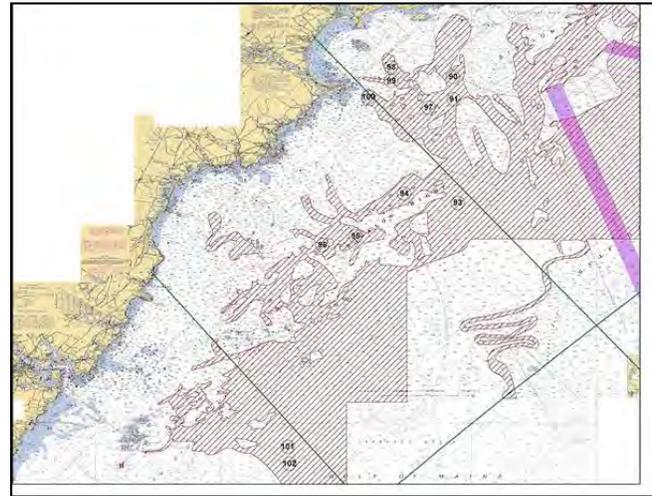


Figure 14. Shrimp tow locations from Cape Elizabeth to the New Hampshire border. Green lines are Loran C lanes and purple lines represent commercial shipping lanes. *Source: Maine Dept. of Marine Resources.*

The shrimp population seems to rapidly go through cycles of abundance and scarcity. Shrimp can be quickly depleted by high rates of fishing mortality (Margaret Hunter, personal communication). However, they appear to be able to rebound relatively quickly. Other factors beyond fishing mortality that affect their numbers include temperature and rates of predation from groundfish. The volatility in the health of the stock is one of the reasons why this fishery has remained an open access fishery (Margaret Hunter, personal communication). In the open access system, fishermen are able to jump in and out of the fishery as the stocks rise and fall. In recent years, landings have been declining due to lower stock biomass and a decrease in the price of shrimp (Figure 15). Concurrently, the number of fishermen in the fishery has also decreased (Ann Tarr, personal

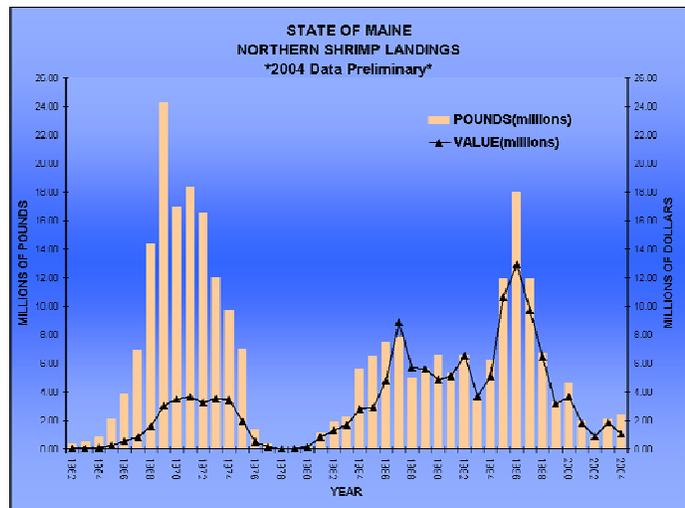


Figure 15. *Source: Maine Dept. of Marine Resources.*

communication). Thus, although there may be a small increase in the number of lobstermen trapping shrimp on the side, it is unlikely that there will be a dramatic increase in the overall number of shrimp fishermen in the next few years.

Marine Worms

Maine is the largest supplier of marine baitworms for recreational fishing (Pete Thayer, personal communication). Two species make up the Maine baitworm industry, the sandworm and the bloodworm. These worms are dug by hand from coastal mudflats primarily from mid-coast to Downeast Maine. The worms are shipped worldwide to be used as recreational bait and increasingly as feed for shrimp aquaculture (Atherton and Chen 2004). This fishery has grown rapidly since the mid-1900's, and is annually one of the top ten most valuable fisheries for Maine. In 2004, the combined landed value of bloodworms and sandworms was over 10.3 million dollars (ME DMR). Although it is not a limited entry fishery, the number of licensed wormers has remained relatively stable for the past several years, ranging from 1015 in 1998 to 1059 in 2005.

The health of marine baitworm stocks in Maine is currently a matter of much debate. There have not been any large-scale population studies conducted in the state since the late 1970's (Atherton and Chen 2004). However, landings data (Figures 16 and 17) from the 1980's through today suggest a decline from 1960's and 1970's levels (Atherton and Chen 2004). Additionally, reports from diggers, dealers and retailers indicate that the average worm size has decreased over the last several decades as has the number of worms harvested per tide (Pete Thayer, personal communication). However, there are many others in the industry who disagree with this assessment and state that the resource is not in danger of being overharvested (Pete Thayer, personal communication).

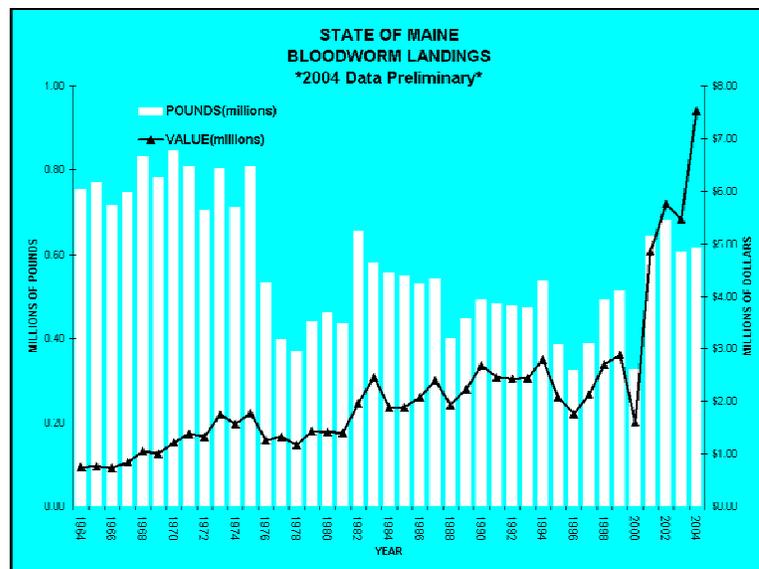


Figure 16. Source: Maine Dept. of Marine Resources.

Meetings have been held between industry representatives and Maine Department of Marine Resources staff to assess the effectiveness of current worm harvesting regulations. At present, wormers must dig by hand. On Sundays, they may not take any more than 125 worms per person. Additionally, individuals who do not have a license may only take 125 worms per day, every day. Discussions about further conservation measures are ongoing. Possible options include size limits or weight standards, spawning closures, rotating zones, conservation areas and the restriction of intertidal dragging (Pete Thayer, personal communication). In addition, studies to assess the

baitworm population are also underway and when completed will likely inform the discussion on conservation measures (Pete Thayer, personal communication).

It appears unlikely that the number of wormers will increase dramatically over the next few years given the recent stability in the number of licenses. Additionally, the development of highly effective artificial baitworms may cause a dip in the market for live worms and potentially cause a contraction in the worming industry (Pete Thayer, personal communication).

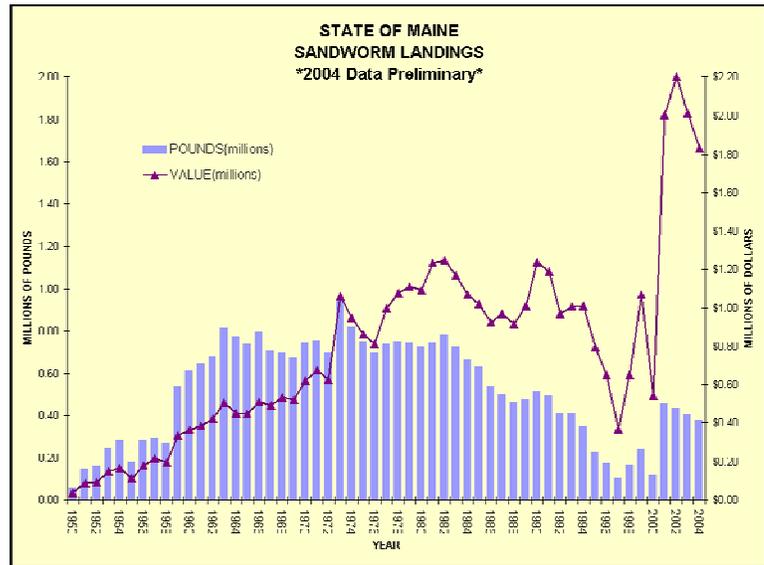


Figure 17. Source: Maine Dept. of Marine Resources.

Periwinkles

The following information was taken from a periwinkle fact sheet written by Stanley Chenoweth and Pete Thayer of the ME DMR.

The common periwinkle, *Littorina littorea*, is a marine snail found in great abundance along rocky shores of the New England coast. It has been harvested commercially in Maine for many years. In its early days the periwinkle fishery satisfied a limited, domestic market, but in the last 15-20 years it has been supplying snails to Europe and the Far East. The Maine fishery is centered in Washington County, where periwinkles, or "wrinkles" as they are called in the industry, are most abundant and of the greatest size. It is a relatively small fishery, but "wrinkling" can be an important supplement to a person's income during the off-season or between jobs. It is difficult to quantify how many people are "wrinkling" because there is no separate periwinkle license. Instead, anyone with a commercial fishing single operator license can harvest periwinkles (Ann Tarr, ME DMR, personal communication).

Most of the harvesters are individuals who work at times in other fisheries or land based jobs. Many people who harvest periwinkles also harvest clams or marine worms, and seasonally will find part time work in other areas. Clam and worm harvesters often turn to periwinkles due to poor market conditions or unfavorable tides. Periwinkles are not filter feeders and therefore are not included in paralytic shellfish poison (PSP) closures, thus becoming an alternative for clammers during such closures.

Periwinkles are harvested at least sporadically all along the Maine coast, but the bulk of the harvest is confined to Washington County where the wrinkles are larger and more abundant. Other counties that occasionally register small landings include: Lincoln, Hancock, Cumberland and Knox.

Periwinkles are harvested in intertidal and shallow subtidal habitats, typically around bottoms that consist of ledge, rock or sand. As of the late 1990's, harvesting pressure had depleted many of these easily accessible areas forcing fishermen to routinely travel farther a field to offshore ledges and islands.

Periwinkles are harvested by hand, sometimes with the aid of a dip net which is squared off at the end. Harvesters that use this method are referred to as "pickers." The pickers are, of course, limited to intertidal areas and very shallow waters. Lightweight drags are also employed to harvest slightly deeper waters. These drags are usually fished on sandy, stony, or ledge bottoms. The drags are normally fished from boats less than thirty feet long and frequently outboard powered. Small, responsive boats are needed because periwinkles are harvested in shallow water areas that often have severely limited maneuvering room.

There is no scientifically derived estimate of the size of the periwinkle population along the coast. It appears, however, that during the 1990's the periwinkle resource in the more accessible areas of the coast was depleted (Pete Thayer, personal communication). Landings peaked dramatically in 1989 (Figure 18) perhaps due to the opening of new European and Asian markets and the effect of the recession on the job market. Landings stabilized in 1990-1992 and then decreased in the mid-1990s.

There are no management regulations on the periwinkle fishery at the present time other than the requirement that a harvester have a commercial fishing license. There are periodically proposals to introduce suction harvesting into the periwinkle fishery. However, these proposals are generally rejected by most harvesters over fears that the efficiency of suction harvesting would lead to a rapid, further depletion of the resource (Pete Thayer, personal communication).

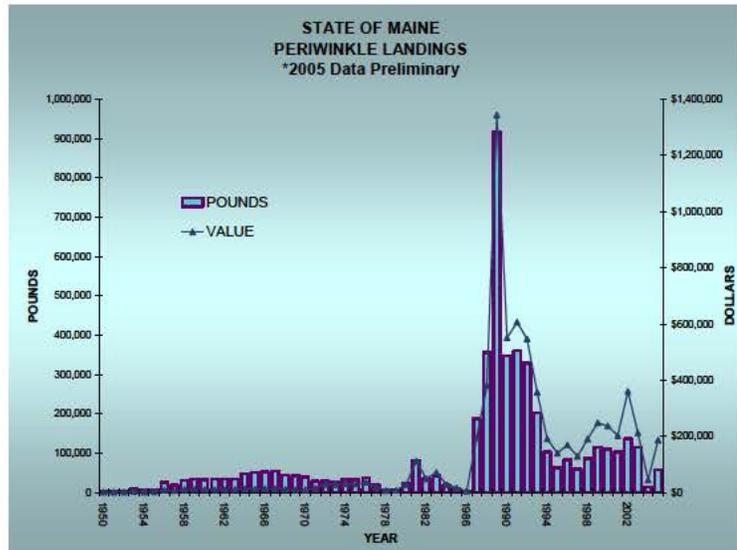


Figure 18. Source: Maine Dept. of Marine Resources.

Seaweed Harvesting

Maine, with its rocky shores, nutrient-rich waters, and large tidal range, provides ideal growing conditions for more than 250 species of seaweeds. Maine harvesters collect 11 of these 250 seaweed species (Table 3), with the bulk of landings attributed to *Ascophyllum* species (commonly known as rockweed) (Heidi Bray, personal communication). Seaweeds are harvested by hand, and with rakes.

They are also harvested by mechanical means such as suction harvesters or mowers that cut the seaweed at a specific height.

Table 3 Maine's 11 Harvested Species of Seaweed with Algal Grouping, Scientific and Common Names (table by KR Wilson, data from White and Keleshian 1994 and Heidi Bray, personal communication)		
Green Algae		
	<i>Ulva Lactuca</i>	Sea Lettuce
Brown Algae		
	<i>Ascophyllum sp.</i>	Knotted wrack
	<i>Fucus sp.</i>	Rockweek, bladderwrack
	<i>Laminaria longicuris</i>	Oarweed, kelp
	<i>Laminaria saccharine</i>	Sugar kelp
	<i>Laminaria digitata</i>	Horsetail kelp, fingered kelp
	<i>Alaria esculenta</i>	edible kelp, winged kelp
Red Algae		
	<i>Porphyra sp.</i>	Laver, nori
	<i>Chondrus crispus</i>	Irish moss
	<i>Mastocarpus stellatus</i>	False Irish moss
	<i>Palmaria palmate</i>	Dulse

Common uses of these seaweeds vary by species, but include use as fertilizer, feed, packing material, and food for human consumption (Pete Thayer, personal communication). Small scale harvesting occurs all along Maine's coast. However, more substantial harvests occur in the following areas: Boothbay, Damariscotta, Sheepscot, Brunswick and Jonesport (Pete Thayer, personal communication).

There are three major processors of *Ascophyllum nodosum* (rockweed) that are harvested in Maine: Source Inc., in Brunswick, Atlantic Laboratories/North American Kelp, in Waldoboro, and Acadian Seaplants in New Brunswick, Canada. Acadian Seaplants processes the largest volume of the three plants, buying from independent harvesters or those working directly for the company. The primary markets for rockweed include both unprocessed product (as packing/shipping for shellfish) and processed product (as fertilizer, soil conditioner, and animal feed supplement) (Pete Thayer, personal communication).

FMC Biopolymer is a major processor of *Chondrus crispus* in Rockland, buying from Chile, the Phillipines, Prince Edward Island, New Brunswick, and Maine. The primary markets include food and cosmetic manufacturers for the carrageenan that is produced from the seaweed (Pete Thayer, personal communication).

At the cottage industry scale, there are some edible seaweeds operations in Maine. These businesses harvest dulse, irish moss, and kelps, dry and then package them mostly for health food stores. They also make them into seasonings, nutritional supplements, snack mixes, and bars.

Despite the success of the small cottage industry and the fact that seaweed landings have recently been relatively high, (Figure 19), the number of seaweed harvesters has decreased dramatically from 256 in 1997 to 37 in 2006. Some of this reduction occurred when the Department of Marine Resources increased seaweed harvesting permit fees (Pete Thayer, personal communication). In addition, this downward trend may be due to the fact that seaweed harvesting has not proven to be lucrative for many harvesters. It is unlikely that the seaweed industry will grow dramatically over the coming years, unless new, significant markets are found and efficient harvesting methods are developed for species such as kelp and Irish moss (Pete Thayer, personal communication).

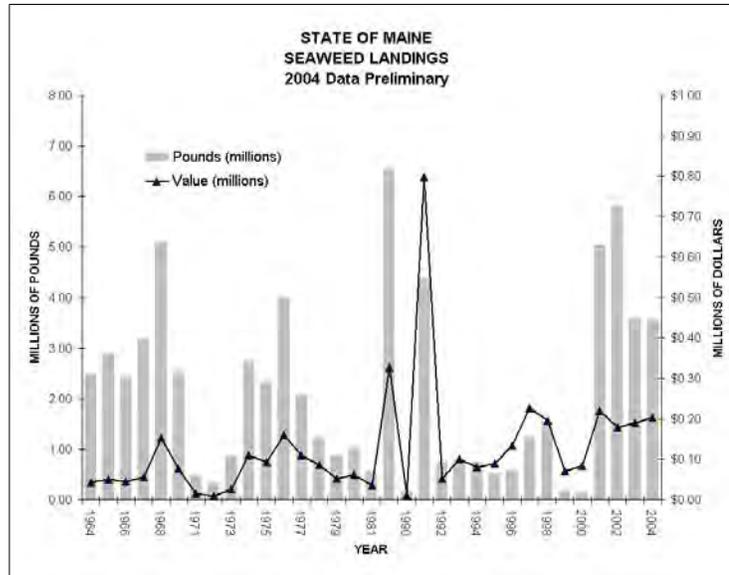


Figure 19. Seaweed Landings from 1994-2004 in Millions of Pounds and Millions of Dollars.

Source: Maine Dept. of Marine Resources' Commercial Fishing web page.

In the past couple of decades, several management measures have been passed concerning seaweed harvesting. In 1989, the state established a permitting system for harvesters that was later revised, effective 1999. These revisions established a Seaweed Management Fund that is funded by permit fees and also relegated specific, additional rule-making authorities to the Maine Department of Marine Resources. In 2000, additional specifications were mandated by law. Harvesters must now keep daily reports that are mailed monthly to the Maine Department of Marine Resources, that include the following information: dates, harvest areas, methods, harvest time, species, and pounds landed (wet weight). Specific restrictions also now apply to the harvest of rockweed, *A. nodosum* (the lowest lateral branches and minimum of 16 inches above the holdfast (base) of the plant must be left undisturbed and attached to the substrate) (Deirdre Gilbert, personal communication). The Maine Seaweed Council, a non-profit organization made up of industry representatives, harvesters, and scientists, has worked together with DMR to manage the macroalgae resource of Maine to protect sustainable use and prevent overexploitation. New language has been added to seaweed licenses issued this year (2006): “A seaweed harvesting license issued by the Department of Marine Resources is not a grant of proprietary interest in the intertidal zone, which in most cases is owned privately” (Deirdre Gilbert, personal communication). This new wording reflects the contested ownership of intertidal seaweed rights in the State of Maine. In Maine, private property interests extend to the low tide mark, and the legal precedence is *Hill v. Lord* (48 Me. 83, 96 (1861)), where the court addressed “seaweed” ownership and ruled in favor of

the private property owner. Harvesters argue that both taxes and harvesting regulations, characterize seaweed harvesting as a fishery, a protected intertidal activity under the State's Public Trust Doctrine (Duff 2003). Despite this sentiment, seaweed harvesting is not permitted in the intertidal area (extending to mean low water) in refuge lands in Maine, including Moosehorn, Petit Manan, and Rachel Carson National Wildlife Refuges. This decision affects more than 30 federally owned islands and 12 mainland refuge sites along Maine's coast. Habitat-providing vegetation may not be removed from National Wildlife Refuges under current federal law (US Fish and Wildlife Service 2001).

Herring

The herring fishery is a very important industry in the Gulf of Maine. Although some herring are utilized for canning, the majority of herring are used as lobster bait (David Libby, ME DMR, personal communication). Additionally, herring are an important forage fish for seabirds, marine mammals and other large commercially and ecologically valuable fish such as cod and striped bass.

Approximately 95% of herring landings are caught offshore (David Libby, personal communication). The small amounts (about 3000 pounds last year) that are caught inshore are primarily harvested with the use of purse seines. Although they used to be abundant on the Maine coast, there are currently only a handful of herring fishing weirs left in the state, all in the Downeast region. Should there be a return of inshore stocks of herring, there would likely be an increase in herring fishing in Maine's state waters; otherwise, this is likely to remain a predominately offshore fishery.

Commercial Fisheries Use Conflicts

Several types of conflicts exist within the fishing industry and between the fishing industry and other resource users. Issues involving gear conflicts may sometimes occur within the industry. One example is the conflict between fishermen who use fixed gear, such as lobstermen and those that use mobile gear such as shrimp, urchin, scallop and mussel draggers. The fixed gear in the lobster fishery has reduced the available space for conventional harvest by drag, forcing most of the dragging industry into smaller and smaller areas of the coast where lobsters are not fished. In addition to mobile gear fishermen, recreational boaters sometimes complain about the difficulty of navigating around lobster gear. As noted earlier, efforts are underway to reduce the overall amount of gear in the water. However, it is unlikely that these statewide or even zone-wide efforts will have an impact on those areas of the coast that are heavily congested with gear. Dealing with these congested areas on a case-by-case basis and involving all pertinent local stakeholders holds the most promise for finding a solution.

Another use conflict relates to concerns over the effects of dragging on the seafloor. Many areas that are dragged are in shallow, inner bays that may contain sensitive habitats such as eelgrass that are vital to juvenile fishes and other marine life. In addition, other commercially valuable species, such as worms and clams may be among the non-targeted organisms affected by dragging. Specifically, wormers and clambers in Maine are concerned that mussel dragging is harming worms and clams and altering their habitat (Pete Thayer, Denis Nault personal communication). Maine DMR is holding discussions among these user groups in an attempt to deal with this conflict. In

addition, concern over the impact of dragging on the sensitive eelgrass habitat has lead to recent discussions about potentially protecting some eelgrass areas from dragging (Pete Thayer, personal communication).

In addition to gear conflicts, fishermen are also dealing with a dwindling supply of waterfront access. In 2002, Coastal Enterprises, Inc (CEI) conducted an in-depth survey of 25 communities along the coast to document the status of working waterfronts. The survey found that 75% of the fishing access was gained over privately-owned sites and facilities, and 25% over publicly owned facilities. Further, 40% of the working access over private facilities utilizes residential property, an arrangement that can be very volatile (CEI 2002). Recent statewide efforts have been enacted to help preserve working waterfront. Passage of a \$12 million Land for Maine's Future bond in November 2005 established a unique working waterfront protection program, funded by a \$2 million set-aside. The money will be awarded in grants to projects that protect strategically significant working waterfront properties. Additionally, Maine voters approved an amendment to the State Constitution which permits waterfront land that supports commercial fishing activities to be assessed based on the land's current use. The amendment was enacted to prevent the conversion of working waterfront land to other uses as the result of economic pressures caused by the assessment of land for property taxation at values incompatible with its use as working waterfront. Despite these efforts, it is expected that over the coming years, the conflicts will continue between the growing sector of coastal community residents whose livelihoods are not tied to the coastal economy and those residents whose livelihoods depend on commercial use of Maine's marine resources.

MARINE RESEARCH AND EDUCATION

Throughout the Maine coast there are a number of institutions, such as colleges, universities agencies, organizations and companies conducting marine research in Maine’s nearshore waters. Although a comprehensive list of all research institutions is not available, most of them are listed below (Table 4) as members of the Maine Marine Research Coalition (MMRC), which was formed in 2005. The MMRC is “an association of research, education and commercial institutions bound together by their history of work on the issues surrounding Maine’ ocean-based economy” (MMRC 2005). Together, the MMRC institutions employ 430 Maine residents and spend \$50 million annually (MMRC 2005). Given multiplier effects, the total impact of MMRC institutions to the Maine economy is over \$100 million (MMRC 2005).

Table 4 Maine Marine Research Coalition <i>Source: MMRC 2005</i>	
Institution	Location
Bates College	Lewiston
Bigelow Laboratory for Ocean Sciences	West Boothbay
Bowdoin College	Brunswick
Cobscook Bay Resource Center	Eastport
Colby College	Waterville
Downeast Institute for Applied Marine Research & Education	Beals
Gulf of Maine Ocean Observing System	Portland
Maine Aquaculture Innovation Center	Orono
Maine Department of Marine Resources	Headquarters - Hallowell Laboratories - West Boothbay and Lamoine
Maine Maritime Academy	Castine
Marical, Inc.	Portland
Mount Desert Island Biological Laboratory	Bar Harbor
Pemaquid Oyster Company	Waldoboro
Penobscot East Resource Center	Stonington
R.J. Peacock Canning Company	Lubec
Sea Run Holdings, Inc	Freeport
University of Maine	Aquaculture Research Center - Franklin Darling Marine Center - Walpole School of Marine Sciences - Orono
University of Maine at Machias	Machias
University of New England	Biddeford
University of Southern Maine	Portland, Gorham and Lewiston/Auburn
Wells National Estuarine Research Reserve	Wells

Maine's research institutions are engaged in a variety of projects, some of which require the direct use of Maine's nearshore waters and others that are done remotely or in laboratories. Although it was beyond the scope of this report to do an inventory of these projects, it is known that the research covers many different fields including, but not limited to, commercial fisheries, aquaculture, marine invasive species, marine biodiversity, climate change, and the oceanography of the Gulf of Maine. Another rapidly emerging field is that of marine biotechnology. Marine biotechnology "merges traditional marine biology with innovative molecular, cellular and genetics techniques" (Gulf of Maine Research Institute 2006). Some of the outcomes of this research include the transformation of products from marine organisms into food, pharmaceuticals, as well as into other chemicals and products (Gulf of Maine Research Institute 2006). The development of marine biotechnology and the marine research field as a whole will be bolstered by the \$4 million Maine Marine Research Fund, established by a legislative bond in 2005.

Special Licenses for the Collection of Marine Organisms

Some of the institutions listed above as well as other facilities, including K-12 schools, collect marine organisms for research and educational purposes. Collection of marine organisms for these purposes requires a "special license for research, aquaculture or education that exempts the holder from one or more marine resources' laws as to the time, place, length, condition, amount and manner of taking or possessing a marine organism" (Title 12 §6074). The license, which must be renewed annually, is not issued to an institution as a whole, but to the individual or individuals who will be doing the collecting of the organisms. In addition to the names of these individuals, each application for a special license must include a description of "the proposed project including the objectives, the location and the estimated time of completion of the project. The application shall also include a list of the sections of law or regulation for which exemptions are required, and the specific reasons for each requested exemption" (Title 12 §6074).

According to Laurice Churchill of ME DMR the number of special licenses issued by that agency has increased from 84 in 2000 to 116 to 2005. The increase may be due in part to a spreading awareness of the special license requirement (Laurice Churchill, personal communication). Of the approximately 100 special licenses issued so far in 2006, about 20% were issued to ME DMR staff. The other 80% consisted mainly of individuals from educational institutions such as primary and secondary schools as well as colleges and universities. A small number of licenses were issued to other state agencies as well as aquariums, biological supply companies and aquaculture facilities. Although the majority of these licenses are issued to Maine residents, a few were also issued to individuals from other states.

Marine Research and Education Use Conflicts

One potential use conflict with marine research is the intentional or incidental interference with research projects by individuals engaged in other activities such as recreation and fishing. Oftentimes, researchers require the use of an area of undisturbed submerged land or water to conduct experiments. Although intentional interference with research projects is likely rare, accidental disturbance of experiments may be somewhat more common. Marking the designated research area (when possible) as well as raising public awareness about the project may help avoid

unintentional interference with these experiments. In some cases, there may be a conflict between the needs of the researcher and those of other resource users, most notably commercial fishermen. For example, ME DMR annually conducts an inshore trawl survey that requires that lobster pots and other fixed fishing gear be removed temporarily from the trawl area (Deirdre Gilbert, personal communication). Other research projects may require an area to be free from fishing impacts for longer periods, potentially creating a minor or major inconvenience for fishermen. These conflicts do not appear to be prevalent or widespread. Although there are many research institutions along the coast, some of them utilize Maine's nearshore waters only intermittently, if at all. Furthermore, as noted earlier, raising awareness about these projects and their importance may help to prevent conflicts.

Another issue relates to the potential environmental impacts of marine research, including the collection of marine organisms. For example, as the field of marine biotechnology develops, there will be further demand for obtaining pharmaceuticals and other valuable products from marine organisms, potentially resulting in an increased harvesting of target species. In many cases, this heightened demand will be short lived. Over the long term, it is likely that laboratories and pharmaceutical companies will want to develop synthetic alternatives to each new product to avoid the costs associated with harvesting live species (Colgan and Baker 2000). Currently, it is difficult to determine how many organisms are being collected for the use in product development. The ultimate use of harvested species is not tracked with commercial or special licenses or through landings data. However, in the next year, ME DMR will be drafting rules that will require dealer reporting of this information (Heidi Bray, personal communication).

MARINE TRANSPORTATION

Cargo Port Traffic

Maine has three cargo port areas along its coast, with locations in Eastport, Penobscot Bay (which includes Bangor, Bucksport, Searsport, and Rockland) and Portland (which includes South Portland) (Figure 20). Since the late 1970s, Maine has promoted a “Three-Port-Strategy,” which acts to encourage port development in Eastport, Searsport, and Portland. These ports have grown dramatically since the program began. In 1980, Searsport handled only a small amount of dry cargo, while Eastport and Portland handled none. Today, the three ports collectively handle over 1.7 million tons of cargo, with Searsport and Portland handling an additional 125 million barrels of petroleum products (Maine Department of Transportation 2006). Considerable investments have been made in these ports, with a \$20 million dollar facility completed in 1998 in Eastport, a new \$20 million dollar terminal in Searsport in 2003, and plans to redevelop the International Marine Terminal in Portland following the completion of a new passenger terminal that will allow the separation of cargo and passenger operations (Maine Department of Transportation 2006; Port of Portland Maine 2006). Due to the large volume of petroleum imports through private terminals in South Portland, the Port of Portland is one of the largest foreign inbound tonnage transit points in the United States, the largest tonnage port in New England, and one of the largest oil ports on the East Coast (Port of Portland Maine 2006).

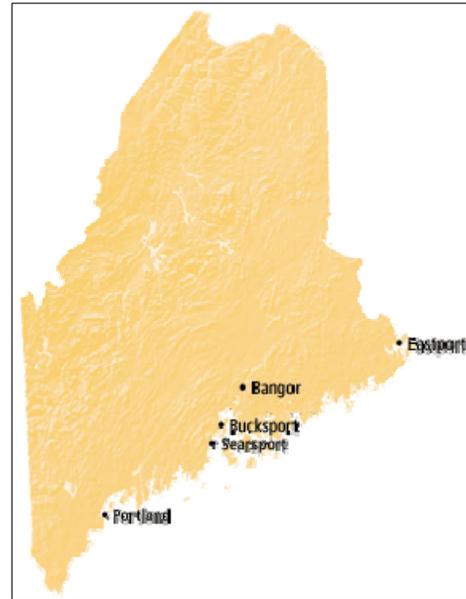


Figure 20. Location of Maine’s five cargo ports. *Source: Maine Port Authority, 2006*

The amount of tonnage at Maine’s major ports increased steadily from 450,000 in 1950 to 1,533,388 in 2004. According to Maine State transportation officials, 2005 was a record-setting year for Maine in terms of the amount of tonnage of dry cargo shipped through the State’s ports, with 1.7 million tons (combined total for Eastport, Searsport, and Portland). This is an 11.4% increase over 2004 tonnage amounts. Searsport had the biggest increase from 2004 at 25%, with Portland increasing by 15% and accounting for nearly half of the State’s total dry cargo (Associated Press 2006).

Since September 11, 2001, considerable efforts have gone into security and infrastructure improvements of Maine’s transportation system, including port facilities, while maintaining economic vigor. Port security plans have been developed and security procedures established in all ports, which has been seen as some inconvenience but not a major impediment or limitation on growth in cargo shipping activities.

Maine continues to follow the Three-Port Strategy that was first implemented in the late 1970s to preserve the coast of Maine's resources while at the same time encouraging needed industrial port development. Recent improvements to the International Marine Terminal in Portland, such as the purchase of a new container crane and additional land, have ensured that the Port of Portland remains competitive as a container feeder service (ME Department of Transportation, Office of Freight Transportation).

The Maine Integrated Freight Plan (prepared by Cambridge Systematics, Inc. in 2002) suggests that Maine may improve marine transport efficiency by enhancing the inter-modal connections at the three major ports. Inter-modal connections are those made between sea-based transportation infrastructure, such as ports, and land-based transportation infrastructure such as rail service and major highways. Improving inter-modal connections in Maine includes continuing to enhance truck access to the highway from the Port of Portland and potentially developing limited rail access near the port of Eastport. The Integrated Freight Plan also recommends continued funding for the Small Harbor Improvement Program (SHIP) to identify and fund projects that would improve marine freight operations, primarily for commercial fishing, in areas not included in the existing three-port configuration. In the longer term, the plan recommends expanding the three-port program to improve operation of the state's overall marine transportation system to include other ports. The three port strategy is currently under review in the context of a strategic plan for port development, which is due for completion in the spring of 2007. This plan will consider needs and opportunities for cargo shipping in other ports. However, major investment programs will continue to concentrate on the three primary ports.

Marine shipping is stable for now with some increases in bulk commodities shipping³. The Maine Department of Transportation (ME DOT) sees a big opportunity in global containerized shipping.⁴ Congested ports on both the West and East coasts have shippers looking for new ports relatively close to eastern markets. Maine ports with good highway and rail connections could be developed to handle containerized shipping.

Public investments in cargo port development will continue to be public/private partnerships, such as the recent and planned investments of bond funds in Searsport and Portland. Factors that may limit growth in marine transportation include the lack of inadequate funding (in terms of public sector general obligation funding due to budgetary constraints within the state), tight land side space, the need for good land transportation connections, and barriers created by development permitting (Brian Nutter, ME DOT, personal communication).

Ferry Service

Both privately-owned companies and state-owned and operated ferries service Maine's coastal region, including limited travel to the Canadian Maritime Provinces. Prices and schedules are subject to change with season, with some services accommodating vehicles, bicycles, and pets in addition to passengers (Maine Today 2006). There is regular ferry service through a combination of

³ Bulk commodities include oil products, tapioca, cement and wood chips, for example.

⁴ Containerized shipping is the transport of large containers that are transferred directly to trucks or trains.

public and private operators to islands in Casco Bay, Penobscot Bay and around Mount Desert Island. High speed ferry operations also connect some Maine ports to Canada, including the CAT from Bar Harbor and Portland, Maine to Nova Scotia, Canada (Bay Ferries 2004).

The Portland Ocean Gateway project will help improve the ferry service to Canada provided by the CAT. The operators of the CAT are still assessing the viability of service to Portland and considering possible service to a point further south, such as Portsmouth. Securing and maintaining current services seems to be the short term outlook for this international ferry service (Ron Roy, ME DOT, personal communication).

Ridership on the Maine state ferry service boats is increasing at most, 1-2% each year (Ron Roy, personal communication). There is some shifting in the type of ridership as island communities change to more seasonal, residential uses with more service vehicles and truck traffic to serve the needs of island residents and property owners. There is not an expected increase in ferry services, either by public or private ferry services over the next several years (Ron Roy, personal communication).

The Maine State Ferry Service is replacing the Vinalhaven ferry with a slightly larger vessel (from 17 to 21 vehicle capacity), which will serve the island's needs. It is noted that island communities tend to rely on the capacity of the ferry as a growth management tool, figuring that limited capacity discourages overwhelming development. This is not an official policy, but does reflect some island sentiments, and points out the complicated nature of the public ferry links to the mainland (Ron Roy, personal communication).

Private ferry services to islands such as Chebeague and the Cranberries are well established and are providing a vital service. Operating costs and changes in ridership will influence the future viability of these services. New private ferry services are running marginal operations at best with limited demand (Ron Roy, personal communication).

The concept of additional, coastal, fast ferry services for the transport of residents and tourists within Maine will be reassessed as the state updates its current "Twenty Year Transportation Plan". The development of the small cruise ship industry shows the potential for moving people along the coast by boat, but a ferry service has yet to develop.

Some of the issues affecting expansion of ferry service include the pervasive lack of parking space, increased security and fuel costs, a shortage of shorefront space needed for new or expanded facilities, and the fact that many ferry travel lanes and terminal approaches are increasingly crowded with recreational boats.

Cruise Ships

The cruise ship industry is one of the fastest growing sectors of the travel industry (Center for Environmental Leadership in Business 2003). In 2001, the industry contributed \$11 billion dollars directly to the United States economy, with an additional \$9.7 billion dollars paid in wages and salaries for the 267,000 industry-supported jobs (University of Maine Department of Resource Economics and Policy 2003). Most of the industry is consolidated into three firms: Royal

Caribbean Cruises Ltd., Carnival Corporation, and Norwegian Cruise Lines (Center for Environmental Leadership in Business 2003).

In Maine, most cruise ships qualify as “large commercial passenger vessels” or LCPV’s, since they provide overnight accommodations for at least 250 paying passengers (Maine Department of Environmental Protection 2006). Prior to 1985, three to six vessels per year visited Maine, while the number jumped to 65 vessels per year by 1992, averaging 250-1,200 passengers per ship (Maine Coastal Program 1992). In 1992, Portland was the major hub of LCPV traffic in Maine. The number of LCPV’s has increased in Maine state waters in recent years, with Bar Harbor and Portland becoming the two major ports for these types of vessels. As evidence of this growth, Bar Harbor had a 36% increase in the number of ships visiting in just four years (56 ships in 2001 versus 76 ships in 2005). Accordingly, in Bar Harbor the number of passengers has increased as well from 14,000 in 1991 to roughly 100,000 in 2004 and 2005 (Brian Nutter, personal communication). Likewise, Portland has experienced major growth within the past 10 years, welcoming 45,225 passengers in 2005 (University of Maine Department of Resource Economics and Policy and the Center for Tourism Research and Outreach 2006).

The cruise ship industry is a key economic force, infusing the local retail economy of host ports and creating jobs. On average, cruise ship passengers spent over \$100/day in port, contributing \$12.1 million dollars to the Bar Harbor economy and \$6.7 million dollars to the Portland economy in 2005. Typically, September and October are the busiest cruise ship months (University of Maine Department of Resource Economics and Policy and the Center for Tourism Research and Outreach 2006).

Currently the industry is branching into smaller, 50-100 passenger vessels, which visit smaller ports-of-call including Boothbay Harbor, Port Clyde, Bath, Rockland, Camden, Belfast, Castine and Bangor. There are currently three cruise lines whose voyages include visits to some of these smaller ports: American Cruise Lines, American Canadian Caribbean Lines and Cruise West (formerly Clipper Cruise Lines). Continued growth is seen in this segment of the industry with more ships and increased offerings (Brian Nutter, personal communication).

Waterway transit access, port facilities and services in these harbors are generally adequate to handle the ship sizes, passenger landing, docking and mooring needs (Brian Nutter, personal communication). Additionally, ME DOT sees little problem with adequate channel depths, cruising lanes, and fitting into fishing and other coastal transportation activities once basic arrangements are in place.

It seems likely that the cruise ship industry will continue to grow, with the Maine Port Authority and the Maine Office of Tourism promoting Maine as a premier tourist destination at trade shows and on the internet and by offering promotional deals to travel agents. The Maine Port Authority continues to work with port and harbor officials and businesses to accommodate the cruise ship industry. They see positive growth in this industry, with spin-off benefits for businesses that cater to cruise ship passengers visiting Maine ports-of-call.

Marine Transportation Use Conflicts

Many of the issues associated with expansion of port facilities and ferry service are land-based, such as competition with other uses for waterfront land. There are also some water-based conflicts with cargo ships and ferries as they interact with fishing vessels and the recent increase in recreational boaters. Recreational boaters are generally less educated as to the “rules of the road” and may get in the way of ferries and cargo ships. It does not appear that the conflict with recreational boaters is of widespread concern at this time, but it is growing and needs to be carefully monitored. In recent years, harbor pilots, fishermen, the Maine/New Hampshire Port Safety Forum and the US Coast Guard have worked cooperatively to establish clearly defined designated transit lanes for deep draft vessels. This has dramatically reduced the conflicts between cargo ships and fishing boats (Brian Nutter, personal communication).

There are several concerns related to cruise ships visiting these smaller towns as well as larger ports-of-call, such as Portland and Bar Harbor. Some of these issues include fears of overcrowding harbor waterfronts, overwhelming small communities, and maintaining the character of these coastal towns while at the same time developing or enhancing businesses that cater to cruise ship passengers. Achieving this balance requires thoughtful shore-side planning and appropriate development, coordination between businesses, cruise lines, shore excursion operators, and municipalities.

There are also environmental concerns related to the cruising industry in Maine. Specifically, cruise ships may impact the natural environment in a number of ways, including: air emissions, ballast water and non-native species, solid waste, and the discharge of oily bilge water. The cruise industry has responded to many of these challenges, working to improve their environmental image. For example, in 2001, members of the International Council of Cruise Lines (ICCL) adopted a set of waste management standards, building on recommendations from the United States Environmental Protection Agency and the International Maritime Organization. These standards include environmental awareness training of crew and shore-side vendors (Center for Environmental Leadership in Business 2003). The standards agreed to by members of the ICCL generally exceed the requirements imposed by federal and international requirements.

Maine has worked to ensure the protection of its coastal waters while promoting the economic growth that the cruise industry brings. In 2004, new legislation entitled, “An Act to Protect Maine’s Coastal Waters,” called for new regulations regarding the discharge of black water (human bodily wastes or materials from receptacles intended to receive those wastes) and gray water (galley, dishwater, bath, and laundry waste water). These new regulations prohibit the discharge of gray water or a mixture of black and gray water into Maine state waters for privately owned LCPV’s, unless permitted by the Maine Department of Environmental Protection (ME DEP). These regulations apply only to LCPV’s and not the aforementioned smaller cruise ships, which generally hold their wastewater until it can be pumped into a municipal treatment system. The recently adopted “No-Discharge Zone” (NDZ) in Casco Bay prohibits discharges from all vessels within the Casco Bay area (ME DEP). There are plans to institute a number of additional NDZ’s at other locations along the Maine Coast in the coming years (ME DEP 2004b). However this can only be accomplished if the areas can provide adequate pump-out facilities for the maritime traffic that generally uses the area. (Please see the sections on Marine Pumpouts and No Discharge Zones

under Water Pollution). Some LCPV's are also installing on-board wastewater treatment facilities that exceed the water quality standards of land based systems (Brian Nutter, personal communication).

MARINE RECREATION

Boating and Boating Facilities

The popularity of recreational boating in Maine appears to be experiencing steady growth. Between 1998 and 2005 registrations of recreational boats increased from 126,665 to 128,202 boats (Bill Swan, ME Department of Inland Fisheries and Wildlife). Sailboats make up approximately 2.7% of the total number of registrations while the remainder consists of motor boats (ME DIFW). About 45% of these registered boats spend some or all of their time on coastal waters (ME DIFW).

Conversations with harbor masters from southern, mid-coast and Downeast Maine suggest a statewide increase in recreational boating activity. Scarborough Harbor master, David Corbeau, stated that four years ago, there were about 60-70 launches a day of recreational boats at the Scarborough boat ramp. This past summer, there were about 130 launches a day. The demand for moorings is also high. According to a 2003 study of 25 coastal municipalities conducted by Coastal Enterprises, Inc (CEI), 56% of these towns have recreational boaters on waiting lists for moorings. The number waiting varies from 3 people in Islesboro to 350 in Freeport. The length of the wait time ranges from several months to 20 years (CEI 2003). In 2003, there were 980 recreational boaters on waiting lists throughout the 25 communities surveyed by CEI (2003). Comparatively, there were 95 commercial fishermen on waiting lists in these towns (CEI 2003). (It is important to note that there are many people on both of these waiting lists who may already have a mooring but are waiting for a better spot to open up).

According to reports from several harbor masters, some of the demand for moorings is a direct result of increased coastal development. Philip Rose, selectman from Machiasport, said there has been an increase in demand for moorings as a result of the addition of several subdivisions in that town. Dave Schmanska, harbor master for the villages of Port Clyde and Tenants Harbor in St. George, indicated that people purchasing property on the coast often want to ensure they will have a mooring in front of their house before they buy their property.

There has also been an increase in demand for moorings from people residing outside of these coastal municipalities. Some boaters like to purchase “convenience moorings” in harbors outside of their home port (Dave Schmanska, personal communication). These boaters usually have a mooring in their own town but want a second one at another location, farther up the coast, for example. In this way they will have a guaranteed place to moor their boat while cruising the coast, even though they may only use the mooring once or twice a year. Demand from outside also comes from residents of towns that have long waiting lists. Rather than waiting for a mooring, these individuals may choose to moor their boats in other towns that have shorter or non-existent waiting lists (Dave Schmanska, personal communication). In some cases these individuals must drive long distances from their homes to their boats. Although towns can not prohibit non-residents from buying a mooring, they can make these individuals pay higher fees for the mooring.

Municipalities are trying to meet the demand by increasing the number of moorings where possible. Among the 25 towns surveyed by CEI (2003) there was an 8% increase in the number of

recreational moorings from 6,880 to 7,216 between the years 2002 and 2003 (CEI 2003). Nine out of the twenty-five municipalities surveyed by CEI indicated that they have plans to expand their mooring fields (2003). However, seven of these 25 municipalities are not able to expand because they are limited by geography.

Increases in recreational boating have also lead to a need for more or expanded marinas. According to the Maine Marine Trades Association (Susan Swanton, Executive Director, MMTA), there has been some slow growth (1-2 new or expanded facilities per year) in the number and size of marinas and boatyards along the Maine coast. This growth is expected to continue, especially in southern and mid-coast Maine. The highest demand for new facilities is in mid-coast Maine (Susan Swanton, personal communication).

Marina growth and expansion is principally limited by siting requirements such as water depth, harbor shelter, and by state and local permitting requirements. New and/or expanded facilities are also subject to opposition from residential owners of shorefront property, especially seasonal residents. Lack of affordable waterfront land and rising waterfront property taxes are the major impediments to those wishing to develop or expand marinas and boating facilities (Susan Swanton, personal communication).

Recreational boating activity and the demand for supporting infrastructure will likely grow over the next decade. Much of this growth will likely be due to the expected, continued increases in coastal population.

Docks, Piers and Wharves

With increased private development along the coast, private docks, piers, and wharves have become more common. Their proliferation has elevated concern at the local, state, and federal levels regarding the cumulative and discrete impacts to coastal wetlands and scenic resources along the coast. Some of the direct impacts are resource degradation, fragmentation, and habitat loss. Other issues include use conflicts between new docks and the existing and traditional uses of the coastal zone. Indirect resource impacts, such as scour and destruction of submerged aquatic vegetation and oil and gas contamination from boats coming into and going from the docks, piers, and wharves are also of concern.

In response to this, the Maine Department of Environmental Protection (ME DEP) removed docks, piers, and wharves from 'permit-by-rule' status. If these structures are to be permanently in place, they now require a full permit under the Natural Resources Protection Act (NRPA). Through statute, ME DEP has had the authority to assess impacts to scenic resources and to address cumulative impacts as part of their permit review procedure; until recently, the Department lacked a method to do so. In July of 2003, as part of the permit review process, ME DEP adopted a standard operating procedure for assessing impacts to existing scenic and aesthetic uses under the Natural Resources Protection Act. In February of 2004, ME DEP adopted and began applying a similar standard operating procedure for assessing cumulative impacts to protected natural resources under the Natural Resources Protection Act.

To support the regulatory changes relevant to docks, piers, and wharves, the Maine State Planning Office (ME SPO) is revising its dock construction handbook, originally produced in 1996. The revision will include more discussion of the resource implications of building docks, will offer best practices to minimize the effects, and will encourage the use of community docks in appropriate settings. ME SPO is also in the process of developing model ordinance language and guidance for towns interested in applying procedures to address cumulative impacts and impacts to scenic and aesthetic resources.

Sea Kayaking

Maine's long coastline and numerous islands continue to be an attraction for both resident and nonresident kayakers. Although the popularity of kayaking continues to increase, there has been a shift in the type of kayakers entering the sport. Natalie Springuel, a marine extension associate with Maine Sea Grant and former president of the Maine Association of Sea Kayak Guides and Instructors (MASKGI) notes that the growth in the number of experienced paddlers using traditional sea kayaks appears to have stabilized in recent years (based on anecdotal evidence from MASKGI meetings). This trend comes after a relative boom in the industry in the late 1990's. Many people entering the sport today appear to have less of an interest in becoming experienced, technical sea kayakers (Dave Mention, Maine Island Trail Association and Natalie Springuel, personal communication). Instead, it seems they are looking for a way to experience kayaking on the Maine coast without spending a lot of time or money on the sport. One indication of this change is that many tour operators are now offering more half-day trips rather than extended overnight trips (Natalie Springuel, personal communication). This shift makes it easier for people with less experience, lower levels of fitness and tighter schedules to participate in sea kayaking. According to Scott Shea, president of MASKGI, these shorter trips are also becoming more prevalent because they are more profitable for sea kayak guides than multiple day trips.

Another important indicator of change in the kayaking industry has been the increasing popularity of recreational kayaks over traditional sea kayaks. According to Wavelength Magazine (2005), over the past couple of years, national sales of the recreational kayak outpaced sales of traditional kayaks by a ratio of 8 to 1. Recreational kayaks are relatively light and durable, are appropriate for a wide range of fitness levels and body types and are much less expensive than traditional sea kayaks (Wavelength Magazine 2005). Additionally, these boats can be purchased from outfitters and from large retail stores such as Walmart. People who buy a recreational kayak from these large retail stores often do not receive the instruction on kayaking safety that is usually offered to customers of kayak outfitters (Dave Mention, and Natalie Springuel, personal communication). The lack of training and education can lead to safety hazards and use conflicts. The purchase and use of these recreational kayaks will likely increase over the coming years as will the need to educate these users about kayaking safety.

Recreational and traditional sea kayakers alike utilize the Maine Island Trail, a 350 mile long waterway of public and private, island and mainland sites where boaters can land for day visits or overnights. Although motor and sail boats also use the Maine Island Trail, the majority of boaters who land on the islands consist of kayakers (Dave Mention, Maine Island Trail Association personal communication). Most recreational kayakers likely use primarily nearshore islands, given that these boats are not designed for extended, offshore paddles (Natalie Springuel, personal communication).

Currently there is little scientific, quantitative data concerning the use of the trail. However, Dave Mention of the Maine Island Trail Association (MITA) indicated that the data collected by monitor skippers and from the entries in logbooks on the state-owned islands suggest that some islands on the trail are used more frequently than others. The MITA data shown in Figure 21 suggest trends similar to those observed anecdotally by Natalie Springuel. She indicates that the Stonington Deer Isle area is popular with paddlers due to the presence of many islands and multiple camping sites. She also indicated that Casco and Muscongus Bays are frequently utilized by kayakers. The Downeast area is gradually becoming more popular with experienced kayakers looking for new challenges (Natalie Springuel, personal communication). However, it is unlikely that this area will become extremely popular with a wide range of paddlers given the difficulty of dealing with the extreme tidal range and currents. Over the next few years, any increased use of the Maine Island Trail is likely to occur in and around the areas that are already popular with paddlers (Natalie Springuel and Dave Mention, personal communication).

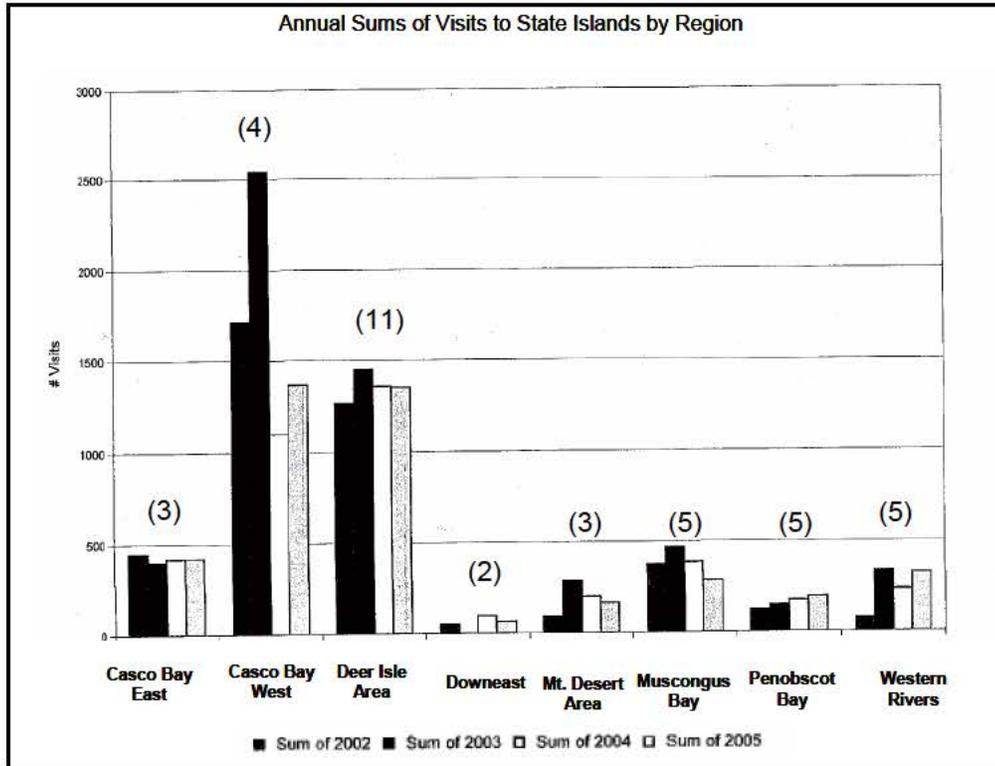


Figure 21. Numbers in parentheses (added by E. Stephenson) represent the number of state islands in that region. Source: 2005 State Islands Overview, MITA. Data for this figure comes from volunteer monitor skippers that make intermittent observations about island use and from logbooks filled out by visitors to state islands.

Source: 2005 State Islands Overview, Maine Island Trail Association

Sea kayakers and the sea kayak tour industry are conscientious about minimizing impact to the islands they visit (Dave Mention and Natalie Springuel, personal communication). For example, in the past five years, many kayak tour operators moved away from primarily using state owned islands for their tours. Some of these operators have made agreements with private property owners to use their islands with certain conditions (Natalie Springuel, personal communication). In this way, the tour operators avoid the congestion of state islands and reduce some of the impact on those popular places. Similar concerns about impacts on the islands caused many tour operators to voluntarily decrease their standard group size (Natalie Springuel, personal communication).

The sea kayak industry also promotes “Leave No Trace” principles to minimize human impact to the islands. There is anecdotal evidence that islands that are visited frequently by kayakers seem to have less trash on them than those that get infrequent use (Dave Mention, personal observation). According to Dave Mention, kayakers following “Leave No Trace” principles not only pack out their own trash, but often they also take with them any marine debris that they find on the island, thus leaving the island cleaner than they found it.

Wildlife Sightseeing

Based on information from the Maine Office of Tourism and other Maine tourism websites, there are approximately 70 commercial operations that offer wildlife sightseeing as part of their boat tours. The boats used for touring include schooners, modern day sailboats, motor boats, mailboats and private ferries. A few of these are advertised as being seal watches, whale watches or puffin cruises. However, in many cases, these boat tours are not advertised primarily as wildlife cruises. Instead, the opportunity to view wildlife such as seabirds, seals and whales is listed as one of the “highlights” or “things to do” while on the cruise. Other aspects of these cruises often include lighthouse viewing and a chance to see a lobsterman in action.

Close to half of these boat tour operations were based in the greater Penobscot Bay area. About 15% were based out of the greater Casco Bay area, 10% from the southern Maine coast, 12% out of Mount Desert Island, 7% out of Boothbay Harbor, 7% in Downeast Maine, and another 4% from the towns of Brunswick, Port Clyde and Georgetown combined. These numbers only account for those outfits that register with the Office of Tourism or those advertise on other internet tourism sites. Thus, these values may underestimate the actual number of boat tours available in Maine.

Ten of the businesses identified above offer cruises devoted to whale watching. Although whales are sometimes sighted in nearshore waters, whales and thus the whalewatch boats spend most of their time offshore, well outside of state waters. According to Cara Pekarcik of the Whale Center in Gloucester, Massachusetts, whale watching in New England is still a popular activity but seems to have reached a plateau in recent years. Zack Klyver, a naturalist with Bar Harbor Whalewatch also does not foresee dramatic growth in the industry over the next few years. Mr. Klyver indicates that future modest growth would likely occur in the number of small scale operations that use smaller boats to conduct wildlife tours in nearshore waters. One of the limitations to growth in this industry may be finding additional space in the harbors where the tour operators can dock their boats.

Saltwater Angling

Saltwater angling continues to be a popular pastime in Maine, although it does not appear to be on an increasing trend based on data from ME DMR and from industry representatives. Saltwater fishermen are not required to have a license in Maine. Therefore, to determine the amount of effort in the fishery, the ME DMR conducts the Maine Recreational Fisheries Statistics Survey (MRFSS) on an annual basis. According to the MRFSS, 287,434 anglers went saltwater fishing in Maine in 2004 (Table 5). Of these anglers, 132,247 were Maine residents. Another measure recorded by the MRFSS is the number of annual saltwater fishing trips. This number has generally been above 900,000 per year for the past several years, except in 2004 when it dipped to 750,000 trips, possibly due to poor weather. About half of these fishing trips were conducted from shore (either on the beach, a jetty or a pier) and the other half were conducted from a boat. The large majority of boat trips took place on private or rented boats while a very small percentage consisted of charter boat trips. An increasing number of people are also engaging in fishing from sea kayaks, according to Scott Shea, president of the Maine Association of Sea Kayak Guides and Instructors. Mr. Shea expects sea kayak fishing to continue to grow in popularity over the coming years.

Table 5					
Number of Saltwater Anglers Recreationally Fishing in Maine					
<i>Source: Marine Recreational Fisheries Statistics Survey, Maine Dept. of Marine Resources</i>					
	2000	2001	2002	2003	2004
Maine Resident Anglers	159,228	142,204	143,404	188,340	132,247
Out of State Anglers	150,224	166,015	172,154	169,763	155,187
Total	309,670	308,220	315,558	358,103	287,434

The data above from the MRFSS indicates that the number of saltwater anglers has fluctuated since 2000. Information obtained from several Maine charter boat captains, including Barry Gibson who has 36 years of experience in the industry, suggests that the overall popularity of recreational saltwater fishing has reached a plateau in recent years. Gibson states that due to commercial over-harvesting, there are relatively few types of fish for recreational anglers to target. Additionally the presence of high quality fishing in neighboring states means that Maine is not a prime destination for saltwater angling. He notes that his primary clients are local Mainers, people with second homes or tourists who are in Maine on vacation and decide to go fishing for a day. Only a small percentage is made up of people who come to Maine specifically to go saltwater fishing. This is one of the reasons why the charter boat fleet has not significantly increased its capacity in about a decade, according to Gibson.

Data from the MRFSS show that although saltwater fishing occurs along the entire coast of Maine, most of the trips occur from Boothbay Harbor and south. This trend may be reflected by the fact that the reported number of sportfishing charter boat operations appears to increase dramatically as

one heads from Eastport to Kittery (Figure 22). The pattern is likely due to the fact that striped bass are more abundant in southern Maine. Also, it is easier to reach good, offshore fishing grounds from southern Maine as compared to other areas of the state (Barry Gibson, personal communication).

According to the MRFSS, anglers in Maine caught 25 different species of fish in 2004. However, for the majority of shore anglers, private boat anglers and charterboat anglers, striped bass was their targeted catch. Landings of this species have been relatively stable over the past several years (Figure 23).

Marine Recreation Use Conflicts

One of the issues facing boaters, kayakers and fishermen is the lack of public access. Currently, there are 85 state-owned or assisted tidal, public boat access sites (up from 74 in 2001). This averages out to only one state site for every 54 miles of mainland shoreline. Finding new sites for public boat access is difficult because much of the coast is already developed and property costs are very high. Additionally, there may be resistance from private property owners who live in the area surrounding the proposed boat access site (George Powell, participant at the Maine Sea Grant-hosted Forum on Coastal Access in Southern Maine, 2006).

At some of these boat launch sites, use by kayakers has been restricted or prohibited. Kayakers often require more time than other boaters to launch from the site because there is more equipment to prepare. If there are multiple kayakers on a ramp, they can create a temporary obstruction for others who want to use the ramp. Scott Shea, current president of the Maine Association of Sea Kayak Guides and Instructors (MASKGI) stated that kayakers may not launch their boats in Stonington Harbor, but instead must travel ¼ mile away to a less convenient site (Forum on Coastal

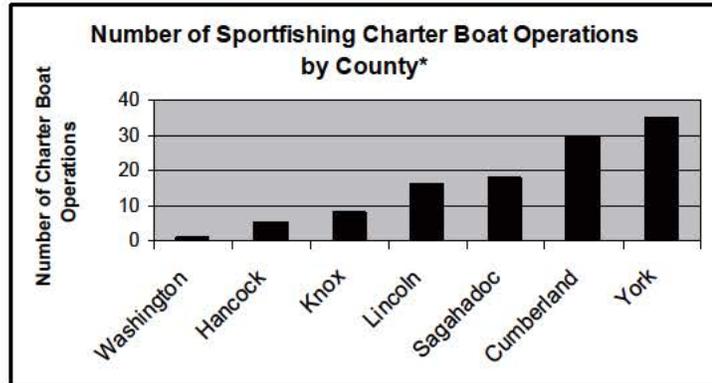


Figure 22. *This figure contains only those operations registered with the Maine Dept. of Marine Resources. Source: *Outdoors at www.MaineToday.com*; figure by Elizabeth Stephenson.

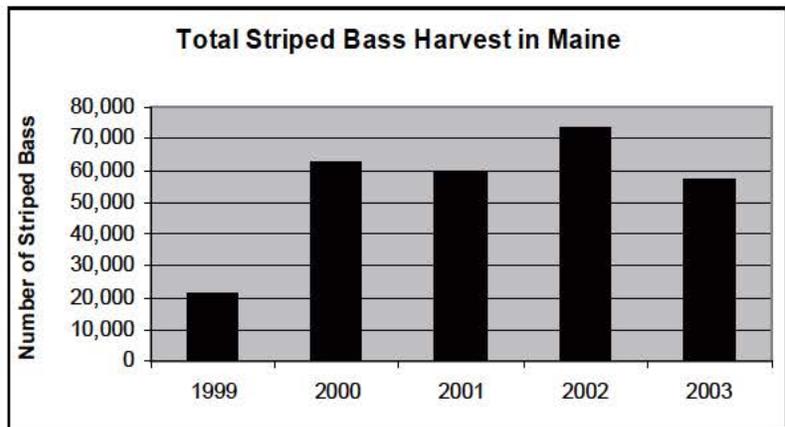


Figure 23. Source: *Maine Recreational Fisheries Statistics Survey, Maine Dept. of Marine Resources*

Access in Southern Maine 2006). He also noted that commercial outfitters are sometimes banned from using sites such as East End Beach in Portland. This ban is due to the high volume of kayakers that would be associated with regular use by an outfitter. However, Mr. Shea noted that it is these same outfitters who are educating the kayakers on the “rules of the road” that may prevent conflict with other boaters (Forum on Coastal Access in Southern Maine 2006). He indicated that these bans and restrictions make it more difficult for kayakers and kayak outfitters to pursue their sport and conduct their businesses.

Natalie Springuel, former president of MASKGI, indicates that traditional permissive use of private island and mainland sites is also decreasing. She stated that as property changes hands, the new owner may not allow the same use that was permitted by the previous owner. Additionally, both Springuel and Dave Mention of the Maine Island Trail Association indicate that the increasing number of kayakers over the past 10 years or so may have also caused property owners to be less permissive. A skiff from a sailboat dropping off eight people on an island may not seem nearly as onerous as eight kayaks landing on shore. Springuel and Mention note that although kayakers are known for their use of low impact practices, property owners may react negatively to what may seem like an armada of boats on their doorstep.

Several individuals associated with the salt water fishing industry also cited public access as one of the biggest barriers to pursuing their sport. However, Barry Gibson, a long time charter boat captain disagrees. Captain Gibson has been working in the recreational fishing industry for 36 years and has served on state, federal and international fisheries management boards. He states that access is not a significant problem for the industry. Instead, he says it is the depletion of fish species by commercial overexploitation that has harmed the recreational fishing industry. He says that either by direct harvest, bycatch or by targeting their forage fish, commercial fisheries have reduced the supply of groundfish, tuna, sharks, bluefish and others that were valued by recreational fishermen. On the other hand, commercial fishermen may have concerns about the fact that there are no restrictions on the recreational harvesting of groundfish while the commercial catch is highly restricted. However, groundfish (which are primarily caught outside of state waters) are only a minor component of the recreational fishing catch. Instead, striped bass (known as stripers) are now the prime target fish for recreational anglers and commercial fishing for this species is currently prohibited. The prohibition of a commercial fishery for stripers helps to reduce the potential for conflict between recreational and commercial fishermen. However, Gibson worries about the effects of commercial mid-water trawlers on species that are forage fish for the striped bass. He indicated that the fact that Maine’s recreational fishery is dependent on this one species makes the industry very vulnerable should anything happen to the stripers. Similar concerns over loss of forage fish were mentioned by Zack Klyver of Bar Harbor Whale Watch. Mr. Klyver worries that a depletion of forage fish could have negative impacts on whales and also cause them to forage in areas that are out of reach of whale watching boats.

One other use conflict is the potential for collision between kayakers and recreational or commercial boaters. Nationwide, in 2004, there were only a handful of collisions between kayakers and other vessels (United States Coast Guard Boating Accidents Statistics). However, the low profile of kayaks makes them difficult to see on the water and thus increases the possibility of their being struck by another boat. Natalie Springuel of Maine Sea Grant partnered with MASKGI and the U.S. Coast Guard to undertake a study to explore the effectiveness of radar reflectors in increasing sea

kayak visibility. They found that when used as described in the report, and in combination with other safe kayaking practices, radar reflectors can improve sea kayak visibility under one mile away. There was a lot of interest in incorporating these radar reflectors into kayaking gear. However, currently, no one is moving forward on an official level with this effort. There has been an effort to disseminate basic kayak safety and stewardship information to paddlers. MASKGI, Maine Sea Grant, MITA, and the U.S. Coast Guard developed a brochure entitled “From Store to Shore: Sea Kayak Safety and Stewardship.” In the past few years approximately 50,000 of these brochures have been distributed to kayak outfitters, kayak guides and to other venues and people who interact with paddlers. One challenge will be bringing this information to the increasing number of individuals who buy recreational kayaks. Given that these individuals often do not buy their kayaks from experienced outfitters and given that they are less likely to go on a guided tour, they are generally not being exposed to the safety information offered at these venues.

ENERGY FACILITIES AND RELATED DEVELOPMENT

The coastal waters of the state may be impacted by energy generation and transport now and in the future. Getting energy to and from Maine consumers and across Maine from Canada to other regions frequently involves coastal waters. Energy transmission and product transportation lines traverse Maine's coastal waters. Likewise, marine-dependent production facilities continue to operate along the coast. In the future, turbines that capture the energy from renewable sources such as wind and tidal power could be sited in coastal waters and re-gasification of liquefied natural gas or LNG in Maine is under discussion. New pipelines from energy-rich Canada are also in the planning stages. The following paragraphs provide information on some of these current and future trends in energy development in Maine.

Overview of recent energy facility siting and related activities

Liquefied Natural Gas (LNG). In 2006, Quoddy Bay, LLC and Downeast LNG, initiated the Federal Energy Regulatory Commission (FERC) process for review and licensing of LNG terminal projects in coastal Washington County. Both projects are currently engaged in the FERC's pre-filing process. Both applicants have indicated that they plan to file applications for a FERC license and requisite state approvals in the fall of 2006.

Hydropower (riverine). Since 1979, the State has reviewed 42 FERC-licensed hydropower project relicensing applications for existing projects as well as 19 applications for initial licensing of existing, expanded or new riverine hydro projects. The State granted requisite state approvals, including principally water quality certification pursuant to Section 401 of the Clean Water Act (CWA), to each of these projects except the East Machias Project (1982), the Big 'A' Project (1986), and the Bangor Dam Project (1986).

Few of Maine's many riverine hydropower projects are located in the State's coastal zone. The Edwards Dam, located at head of tide on the Kennebec River, was one such project. After an extensive regulatory process, the dam was removed pursuant to a settlement agreement resolving the parties' issues regarding the Edwards project and fish passage issues at other hydro projects in the lower Kennebec basin. A similar multi-party hydropower settlement agreement covering projects on the lower Penobscot basin provides for removal of Veazie Dam, the lowest dam on the river, and the Great Works dam upstream, construction of a fish by-pass facility at the Howland dam near the confluence of the Penobscot and Piscataquis Rivers, and construction of state of the art fish passage and power enhancements at the remaining lower Penobscot dams licensed to Pennsylvania Power and Light, dam owner and party to the settlement.

State water quality certification authority under Section 401 of the CWA is the principal tool by which the State addresses anadromous fish passage and other natural resources-related issues posed by hydropower projects. Fish passage related requirements, including dam removal, can be controversial given costs to dam owners, changes in water levels and other environmental conditions of concern to landowners, e.g., restoration of an impounded river section to free-flowing river conditions, and other factors.

Tidal power. Beginning in 2003, the Governor's Office of Energy Independence and Security (OEIS) and the Public Utilities Commission have worked with the Electric Power Research Institute (EPRI), the Maine Technology Institute, ME DMR, and other interested parties on an EPRI study "to identify and characterize sites in Maine that have significant development potential for tidal in-stream energy conversion (TISEC)" and thus provide "the basis for selecting the most promising sites for a feasibility demonstration project." This study is part of EPRI's national initiative to assess and demonstrate the efficacy of tidal and wave power projects in various coastal areas of the United States. The study, *Maine Tidal In-stream Energy Conversion (TISEC): Survey and Characterization of Potential Project Sites* (EPRI, June 2006), is a site survey analyzing tidal power production potential at 10 locations along the Maine coast, from York County to Washington County. EPRI's report indicates the potential viability of tidal power development at various sites along the Maine coast. EPRI also prepared a report providing a more detailed analysis of the Western Passage site, in the Eastport area, one of the potentially more promising sites identified in its site survey. (*System Level Design, Performance, Cost and Economic Assessment – Maine Western passage Tidal In-stream Power Plant* EPRI, June 2006).

There are currently eight applications to FERC for preliminary permits for tidal power projects at the following locations on the Maine coast (nearest town(s) indicated): Western Passage, Eastport; Cobscook Bay; Eastport and Perry; Half Moon Cove, Eastport and Perry; Little Machias Bay, Cutler; Penobscot River, Verona; Kennebec River, Bath; and Piscataqua River, Kittery. While receipt of such a permit does not authorize development or operation, it does give the holder an exclusive three-year right to file a license with FERC to develop the project. Proposals to develop tidal power resources in state waters may reasonably be expected to raise issues regarding potential effects on commercial fishing, anadromous fish, and other uses and resources.

Windpower. There are currently about 1000 megawatts of windpower under consideration for development at several locations in Maine. None of these projects is located in the State's coastal zone. The Minerals Management Service (MMS) renewables program, the need for new electric generation in New England, rising oil and natural gas prices, and changing market conditions may in the future facilitate development of wind power in Maine's coastal areas. A recent study by the National Renewable Energy Laboratory (NREL) indicates that Maine has a significant offshore wind energy resource. New technological developments may allow for siting of wind energy turbines on floating platforms in areas where ocean depths make structures fixed to the sea floor impracticable.

Interstate natural gas pipelines. Maine is host to portions of the nation's interstate gas pipeline system. The majority of the interstate gas pipeline in Maine is owned and operated by Maritimes Northeast Pipeline, LLC (Maritimes), whose pipeline extends from Baileyville to Westbrook, Maine, where Maritimes' pipeline merges with the Portland Natural Gas Transmission System (PNGTS) and continues on as "joint facilities" owned PNGTS and Maritimes) across Maine's southern border to Dracut, Massachusetts. A third interstate pipeline, Granite State Gas Transmission (Granite State) runs from Dracut, Massachusetts to Portland, Maine. These pipelines, portions of which cross Maine's coastal zone, connect the State to the Canadian as well as American national gas pipeline system and serve markets in Maine and to the south. In Maine, there are five natural gas-fired electric generators, all built subsequent to construction of the Maritimes, PNGTS and Granite State pipelines which came on line beginning in late 1998 or early 1999. There are also several large industrial customers that are substantial users of natural gas as well as smaller gas consumers.

Maritimes recently filed an application with FERC to expand its pipeline capacity to meet the needs of a Canadian LNG facility. While not currently proposed, a further significant expansion of the pipeline (send-out line(s) and increased capacity to bring the gas to market) would be needed to serve one or both of the LNG projects proposed for Washington County if approved and built.

Intrastate natural gas pipelines and transmission lines. 35-A MRSA chapter 45 requires the PUC's authorization or a certificate of public convenience and necessity to construct or operate an intrastate natural gas pipeline and appurtenant facilities. Section 4503 requires that such CPCN be filed with the Secretary of State 30 days before beginning construction and sections 4510 and 4511 require that the gas utility file information on the engineering design of the pipeline for safety review, as well as an informational map of the route. In 1999, for example, Maine Public Utilities Commission (PUC) granted such authority to Bangor Gas Company and Maine Natural Gas Corporation, which serve several communities in Maine's designated coastal zone. In contrast with FERC's approach to interstate gas pipelines, absent a complaint or an issue of cost relating to the route, Maine PUC's review has focused on the companies' business plans, financial and technical abilities as opposed to details regarding the specific location of the pipelines which were subject to state environmental permitting as applicable.

35-A MRSA section 3132 requires a transmission and delivery utility to obtain a certificate of public convenience and necessity from the Maine Public Utilities Commission before building a transmission line of 100 kV or more. Since passage of state law restructuring the electric power industry in 1999, PUC has granted such certificates for approximately five transmission line proposals.

OCS development. Due to long-standing federal moratoria, there have been no oil or gas exploration activities in U.S. waters in the Gulf of Maine for over two decades. There has never been commercial oil or gas development in this area, although natural gas resources off Canada's Scotian shelf have been exploited. Consequently, the State has had no occasion to develop agency expertise regarding oil or gas development nor a reasonably foreseeable need to develop and adopt enforceable policies specifically designed to address offshore oil and gas development activities, which would be subject to generally applicable state environmental laws that serve as the State's enforceable policies.

MMS' proposed five-year plan for 2007-2012 for Outer Continental Shelf ("OCS") leasing for oil and gas exploration and development (MMS, August 2006) does not propose inclusion of the North Atlantic planning area, which includes the Gulf of Maine, among the areas subject to leasing. MMS has jurisdiction over activities on federal lands beyond the three-mile limit of state ownership. Under the Outer Continental Shelf Lands Act, only those areas included in the five-year plan are subject to leasing. Consequently, absent changes in federal law, it does not appear at present that OCS oil or gas leasing of areas in the Gulf of Maine region, including Georges Bank, is probable during the next five-year period. MMS' proposed plan does note that several companies expressed an interest in inclusion of the North Atlantic region in the plan.

In July 2006, the House of Representatives passed a bill that would effectively lift moratoria on offshore areas, including Georges Bank, and allow natural gas exploration and development subject to state approval and provision for a share of OCS royalties to states under certain circumstances.

The Senate passed much narrower legislation to allow OCS development in eastern Gulf of Mexico. A congressional conference committee has begun efforts to reconcile these divergent bills.

Interagency Coordination

The State has several means by which it coordinates development and implementation of state energy policy. These include the Energy Resources Council (“ERC”), OEIS, the LNG working group, and the Hydropower Coordinating Committee

Potential emerging issues in energy facilities and related development

- Development and operation of renewable energy facilities (particularly tidal power); concerns regarding effects on commercial fishing, fish migration and other coastal resources and uses
- Exploration and development of hydrocarbon resources on areas of the outer continental shelf adjacent to Maine and construction and operation of related sub-sea pipelines and shore-based facilities; concerns regarding effects on commercial fishing, coastal communities and other state interests
- Recent changes in federal law, including those pursuant to the Energy Policy Act of 2005, may complicate exercise of state authority regarding energy facilities siting. The resulting implications for state management of coastal resources will become clearer as these laws are implemented.
- The Energy Policy Act of 2005 directs the Minerals Management Service (MMS) to develop a program and rules for leasing portions of the OCS for development of alternative energy projects. Development of alternative energy projects on the OCS may raise issues regarding potential effects on commercial fishing activity and other OCS uses and resources and associated land-side development.

Use Conflicts with Energy Facilities and Related Development

As is the case with other comparatively large scale development in or adjacent to nearshore waters, siting and operation of energy facilities have the potential for site-specific use conflicts, such as displacement of commercial fishing operations and recreational opportunities as well as possible impacts on wildlife.

COASTAL DREDGING AND OCEAN DISPOSAL OF DREDGED MATERIALS

There are currently three federally authorized dredged material disposal sites in the waters off the coast of Maine. These disposal areas are the Rockland Disposal Site (RDS) in Penobscot Bay, the Portland Disposal Site (PDS) in Casco Bay, and the Cape Arundel Disposal Site (CADS) off of the southern Maine coast. By operation of federal law, CADS will no longer be available for use after 2010. Coastal agency staff in Maine and New Hampshire have been working with their congressional delegations to secure funding for the U.S. Army Corps of Engineers (ACOE) to initiate the process for identifying and siting a replacement for CADS.

For the period beginning in January 2000 until early spring of 2005, the Maine Department of Environmental Protection (ME DEP) and the ACOE processed 50 applications for dredging operations along the coast of Maine. Of these, 12 were conducted for the maintenance of federal navigation projects, with the remaining 38 for private dredging projects. Approximately two-thirds of these private projects were first time dredges while the remainder were for maintenance purposes (Jeff Madore, ME DEP, personal communication). Most of the private dredges were to accommodate boat yards and berthing areas for commercial activities

Material from the 12 federal maintenance dredging projects were disposed at RDS (3), CADS (2), and at other federally approved, project specific sites (5). In two instances, the dredged material was utilized for beach nourishment projects. Of the 38 private dredging operations during this period, 7 utilized PDS, 13 utilized RDS, 1 utilized CADS, and 11 utilized upland disposal. In six instances, the material was disposed of at other federally approved, project-specific ocean sites. The average size of these dredges was 12,000 cubic yards. In some cases, upland disposal may represent a viable option for small dredge operations with limited amounts of material to be disposed of. The disposal of dredge material in this manner is regulated under ME DEP's solid waste rules for beneficial uses.

In all instances, dredged materials must be tested and deemed suitable for ocean disposal. Requirements for testing, provided for under federal law to avoid adverse direct and cumulative effects, may differ depending on whether the disposal is proposed to be in federal or state waters. For disposal at a site in state waters, there are more places in the review process where professional judgment and experience, weight-of-evidence, and reason can be used. By contrast, for disposal at a site in federal waters, federal regulations can be extremely rigid and require biological assays in most if not all cases. Stakeholders in Maine have expressed concerns about the cost of disposal under federal regulations and resulting economic incentives to dispose dredge materials in state waters.

There are a total of 70 federal navigational projects in Maine. Depending on geography, the frequency of the need for dredging of these projects varies greatly. As compared to Downeast Maine, projects in southern Maine need to be dredged more frequently due to greater rates of sedimentation. In addition to the degree of need, there are other factors that determine whether a project will be dredged in any given year. These include the availability of federal funding and the receipt of all necessary environmental approvals. In consultation with municipalities and state agencies, the Maine Department of Transportation (ME DOT) periodically assesses state maintenance dredging priorities, taking into consideration projects need for dredging, their

economic contribution, and pertinent environmental issues, and communicates the resulting priorities identified to the ACOE and Maine's congressional delegation.

Current Management Framework

Dredging and the management of dredged material in Maine are regulated under state and federal law, by the Department of Environmental Protection, and the Army Corps of Engineers and the Environmental Protection Agency (EPA), respectively. Permits are required from both ME DEP and ACOE for dredging activity in coastal waters. EPA has oversight authority regarding permitting of ocean disposal and works closely with ACOE on materials testing and other issues.

In 2006, in accordance with recommendations to the Legislature's Natural Resources Committee, ME DOT, ME DEP and the State Planning Office organized a Dredging Work Group, under the oversight of the Land and Water Resources Council, to help facilitate review of dredging projects; develop policy options; and coordinate state participation in federal regional dredging team discussions. Members of this informal policy coordination group include representatives of the Departments of Marine Resources, Inland Fisheries and Wildlife, Conservation as well as ACOE, EPA, and several stakeholders.

Potential emerging issues

- Identification of a replacement site or other disposal alternative(s) to replace CADS
- Cost of dredging, particularly to small coastal enterprises, due in part to federal testing requirements
- Reduction in federal funds available to support maintenance dredging and changes in ACOE budgeting practices that force small harbor projects to compete for available funding on a national as opposed to a regional basis as previously
- Case-specific conflicts or concerns between coastal dredging or disposal and commercial fishing and other coastal uses
- Identification and siting of a regional disposal site to replace CADS as well as, potentially, a site subject to the ACOE's monitoring program (DAMOS) to serve the Downeast area
- The need to establish a source(s) of funds to address mitigation and compensation for adverse effects on wetlands and values not covered by federal project funding.
- The need for improved monitoring and enforcement regarding mitigation and compensation required as conditions of approval.

Use Conflicts Associated with Coastal Dredging and Ocean Disposal of Dredged Materials

Use conflicts associated with dredging include a temporary displacement of fishing gear (such as lobster pots) while dredging operations, including hauling of materials to the disposal site, are underway. Both dredging and disposal of dredged materials may have short-term, localized impacts on benthic organisms, including lobsters, although seasonal constraints on dredging operations serve to avoid and minimize potential adverse effects on the marine environment. Monitoring at federally approved disposal sites in Maine has not identified long-term adverse effects due to the disposal of dredged materials.

SAND AND GRAVEL MINING

Unless otherwise noted, the information below was obtained from Stephen Dickson, Ph.D. of the Maine Geological Survey.

Sand and gravel mining are not currently occurring in Maine's nearshore waters. However, over the past several years, there has been growing interest in making use of Maine's submerged sand and gravel deposits due to an increased demand for construction aggregate and beach nourishment.

Gravel

Gravel is an important component of construction materials. Although areas of submerged gravel can be found throughout much of the Maine coast, these deposits are small in comparison to the amount presently available from gravel pits on land. In addition, the depth of many of these submerged gravel deposits in Maine's waters means that extracting them is currently not economically practical. However, over the long term, continued demand, improvements in mining technology, and favorable economics of barge transport may increase the likelihood that submerged gravel deposits will be mined in Maine.

Sand

The interest in mining submerged sand deposits has been driven in part by an anticipated need to find sediment sources for beach nourishment in Maine. To date, sand for beach nourishment has been obtained from federal dredging projects⁵. Relying on dredging projects may not be sufficient to meet future nourishment needs. Utilizing land-based deposits is another option for obtaining sediment. Given the quantity of sand needed, this method would require thousands of truckloads to bring the sand to the beach, creating road wear and noise pollution. As a result of these issues, interest has arisen in mining submerged deposits to augment the sand supplied by these other sources. There are also limitations to exploiting submerged deposits, however. First, sand deposits appear to make up only a small percentage of Maine's state submerged lands (Kelley et al. 1998). However, only 10% of these state submerged lands have been mapped to date with side-scan sonar, so it is possible that further mapping will reveal more sand deposits. Second, some of the identified sand deposits are in deep water, are very thin or are mixed with other sediments, such as mud, making it economically impractical to mine them. Finally, some submerged sand deposits are adjacent to a beach and thus extracting them would undermine the stability of the beach system. Despite these issues, under certain conditions, mining submerged deposits remains a future option for obtaining sand for beach nourishment (Maine Beach Stakeholder's Group 2006).

Based on geological research and mapping, there are currently three identified sites that could potentially be considered as sources of sand for beach nourishment. These include a site off of Bald Head Cliff in Ogunquit, near the entrance to Perkins Cove; a site near the northern end of Saco Bay; and a site offshore of the Kennebec River, near Seguin Island. Further geological research and

⁵ In recent years, sand from routine dredging projects in the Saco River, Scarborough River and the Webhannet River has been placed on beaches in Saco and Wells (Stephen Dickson, personal communication, 2006)

environmental impact assessments would need to be undertaken to determine whether the sand at these sites was suitable for beach nourishment and whether these areas would be appropriate borrow sites.

Sand and Gravel Mining Use Conflicts

As with dredging projects, sand and gravel mining would require a temporary displacement of fishing gear. In addition, studies conducted outside of Maine indicate that creation of a borrow pit can have impacts on local wave dynamics and the stability of shoals, and can reduce sediment supply to areas down-current of the borrow site (Applied Coastal Research and Engineering 2000). These studies have also shown that the primary biological effect of marine mining is removal of the benthic organisms at the borrow site (National Research Council 1995). Time required for recovery of the benthic community can range from a couple of months to several years (National Research Council 1995). The creation of particularly deep borrow pits can impede recovery by leading to low dissolved oxygen levels and excessive siltation into the pit (Applied Coastal Research and Engineering 2000). The degree of biological and physical impacts from mining depends greatly on the site chosen as a borrow pit. Therefore, careful evaluation of the geological, biological, and hydrodynamic characteristics of an area, and consideration of potential impacts would be necessary to determine whether it was a suitable borrow site.

WATER POLLUTION

Point Sources

Sixty publicly owned sewage treatment plants discharge directly into marine or estuarine waters. Twelve plants which discharge into estuarine and marine waters provide only primary treatment under a waiver from the Environmental Protection Agency. Approximately 1425 residential and commercial overboard discharge (OBD) licenses exist along the Maine coast. In 1987, the Maine Legislature prohibited the construction and use of new overboard discharge systems and required the gradual phase-out of most of the existing systems. Consequently, the number of OBD's has been reduced by 50% in the last 15 years. Approximately 84 industries and commercial facilities are licensed to discharge wastewater to Maine's coastal watersheds. These facilities include pulp and paper mills, fuel storage, energy producers, food processing, and aquaculture (Brian Kavanah, MDEP, personal communication). According to the Maine Integrated Water Quality Report (ME DEP 2004), 2,846 square miles of estuarine and marine waters are impaired by industrial point sources and 144 square miles are impaired as a result of municipal point sources/overboard discharges (Table 6).

Maine has a schedule for improving combined sewer overflows over the next decade, as well as new storm water treatment plans in some of the more industrial cities. The lack of funds to implement wastewater and stormwater improvements continues to be a major limitation, as is funding to plan and design needed improvements.

Table 6	
Total Size of Waters Impaired by Sources for Estuarine and Marine Waters	
<i>Source: Draft Maine Integrated Water Quality Report, 2006</i>	
<i>Maine Dept. of Environmental Protection</i>	
Source Category (examples)	Size Impaired (square miles)
Industrial Point Sources	2,845.99
Municipal Point Sources / Overboard Discharge	143.95
Combined Sewer Overflows	variable
Urban Runoff / Storm Sewers	51.70
Sediment Oxygen Demand	1.06
Nonpoint Source	153.55

Non-Point Source Pollution

Unlike point sources, non-point source pollution can not be traced to one source but instead comes from a number of diffuse sources within a watershed. Pollutants such as sediment, pesticides, fertilizers, bacteria and petroleum products are transported by stormwater from roads, lawns, farms, parking lots, failed septic systems and golf courses into our coastal waters. Increasing development leads to increases in the amount of impervious surface and increases to the pollutant load, both of which worsen the problem of non-point source pollution.

According to the Draft Maine Integrated Water Quality Report (2006), 154 square miles of estuarine and marine waters are impaired by non-point source pollution and 52 are impaired as a result of urban runoff/storm sewers (Table 6, above) Non-point source pollution is the only impairment category that has increased at a slow but steady rate over the years.

Maine has identified 17 priority watersheds that are impaired or threatened by non-point source pollution from land based activities in the watershed (Table 7) (ME DEP). These watersheds were also chosen because of their significant value and based on the likelihood that improvements in water quality could be achieved in the watershed (ME DEP).

As indicated by Table 6, the majority of the priority watersheds are impacted by bacteria. According to the ME DEP website, bacterial contamination comes from a variety of sources including failing septic systems, sewer outflows, boat discharges, and livestock, waterfowl, and pet waste.

Approximately 90 square miles of shellfish harvest areas were closed in 2005 due to bacteria pollution (Lee Doggett, personal communication). These closures were mainly located adjacent to residential areas or boating activity, all along the coast.

Table 7			
Priority Coastal Waters with Threatened or Impaired Water Quality from Non-Point Source Pollution			
<i>Source: ME DEP</i>			
Coastal Water	Water Quality Problem or Threat		
	Bacteria	Dissolved Oxygen	Toxic Contamination
Piscataqua River estuary			X
Spruce Creek	X	X	X
York River estuary		X	
Ogunquit River estuary	X	X	
Webhannet River estuary	X	X	
Scarborough River estuary	X		X
Royal River estuary	X		
Cousins River estuary	X		
Harraseeket River estuary	X		
Maquoit Bay	X		
New Meadows River estuary	X	X	X
Medomak River estuary	X	X	
St. George River estuary	X	X	
Weskeag River	X	X	
Rockland Harbor	X		X
Union River estuary	X		
Machias River estuary	X		

Bacteria from non-point source pollution have also lead to beach closures in southern and mid-coast Maine. During last year's 100 day swimming season, there was average of one closure per day among all of Maine's monitored beaches. Despite some aggressive remediation of discharging septic systems in some of our beach watersheds with chronic bacteria problems, the frequency and number of bacterial contamination events at coastal swimming beaches continues to rise.

Maine has a Statewide Non-Point Source Pollution Plan that continues to be implemented by state agencies, and includes measures to identify, decrease, and eliminate non-point pollution sources in coastal areas. Unfortunately, federal funding for non-point source pollution programs has decreased over the last few years, and is expected to do so in the future. The source(s) of the contamination remains unknown, although investigations are continuing to identify it.

Marine Pumpouts

A marine pumpout is a facility where boats can empty their wastewater holding tanks. The ME DEP manages the Pumpout Grant Program (PGP) that provides funding for the installation of new pumpouts or the repair of existing pumpouts. According to ME DEP (2004b) the PGP has helped to triple the number of pumpouts along the Maine coast since 1998. As of 2006, there were about 80 pumpouts on the coast (Pam Parker, ME DEP, personal communication).

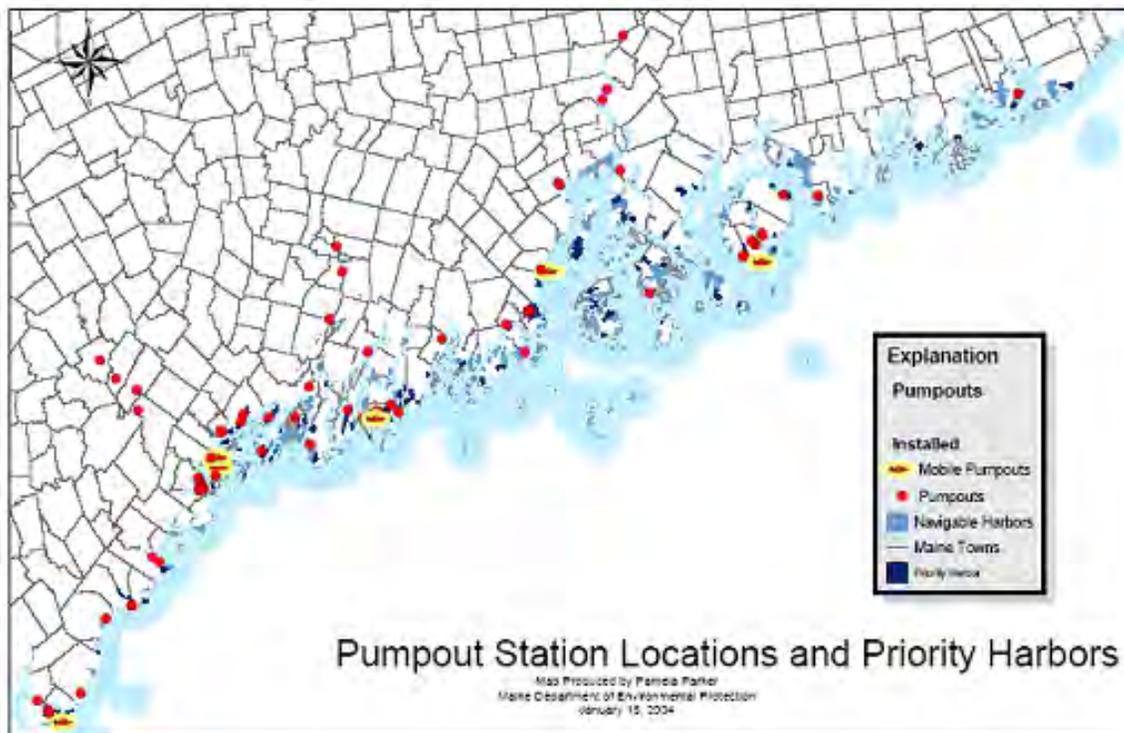


Figure 24. Source: ME DEP (2004b)

Maine DEP prioritizes the development of pumpout stations based on a list of 100 harbors they have designated as being “priority harbors”. Harbors were placed on the priority list by ME DEP based on the following criteria:

- “Existing Point Sources, including municipal treatment plants, industrial sources and sewer overflows.
- Water Quality, including water classification attainment and bacteria levels.
- Sensitive Resources, including shellfish areas, endangered species habitat, and natural areas.
- Boat Services, including marinas, boatyards, fuel docks and public launching areas.
- Number of Boats, consists of a rough estimate of all boats using the harbor.
- Flushing, consists of a rough description of the harbor’s hydrographic aspects.
- Existing Pumpouts, consists of an evaluation of the number of pumpout stations serving a harbor.” (ME DEP 2004b)

Maine DEP’s goal is to have pumpouts within a four mile radius of all of the priority harbors (ME DEP 2004b). Currently, 96 of the 100 harbors have pumpouts within this proximity (Pam Parker, personal communication). Over the next few years, Maine DEP will work to ensure that pumpouts are installed at or near the four remaining harbors (ME DEP 2004b). Figure 24, which is current as of 2004, shows the locations of pumpouts and priority harbors.

No Discharge Zones

In 2006, Casco Bay was declared a “no discharge zone” (NDZ). This designation means that no vessel with an installed toilet can release treated or untreated sewage into Casco Bay (ME DEP 2004b). There are a number of additional areas proposed for NDZ designation (Table 7). All of the harbors on the list already have adequate pumpout facilities, a prerequisite for designation. According to Pam Parker, ME DEP plans to apply for NDZ designation for some of these harbors in 2007. According to Ms. Parker, there currently is no particular order in which the harbors (listed in Table 8) will be slated for designation.

Table 8		
Proposed List for No Discharge Zone designation, listed in alphabetical order by town. Note:		
All harbors listed here are served by at least one pumpout station.		
<i>Source: ME DEP 2004b; Figure by E. Stephenson</i>		
Waterbody	Town	Reason
East Boothbay Harbor	Boothbay	High bacteria, lots of boats
Boothbay Harbor, Townsend Gut	Boothbay Harbor, Boothbay	Lots of boats
Camden Harbor	Camden	High bacteria, lots of boats, poor flushing
Robinhood/Riggs Cove	Georgetown	High bacteria, medium number of boats, poor flushing
Kennebunk River	Kennebunk, Kennebunkport	High bacteria, lots of boats, poor flushing
Northeast Harbor	Mount Desert	High bacteria, lots of boats, very poor flushing
Rockland Harbor	Rockland	High bacteria, lots of boats
Rockport Harbor	Rockport	Sensitive resources, lots of boats
Christmas Cove	South Bristol	High bacteria, sensitive resources, lots of boats, poor flushing
Southwest Harbor and Manset	Southwest Harbor	High bacteria, lots of boats
Thomaston Harbor	Thomaston	High bacteria, medium number of boats, poor flushing
Bass Harbor	Tremont	High bacteria, lots of boats

Marine Debris

Marine debris includes any manufactured object of wood, plastic, glass, metal, cloth or other material that is disposed of in the marine environment, either purposefully or accidentally. In addition to being unsightly, marine debris can cause serious harm to marine organisms and their environment and is a persistent problem in Maine.

Marine debris degrades coastal habitats and endangers the health of marine and estuarine plants and animals. Debris resting on beaches, tidal flats and submerged lands covers and displaces the original vegetation and habitat. Plastic products may persist in the marine environment for hundreds of years. Fish, birds, marine mammals and sea turtles occasionally ingest or become entangled in plastic marine debris. Active and abandoned fishing gear also presents a hazard to marine life. Lost traps, monofilament line, nets and other fishing gear may continue to entrap marine life for years after disappearing from the harvester's care.

Marine debris in Maine has been informally surveyed since 1985 through data collected as part of the annual Coastweek Cleanup organized by the Maine Coastal Program and in cooperation with The Ocean Conservancy. In 2005, 2670 Coastweek volunteers covered 112 miles of the Maine coast

and picked up 50,383 debris items that weighed 16,433 pounds. Given that the quantity of debris collected depends on the number of volunteers that participate and the number of miles they cover, it is difficult to accurately quantify the amount of marine debris present on Maine's coast. The Coastweek Cleanup data are most useful in the determination of the sources of debris, the identification of the top ten most-counted items and in recording the presence of dangerous debris items which can prove fatal to marine species.

According to the Coastweek Cleanup reports, the primary sources of debris in Maine over the past five years have been smoking related activities and shoreline and recreation activities which consist of land-based activities such as picnics, festivals, sports, and days at the beach (Figure 25). Litter washed from streets, parking lots, and storm drains also contributed to this category of debris. Another important source of debris is ocean and waterway activities which includes offshore activities such as commercial and recreational fishing and boating. Over the past five years, some of the most prevalent items in Maine's marine debris have included cigarettes, food wrappers and containers, beverage bottles, plastic bags and rope. The latter two, plastic bags and rope are known for being dangerous to marine life due to ingestion and entanglements.

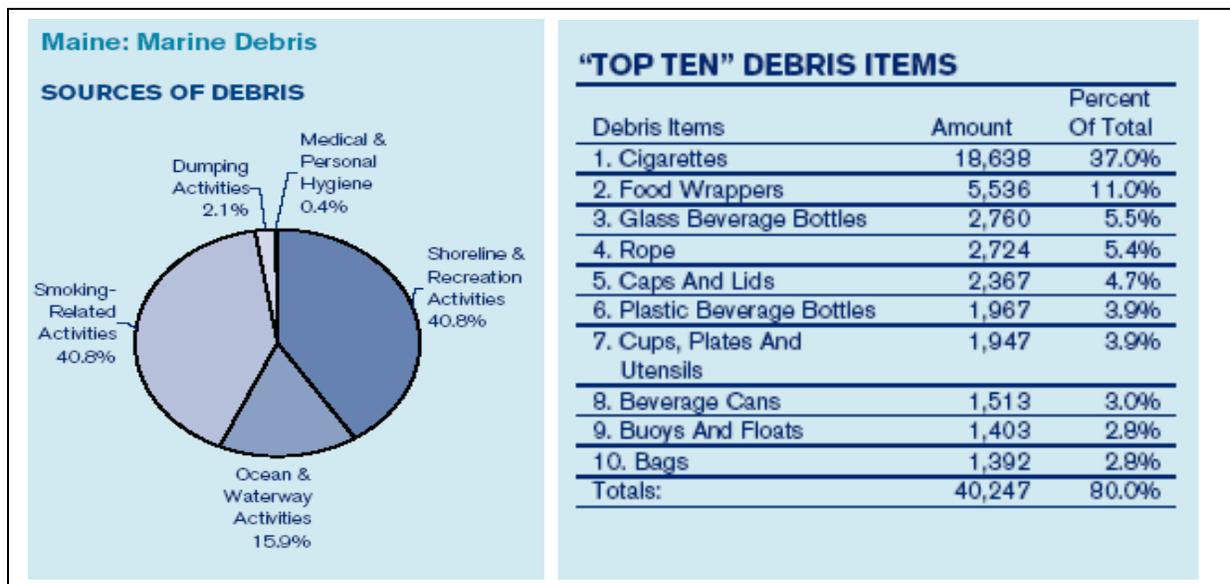


Figure 25. Maine debris data from the 2005 Coastweek Cleanup.
 Source: Maine Coastal Program and The Ocean Conservancy

The prevalence of marine debris continues to impact the health of the marine environment, as was indicated in the U.S. Commission Report on Ocean Policy (2004). Despite efforts to clean up debris each year, the volume of marine debris on Maine's beaches does not appear to be decreasing. Where some activities have decreased significantly, others such as littering, have not. Individuals engaged in marine related industries or recreation do not identify their actions as having a significant impact on the problem of marine debris and the degradation of the marine environment. It is

anticipated that marine debris will continue to impact Maine waters as use of coastal waters and the shoreline intensifies.

Toxic Pollution

The following text is excerpted from the *Maine Integrated Water Quality Report for 2004*, published by the Maine Department of Environmental Protection:

“Elevated levels of toxic contaminants tend to be present in harbors, commercial ports, mouths of river watersheds and locations adjacent to population centers. Areas that have a ‘dirty history’ (i.e., manufacturing or some other past activity) may still be a source of toxic substances. However, the geographic extent of toxic contamination tends to be localized. Most areas that are away from human activity, past and present, contain natural background concentrations of toxic contaminants...

...Sediment analysis has shown that Polycyclic aromatic hydrocarbons (PAHs) are especially high in areas where petroleum is routinely handled, such as: marine terminals, marinas, and urban areas. In Casco Bay, tributyl tin (TBT) from antifouling paints was highest in concentration in sediments near areas of boating activity in the inner Bay near Portland, Falmouth Foreside and the Anchorage on the inner part of Hussey Sound. Polychlorinated biphenyls (PCBs), and DDT, though not sold for 20 years, continue to be present in sediments along the whole coast, although they are more pronounced near centers of commerce and industry.

...Based on analyses for toxics in sediment and for metals in the tissue of mussels, areas of concern include six areas of Maine's coast, which are summarized in Table 9 below.”

Table 9 Marine and Estuarine Areas of Concern for Toxic Contamination (2004)	
Location	Area¹
Piscataqua River Estuary	2,560 acres
Fore River	1,230 acres
Back Cove	460 acres
Presumpscot River Estuary	620 acres
Boothbay Harbor	410 acres
Cape Rosier	80 acres
¹ Acreage based on professional judgment. Empirical evidence to conclude non-attainment or adverse impact is lacking. Biological standards must be developed to assess attainment and monitoring must be conducted to assess impact.	

Toxic pollution from stormwater runoff, such as that in the Pisquataqua River Estuary, the Fore River, the Back Cove, and the Presumpscot River Estuary is expected to continue in the future. Pollution due to contamination from shipyard practices, such as in Boothbay Harbor, is expected to be addressed by the use of Best Management Practices (BMP). Clean up of pollution from the Cape Rosier Superfund site will depend on securing needed funding. (Lee Doggett, Maine DEP, personal communication)

In general, it is expected that PCB, TBT, pesticide, and most metal pollution will decrease, while PAH and lead in some cases will increase. Most additional toxic pollution expected will be from increases in impervious surface in coastal drainages (Lee Doggett, ME DEP, personal communication).

Water Pollution Use Conflicts

Impairment of waters due to point or non-point source pollution can lead to limitations on the uses of those waters as well as have negative effects on wildlife. Some of the use limitations may include restrictions on harvesting of shellfish or advisories to avoid swimming on contaminated beaches.

MARINE CONSERVATION

Marine Managed Areas

Management of nearshore and marine areas for conservation purposes is an important management goal in Maine. Conservation therefore, can, in itself, be considered a “use” of submerged lands and coastal waters. Although Maine currently lacks specific enabling legislation to enact broad-based marine protected areas, there are a number of areas in Maine that are afforded special protection based on their ecological or archaeological value or their importance to commercial fisheries. These marine managed areas have the potential to achieve a variety of goals, including but not limited to conservation of biodiversity, protection of vital habitats, replenishment of commercial stocks, and the preservation of important cultural and historical resources. In addition, marine managed areas can serve as a benchmark against which ecological change can be measured and as sites for ongoing scientific research and monitoring.

Recently, two estuarine areas of ecological significance, Great Salt Bay and Taunton Bay were granted special protection by the Maine Legislature, in response to requests made by conservation organizations. Taunton Bay has been closed to dragging since 2000 and will remain closed until 2008. The Legislature has tasked the Department of Marine Resources with developing an area-based resource management plan for Taunton Bay by 2007, and pending the Legislature’s acceptance of the plan, it will be in place in 2008. The Great Salt Bay Shellfish Preserve was permanently closed in 2002 to the harvesting of any shellfish species, and any other harvesting activities resulting in bottom disturbance. Additionally, there are other areas of Maine that meet the federal definition of Marine Managed Areas such as fisheries closures and sites protected for their significant archeological value.

The establishment of a cohesive network of marine managed areas as a method to conserve important habitats and rebuild fish stocks is a topic of widespread discussion nationally and regionally. In 2000, President Clinton passed an executive order to “develop a scientifically based, comprehensive national system of marine protected areas (MPAs) representing diverse U.S. marine ecosystems, and the Nation's natural and cultural resources” (Executive Order 13158, May 26, 2000). More recently, in November of 2006, the Conservation Law Foundation and World Wildlife Fund-Canada released a report recommending the creation of marine reserves in approximately 20 percent of the ocean that stretches between Cape Cod, Massachusetts and the Scotian Shelf in eastern Canada. As more information about nearshore and marine habitats is gathered, it is anticipated that additional proposals to establish conservation areas in state waters will be forthcoming.

Marine Managed Area Use Conflicts: The establishment of a marine managed area usually means that certain activities will be limited or prohibited within its boundaries. Consequently, depending on the types of activities that are restricted, certain user groups, such as commercial fishermen, for example, may voice opposition to the designation of marine managed areas due to the effect the restrictions may have on their livelihoods.

Species Protection

According to the Maine Department of Inland Fisheries and Wildlife (ME DIFW), and the Gulf of Maine Research Institute, Maine has fourteen endangered and six threatened species of birds, reptiles, fish, and mammals protected by state and federal laws that utilize Maine state coastal waters (Table 10). The Endangered Species Act and the Maine Endangered Species Act both afford protection, as does the Marine Mammal Protection Act for all marine mammal species (Table 10). Endangered species are those defined as species in immediate danger of extinction throughout all or a significant portion of its range, while threatened species are those that will likely become endangered within the foreseeable future throughout all or a significant portion of its range (ME DIFW 2003). No marine plants are listed as threatened or endangered within the State (Don Cameron, personal communication).

Many of the species listed in Table 10 do not spend a significant amount of time in Maine's nearshore waters. What follows is a discussion of some of the protected species that are frequently spotted in state waters and/or those who are impacted by human activities in these waters. For further information on all of Maine's state and federal endangered and threatened species please see the following website presented by Maine's Department of Inland Fisheries and Wildlife: http://www.state.me.us/ifw/wildlife/etweb/state_federal_list.htm.

Whales

Although the large whales species such as, finbacks, right whales and humpbacks spend most of their time offshore, they do occasionally enter state waters. The smaller, minke whale however, is seen rather frequently in Maine's nearshore waters (Lynda Doughty, ME DMR, personal communication). The population of minke whales in the Gulf of Maine appears to be fairly stable. Worldwide they are the most abundant whale with a global population estimate of 1,000,000 (www.whalecenter.org).

Human interactions/impacts: There are several threats facing whales in the Gulf of Maine including degraded water quality and ship strikes. There have also been concerns expressed about the effects of the commercial exploitation of the whales' forage fish, such as herring. An additional threat of concern in Maine's nearshore waters is the problem of entanglement in fishing gear such as gill nets and lobster pots. Although the endangered northern right whale does not spend much time in state waters, concerns over entanglement are particularly heightened for this species given its extremely low abundance (around 300 individuals) and slow population growth rate (www.whalecenter.org). As a result of these concerns, in 1997, the National Marine Fisheries Service promulgated regulatory and non-regulatory measures to protect large Atlantic whale species. These measures included changes such as gear modifications and seasonal closures. Given the continued concern about gear entanglements over the past several years, NMFS has recently been considering several alternatives for modifying the measures passed in 1997. A decision from NMFS regarding these alternatives is currently pending.

Table 10 Those species utilizing Maine coastal waters and afforded protection under the US Endangered Species Act, the Maine Endangered Species Act, and/or the Marine Mammal Protection Act (table by KR Wilson, data from the Maine Department of Inland Fisheries and Wildlife 2003, 2003 § 6975, and the Gulf of Maine Aquarium 2006)	
Endangered Species	Additional Protected Marine Mammal Species
Northern Right Whale *^	Gray Seal
Humpback Whale *^	Hooded Seal
Finback Whale *^	Harbor Seal
Sperm Whale *^	Harp Seal
Sei Whale *^	Ringed Seal
Leatherback Sea Turtle *^	Atlantic Walrus
Atlantic Ridley Sea Turtle *^	White-sided Dolphin
Atlantic Salmon *	Bottle-nose Dolphin
Shortnose Sturgeon *	White-beaked Dolphin
Eskimo Curlew *	Striped Dolphin
Roseate Tern *^	Common Dolphin
Piping Plover ^†	Harbor Porpoise
Least Tern ^	Gray Grampus
Black Tern ^	Killer Whale
Threatened Species	Pilot Whale
Loggerhead Sea Turtle †‡	Northern Bottlenosed Whale
Razorbill ‡	True's Beaked Whale
Atlantic Puffin ‡	North Sea Beaked Whale
Harlequin Duck ‡	Dense-beaked Whale
Arctic Tern ‡	Blue Whale
Bald Eagle †‡	Minke Whale
	Beluga Whale
* = Federally listed endangered species † = Federal listed threatened species ^ = State of Maine listed endangered species ‡ = State of Maine listed threatened species	

Porpoises/Dolphins

Although several species of porpoise and dolphin inhabit the Gulf of Maine, few of them are seen frequently in Maine's nearshore waters (Lynda Doughty, personal communication). One of the species that does visit Maine's nearshore waters is the white-sided dolphin. Although it is difficult to determine the actual population size of this species, it is considered to be relatively abundant (www.whalecenter.org).

The harbor porpoise is seen more frequently in Maine state waters. According to the National Marine Fisheries Service 2005 stock assessment, the best, current estimate indicates there may be around 89,700 harbor porpoise in the Gulf of Maine/Bay of Fundy stock. In summer, the population is concentrated in the northern Gulf of Maine and the Bay of Fundy (NMFS 2005). In fall, the population appears to disperse throughout Maine and in late fall, many harbor porpoise travel to areas south of Maine (NMFS 2005).

Human Interactions/impacts: The white-sided dolphin and harbor porpoise forage on the same fish that are targeted by gillnetters and are thus sometimes caught in the fishing gear. The harbor porpoise, however, has historically been caught more frequently in gillnets in Maine than the white-sided dolphin, according to 2005 NMFS stock assessment reports for each species. In the 1990's rates of bycatch in gillnets for the harbor porpoise were disconcertingly high. Consequently, in 1999, NMFS instituted a Harbor Porpoise Take Reduction Plan in order to reduce bycatch rates within the commercial gillnet fishery (NOAA 2006a). This Take Reduction Plan included time and area closures, including complete closures and contingent closures. These contingent areas remained closed unless acoustic deterrent pingers were utilized on nets (NOAA 1997; NOAA 2003). According to the 2005 NMFS harbor porpoise stock assessment, there are insufficient data to determine population trends for this species. However, the report noted that the "total fishery-related mortality and serious injury for this stock...cannot be considered to be insignificant" (NOAA 2005).

Seals

There are several seal species that are regular visitors or residents of Maine's state waters. The most abundant species is the harbor seal (Lynda Doughty, personal communication). The population of harbor seals has been increasing about 6.6% over the past several years (Gilbert et al 2001). Estimates suggest that there may be around 100,000 harbor seals in the Gulf of Maine (Gilbert et al 2001). Reasons for this increase may be the protection afforded by the Marine Mammal Protection Act as well as possible increased food availability. The grey seal, hooded seal and harp seal also spend time in Maine's waters. Grey seals are most abundant in Downeast Maine, although their range is expanding southward as their population increases (Lynda Doughty, personal communication). The hooded and harp seals migrate from Canada to Maine in the winter and primarily haul out on beaches. Their numbers are relatively stable (Lynda Doughty, personal communication). However, hunting of these species is permitted in Canada.

Human interactions/impacts: Concerns exist that the increase in harbor seals may result in increased competition for fish species targeted by both seals and fishermen, or that seals may be stealing bait from lobster traps, or preying on wild and aquacultured salmon. However, fishermen, scientists and aquaculturists seem to accept the fact that seals are part of the coast. Fears that fishermen might be

killing seals appear unfounded given that none of the many seals necropsied by ME DMR have shown obvious gunshot wounds (Lynda Doughty, personal communication). Given the protected status of the seals, it is unlikely, in the near future, that any measures would be instituted to control their population (Lynda Doughty, personal communication).

Seabirds

A number of protected seabird species nest along Maine's coast and islands. The piping plover and least tern both nest on sandy beaches from southern Maine to Georgetown. Both species generally arrive in Maine in the middle of spring and nest on Maine's beaches until September, although the timing can vary from year to year (ME DIFW 2003). Unlike many other nesting seabirds, including the least tern, piping plovers do not nest in colonies. Populations of plovers and least terns (based on a count of nesting pairs) often fluctuate from year to year but do appear to have declined recently (Maine Audubon Society 2005). In addition to the human impacts mentioned below, some of this decline is attributable to severe storm events that have occurred in recent years along with predation by gulls and small mammals (Maine Audubon Society 2005).

Roseate terns, Arctic terns, razorbills and Atlantic puffins nest on islands in Maine from spring to late summer. According to Linda Welch of the U.S. Fish and Wildlife Service (USFWS) roseate terns nest on six islands in Maine that are between (approximately) one-half mile and 20 miles offshore. Populations of roseate terns continue to decline. This decline may be due to predation by small mammals, such as mink, despite management efforts to control predators on nesting islands (Linda Welch, personal communication). Arctic terns nest on nine islands along the Maine coast, most of which are managed to control predators. The population of Arctic terns appears to be relatively stable (Linda Welch, personal communication). Atlantic puffins nest on four islands between mid-coast Maine and the Canadian border, including Matinicus Rock and Eastern Egg Rock, which lies six miles off of Pemaquid Point (Linda Welch, personal communication). The populations of puffins appear to be on the increase (Linda Welch, personal communication). Populations of razorbills also seem to be increasing. This species nests on six islands along the Maine coast, mostly in the north-eastern half of the state (ME DIFW). As with the other protected seabirds, several of the islands used by razorbills and puffins are managed to control predators (Linda Welch, personal communication).

Human interactions/impacts: Historically, piping plovers and least tern populations were affected dramatically by a loss of habitat due to construction of shorefront homes, parking lots, seawalls and jetties (ME DIFW). Today, state law serves to reduce the impacts of development on the essential nesting habitat of these two species (ME DIFW). However, the historic loss of habitat makes it less likely that piping plovers and least tern populations can find alternative nesting areas when habitat is destroyed in a storm event (ME DIFW). Other threats to these birds include trampling of their nests by beachgoers and by beach maintenance activities (ME DIFW). In addition, small predators of plovers and terns, such as gulls, raccoons, skunk and fox are attracted to beaches by the trash left by visitors. Intensive management efforts by the Maine Audubon Society, ME DIFW, USFWS and the Nature Conservancy have been vital in preventing extinction of these species (ME DIFW, Maine Audubon 2005). Some of these management efforts include putting up signs and fences around nesting areas at the start of season (in April) to prevent human disturbances. Mesh enclosures are

also sometimes used to exclude predators. Finally, data is collected to monitor the status of the populations (ME DIFW).

Seabirds on nesting islands do not live in close proximity to people and are thus less affected by human disturbance than piping plovers and least terns. Signs on seabird nesting islands indicate that they are closed to the public between April and August. However, people do not always comply with these signs and may visit the islands and disturb the nesting birds. Such disturbance can result in chick and nest abandonment (ME DIFW). Linda Welch of USFWS indicates that these closures are difficult to enforce. Finally, nesting seabirds often forage on the same fish targeted by commercial fishermen. Decreases in food availability can lower the productivity of the breeding populations of these bird species.

Bald Eagles

Bald eagles nest throughout the state of Maine and along much of its coast. These eagles nest in tall trees that are generally within one mile of water and in places where human disturbance is minimal (ME DIFW). Bald eagles often use their nests over multiple nesting seasons, which generally begin in February and end in September (Linda Welch, personal communication). Many of the eagles and their new offspring remain in Maine throughout the winter (ME DIFW). Bald eagle populations have been on the increase in Maine. In 1979 there were only 29 breeding pairs in the state. In 2002, 290 breeding pairs produced 280 eaglets (ME DIFW). ME DIFW estimates that bald eagle numbers are growing by about 8% per year.

Human interactions/impacts: Bald eagle populations have been recovering for several reasons including the decades' long ban on the spraying of DDT and protection of their essential nesting habitat from the impacts of development. However, eagles still face several threats including human disturbance of nesting sites, the effects of environmental pollutants (especially mercury and PCB's) and habitat loss (ME DIFW). Despite these threats, the successful recovery of this species raises the possibility that it may be removed from state and federal endangered species lists. Even if it is removed from the lists, management measures will remain in place to protect the eagle, including the current seasonal closure of all eagle nesting islands to public access (Linda Welch, personal communication).

Sea Turtles

Three protected sea turtle species have been reported in the Gulf of Maine, the leatherback, the loggerhead and the Atlantic ridley. Although none of these turtles spend much time in state waters, the one that is most likely to be spotted in nearshore waters is the leatherback. These three turtle species nest in the winter and spring in the southeastern region of the United States (and in other areas of the world) and spend part of the summer and fall feeding in the Gulf of Maine. Global populations of the leatherback, Atlantic ridley and loggerhead turtle continue to decline.

Human interactions/impacts: Many of the threats to these turtles occur in areas outside of Maine, such as destruction of their nesting habitat, poaching of their eggs, light pollution in nesting areas, and capture in nets in the southeast and Gulf of Mexico shrimp fishery (ME DIFW). Within Maine's waters, threats include entanglement in lobster gear and in trawling nets. Regular tending of pots and nets can lead to the release of turtles before they drowned (ME DIFW). Turtles are also impacted by the problem of marine debris. Worldwide, each year, many of them are injured or

killed by swallowing or becoming entangled in discarded ropes, plastic bags and other types of trash (ME DIFW).

Atlantic Salmon

Atlantic salmon occur in rivers throughout the state of Maine and can also be found in Maine's coastal waters (ME DIFW). Most Atlantic salmon are anadromous, meaning that they migrate from the ocean to reproduce in the river where they were born. This migration from ocean to river begins in the spring and continues into fall (ME DIFW). Juvenile salmon often remain in their natal river until they are a few years old, at which time they migrate into the ocean. The population of Atlantic salmon is currently on the decline (ME DIFW).

Human interactions/impacts: Many of the threats to Atlantic salmon populations are found in their river habitats. For example, dams impede migration and make salmon more vulnerable to predators; run-off from construction sites near spawning rivers can create siltation in the water column; and the pollutants present in some rivers are harmful to the fish. Some of the human threats to salmon in Maine's coastal waters relate to aquaculture operations including the potential for disease and parasite transfer as well as the possibility of genetic contamination from cultured salmon. There is no commercial fishery for this species in Maine, although there is one in Canada. In 1999, when salmon were placed on the endangered species list, recreational fishing for this species in Maine was also prohibited. In early fall of 2006, a month long, experimental recreational fishing season was instituted on the Penobscot River. This season may be expanded or augmented with spring fishing depending on the status of the population.

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APPENDIX B
MAINE'S NEARSHORE WATERS – CURRENT USES & ANTICIPATED TRENDS

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APPENDIX C

STEERING COMMITTEE MEMBERSHIP, MEETING SCHEDULE AND LETTER TO THE LWRC

**STEERING COMMITTEE MEMBERSHIP, MEETING SCHEDULE,
AND LETTER TO THE LAND & WATER RESOURCES COUNCIL**

Steering Committee Membership

- **Paul Anderson**, Director, Maine Sea Grant Program
- **Kathleen Billings**, Chair, Maine Soft Shell Clam Advisory Council; and Town Clerk, Town of Stonington
- **Heather Deese**, Marine Science and Policy Consultant
- **Dewitt John**, Director of Environmental Studies Program, Bowdoin College
- **Evan Richert**, Associate Professor, Muskie School of Public Service
- **Jim Salisbury**, Retired CEO, Supreme Alaska Seafoods
- **David Schmanska**, Harbormaster, Town of St. George
- **Barbara Vickery**, Director of Conservation Programs, ME Chapter of the Nature Conservancy

Meeting Schedule

1. **September 21, 2004**, 12:30 p.m. to 5:00 p.m.
Hutchinson Center, Belfast
Agenda items:
 1. Orientation for Steering Committee and Staff
 2. Facilitated Discussion – Developing a Draft Definition of Bay Management
 3. Final review of principles statement (principles for guiding the work of the study)
 4. Presentation of public participation survey
 5. Discussion of proposed public participation plan and schedule
 6. Discussion of project decision making
 7. Final comments on RFP to solicit proposals for pilot projects

2. **January 7, 2005**
Originally planned for Belfast, this meeting had to be changed due to dangerous driving conditions. It was conducted as a conference call.
Agenda items:
 1. Selection of Pilot Projects
 2. Refinement of Working Definition of Bay Management
 3. Decision Making with the Study
 4. Planning for the Community Meetings

3. **February 25, 2005**, 12:30 p.m. to 4:30 p.m.
State Planning Office, 184 State St. Augusta
Agenda items:
 1. Presentations by representatives of pilot projects (Taunton Bay and Muscongus Bay)
 2. Overview of Maine’s marine governance structure
 3. Overview of Municipal authorities
 4. Model presentations:
 - a. Ocean zoning
 - b. Nearshore governance in Australia

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- c. Northwest Straits
- d. British Columbia
- 5. Report on Public Meetings

- 4. **June 13, 2005**, 10:00 a.m. to 2:00 p.m.
Hutchinson Center, Belfast
Agenda items:
 - 1. Overview of the Public Meeting Process
 - 2. Bay Management Issues of Concern by Region
 - 3. Governance Issues
 - 4. Ongoing compilation/analysis of issues and development of bay management models
 - 5. Update on pilot projects

- 5. **September 19, 2005**, 10:00 a.m. to 2:00 p.m.
Gulf of Maine Research Institute, Portland
Agenda items:
 - 1. Bay Management Scenario – Surface Water Use Conflicts and Navigation in Casco Bay
 - 2. Public Outreach Plan
 - 3. Study Workplan and Timeline

- 6. **November 9, 2005**, 9:30 a.m. to 3:30 p.m.
Department of Marine Resources, 194 McKown Point Rd., West Boothbay Harbor
Agenda items:
 - 1. Coast-wide Problems and Potential Improvements (Tiered Approach to Identifying Problems on the Maine Coast)
 - 2. Mid-course Study Check In – Gaps and Next Steps
 - 3. Accomplishments and Remaining Tasks – Milestones and Deliverables
 - 4. Public Participation Plan

- 7. **February 17, 2006**, 9:00 a.m. to 4:00 p.m.
Belfast Armory, Rt 1, Belfast
Agenda items:
 - 1. Stakeholder presentations
 - a. Panel 1: Large-scale, System-Change Approaches to Bay Management
 - b. Panel 2: Local or Place-Based Approaches to Bay Management
 - c. Panel 3: Resource Management Tools for Bay Management
 - 2. Small group discussions
 - 3. Report out of ideas generated during discussions
 - 4. Steering Committee work session

- 8. **June 2, 2006**, 9:00 a.m. to 3:00 p.m.
Hutchinson Center, Belfast
Agenda items:
 - 1. Presentation of Pilot Projects
 - a. Muscongus Bay Pilot Project – Recommendations

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- b. Taunton Bay Pilot Project – Recommendations
 - 2. Lessons Learned and Observations from Pilot Projects
 - 3. Options for Improved Nearshore Management
 - a. Existing Governance System with Suggested Improvements
 - b. New Regional Approaches
 - c. New Bay Planning Processes
 - d. Creation of a New State Board
9. **August 15, 2006**, 9:30 a.m. to 3:30 p.m.
Bowdoin Coastal Studies Center, Orr's Island
Agenda items:
- 1. Review status of deliverables and review study schedule;
 - 2. Discussion of draft Problem Statement and draft Principles
 - 3. Discussion of Options for Nearshore Management
 - a. Supporting regional initiatives
 - b. Interlocal agreements
 - 4. Data and Information Needs Study Plan
10. **October 2, 2006**, 8:00 a.m. to 4:00 p.m.
Darling Marine Center, Walpole
Agenda items:
- 1. Review Recommendations to date
 - a. Recommendation #1: Maine Coastal Policies Act
 - b. Recommendation #2: Supporting Regional Initiatives
 - c. Recommendation #3: Enhancement to the Existing Nearshore Governance Framework;
 - d. Recommendation #4: Interagency Coordination and Communication
 - e. Recommendation #6: Funding and Capacity Needs
11. **December 1, 2006**, 9:00 a.m. to 4:30 p.m.
Pine Tree State, Arboretum, Augusta
Agenda items:
- 1. Review Draft Report

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December 12, 2006

To: The Commissioners of the State of Maine Land and Water Resources Council

From: The Bay Management Study Steering Committee

Members: Evan Richert, Kathleen Billings-Pezaris, Dewitt John, David Schmanska,
Barbara Vickery, Jim Salisbury, Heather Deese, Paul Anderson

We the members of the Bay Management Study Steering Committee are writing to the members of the Land and Water Resource Council (L&WRC) to lend our support to the study report, to add emphasis to particular points in the report, and to indicate the importance of the recommended actions.

First, we wish to compliment the staff members from the Department of Marine Resources and the Maine Coastal Program of the State Planning Office for their dedication and diligence over the past two years in conducting this study. The staff have conducted their work in a professional and transparent way and have done an admirable job engaging the public and the steering committee members throughout the study. The report you have before you, though quite lengthy, provides an accurate assessment of the situation in Maine and offers a series of reasonable recommendations for improving the management of coastal natural resources that allows for regional approaches and input from coastal communities.

The steering committee fully endorses the recommendations contained in the report, but would like to take the opportunity, as public sector advisors to the L&WRC to make the following points:

1. The recommendations in this Bay Management Study report represent an initial step towards building multi-agency approaches to the governance needs of the coast that should lead to inter-agency planning and coordination in order to implement innovative, regional and adaptive approaches. Although there are examples of inter-agency coordination, **there are many issues which would benefit from better coordination between agencies**. Further, State Government needs to improve its awareness that **portions of our coast have unique attributes which require consideration in making management decisions and that the application of single, centralized, policies may not result in the most effective management**. Indeed, some of the public comments indicated the need for clarity with regard to government agency roles, responsibilities and coordination, and the public also expressed the need for a regional stakeholder-based process for assessing a regions needs, strategic direction, and a mechanism for these perspectives to be considered by state regulatory agencies.
2. Although this study did not identify a single critical issue along Maine's coast that highlights the need for improved, regionally-relevant strategies for coastal resource management, there were many issues identified through the public scoping process that were peculiar to certain

regions of the state. The range of issues loosely fall into the themes of challenges associated with developmental changes along the coast, associated impacts on ecosystem health and the coastal habitats, and impacts on the livelihoods of those working along the coast. Our management of activities that effect coastal communities and our natural resources need to ensure that the marine based economy and the health of the ecosystems are sustained. The pressures are rapidly increasing and Maine is in a position to be able to preserve and protect the quality of our coastal ecosystems while balancing the opportunities that these areas have for economic activity. **We wish to express the urgency of the need for effective management of our coastal resources in a regional context and the need for our existing governance structures to think progressively about** how to be adaptive and innovative to address these challenges.

3. The long term need for effective management is to **build the capacity to predict and intercept environmental changes in the marine environment** related to issues such as: habitat change, harmful algal blooms, water quality, social pressures, changing and emerging uses, cumulative impacts and economic issues and others. This will require creativity in bringing both governmental and non-governmental assets to bear in providing the information-gathering and data management capacities. The state needs to commit to this principle and begin building a strategic direction that will realize this capacity and sustain it for generations to come.
4. The steering committee recognizes the challenges with government funding for these kinds of programs. It is obvious that our state, and indeed our nation, needs to invest more government funding in the agencies responsible for monitoring the quality of our coastal ecosystems and conducting the research needed to develop new approaches to management. However, growth in these areas should not take place at the expense of the existing critical programs and staffing levels in the related agencies. **Funding for the proposed recommendations and coastal natural resources management needs to be sustained and even increased to meet these needs. The cost to the people of Maine for not investing in these ideas will far exceed the modest funds suggested at this time.**
5. The steering committee understands that all of the agencies represented by the L&WRC have been apprised of this study and we assume that all of these agencies will accept some responsibility in the implementation of the recommendations of this report. Although it may seem that the majority of existing jurisdiction associated with these recommendations falls within the mission of the Department of Marine Resources, we urge the members of other agencies to realize that many of these issues will require some new paradigms in how governance takes place. A more holistic, inter-disciplinary, collaborative approach will result in better governance and ultimately more sustainable environmental quality and economic viability. Since there is no other formal body for implementing these kinds of inter-agency approaches, **we strongly urge that the L&WRC take an active role in the implementation of these recommendations and agency follow-through of this report's recommendations.** The State Planning Office, via the work of the Maine Coastal Program, has played a critical role in this study and they have offered to play an integral role in the

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implementation of many of the recommendations being proposed. The steering committee applauds the commitment of the Maine Coastal Program in this regard, but cautions the regulatory agencies of the L&WRC not to rely too heavily on the Coastal Program and to take appropriate responsibility in the implementation of these recommendations.

6. **The steering committee suggests that an Executive Order from the Office of the Governor may be an appropriate tactic for highlighting the importance of the issues and expediting the implementation of the report recommendations.** We would be glad to work with you to develop appropriate language for such an executive order if you agree with this approach.

APPENDIX D
COASTAL MANAGEMENT DISTRICTS

CURRENT COASTAL MANAGEMENT DISTRICTS

The Bay Management study included an examination of the variety of ways in which Maine's coast is currently divided. Coastal planning or management districts were examined because of their potential to:

1. Enable us to consider a particular bay within the larger biophysical and social context of the area in which it is located;
2. Provide divisions for a regional council system in bay management⁶
3. Encourage better coordination between the various governmental and non-governmental groups doing coastal work by promoting the use of similar divisions.

Several planning and management districts already exist (see maps below):

Planning/Management-based divisions

- Regional planning councils (Figure D-1)
- Counties (Figure D-2)
- Lobster zone divisions (Figure D-3)
- Marine patrol divisions (Figure D-4)

Biophysical divisions

- Biophysical regions (Figure D-5)
- Watershed/drainage areas (Figure D-2)

Combination planning/biophysical

- Draft Beginning with Habitat (BwH) coastal divisions⁷ (Figure D-2) (based on: drainage divides, "An Ecological Characterization of Coastal Maine", "Environments of Maine's Glaciated Shoreline" (Joe Kelly), "Maine's Coastal Wetlands" (Ward), and coastal waterfowl survey divisions).

Staff concluded that if coastal districts were to be used, it would be important to pay attention to existing administrative divisions (i.e. county lines, regional planning council jurisdictions) and to use one of the generally known and pre-existing methods of dividing the coast into districts. In addition, the specific boundary of any given bay is not clear-cut and depends, at least partly, on the issues that local people are dealing with in that area. Finally, the concept of a 'bay' is harder to visualize along the southern coast, where the coast is fairly straight between shallow bays.

⁶ Regional council systems were explored, but not ultimately recommended at the conclusion of the study.

⁷ The BWH coastal divisions (created by Bob Houston, USFWS) have not yet been officially adapted by the BWH group.

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CURRENT COASTAL MANAGEMENT DISTRICTS

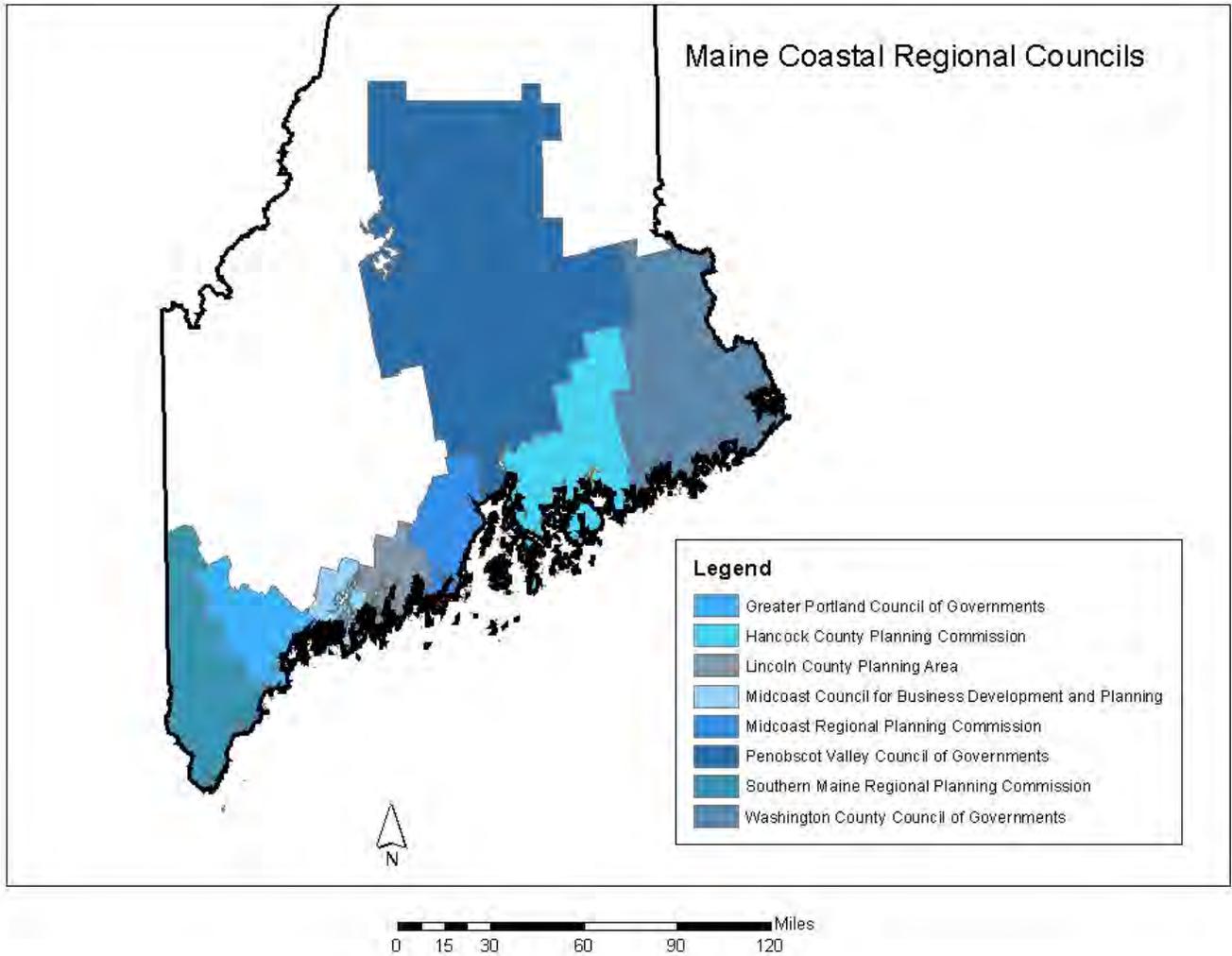


Figure D-1: Maine Coastal Regional Councils

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CURRENT COASTAL MANAGEMENT DISTRICTS

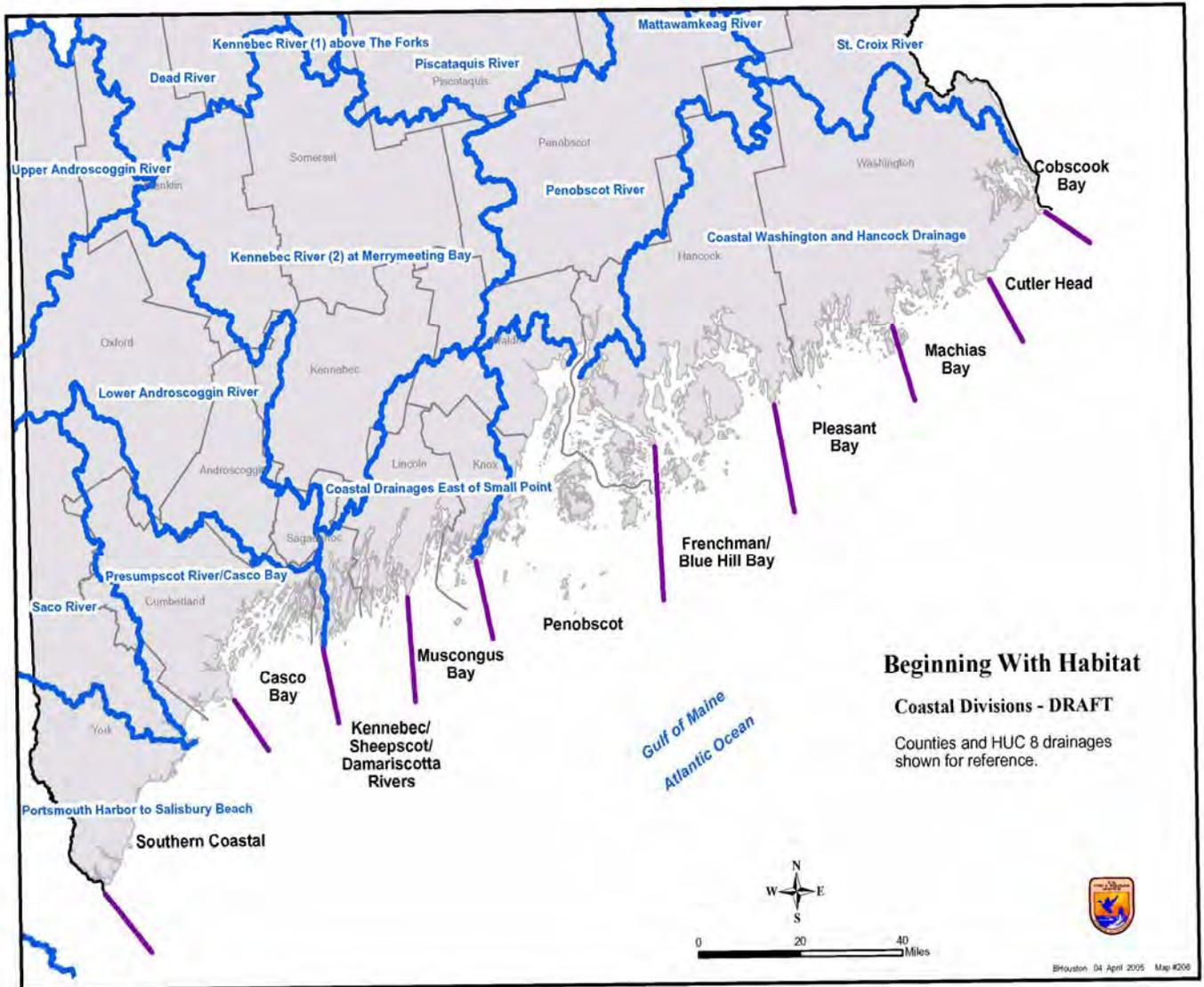


Figure D-2: Draft Beginning with Habitat Coastal Divisions, also showing coastal drainages and counties

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CURRENT COASTAL MANAGEMENT DISTRICTS

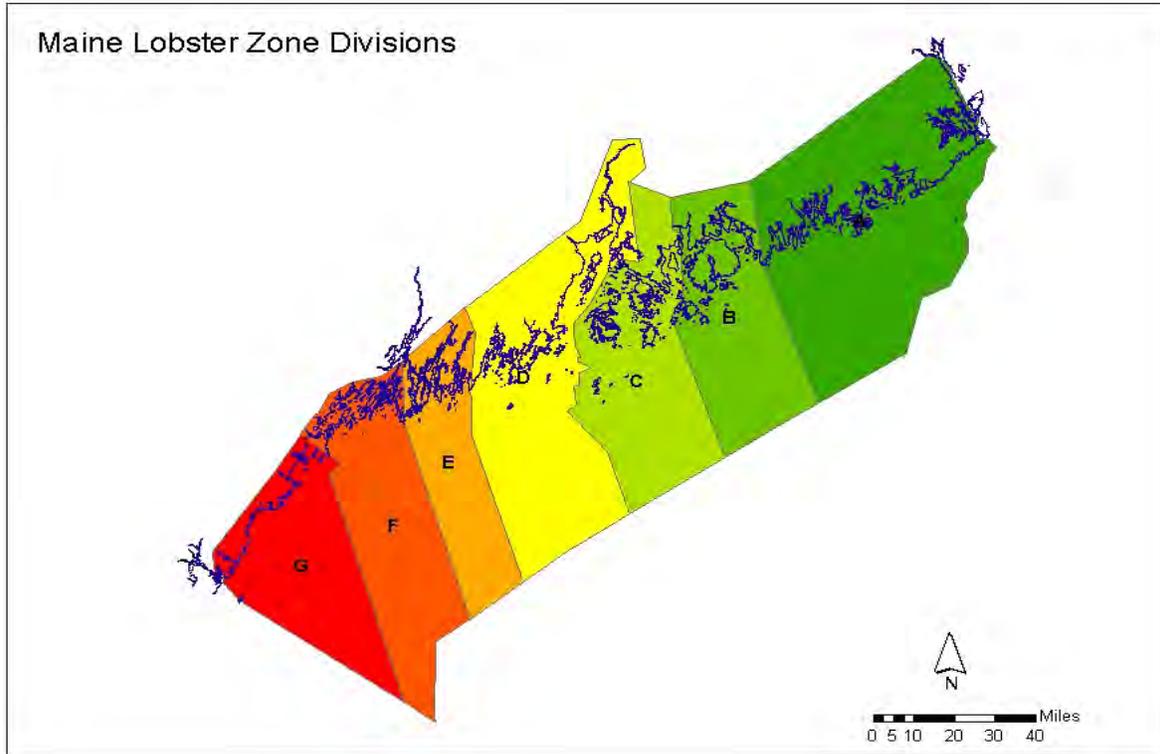


Figure D-3: Maine Lobster Zone Boundaries

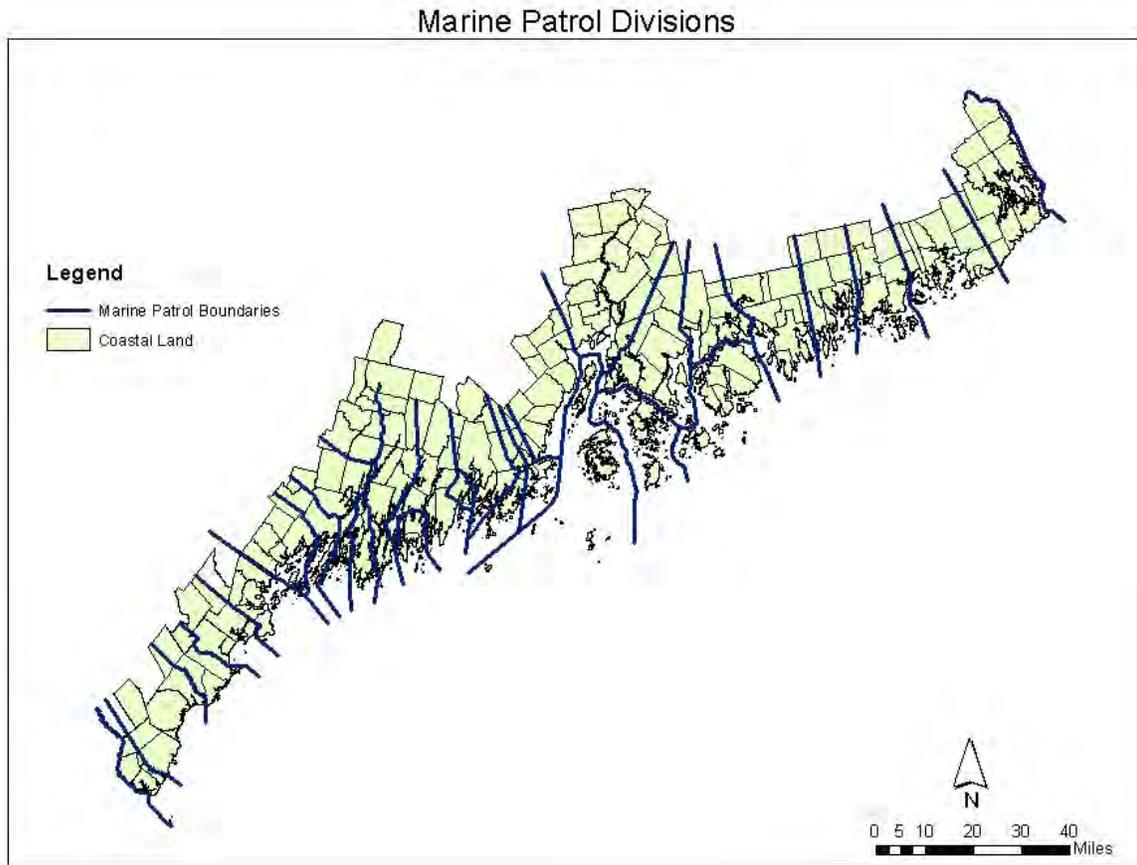


Figure D-4: Maine Marine Patrol Divisions

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CURRENT COASTAL MANAGEMENT DISTRICTS

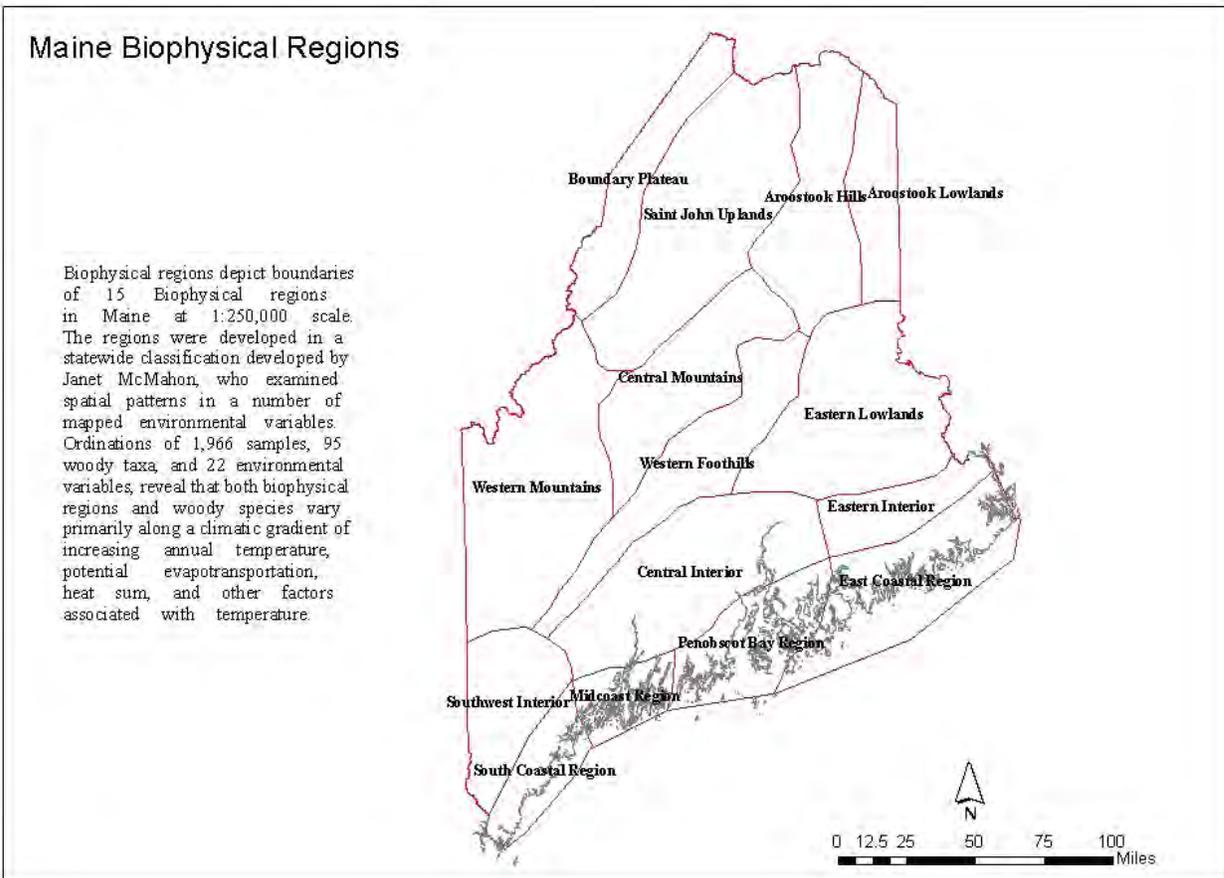


Figure D-5: Maine Biophysical Regions

APPENDIX E
COASTAL MANAGEMENT POLICIES ACT

COASTAL MANAGEMENT POLICIES ACT

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§1801. Findings and declaration of coastal management policies

The Legislature finds that the Maine coast is an asset of immeasurable value to the people of the State and the nation, and there is a state interest in the conservation, beneficial use and effective management of the coast's resources; that development of the coastal area is increasing rapidly and that this development poses a significant threat to the resources of the coast and to the traditional livelihoods of its residents; that the United States Congress has recognized the importance of coastal resources through the passage of the United States Coastal Zone Management Act of 1972 and that in 1978 Maine initiated a coastal management program in accordance with this Act which continues to be of high priority; and that there are special needs in the conservation and development of the State's coastal resources that require a statement of legislative policy and intent with respect to state and local actions affecting the Maine coast. [1985, c. 794, Pt. A, § 11 (new).]

The Legislature declares that the well-being of the citizens of this State depends on striking a carefully considered and well reasoned balance among the competing uses of the State's coastal area. The Legislature directs that state and local agencies and federal agencies as required by the United States Coastal Zone Management Act of 1972, PL 92-583, with responsibility for regulating, planning, developing or managing coastal resources, shall conduct their activities affecting the coastal area consistent with the following policies to: [1985, c. 794, Pt. A, § 11 (new).]

1. Port and harbor development. Promote the maintenance, development and revitalization of the State's ports and harbors for fishing, transportation and recreation;

[1985, c. 794, Pt. A, § 11 (new).]

2. Marine resource management. Manage the marine environment and its related resources to preserve and improve the ecological integrity and diversity of marine communities and habitats, to expand our understanding of the productivity of the Gulf of Maine and coastal waters and to enhance the economic value of the State's renewable marine resources;

[1985, c. 794, Pt. A, § 11 (new).]

3. Shoreline management and access. Support shoreline management that gives preference to water-dependent uses over other uses, that promotes public access to the shoreline and that considers the cumulative effects of development on coastal resources;

[1985, c. 794, Pt. A, § 11 (new).]

4. Hazard area development. Discourage growth and new development in coastal areas where, because of coastal storms, flooding, landslides or sea-level rise, it is hazardous to human health and safety;

[1985, c. 794, Pt. A, § 11 (new).]

5. State and local cooperative management. Encourage and support cooperative state and municipal management of coastal resources;

[1985, c. 794, Pt. A, § 11 (new).]

6. Scenic and natural areas protection. Protect and manage critical habitat and natural areas of state and national significance and maintain the scenic beauty and character of the coast even in areas where development occurs;

[1985, c. 794, Pt. A, § 11 (new).]

7. Recreation and tourism. Expand the opportunities for outdoor recreation and encourage appropriate coastal tourist activities and development;

[1985, c. 794, Pt. A, § 11 (new).]

8. Water quality. Restore and maintain the quality of our fresh, marine and estuarine waters to allow for the broadest possible diversity of public and private uses; and

[1985, c. 794, Pt. A, § 11 (new).]

9. Air quality. Restore and maintain coastal air quality to protect the health of citizens and visitors and to protect enjoyment of the natural beauty and maritime characteristics of the Maine coast.

[1985, c. 794, Pt. A, § 11 (new).]

PL 1985, Ch. 794, §A11 (NEW).

APPENDIX F
DECISION CRITERIA

DECISION CRITERIA

The following is a listing of decision criteria that different agencies employ when making permitting decisions (found in both statute and regulation). The criteria clearly set forth which uses are considered in making these determinations.

1. Aquaculture

In evaluating the proposed lease, the commissioner shall take into consideration the number and density of aquaculture leases in an area.

The proposed activity will not:

- Unreasonably interfere with riparian ingress and egress
 - The commissioner shall examine whether the riparian owners can safely navigate to their shore. The commissioner shall consider the type of shore involved and the type of vessel that can reasonably land on that shore. He/she shall consider the type of structures proposed for the lease and their potential impact on the vessels which would need to maneuver around those structures.
- Unreasonably interfere with navigation
 - The commissioner shall examine whether any lease activities requiring surface and or subsurface structures would interfere with commercial or recreational navigation around the lease area. The commissioner shall consider the current uses and different degrees of use of the navigational channels in the area in determining the impact of the lease operation.
- Unreasonably interfere with fishing or other uses
 - The commissioner shall examine whether the lease activities would unreasonably interfere with commercial or recreational fishing or other water-related uses of the area. This examination shall consider such factors as the number of individuals that participate in recreational or commercial fishing, the amount and type of fishing gear utilized, the number of actual fishing days, and the amount of fisheries resources harvested from the area.
- Unreasonably interfere with significant wildlife habitat and ecologically significant flora and fauna
 - Such factors as the degree to which physical displacement of rooted or attached marine vegetation occurs, the amount of alteration of current flow, increased rates of sedimentation or sediment resuspension, and disruption of finfish migration shall be considered by the commissioner in this determination.
- Unreasonably interfere with publicly owned beaches, docks, or conserved land
 - The commissioner shall consider the degree to which the lease interferes with public use or enjoyment within 1,000 feet of a beach, park, docking facility or certain conserved lands owned by the federal government, the state government or a municipal government.
- Result in an unreasonable impact from noise or lights
- Proposed activity must be in compliance with visual impact criteria

2. Submerged Lands

The proposed activity will not:

- Unreasonably interfere with customary or traditional public access ways to or public trust rights in, on or over the intertidal or submerged lands and the waters above those lands

APPENDIX F
DECISION CRITERIA

- Unreasonably interfere with navigation
- Unreasonably interfere with fishing or other existing marine uses
For consideration of impacts upon commercial fishing industries or infrastructure, the following guidelines shall apply:
 - The use will not result in the loss or unreasonable diminishment of opportunity to economically pursue commercial fishing for the operators of any commercial fishing vessels that will be displaced.
 - The use will not result in a loss of access or unreasonable diminishment of access to existing commercial fishing grounds.
 - The use will not result in a loss or unreasonable reduction of repair and maintenance services essential for commercial fishing operations.
 - The use will not result in a loss of fish buying, processing, or handling facilities that are in operation at the time of the application.
 - The use will not result in a loss or unreasonable diminishment of access to existing commercial fishing facilities.
- Unreasonably diminish the availability of services and facilities necessary for commercial marine activities
- Unreasonably interfere with ingress and egress of riparian owners

3. NRPA

The proposed activity will not:

- Unreasonably interfere with existing scenic, aesthetic, recreational, or navigational uses
 - The potential impacts of a proposed activity will be determined by the Department considering the presence of a scenic resource listed in Section 10, the significance of the scenic resource, the existing character of the surrounding area, the expectations of the typical viewer, the extent and intransience of the activity, the project purpose, and the context of the proposed activity. Unreasonable adverse visual impacts are those that are expected to unreasonably interfere with the general public's visual enjoyment and appreciation of a scenic resource, or those that otherwise unreasonably impair the character or quality of such a place.
- Cause unreasonable erosion of soil or sediment, or prevent naturally occurring erosion
- Unreasonably harm any significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine or marine fisheries or other aquatic life
- Unreasonably interfere with the natural flow of any surface or subsurface waters
- Lower water quality
- Cause or increase flooding
- Unreasonably interfere with supply or movement of sand to sand dune areas
- Cross a river segment identified in the NRPA as "outstanding" unless no other alternative having less adverse impact on the river exists

APPENDIX F
DECISION CRITERIA

4. Army Corps of Engineers Permit for Structure in Navigable Waterway

- The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest.
- That decision will reflect the national concern for both protection and utilization of important resources.
- The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments.
- All factors which may be relevant to the proposal will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people

5. Shoreland Zoning

The minimum guidelines for piers, docks, wharves, bridges and other structures and uses extending over or beyond the normal high-water line of a water body or within a wetland are:

- Access from shore shall be developed on soils appropriate for such use and constructed so as to control erosion.
- The location shall not interfere with existing developed or natural beach areas.
- The facility shall be located so as to minimize adverse effects on fisheries.
- The facility shall be no larger in dimension than necessary to carry on the activity and be consistent with existing conditions, use, and character of the area.
- No new structure shall be built on, over or abutting a pier, wharf, dock or other structure extending beyond the normal high-water line of a water body or within a wetland unless the structure requires direct access to the water as an operational necessity.
- No existing structures built on, over or abutting a pier, dock, wharf or other structure extending beyond the normal high-water line of a water body or within a wetland shall be converted to residential dwelling units in any district.
- Except in the General Development District and Commercial Fisheries/Maritime Activities District, structures built on, over or abutting a pier, wharf, dock or other structure extending beyond the normal high-water line of a water body or within a wetland shall not exceed twenty (20) feet in height above the pier, wharf, dock or other structure.

6. Essential Habitat

Once an area becomes designated as Essential Habitat, the Maine Endangered Species Act requires that no state agency or municipal government shall permit, license, fund or carry out projects that would significantly alter the habitat or violate protection guidelines adopted for the habitat. In determining whether a project significantly alters or unreasonably harms essential nesting habitat, the following factors will be considered:

APPENDIX F
DECISION CRITERIA

- Magnitude and time of year of noise and human activity generated by the project
- Physical alteration to the landscape
- Destruction of or alteration to key habitat components such as perch trees, roost trees, and foraging areas
- Reduction in the seclusion of the nest site and adjacent shoreland area
- Demonstrated tolerance of the particular eagles to human activity and disturbance
- Reduction in the future suitability of the nest site to bald eagles.

APPENDIX G
CURRENT PROGRAMS AND AUTHORITIES



CURRENT PROGRAMS AND AUTHORITIES IN MAINE'S BAYS*

* Blue shading indicates federal agencies, green shading indicates state agencies, yellow shading indicates municipalities.

IF&W: manage populations, habitats, and consult on impacts of development for coastal seabirds (including Endangered & Threatened seabirds and Bald Eagles). Recreational public access, oil spill response, manage sea-run brook, brown and rainbow trout fisheries

DOC: Bureau of Parks & Lands leases state-owned submerged lands for erection of permanent or seasonal structures (not including aquaculture) such as construction of wharves and marinas, dredging and filling. LURC regulates activities in Unorganized Territories, which include many coastal islands

USACOE: permitting of projects located on intertidal and submerged lands, dredging of channels, construction of breakwaters

DMR: Fisheries and marine resource management, research, monitoring and regulation; aquaculture leasing & monitoring; shellfish toxin monitoring; anadromous fish restoration; consultation with state and federal agencies on proposed development projects

USCG: navigational issues, boating safety, search and rescue

NMFS: fisheries, protected resources, and EFH management

ASC: manage and enhance Atlantic salmon habitat, populations, and sport fisheries within historical habitat in all (inland and tidal) waters

DOT: shipping (cargo ports) ferries, surface water quality, coastal access

Municipalities: land use ordinances & zoning; harbor management; soft shell clam ordinances, intertidal leases

MCP – coordinate state review of federal agency actions, e.g., maintenance dredging and military construction projects, for consistency with applicable state environmental laws

DEP: Water quality regulation, such as discharges from vessels (e.g. pump-out program), overboard discharges, combined sewage overflows, issuance of MEPDES permits (including those needed for aquaculture facilities with discharges), issuance of land use permits under NRPA and site law

EPA: Water quality regulation through NPDES oversight

USFWS: Management of National Wildlife Refuges, Endangered and Threatened species, migratory birds

FERC: Regulation of the interstate transmission of natural gas, oil, and electricity.

Federal waters: Federal ownership, EEZ management authority, and regulatory jurisdiction extends from 3 miles out to 200 miles.

Mean high water

Mean low water

Intertidal zone – may be privately owned, subject to a public easement for "fishing, fowling, and navigation"

Maine state waters = mean low water to 3 miles
The Public Trust Doctrine provides that public trust lands, waters, and living resources are held by the State in trust for the benefit of all the people of Maine.

3 mile limit: Outer limit of state jurisdiction. Federal regulatory jurisdiction also extends into state lands and waters under select laws.



Current Programs and Authorities in Maine's Embayments

As the concept of bay management is examined and discussed, it is helpful to first consider the current mix of legal jurisdictions and authorities over Maine's nearshore coastal waters. 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. This handout provides a broad overview of the programs and authorities that currently exist in coastal areas at the local, state and federal level.

Municipal Programs and Authorities

Under home rule authority, a town may assume certain regulatory powers. However, local ordinances and regulations cannot conflict with applicable federal or state statutes or regulations. In some cases, the state or federal government has expressly delegated authority to local governments to enact more stringent standards (such as a number of environmental laws). In the nearshore environment, primary municipal programs and authorities include:

- **Land use ordinances/zoning** – Municipalities have broad authority under home rule provisions to regulate land use, through local zoning and subdivision ordinances, etc. The Mandatory Shoreland Zoning Act requires all municipalities to establish zoning ordinances for land within 250 feet of great ponds, rivers, tidal areas, and freshwater and coastal wetlands. Local ordinances may be more restrictive, but not less restrictive than the state model ordinance. Shoreland zoning ordinances may also regulate aspects of structures which extend into and over the water (e.g. size, height, consistency with existing use and character), including boat ramps, piers, docks, and floats.
- **Harbor management** – Municipal harbormasters have authority for the issuance and siting of moorings, the designation of open, convenient channels for the passage of vessels, and the establishment of anchorages.
- **Soft shell clam ordinances** - Towns may establish local ordinances regulating the harvest of soft shell clams. ME DMR regulations detail the standards that local shellfish ordinances must meet in order to be approved.
- **Intertidal leases** – A municipality that has established a shellfish conservation program may issue a municipal shellfish aquaculture permit to a person for the exclusive use of shellfish in a designated area in the intertidal zone to the extreme low water mark, for the purpose of shellfish aquaculture.

Maine State Agency Regulatory Programs and Authorities

In Maine, the inner boundary of state ownership is the mean low water mark, unless the State owns the adjacent shorelands. Maine common law, derived from the Massachusetts Colonial Ordinance of 1641-7 allows private individuals to own submersible lands that lie between the mean high and mean low tide lines. The public, however, has certain rights of use in this intertidal area, including rights of fishing and navigation. The Submerged Lands Act sets the outer boundary of State waters at 3 nautical miles from the coastline.

Department of Marine Resources (DMR)

- **Fisheries management** – DMR has primary authority for the management of state water marine fisheries. Several species have advisory/management councils that provide recommendations to the Commissioner – the most well known are the seven lobster zone councils. For those species for which the fishery extends into federal waters and/or into adjacent states, DMR works with NOAA Fisheries (NMFS), the New England Fisheries Management Council (NEFMC), the Mid-Atlantic Fisheries Management Council (MAFMC), and the Atlantic States Marine Fisheries Commission (ASMFC) to coordinate federal, state, and interstate management of such species.
- **Aquaculture leasing and monitoring** – DMR has responsibility for evaluating finfish and shellfish lease applications, and monitoring environmental impacts of aquaculture operations in State waters.
- **Shellfish toxin monitoring** – DMR's division of public health oversees the application of the National Shellfish Sanitation Program within Maine. This program keeps molluscan shellfish safe for human consumption by ensuring that a common set of standards are used to classify shellfish growing areas and to handle shellfish when they go to market. The Marine Biotxin Monitoring Program uses the standards outlined in the NSSP to monitor levels of PSP ("red tide") and other marine biotoxins. When toxin is found at unacceptable levels, closures to the harvest of shellfish are implemented
- **Anadromous fish restoration** - Major restoration activities include the operation of fishways and traps to collect fish on their upstream spawning migration and transport them to upriver spawning areas. DMR also works closely with hydroelectric dam owners to provide for installation of fish passages to carry fish

Current Programs and Authorities in Maine's Embayments

upstream to spawning areas and safely pass seaward migrating adults and juveniles downstream around hydropower turbines.

- **Coastal permit review** - DMR is responsible for environmental impact reviews on projects seeking leases on publicly owned submerged and/or intertidal lands, and permits issued by DEP and LURC. DMR consults with federal resource and regulatory agencies on these issues, as well as reviewing and commenting on municipal comprehensive plans which may affect marine, estuarine and riverine resources.

Department of Environmental Protection (DEP)

DEP's role in the nearshore marine environment centers around water quality protection through the regulation of discharges – both from vessels and shore based facilities.

- **Discharges from vessels –**
 - Marine Sanitation Devices** - Under the Clean Water Act (Section 312), vessels with installed toilet facilities and operating on the navigable waters of the U.S. must contain operable marine sanitation devices (MSDs) certified as meeting standards and regulations promulgated under section 312.
 - Pump-out Program** - For vessels without MSDs, DEP manages the pump-out program in Maine. DEP administers the grant program for the installation and maintenance of holding tank pump-out stations in coastal areas.
 - Commercial Passenger Ships** - Maine recently enacted Chapter 650, which specifies a number of requirements applicable to commercial passenger vessels (cruise ships). It provides for future rulemaking and issuance of a general permit for the discharge of graywater, and mixtures of graywater and blackwater, from large commercial passenger vessels.
 - No Discharge Zones** - Section 312 also allows establishment of zones where discharge of sewage from vessels is completely prohibited. The process requires DEP to make an application to the EPA for a specific area. An application for Casco Bay is currently in development.
- **Other discharges -**
 - Combined sewer overflows (CSOs)** occur during storm events when a mixture of wastewater and stormwater runoff overflows the combined sewer collection system before receiving treatment at a licensed wastewater treatment facility. These discharges of diluted untreated wastewater violate both State and Federal water pollution laws. Municipalities or Sewer Districts that have CSOs are required to license them with DEP. License requirements direct these communities to evaluate their CSO problems and determine cost effective solutions to abate them.
 - Overboard discharge** is the discharges of sanitary waste from residential or commercial sources to streams, rivers, bays, and the ocean. All overboard discharges must be approved by the DEP.
 - National Pollution Discharge Elimination System (NPDES)** - Following Maine's authorization by the EPA in 2001, the State became the primary NPDES authority and point of contact for most wastewater discharge sources in Maine. State issued permits under the NPDES program are known as MEPDES or Maine Pollutant Discharge Elimination System permits.
- **Stormwater Management** - The Maine Stormwater Program includes the regulation of stormwater under two core laws: The Site Location of Development law (Site Law) and Stormwater Management Law.
- **Erosion and Sedimentation Control** - Under the Erosion and Sediment Control Law, activities that involve filling, displacing, or exposing soil must be conducted to prevent unreasonable erosion of soil or sediment beyond the project site or into a protected natural resource.
- **Site Law** - Large developments considered to be of state or regional significance or of a type that may substantially affect the environment are required to obtain a Site Location of Development Permit.
- **Issuance of permits under the Natural Resources Protection Act** - Permits are required for certain activities (1) in, on, or over a protected natural resource and (2) on land adjacent to any great pond, river, stream or brook, coastal wetland and freshwater wetlands that may cause material or soil to be washed into those resources. DEP is responsible for issuing permits for specific activities up to 75' inland from the high water line, and up to 3 miles seaward.
- **Classification of Maine waters** - DEP establishes water quality goals for the State. Class SA is the highest classification of estuarine and marine waters. This classification is applied to waters that are outstanding natural resources and that should be preserved because of their ecological, social, scenic, economic or recreational importance. By law, Class SA waters shall be of such quality that they are suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, and navigation and as habitat for fish and other estuarine and marine life.

Current Programs and Authorities in Maine's Embayments

- **Watershed Management** is an approach to protecting water quality and quantity that focuses on a whole watershed. This is a departure from the traditional approach of managing individual wastewater discharges, and is necessary due to the nature of polluted runoff, which in most watersheds is the biggest contributor to water pollution.
- **Nonpoint Source Water Pollution Control Grants** – DEP provides grants to prevent or reduce nonpoint source pollutant loadings entering water resources so that beneficial uses of the water resources are maintained or restored
- **Provide technical assistance** to municipalities for the adoption, administration and enforcement of shoreland zoning ordinances.

Department of Conservation (DOC) Bureau of Parks and Lands (BPL) and Land Use Regulation Commission (LURC)

- **Submerged lands leasing** – BPL has authority to lease state-owned submerged lands for erection of permanent or seasonal structures and other activities, such as construction of wharves and marinas, dredging and filling (the exception is aquaculture leases, which are handled by DMR). Structures located on submerged land require a lease or easement when the existing use is being changed, or the size of an existing structure is being changed. A lease or easement is also required for new structures that will be permanent, or for new seasonal structures larger than 2,000 square feet and used for commercial fishing related purposes or larger than 500 square feet for any other purpose. Lease or easements are also required for pipelines, utility cables, outfall/intake pipes, and dredging. To qualify for a lease or easement, the proposed use cannot have adverse impacts on access to or over the waters of the State, the public trust rights (fishing, fowling and navigation), and/or services and facilities for commercial marine activities.
- **LURC regulates activities** in “Unorganized Territories” which include many coastal islands.

Department of Inland Fish & Wildlife (IF&W)

- **Manage populations, habitats and consult on impacts of development** for coastal seabirds (including Endangered & Threatened seabirds and Bald Eagles under the Maine Endangered Species Act)
- **Fund and develop** recreational public access
- **Partner** with other state and federal agencies in oil-spill response programs
- **Manage** sea-run brook, brown and rainbow trout fisheries

Atlantic Salmon Commission (ASM)

- **Atlantic salmon** - protect, conserve, restore, manage and enhance Atlantic salmon habitat, populations and sport fisheries within historical habitat in all (inland and tidal) waters of the State of Maine.

Maine State Planning Office, Maine Coastal Program (MCP)

- **Coastal Zone Management** – Maine has a federally approved Coastal Zone Management Plan (CZMP), and may therefore review any federal activities (either projects proposed by a federal agency or licensed or permitted by a federal agency) for consistency with the enforceable policies of the CZMP (the core laws). The core laws involve regulated activities such as wetland alteration, pollution discharge and dredging/dredge material disposal, both in organized and unorganized territories.

Maine Department of Transportation (DOT)

- **Shipping (cargo ports)/Ferries**
- **Surface Water Quality Protection Program (SWQPP)** - The purpose of this program is (1) to identify surface water bodies (lakes, rivers, streams, estuaries, etc.) where water quality is being adversely impacted by runoff from highways, (2) to select and prioritize candidate pollution elimination projects to fund, and (3) to manage the design, development and construction of projects selected for funding.
- **Wetland mitigation** - The Mitigation Unit directs and coordinates compensatory mitigation for impacts to wetland resources caused by transportation projects throughout the State.
- **NEPA Compliance** - DOT develops Environmental Impact Statements (EIS's) and Environmental Assessments (EA's) and Categorical Exclusions (CE's) for most major projects, as required by the National Environmental Policy Act (NEPA).

Current Programs and Authorities in Maine's Embayments

Federal Agency Regulatory Programs and Authorities

The United States Exclusive Economic Zone (EEZ) extends from the outer boundary of state waters (3 miles) out to 200 miles from shore. However, the federal government's legal authority in navigation, commerce and security extends shoreward into state waters. The federal agencies highlighted below are those that have a role in regulation or review of activities in state waters.

National Marine Fisheries Service (NMFS)

- **Fisheries Management** - Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), the U.S. claimed sovereign rights and exclusive fishery management authority over all fish, and all Continental Shelf fishery resources, within the EEZ. Fisheries regulations for federal water species are often developed through the Regional Fisheries Management Councils. However, for some species, the interstate Marine Fisheries Commissions (e.g. ASMFC) may recommend to the Secretary of Commerce that the Secretary adopt federal regulations that reflect state management approaches or incorporate specific state measures.
- **Protected Resource Management** - NMFS administers the Marine Mammal Protection Act, and shares statutory responsibility with the USFWS for the Endangered Species Act.
- **Act as a review agency on coastal projects** which affect living marine resources, including Essential Fish Habitat (EFH) as identified in cooperation with regional Fishery Management Councils.

US Fish and Wildlife Service (USFWS)

- **Act as a review agency on coastal projects** with impacts on resources under their jurisdiction. USFWS has responsibility for National Wildlife Refuges, Endangered and Threatened species, migratory birds, and other natural resources.

Environmental Protection Agency (EPA)

- **Water quality protection and monitoring** - The primary mechanism in the Clean Water Act (CWA) regulating the discharge of pollutants is the NPDES. Under the NPDES, a permit is required from EPA or an authorized state for the discharge of any pollutant from a point source into the waters of the US. Permits may be issued by states following approval of their permit program by EPA (ME's program was approved in 2001); for discharges beyond the territorial sea, EPA is the permit-issuing authority. In ME, as in all delegated states, EPA's role is to assure that state actions meet the requirements of the CWA. This includes review of draft permits prepared by the state, general oversight of program requirements and performance, and review of proposed changes to state laws and rules related to the NPDES program.
- **Disposal Site selection** in cooperation with other state and federal agencies.

US Army Corps of Engineers (USACOE)

- **Jurisdiction over projects located on intertidal or submerged land** through issuance of permits authorizing activities in or affecting navigable waters of the U.S., and adjacent wetlands, including the discharge of dredged or fill material, and the transportation of dredged material for the purpose of dumping it into ocean waters. This requires consultation with other federal agencies, including NMFS and USFWS, and frequently involves consultation with state agencies.
- **Navigation Project Development and Maintenance**, including maintenance dredging of channels and anchorages, construction and maintenance of breakwaters.
- **Disposal Site Selection and Monitoring**

US Coast Guard (USCG)

- **Navigational issues** – placement and maintenance of navigational aids, permitting of bridges and consultation with the ACOE on other activities that have the potential to impact navigation.
- **Boating safety/Search and rescue**

Federal Energy Regulatory Commission (FERC)

- **Regulation of the interstate transmission of natural gas, oil, and electricity.** FERC also regulates natural gas and hydropower projects.

APPENDIX H
INPUT RECEIVED DURING INTERAGENCY MEETING

INPUT RECEIVED DURING INTERAGENCY MEETING

Study staff organized a meeting, held on September 18, 2006, in Hallowell, Maine to solicit ideas from state agency staff on opportunities for addressing select issues from a regional perspective and for improving interagency coordination. This meeting was attended by staff from the following Maine state agencies: DEP, DMR, DOT, DOC, DIFW and SPO. The following is a summary of the main comments and observations provided at the meeting by the participants:

- There was general consensus among agency participants that there is currently a high degree of interagency communication and collaboration on nearshore management related issues and initiatives. Current examples include MaineDOT's Gateway 1 and Sagadahoc projects, interagency working groups addressing LNG and potential tidal power proposals and the coastal water access planning group. The apparent discrepancy between this general agency perspective and public comments suggesting the need for more effective interagency coordination may be explained in part by the fact that these interagency collaborations are often issue-specific and focused on regulatory matters, are of limited duration and are not made known to the public generally in a way that indicates their collective scope.
- State agencies are for the most part not organized regionally such that there are designated point persons who are knowledgeable about the policy issues or concerns facing discrete regions and thus able to direct the public to pertinent information or decision makers. State agencies noted that the net benefits of this type of reorganization to achievement of their programmatic missions and related priorities is not readily apparent and that any decision about how best to reorganize and redeploy agency efforts should be based on a prior and more detailed assessment of agencies' missions, program responsibilities and priorities and resources.
- Any multi-agency strategic planning effort aimed at further integrating agencies' nearshore management efforts must take into account their existing missions, related programmatic priorities and funding related commitments. As an initial step in such a strategic planning effort, it would be useful to develop a multi-agency matrix that depicts this information.
- In order to develop or support regional initiatives efficiently and effectively, the State needs to provide for the requisite staff capacity and expertise, perhaps through enhancement of efforts by existing regional councils or by the State Planning Office. Any new state efforts to support or enhance regionally-based efforts should be well-coordinated with SPO's legislatively-directed effort to promote and enhance regionally-based management through the land use planning laws and programs it administers.
- There was general concern among state agencies that any new state effort to support regional initiatives, whether through reorganization or redirection of existing resources or through use new resources, should not diminish or dilute but be designed to support and enhance existing efforts to address agency priorities.

APPENDIX I

INPUT RECEIVED DURING FIRST SERIES OF PUBLIC MEETINGS

INPUT RECEIVED DURING FIRST SERIES OF PUBLIC MEETINGS

Below is a compilation and analysis of the information provided at public meetings in five coastal locations in winter 2005. The first two sections are the problems, issues and concerns that people have related to their coastal environments. The last two sections compile the problems directly related to governance of nearshore environments.

SECTION 1: PROBLEMS AND CONCERNS REGARDING MAINE’S NEARSHORE ENVIRONMENT

Ecological Issues

Impact of land-based activities on the marine environment

1. Land use impact on water quality and marine ecosystems: caused by - loss of vegetated buffer zones, urbanization, non-point source pollution, local sewage treatment, industry
2. Human activities harm marine organisms/habitats: recreation threatens seabird habitat; dams restrict fish passage and change ecosystems; filling wetlands; seawall impacts; excessive development on small islands; development encroachment on marshes, wetlands and beaches
3. Impact of recreation/tourism: increased tourism putting pressure on islands and remaining wild places; intertidal habitats negatively impacted by visitor use

Impact of water-based activities on the marine environment

1. Harvesting concerns: impacts of mussel dragging; shellfish harvesting harms ecologically sensitive areas;; depleted fisheries (i.e. urchins, scallops, groundfish) and other stocks (American eel, dogfish, and flounder); new fisheries are often underregulated (knotted wrack); impacts of aquaculture
2. Impact of recreation/tourism: lack of pump-out stations and boater use of existing facilities; intense seasonal (summer) use by recreational boaters; cruise ships impact water quality, air quality and marine mammals
3. Dredging/Waste concerns: dredging needed yet it disturbs habitat; need dredge spoils disposal options; hazardous waste disposal; deliberate dumping into bay
4. Water use impact on water quality: aquaculture, oil spills
5. Human activities on the water harm marine organisms: farmed salmon impacts wild salmon; loss of eel grass (i.e. from dock construction); ghost traps

Social Issues

User conflicts

Activity-based conflicts

1. Multi-use conflicts: in multi-use areas, everyone thinks their use is more valid; multi-use conflicts greater in summer. Some areas actively try to balance fishing, aquaculture, recreation, commerce, transportation and tourism while others think that too many uses (moorings, lobstering, fishing, swimming) in one place inhibits recreation
2. Commercial access to water from land impacted by competition at public docks with recreational users (e.g. tourists block landing for unloading of clam diggers), as well as with other commercial users

APPENDIX I
INPUT RECEIVED DURING FIRST SERIES OF PUBLIC MEETINGS:
“SHARING PUBLIC WATERS: A COMMUNITY DISCUSSION”

3. Conflicts between harvesters: lobstermen and mussel rafts compete for space; fiercely guarded lobster territories hems in some fishermen to certain areas; fixed gear conflicts with ability to trawl; pillage of mussel beds by harvesters from away
4. Safe navigation concerns: many different vessel types (large, small, working, transit, recreation, fast, slow) all trying to use same space; lobster gear in channel creates navigational challenge for other boaters; conflict between lobster boats and most other boaters (from kayakers to LNG tankers); recreational boaters and jet skiers operate with no safety training or boater education
5. Scientific research impacted by public and commercial uses: marine lab needs clean salt water, but mussel dragging damages intake and stirs up sediment; research area (markers and sites) disturbed by draggers and urchin fishing; lack of intertidal areas where public access is restricted but research can take place; lack of subtidal areas where boating and commercial fishing (esp. bottom trawling/dragging) isn't allowed

Cultural or perspective-based conflicts

1. Differing views on how resources should be used: new coastal residents perceived to have no interest in commercial uses of water, including fisheries and aquaculture (opposition to mussel rafts, riparian landowner boat interference at aquaculture site; lack of support for infrastructure to support commercial fishing and aquaculture); some coastal residents think others lack respect for private property
2. Water access (public or working waterfronts) needed but some local residents fight it
3. Differing views on aesthetics: cruise ships (and other specific activities) believed to impact aesthetics

Economics

1. Support economic uses of coast: ecotourism; need dredged channels for commercial maritime commerce; encourage acceptance of aquaculture industry and waterfront development; need to preserve native traditional uses of resources; need to prevent regulatory history from disadvantaging some groups (local fishermen may not have permits to access returning groundfish stocks)
2. Balance economic development with other issues: conservation is fine, but balance with economic diversity and with small fishing communities; important to preserve traditional working uses while controlling coastal development; balance waterfront development with environmental concerns

Management Process

1. Current management process yields poor outcome: concerns that there is a lack of ecosystem management perspective; concerns that existing management framework for certain species (urchins, rockweed, periwinkles) is insufficient; work should be done to identify and restore areas damaged by human activity; need for more municipal planning; scale of management is not right; management doesn't integrate land-based and water-based issues
2. Current management process insufficient for participants: concerns about aquaculture leasing process; bureaucratic system not responsive enough; lack of State vision for the coast

APPENDIX I
INPUT RECEIVED DURING FIRST SERIES OF PUBLIC MEETINGS:
“SHARING PUBLIC WATERS: A COMMUNITY DISCUSSION”

3. Insufficient resources: not enough DMR staff (e.g. to retest shellfish closures, water quality testing, to respond to problems); towns don't have resources for enforcement
4. Impact on harvesting: conservation efforts are stymied (no fishing area violated by rogue urchin divers; no incentives for local conservation efforts because outsiders can come in and harvest.)

Water access issues

1. Threatened or limited public access (for recreation, beaches, passive enjoyment, transient yachts, kayaks/canoes, etc.): usually attributed to increased use and/or increased population. Also can be a cultural clash issue (see above).
2. Threatened or limited working waterfront (for fishing, clamming, worming, or other commercial uses): attributed to increased waterfront development and taxes, as well as to competition at public facilities (see activity based conflicts above)
3. Limited support for water access: moorings (overflowing, lack of suitable anchorages); parking limitations (not enough spaces, exorbitant fees, lobstermen taking spots early in morning); dinghy storage; pump-out stations

No Problem!

Use or Enjoyment of an area

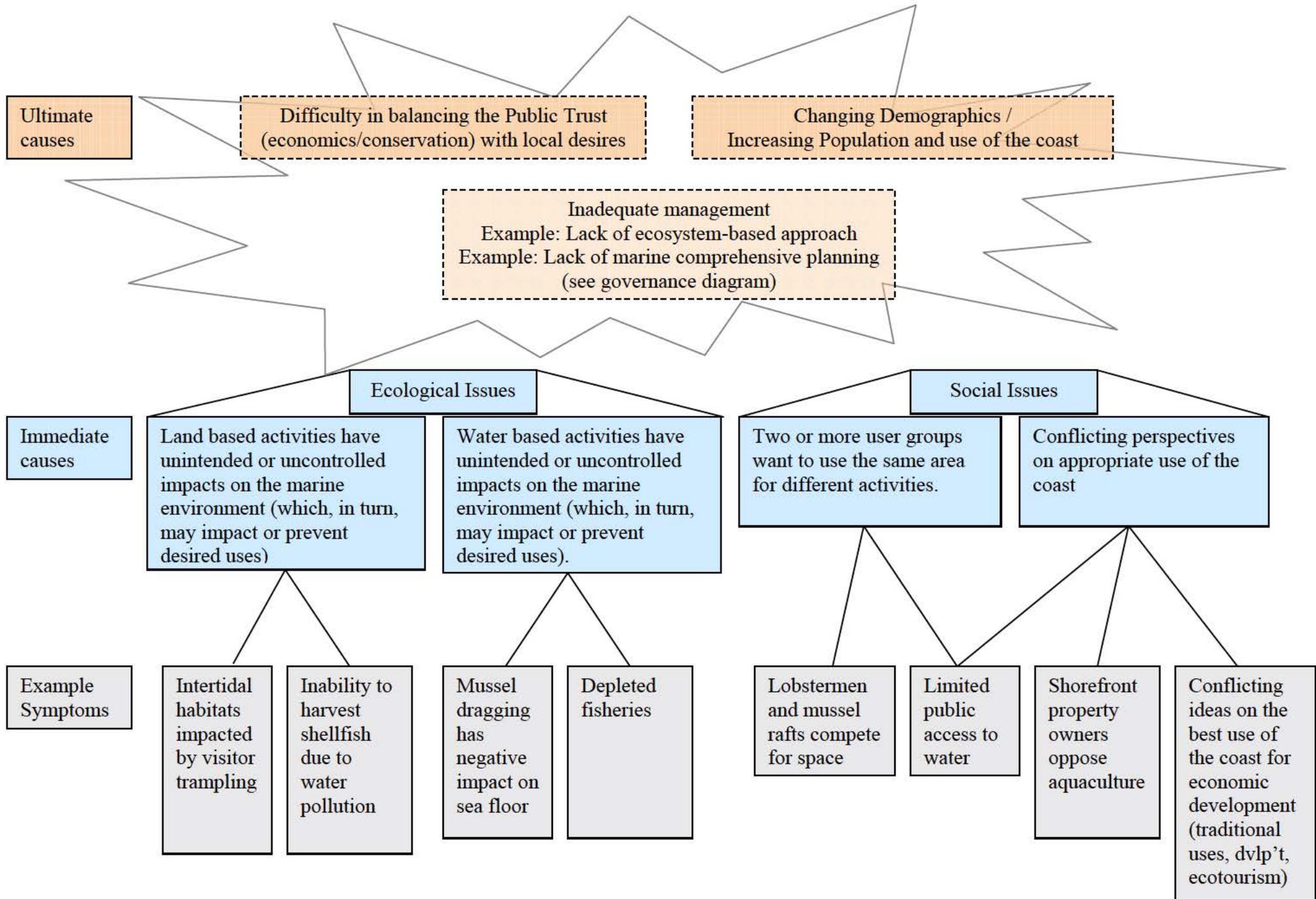
1. Desire to maintain identified places as they are: passive recreation, boating, fishing camping, wildlife observation conservation; scenic values
2. Desire to conduct resource extraction in same locations as currently used: lobster, shellfish (mussels, clams, quahogs, scallops), urchins, crabs, rockweed, aquaculture (finfish or shellfish)
3. Desire to maintain existing biological integrity of coastal ecosystems; desire to keep remote outer islands remote; some sites have ecological value

Diagram: Identifying Problems on the Maine Coast

There were over 500 problems, issues and concerns identified at the initial bay management study public meetings. Although some problems are common to many bays, the specific mix of problems is unique to each specific area or bay. Further, the information collected during the 2005 meetings was a snapshot of the problems present at the time. It is fully expected that the problems faced by an area will continue to evolve, and that management solutions should be structured to anticipate, to the degree possible, future needs. Thus, the aim of the following diagram is to help us identify and address the *causes* of a wide range of problems.

- ⇒ At the bottom of the page in the gray boxes labeled “Example Symptoms” are a few of the problems identified at the public meetings.
- ⇒ The blue boxes in the middle of the diagram labeled “Immediate Causes” show the four causes that result in all of the identified problems.
- ⇒ At the top of the page, in the tan boxes, are the “Ultimate Causes” of the problems. The ultimate causes regarding the public trust and changing demographics are difficult to address or control. In contrast, the ultimate cause labeled “Inadequate management” is an area in which we could make changes.

SECTION 2: IDENTIFYING PROBLEMS ON THE MAINE COAST



SECTION 3: PROBLEMS WITH GOVERNANCE OF MAINE’S NEARSHORE ENVIRONMENT

Background

At the initial set of five public meetings along Maine’s coast, participants were asked whether Maine’s bays were being managed well in regards to five aspects of governance: 1) local input; 2) use of science; 3) coordination of multiple agencies; 4) accommodating multiple uses; and 5) matching the scale of management to the scale of the activity or use being managed. The following summary provides an overview of the points raised during the small group discussions, but does not list every comment mentioned. A complete list of comments is available upon request.

1) Local Input

We asked meeting participants to identify what works and does not work in terms of incorporating local input in management decisions. We found that ‘local input’ spurred more discussion than any of the other aspects of management. Some of the questions that arose out of this discussion centered around who is a local person, and to what degree does local ‘input’ mean local ‘control.’

Examples where local input in bay management is *working well*:

- Existing opportunities for local input in government processes. Identified examples usually had at least a medium level of control for participants. Lobster zone councils came up several times, and some people recognized the aquaculture lease process for allowing involvement.
- Regional cooperation leading to control of resources. These examples focused on locals coming together themselves to manage resources, such as the St. George River wormers and the Cobscook Bay Fishermen’s Association.
- Town control. These were examples of towns being proactive, taking advantage of the ability they have to manage coastal areas through shellfish ordinances, zoning, and harbor management.
- Interlocal agreements between towns. In a few areas, towns have come together to manage resources, and these examples were noted as good opportunities for local input. Two examples are a ‘no buoy zone’ and an ‘interlocal stormwater working group.’
- Citizen groups taking action. Voluntary efforts, usually with no designated power, were often cited as opportunities for local involvement that make a difference. These range from “Friends of” groups to annual beach cleanups to stewardship of islands.
- Industry participation. Marine-based industry representatives mentioned ways they have been involved through the Clean Marinas program and aquaculture bay zones.

Examples where local input in bay management is *not working well* are:

- The existing process for local input does not work. While many participants acknowledged that opportunities exist for local input, they felt that they were inadequate.
⇒ *Lack of empowerment.* Participants felt that what they say does not influence decisions. State agencies are not responsive to local input, which results in people not wanting to participate in the future. Some of the examples are: the aquaculture lease process, the LNG debate, and the Administrative Procedures Act.

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- ⇒ *Methods of participation fail to engage some groups.* The public meeting format was cited as a method that does not work well for certain groups of people, especially fishermen. Furthermore, the amount of time and preparation to effectively participate in hearings limits involvement of some people.
- ⇒ *Activity seen as having no opportunity for local input.* LNG and groundfisheries were specifically noted as not allowing for local input.
- Towns lack ability to carry out task or to see the bigger picture. Even though towns have opportunities to manage resources, they may not have the ability to do so effectively. It was suggested, for example, that towns do not know enough to develop and/or enforce effective shoreland zoning or other ordinances. Related, towns may be reluctant to think/act regionally or consider the bigger picture (i.e. port authority approving docks).

2) Science

We asked participants to discuss how science is incorporated into management decisions, and found that people had almost as much to say about this as they did about local input. Participants were generally in favor of science-based decision making, but stressed the need to better incorporate local knowledge.

Examples where incorporating science in bay management is ***working well***:

- State/Federal government using science effectively. There were several references to data being used effectively in shellfish management – from volunteer data to DMR water quality testing to shoreline surveys. Other examples included creating a no discharge zone for inner Cobscook Bay, and Beginning with Habitat data provided to towns.
- Information dissemination. Most of the examples related to the good distribution of scientific information were by non-government entities. Examples included the Wells Reserve and Gulf of Maine Research Institute (GMRI). The increased availability of GIS information for decision making was also noted.
- Collaborative research. The collaboration between fishermen and scientists (at DMR and at GMRI) was noted as an effective use of the scientific process and local knowledge.

Examples where incorporating science in bay management is ***not working well***:

- Not enough good data. Science isn't being used well, according to some, because agencies are making decisions with limited information for things such as invasive species, or cumulative impacts. Lack of data was often linked to limited funds for applied research (for both governments or NGOs). Lastly, some said that data is biased.
- Available science is not being used or linked to policy decisions/makers. There were many examples provided of decisions being made without regard to appropriate data. Examples include: urchin and rockweed management, beach closures, aquaculture lease process, and a Mere Point boat launch proposal. In some cases, it was suggested that the problem lies in getting information to decision makers, while in other cases, the problem described was that the decision-makers are failing to consider available data.
- Local knowledge ignored. Some participants felt that local knowledge has been ignored, and only official studies considered in decision making (i.e. urchin management, LNG).

3) Multiple agencies

We asked participants to discuss what has worked or not worked in terms of encouraging multiple agencies or levels of government to work together effectively in decision making.

Examples where multiple agencies are *working well* together are:

- Participants seemed to have trouble coming up with examples of multiple agencies or levels of government working well together. Some pointed out that having various agencies working in the same area is good because it provides checks and balances. But the only examples that participants provided of actual multi-agency collaboration were local groups that maintain connections with other agencies or groups. Watershed organizations and land trusts were most often mentioned in this category.

Examples where multiple agencies are *not working well* together are:

- Conflicting policies/lack of common vision. It was perceived that different state agencies have different policies or goals for the same areas or resources. For example, DOT and DOC have different plans for Sears Island, and land use agencies and water use agencies (i.e. DEP and DMR) have conflicting policies. Others suggested that the problem was a lack of a plan or vision in the state for coastal resources.
- Agencies do not work together. When multiple governing authorities have jurisdiction over similar areas, it can create a difficult system for others to work within. Examples include: filling out similar paperwork for both DMR and Federal agencies on dogfish harvesting, dealing with both DEP and EPA and DMR in aquaculture leasing, and the various agencies involved with septic systems and shellfish closures (DEP, DHHS, DMR). The complexity of dealing with so many agencies leads to delays and is confusing.
- Poor coordination between State and towns. The state should be responsible for coordinating with towns. For example, local code enforcement could be enhanced if the state worked more closely with towns so they know their roles and are outfitted with needed tools and knowledge.

4) Multiple use planning

We asked participants to discuss what has worked or not worked in terms of how governance accommodates multiple uses in an area. While participants were able to give examples of where multiple uses were or were not occurring, it appeared more difficult for them to point to aspects of governance that helped or hindered these situations.

Examples of how governance encouraging multiple uses is *working well*:

- Direct communication or tradition. Although communication between various user groups (i.e. commercial and recreational users, fishermen and landowners) may not be a formal governance technique, it was pointed out as a method of self-governance that can work well.
- Working waterfront planning. Some waterfront areas have planned well for both commercial and recreational uses.
- Business practices and/or educational efforts. Again, although not a governmental practice, it was pointed out that when businesses agree on certain practices (i.e. boatyard regulations through the clean marina program, no discharge zones in Casco Bay) or engage in education

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(i.e. brochures and signs promoting piping plover protection), the end result is that more uses end up being compatible in one area.

Examples of how governance encouraging multiple uses is ***not working well***:

- One use in an area prevents or hinders another use in the area. Some of the many examples discussed are: recreational uses get priority over commercial uses, land uses (esp. pollution) negatively impact water uses, and use of low tide channels. A more specific example was that shellfish harvesters are concerned that if they are conserving an area (reseed, brush, do rotation), others (like worm diggers) have access to area and disturb it, which means they are reluctant to put too much effort into conservation. Shoreland zoning planning and enforcement was the only aspect of governance specifically mentioned as needing improvement to help with multiple use planning. Thus, it may be a lack of governance techniques to mitigate use conflicts that is being described.
- Access issues. Some participants felt that the problem of multiple-use conflicts rests in the lack of access for certain user groups (commercial, recreational).

5) **Scale of management matches scale of resource/use**

We asked participants if the scale of management was appropriate for the specific resource or use it was managing. For example, a town trying to manage a resource that people felt needed to be managed at a state-wide level would be an example of mismatched scales.

Examples of where the scale of management matching the scale of the resource is ***working well***:

- Town level. Participants felt that towns having control over the management of certain resources (i.e. clam ordinances, shellfish management, harbor management) was appropriate.
- Regional level. A few examples of appropriate regional management of resources were: lobster zone councils, local grassroots coalitions, and Wells Reserve.
- State level. The Beginning with Habitat program was cited as a good example of a state-level program assisting with town-level decisions.

Examples where the scale of management matching the scale of the resource is ***not working well***:

- Too large of a management scale. There were some general comments that top-down (Augusta-based or federal ground fishing) management is not appropriate. The two-zones in urchin fishery management were noted in particular as being too large.
- Local scale management lacks big-picture approach. Some participants felt that towns don't look past municipal boundaries to the detriment of resource management (i.e. beach closures, clams). DMR was also cited as lacking an ecosystem approach to their management of state-wide resources (esp. not considering land uses that impact marine systems).
- Not enough assistance available at local level. While towns may be the appropriate scale for managing some resources, they are not provided with enough assistance to do so properly. It was noted that there are not enough DMR staff based at the local level.

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6) Other

Participants in the public meetings were also encouraged to describe any other aspects of bay management that they felt was or was not working well. These are pieces of governance that did not fit into any of the other major categories.

Other examples where governance of bays is *working well*:

- Watershed management: Addresses multiple uses and multiple species at a regional level.

Other examples where governance of bays is *not working well*:

- Regulations or enforcement: Examples of where there were not good regulations in place, or where existing regulations are not enforced included: shoreland zoning, emerging species regulation (e.g. rockweed), and the difficulty towns have in writing good ordinances.
- Economic constraints: While not a method of governance, some participants pointed to economic problems as hindering governance efforts. For example, DMR has more to take care of given their staff and funds, the tax system is driving local people away from the coast, and the market forces work against commercial fishermen.

Suggested Improvements

Throughout the discussion of governance, participants suggested various ways to improve decision making. The following is a synopsis of these suggestions:

Local Control

- Look at examples where local people have successfully managed their own resources and find ways to replicate this elsewhere and for other resources/uses.
- Encourage more interlocal agreements.
- Develop participation methods that engage groups that are often left out of decision making. For example, seek out fishermen in their own environment and make meetings less academic.
- Provide towns with better information about what their roles are and are not in managing coastal resources (e.g. shoreland zoning, etc.)
- Explore how local input can be increased while also maintaining state control over some aspects of state-wide or public trust significance.

Science

- Provide informal ways to exchange information (not just in public hearings/meetings). Similarly, develop mechanisms for conveying science to local decision-makers.
- Create central (but local) repositories for scientific information that can be accessed by anyone.
- Actively seek out local knowledge for use in decision making.
- Seek out more funding for applied research.

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Multiple Agencies

- Develop a state vision for the coast. Develop a statement about the value of the coast (culturally, economically and ecologically).
- Create a streamlined or centralized method for dealing with multiple state agencies with jurisdiction in the same area or over the same resources.

Multiple Uses

- Encourage more direct communication between different user groups.
- Develop governance for dealing with user conflicts.

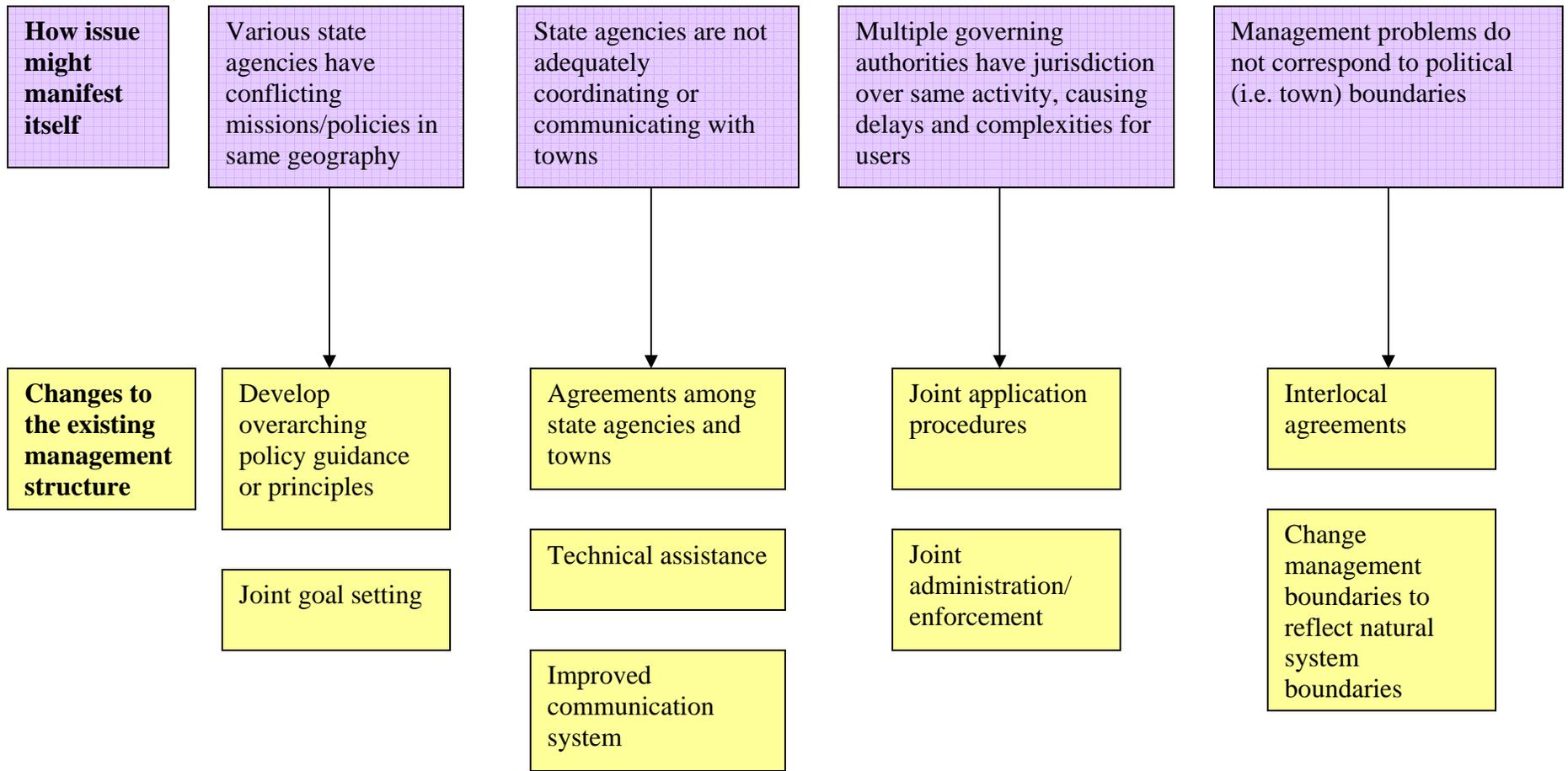
Scale of Management

- Develop regional or state body to coordinate with local grassroots coalitions
- Encourage more regional planning (right now its either town or state).
- Towns need better training. Improve regional staffing/resources for towns to draw from.

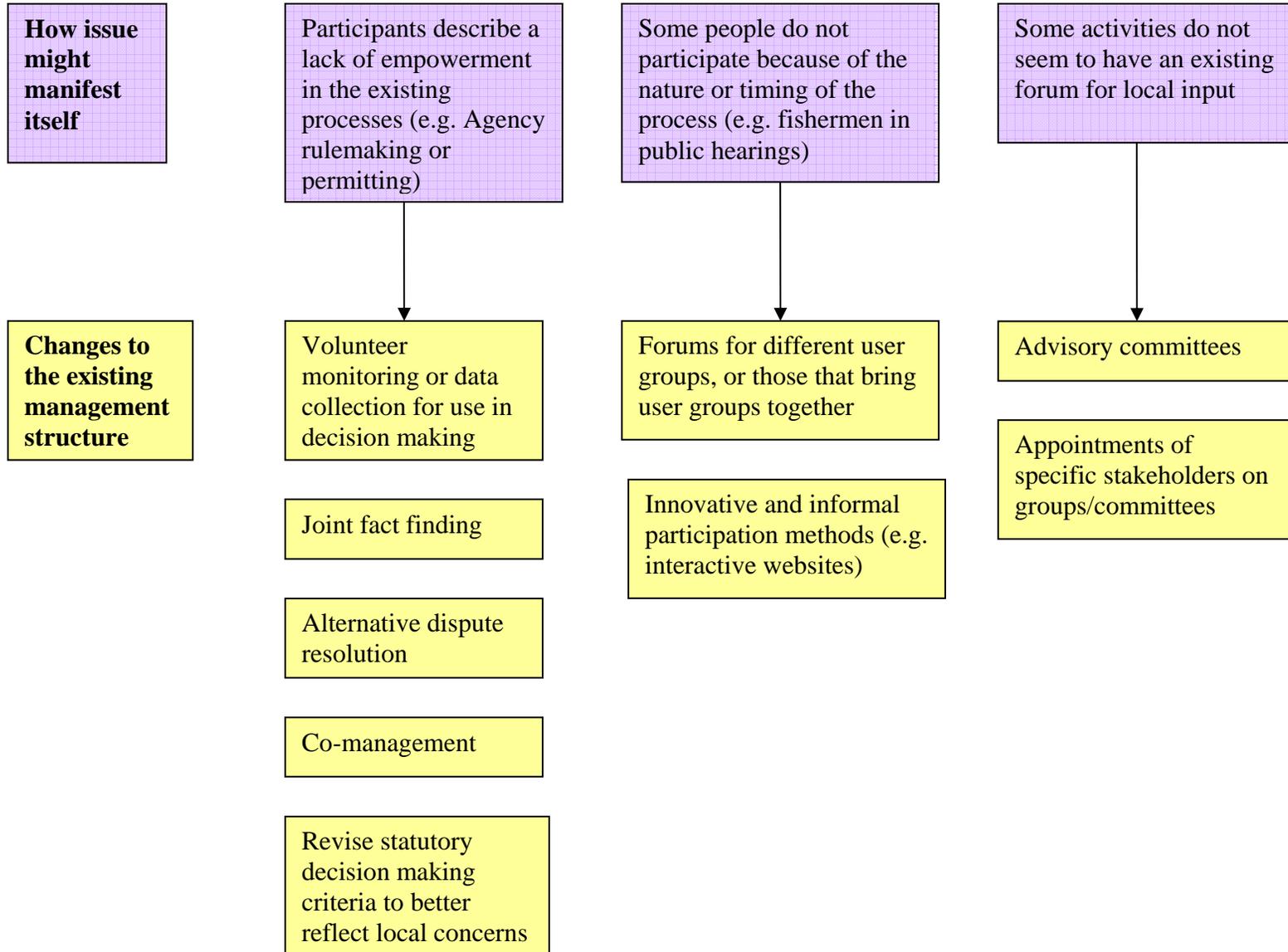
Other

- Bring different stakeholder groups together to share information and strategize.
- Bay management should be guided by the geographic, ecological and social conditions unique to each bay.

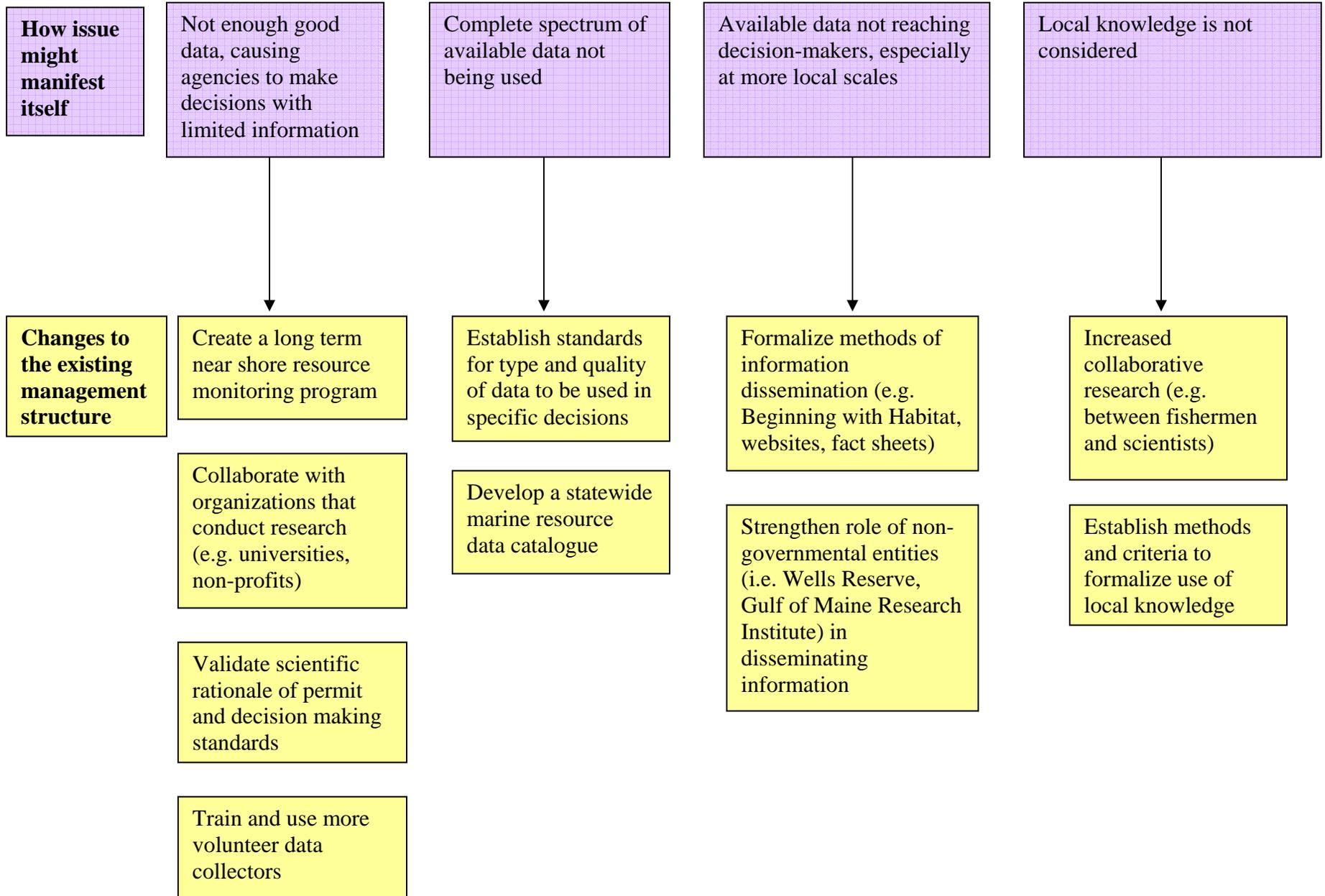
MANAGEMENT ISSUE: GOVERNMENT COORDINATION



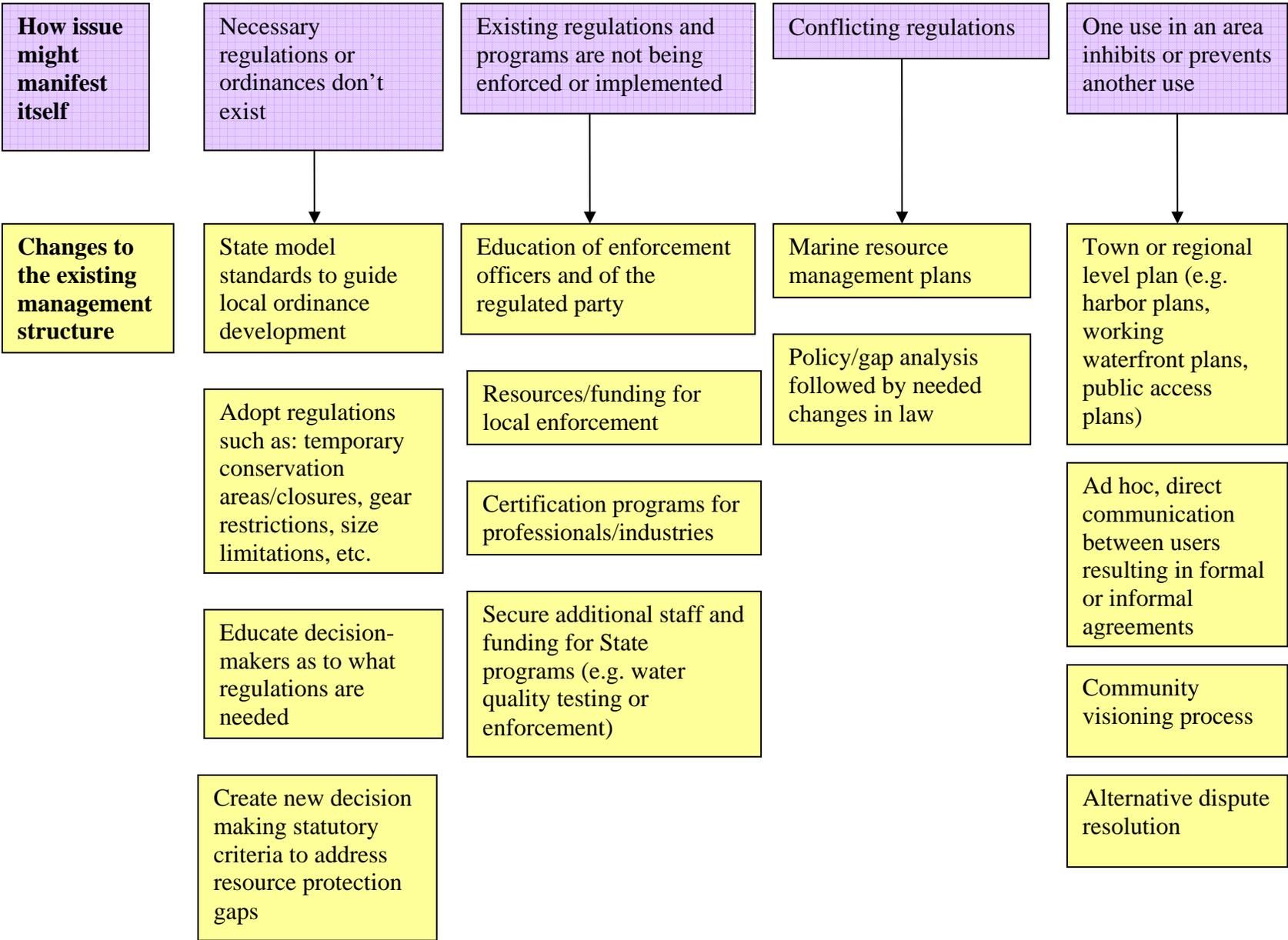
MANAGEMENT ISSUE: LOCAL INPUT



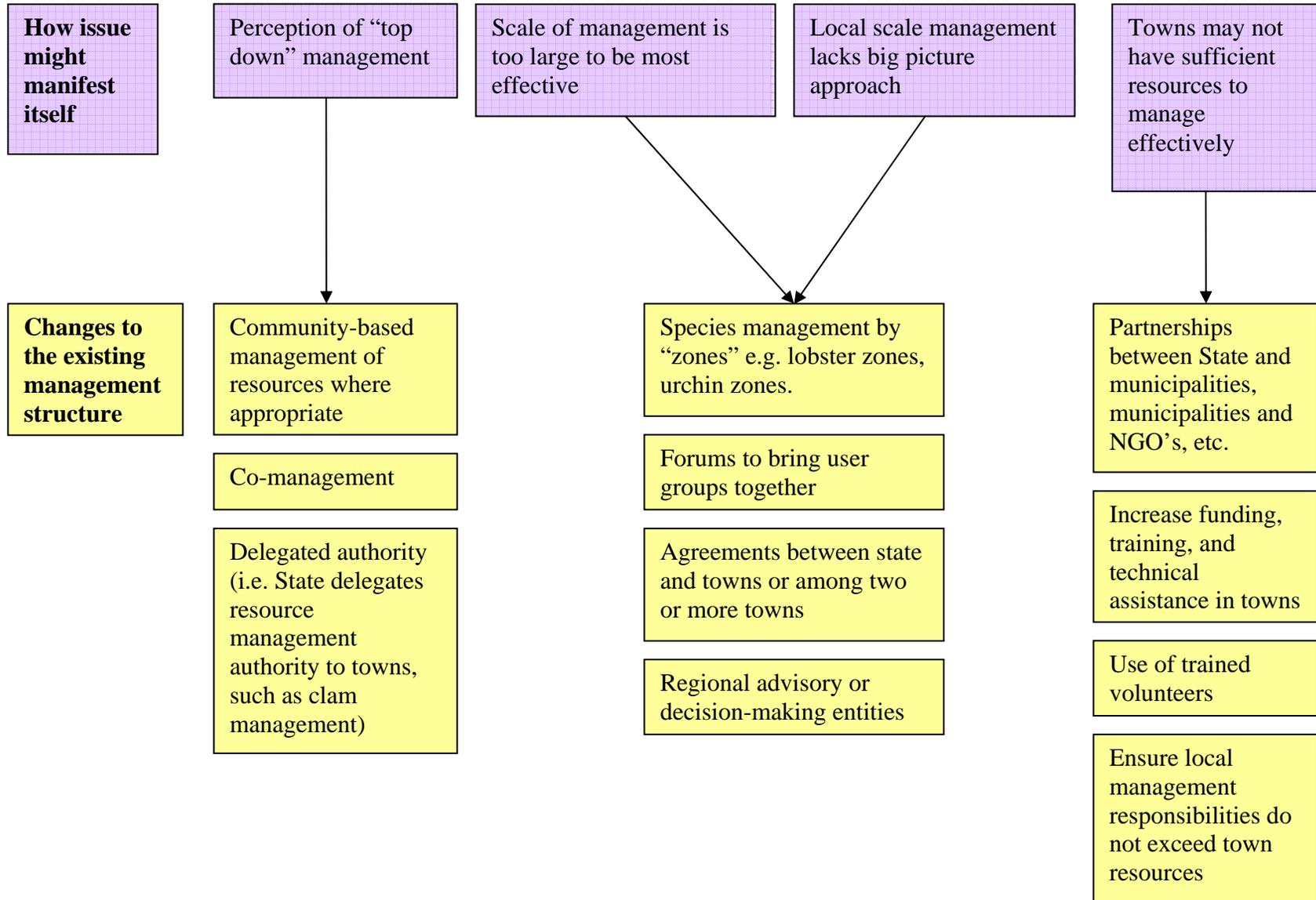
MANAGEMENT ISSUE: USE OF SCIENCE IN DECISION MAKING



MANAGEMENT ISSUE: MECHANISMS FOR RESOURCE PROTECTION OR MULTIPLE USE CONFLICTS



MANAGEMENT ISSUE: MANAGING RESOURCES OR USES AT THE MOST APPROPRIATE SCALE



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Below is a compilation and analysis of the information provided at this full day work session held in Belfast in February 2006. The first section provides an overview of the stakeholder presentations and the second section summarizes the small group discussions.

SECTION 1: SUMMARY OF PANEL PRESENTATIONS

PANEL 1: LARGE-SCALE, SYSTEM-CHANGE APPROACHES TO BAY MANAGEMENT

Roger Fleming, Conservation Law Foundation
Sal McCloskey, East Penobscot Bay Environmental Alliance
Vivian Newman, Maine Chapter of the Sierra Club
Steve Perrin, Friends of Taunton Bay

Speaker: Roger Fleming, Conservation Law Foundation (CLF)

Title: Bay-Area Planning and Management

Wants to encourage the State to set up a framework for decision making that will lead to better management of the Coast.

There are many benefits of local management and planning.

CLF has been involved in different aspects of marine planning for years.

The Pew Oceans Commission report and the US Oceans Commission report concluded that oceans are in trouble and that we need to move toward the use of more ocean planning tools – geared toward improving the overall health of the oceans.

The EEZ is large, and is held as a public trust. If we treated the land as we treated the EEZ people would be outraged.

Resources belong to all and should be managed for all – as a whole.

The coastal New England ecosystem, Gulf of Maine, and other ecosystems are all the same in the sense that they are functioning ecosystems, and need to be treated as such– the only difference is that the Gulf of Maine is covered with water.

There are concerns about ecosystem health, and increasing demands on ocean resources. Current management structures can no longer cope with these.

CLF has been studying Bay Area management models for a couple of years. They have been looking at various models to find tools to be used in Bay Area Management models. CLF issued a draft whitepaper to the Aquaculture Task Force, and is about to issue an update.

The classic elements of Bay Area Management in current models and studies are:

- Adaptive
- Integrated and Interdisciplinary
- Long Term Perspective and Vision
- Ecosystem-based
- Community-based Initiatives and capacity building
- Proactive Issue Management
- Marine Reserves and Coastal Protections

Note especially the adaptive nature of the tools, and that a second review loop is used to see if they are working. Tools tend to be integrated: they deal with multiple users and try to incorporate regulatory entities. Single sector models are not discouraged, they will over time lead to a more integrated model.

Proposed model:

The proposed model strikes a balance between proposals that are on the table right now. There is a range of possible actions, and this proposal is in the middle. It is the best fit based on where Maine is right now. The proposed model would establish an option for people who live around or value a bay to put together a plan to manage the bay subject to approval and oversight.

The local plan would fit in a geographically defined area and it would establish standards and a local body. If the plan is created locally and approved by the state, it would work on the basis of a consistency determination.

If a plan is found consistent, it could move forward. If found inconsistent, there would be an appeal route.

There are many details that could be discussed, but these would be better addressed through questions and answers than in the ten minute presentation. (Some are in handout)

This proposal would involve statewide principles and statewide standards.

The tendency will be toward making the process complex, but CLF would like to see a less regulated, more open program that provides incentives for local communities to undertake the planning exercise and try some experiments.

Speaker: Sally McCloskey, East Penobscot Bay Environmental Alliance (EPBEA)

Title: Working Group Position Paper on Bay Management

Project members who prepared the position paper:

Marsden Brewer, Danny Weed, Clare Grindal, Nonny Ferriday, Becky Bartovics, Jane McCloskey, Sally McCloskey

There are many licensing entities acting in a hodgepodge approach, and there is little analysis of the overall impacts of uses and of management. Agencies work with municipalities, but lack the overall

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picture in this respect as well. Some licensing and enforcement is not happening because of lack of resources or lack of oversight.

River systems are part of the health of our bays, and should be regionally managed as well. One cannot manage the public trust with one size fits all solutions from Augusta, nor from the myopia of municipalities, rather bay and river management requires a regional approach.

Vision statement: Bay management seeks to coordinate the activities of state and local government, stakeholders, special interest groups and bay citizens in the management of the public trust. It works to mitigate the impact of a host of public and private uses of a water system to ensure the ecological sustainability of its marine environment and the economic sustainability of its working people.

Regional management structure: The group's conclusion was that one of the ways of getting local control, was to create a bay or river advisory *council* made up of state agencies, bureaus, etc. as an advisory council to a bay or river *committee* which would be the governing authority.

The bay or river committee would be comprised of 12 volunteer members representing a broad array of stakeholders and appointed by the Governor. It would need a distribution of people around the bay, not necessarily one from each town for larger bays. *[This is different than the position paper – paper says at least one from each town fronting a bay]*.

Subgroups could be formed to coordinate with larger bay group, but the members must represent areas they are making decisions about.

The advisory council would be comprised of representatives from state agencies, the Legislature, towns, and counties. They would make suggestions to the Bay Management committee, either by request or on their own initiative. SPO would be in charge of coordinating this.

A Bay Keeper for each bay or river would be hired and paid for by the bay committee through general revenues, federal funds, special fees, etc.

The Bay Keeper would liaison with local law enforcement, the Bay Committee, the harbormaster, and play an education role as well. The Bay Keeper would provide feedback to the committee. Bay Stewards and Partners in Monitoring, as well as other groups would assist the Bay Keeper.

The Bay Keeper can regularly keep track of monitoring, land uses, bay uses, the results of water testing, etc. The Bay Keeper also performs oversight by reporting violations to law enforcement, moral support to town code enforcement officer, and harbormaster, and also reports to committee about what is working and not working.

Roger's presentation of what a planning effort is was wonderful and she would support and recommend it.

Further detail is available in the position paper.

Speaker: Steve Perrin
Title: Ecosystem-Based Management

18 points
4 take home messages

Ecosystem based management
In gray area of diagram – all new ground.

We are so accustomed to thinking in monetary terms that the natural world becomes an extension of the economy. This turns reality on its head

We rely on natural systems which make our uses possible. Attempts to manage the ecosystems surpass our understanding. Ecosystem based management is to sustain their natural functions over long periods so that the marine-dependent jobs and activities they make possible are sustained as well.

Figure 1
What does ecosystem-based management look like?

Points

1. Harvesting impacts a particular species within a community. How many are landed, and how many remain?
2. What other species make up that community and how are they impacted?
3. Each community exists within a habitat. How does use impact that habitat?
4. Habitat communities are built on trophic levels - how does a given use impact the structure?
5. Coastal ecosystems rely on a variety of habitats. How does a particular use affect a balance between these areas?
6. How does a use affect the characteristics of the area which drive ecosystem functioning?

Take home: Sustainable uses depend on a full understanding of the effects of such uses on species populations, community and habitat structures, and the ecosystem as a whole.

Figure 2
How do we do the management part?

Regionally in an integrated and cooperative manner

Points

1. Establish an orderly and ongoing exchange of information between many stakeholders.
2. Horizontal and vertical integration – a county level management council.
3. Participants agree to common goals and principles.
4. All participants must be clear that public trust doctrine is best implemented by assuring the sustained health of all coastal ecosystems, not for the benefit of a few individuals.
5. Regional offices responsible for data collection and volunteer training.
6. Resolution of conflicts is based on data and shared principles and ecosystem based management.

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Take home: Regional ecosystem-based management implements the essence of public trust doctrine, which is to assure the greatest benefit to Maine citizens by coordinating and implementing a broad range of state and local thinking regarding sustainable coastal uses by citizen stewards.

Why do we do it?

Sustainability of coastal uses, jobs, ecosystems.

Take home: Sustainability of coastal uses, jobs, ecosystems.

What first steps to take?

1. Beware romance of nostalgia and tradition, we can't reverse the course of history. Ecosystem based coastal management learns from the past, builds on the present and plans for the future.
2. Develop a coastal management template that can be tailored to ecosystems up and down the coast.
3. Build on the Steering Committee's work, including lessons learned from pilot projects.
4. Establish regional forums as precursors or regional management bodies.
5. Assign state agency personnel to development of such forums.
6. Seek ideas and expertise from many institutions and groups – generalists and specialists.

Take home: Take small steps but prepare for them right now.

What are the greatest challenges? Public education. We will never fully understand ecosystems. We can start with human ecosystems to build understanding.

Speaker: Vivian Newman, Sierra Club

Important words mentioned already:

- Ecosystem
- Integrate
- Proactive

She is preoccupied with national level issues, but sees the relationships between local and national issues as important. Bay management should be undertaken with an eye for future uses. Offshore energy issue is of particular concern; we need to incorporate that thinking. There are proposals for new management regimes for renewable energy offshore: this is in its infancy, but it will have a very direct impact on the local base.

Leasing and permitting programs for renewable energy sources are in their infancy. This will all take place in federal waters but impacts will be inshore and on the coast. Despite LNG issues in Maine, it is still not settled. Much of the information is proprietary or expensive. There should be an emphasis on the state's role in providing information early in the process. We should all be engaged, especially at the federal level, when permitting processes are designed. She has strongly suggested that the state update its energy facility siting plan, especially environmental and socioeconomic concerns.

Vivian issues a plea for looking ahead to the things that will be very large and affect bay management but remember that the CZM Act has become a lifeless thing, and we need to breathe new life into these words. These fine constructs depend on human beings carrying them out. Vivian was asked to address NIMBYism, which in this case is NIMBOceanism. It is almost an imponderable. We have to have some proactive info and planning and thinking, and then when it comes down to actual in the bay decision-making we have to be prepared – turf warfare has to be addressed – find some way to have integrated approach to CZMA.

PANEL 2: LOCAL OR PLACE-BASED APPROACHES TO BAY MANAGEMENT

Frank Dorsey, Friends of Taunton Bay, Taunton Bay Pilot Project

Brad Haskell, Bar Harbor Marine Resources Committee

Don Eley, Friends of Blue Hill Bay

Note: Due to a family emergency, Jennifer Atkinson of the Quebec-Labrador Foundation and the Muscongus Bay Pilot Project was not able to present as part of this panel as planned.

Speaker: Frank Dorsey, Friends of Taunton Bay (FOTB)

Title: The Taunton Bay Study – Lessons to Date

Taunton Bay is one of two bay management pilot projects funded for one year to inform the Bay Management Study.

The Study is organized into five major working groups. Next to each is an example of a lesson learned.

1. **Economics:** FOTB Economic Working Group has tried to estimate the economic value of the Taunton Bay. There is very little data available. The estimate was \$4-12 million. This range is too large to make the estimate very usable. To come up with a better estimate (smaller range) would take better data which would not be cheap to get. In addition, determining how to deal with confidentiality of data issues has been a challenge. In the end, the Study adopted a policy of not collecting confidential data.
2. **Governance:** motto has been “Green shores, clean water, job\$”. As this group has worked, there have been some disagreements in principle, but also some agreements in principle with disagreements in detail
3. **Indicators:** This has been found to be costly in expertise, effort and dollars. There needs to be a mix of statewide standards and local necessities. This information is critical to rational management.
4. **Mapping/Information:** This is also a costly area, and one where there is a need for particular expertise. Issues are the currency and compatibility of data, and it must be recognized that this is not a one-time process. However, maps are a great tool for obtaining stakeholder input, and as a way to mobilize participation.
5. **Outreach:** Requires substantial effort, who sponsors the event matters, and buy-in to management schemes may be a problem.

Speaker: Brad Haskell, Town of Bar Harbor

Title: Bar Harbor Clam Flat and Eelgrass Bed Habitat Restoration Project

Upper Frenchman's Bay has been degraded by over-harvesting, dragging and development pressure. They estimate a loss of 60%+ of eelgrass between 1996 and now. A current initiative aims to address this problem by: restoring clam-flats and eelgrass beds; building community awareness of the problem; working jointly with mussel aquaculture lease companies and town communities; and reviewing town moorings.

At a local level, this initiative would be accomplished by volunteer stewardship activities (e.g., water quality testing, College of the Atlantic student survey, eelgrass reseeding), and by the town planner and marine resources committee bringing together a diverse group of stakeholders to build awareness, create partnerships and develop plans aimed at improving clam flats and eelgrass beds. In addition to local level work, the project calls for collaboration between state agencies (such as the Department of Marine Resources) and regional Frenchman's Bay community groups.

Speaker: Don Eley, Friends of Blue Hill Bay (FOBHB)

Community members have a responsibility to have a healthy bay both economically and environmentally, and need to play a role in bay management. Bay management models will vary from bay to bay but the more local involvement the better the process.

Aquaculture is a lightning rod in Blue Hill Bay. How do we get stakeholders involved and separate out the issues vs. the process? The local community needs to be more involved in the process.

What FOBHB has done:

- Neil Pettigrew has studied the circulation of the bay (2 yr study). This study showed that a lot of the water leaving on the outgoing tides comes right back in on the incoming tides. Physical oceanographic characteristics are an important element of bay management and very expensive to get.
- FOBHB did not submit a proposal to become one of the pilot studies in the bay management study. Through the process of proposal development they realized how important (and difficult) it is to pull all of the stakeholders together and the importance of good communication.
- FOBHB is trying to inventory the human uses and users of the bay.

PANEL 3: RESOURCE MANAGEMENT TOOLS FOR BAY MANAGEMENT

John Richardson, Blue Hill Hydraulics, Inc

Sebastian Belle, Maine Aquaculture Association

Sherman Hoyt, University of Maine Cooperative Extension

Lee Hudson, Frenchman Bay Fisheries and Friends of Taunton Bay

Speaker: Lee Hudson, Frenchman Bay Fisheries & Friends of Taunton Bay

She is here representing the commercial fishing industry. To her, the goals for bay management are green shores, clean water and jobs.

There are many difficulties with outreach and interacting with stakeholders. We need to clearly establish goals upfront to let people know why they are there and that bay management is not a secret device to shut-down commercial industries. We must convert users to stewards. In organizing, all stakeholders are vested stakeholders – no third party indifference. Education, collaboration, and regulation make for better communication. Gentlemen’s agreements don’t always work because they are unenforceable. Even with the best laid plans, we need an enforcement piece. Improved communication is necessary between state and industry groups. Fishermen don’t like going to meetings. The dialogue provided to fishermen is often not appropriate; it can be beyond their grasp (not to stereotype).

Incorporating fishermen is important and we need to find different ways to do this. One way might be local organizations that act as facilitators for dialogue between the State and fishermen. Collaboration – a tricky catch word – not everyone will be happy, but most people are interested in working together to find solutions to common goals. No room for extremism in collaboration; extreme portions need to fall out of the process. Unintended consequences are real and need to be accounted for. Potential solutions – authority for managing marine resources needs to stay with the State and what we can increase is the input of local entities. Legislation doesn’t always listen to the State agencies (*e.g.* licensing or money); no device(s) to kick decisions back to those entities who best know the area or climate. Local people that have the local knowledge should have a role. We need to create new rules for input to the legislature. Take a look at industry organizations – some fisheries have councils too (*e.g.* seaweed council), which can form an easy channel for communication. We need to encourage more industry organization participation. DMR is a helpful State agency and it would help if we funded DMR.

Speaker: Sherm Hoyt

**Title: Taking a Step Toward Bay Management
Using Lobster Harbor Territories and Lobster Zone Districts to restore and manage
Maine’s sea urchin fishery at experimental sites west of Rockland**

This model is for sea urchins, and uses existing area models from fishing as one potential model for bay management. This is one local option, specific, and small-scale.

Under the current urchin management system there are two large zones (originally State was 1 zone). We have tried to play catch-up with our management and the result has been extensive over-fishing. The urchin fishery essentially collapsed in the western half of the state and we have come to realize that large-scale management of the zones is inappropriate. We have essentially fished out this resource (harvest is now down to 10 days in the western part of the State). The fishery needs to be restored and managed in a better way. Fisheries that have been successful: softshell clam and lobster, both of which have had small-scale management units for a long time (hundreds of years). The lobster management system has 7 zones for the state. This model is adaptable to other fisheries and to bay management. Sherm is from the Penobscot Bay area and lives in St. George. A good

bay – lots of research coordinated by the Island Institute. Penobscot Bay has parts of three lobster zones (D,C,B), within which there are smaller management modules – harbor territories, connected to residents but not municipalities. There are 7 districts and 18 harbors. These units are useful spatial units for bay management.

Looking at sea urchins, managing at the district scale may aide restoration efforts. Could also go down to the harbor unit (this is the smallest scale the lobstermen go down to).

Step 1 – talk with local lobstermen – how do they feel about restoring sea urchins; do they want this? If they don't, it wouldn't be wise to ask that of them. If the entire coast has this conversation and everyone says no, then should go back to the drawing board. International examples exist that are successful at managing urchins at small scales (*e.g.* New Brunswick, Nova Scotia).

Step 2 – Create Local Urchin Management boards (LUMB) that coordinate with state agencies; the LUMB would be the basic governing entity.

Step 3 - In addition, a Bay-wide Board would be needed to coordinate the LUMBs and have a multi-species approach/perspective. Local volunteer groups can't be expected to do this (too much to handle, not maintained in perpetuity). LUMBs could be run by a combination of volunteers, local fishermen, some non-local individuals, and other stakeholders. LUMBs could be contracted with DMR to maintain the public trust (the contract could be revocable). Enforcement by marine patrol and management would be adaptable.

Speaker: Sebastian Belle, Maine Aquaculture Association

Title: Sustainable Solutions for Maine's Growing Future

From what he has heard today, green shores, clean water, and jobs, sums up a lot about bay management. "Users as stewards," is also an important part of the equation. Many people don't believe that the users care about their resource(s). For the MAA, this is near and dear. Two things today – to present concerns about bay management as aquaculturists, and then to propose a potential model (this model does not reflect the MAA's official position – haven't had as many internal conversations as necessary to have this approval).

Concerns:

- Bay management will establish another layer of regulation/management that aquaculturists will have to deal with. Currently, there is a very comprehensive, rigorous permitting/leasing process with public input, in place. If bay management moves forward, we will have to be prepared to remove some other existing architecture for resource management to occur. If we layer on more requirements, it may become very difficult to become vested in that system.
- Another concern is false expectations – there is a great danger of this. Will bay management reduce conflict (a very naïve assumption)? Just because there is a local entity involved in the process does not mean that conflict necessarily will be reduced.
- Will bay management more comprehensively reduce environmental risk? It may actually increase environmental risks by not providing adequate resources and personnel. Much of bay management is airy - for example, allocating certain areas for different purposes. At larger scales and without adequate data, this lack of definition may have real, unintended consequences.

- How does bay management ensure equal access to Maine State public waters by all Maine citizens? What about someone coming from Aroostok county and wanting access – how are they or will they be represented in this process?
- There is a risk with bay management that we will only focus on aquatic resources. Bay management must include land-use patterns, including literally zoning and local codes, such that land-based uses do not affect users ability to make a living. We must link bay management with land-use in order to be effective.
- Bay management may inhibit commercial uses of marine resources – a concern; it does not have to inherently inhibit it – majority of residents no longer make their living on the water. Ability to voice concerns (as users) may be a minority voice within changing demographics (and this needs to be considered).
- Bay management may inhibit co-management structures – may be a disincentive to industry to create self-management entities.

Proposal:

- Sebastian’s own position is similar to Roger’s model – a State-wide resource management board that establishes a statewide plan that regional plans can be compared against. Such a plan demands a real need for resources – for state-wide support and enforcement.

Speaker: John Richardson, Blue Hill Bay Hydraulics, Inc.

Title: Development of a Coastal GIS for Water Use Planning

The problem addressed by this approach is that successful management requires a comprehensive understanding of water resources, current/historical usage and intrinsic value. Planning for the use of coastal resources is not always done systematically; perhaps the development and application of better tools would be advantageous. This project will create a coastal GIS for Stonington with support from the Maine Aquaculture Innovation Center. Maps are one way to pool together information for planning purposes and communication to and with the public. GIS will be one tool for the town to use in decisions about resources. It will provide a base layer with waters around the town (static data), as well as some dynamic data sources (which can marry more traditional information with more current information, like circulation models). For example, flow around mussel rafts – with GIS we can better assess effects. In addition, other techniques can be incorporated with GIS. Hopefully, we will be able to site areas suitable for economic growth (and equally, others that are unsuitable) and this will become a resource for the town for decisions concerning different water usages. We will be able to assemble spatial data and hopefully apply those data. The approach is flexible (custom-designed) and the GIS will identify data gaps (this last point is important). Work is scheduled to be completed this summer (2006).

SECTION 2: SMALL GROUP DISCUSSIONS – SUGGESTED IMPROVEMENTS

Improving Local Input:

Brainstormed ideas

- Identify bay management models that work and support them
- Create bay area councils that have standing with state agencies
- Local person – bay monitor- to watch for conflicts, violations, identify emerging issues. This person would work with a Bay Council
- Create a mechanism to provide for local input into baywide issues (like expansion of mooring fields, clam flat management)
- Encourage towns to use existing authority (to protect water quality, limit size of development)
- Create a mechanism for the enforcement system to accept local input
- Earlier notice / better dissemination of notice for lease applications
- ID existing forums/stakeholder groups and use them to get notice info out
- Use local fishermen to advise on lease activity / Have local fishermen involved in site selection
- Require lease proposals to address: Local economic benefits; Impact – require minimal impact; Reflect good science
- Require companies to go to locality with proposals as part of the process.
- Hold more meetings more locally
- Better resource inventory to inform uses of the bay (*we are assuming that this one is related to local input in that in order for such input to be meaningful, locals need to have better information, such as an inventory of resources*).

Fleshed-out idea

WHAT: Regional Bay Area Council with a bay monitor. Quasi-governmental entity composed of member towns and stakeholder groups.

Mission:

To promote understanding of the bay ecosystem.
Disseminate information to the bay's population.
Coordinate assessment of cumulative pressures
Report to agencies and legislature
Provide a forum for discussion of problems, make recommendations for solutions
Develop a plan for bay resources

How funded:

Paid for by a mixture of grants, dues, % of mooring fees, licenses, state funds.

Authority:

Standing with DMR, other state agencies

Who is on the Council:

Public, stakeholders, towns/local govt, harbor master, sewage treatment operator
Varies from bay to bay depending on the nature of each bay.
Each Bay Council could send a member to a larger council where information could be shared; larger issues identified and discussed, etc.

Improving Use of Science:

Brainstormed ideas

- State agencies should validate information offered as fact in adjudicatory proceedings and take appropriate enforcement action when false information is deliberately offered.
- State law should allow public access to information on biomass harvested when Public Trust resources are harvested.
- Improve data collection by: collecting data on a bay level; collecting data on non-commercial species; and prioritizing data collection.
- Improve data management by creating a more effective means to share and integrate data. A centralized databased/catalog (i.e. the PEARL database) or a data registry that points people to data sources (i.e. NASA registry) are two examples.
- Carry out long-term monitoring to identify trends.
- Develop state standards regarding the type and quality of data to be used for making specific management decisions.
- Define the levels of accuracy needed in data for decision making.
- Set eco-targets/goals (conservation/restoration/carrying capacity). Time series monitoring of index sites/parameters. Diagnostic monitoring. Area characterization.

Fleshed-out idea

WHAT: Develop state standards regarding the type and quality of data to be used for making specific management decisions.

- Identify all data needed for decisions under consideration. Do a literature search to establish some data standards. A comprehensive suite of information is needed.
- Distinguish between area-specific regulatory standards (involving significant field work and data analysis) and standards for use in decision making (i.e. development of indicators to gauge trends)
- Management standards should be clearly related to issues of concern to the public (the public often doubts the utility and integrity of numeric standards). Standards should address pertinent social, economic and biological data.

WHO: Need to consider what entity would develop these standards since it can be controversial. Would need public agreement on the level and quality of data to make it workable.

WHERE: Place-based or bay-level

WHY: Science should be incorporated into decision making under any approach to bay management. This approach depends on agreement that decision making on bay management issues should be based on good science. Also, development of place-based standards and indicator species or conditions where numeric standards lacking or to supplement such standards may be useful to gauge trends and inform policy development and decision making.

Consideration/Concern: While scientific data is important to decision making, it is important to recognize that the key issue is resource allocation which manifests itself as user conflict.

Mechanisms for Resource Protection or Conflict Resolution (green group):

Brainstormed ideas

- Create a map that has conservation areas mapped so we know the current situation
- Communicate to the public the rules and regulations already in place for the fishing industry
- Change management structure to a more local level so that local people are more involved and invested in managing resources
- Improve enforcement of existing laws and regulations (e.g., shoreland zoning, local ordinances, water quality regulations).
- Need regulations in place before allowing fishing of a new/emerging resource
- Develop local area management plans.
- Manage activities in ways that support ecosystem function and integrity
- Reconcile big theory ideas with reality of users on the water
- Provide state level guidelines for local ordinances for bay management
- Figure out ways to involve harvesters, municipal officials and full range of stakeholders
- More local (municipal) control in intertidal zone and state control from low water to 3 miles
- Develop a system to address cumulative impacts in a bay

Fleshed-out idea

WHAT: Manage activities in ways that support ecosystem function and integrity

- Manage area based on agreed upon overall objectives
- Use local knowledge
- Each area works on issues that are deemed to be important to that bay at that time (context-driven)
- We disagreed about the appropriate level of authority for the councils to have. Some suggested that the councils be advisory but have their suggestions codified in some way so that they must be considered in state decisions. Others suggested that we maintain the current state regulatory system but that we delegate more authority for certain permitting and enforcement activities to the councils.

WHO: Local councils that involve all stakeholders to the extent possible (esp. users, local governments and environmental NGOs).

WHERE: Regional approach

WHEN: Don't rush into this new structure of councils without carefully planning and testing it first. Once they get going, they should be proactive when possible – they can form “action committees” to respond to emerging issues.

WHY: Communication! The most important function for the councils will be to improve communication between stakeholder groups (including the state).

CONCERNS: Make sure this new system doesn't add complexity to our current way of doing things. Also, this idea needs a high level of funding and human assets (capacity). We need to think of ways to reallocate existing resources if restructuring coastal management, as well as use NOAA 309 funds.

Mechanisms for Resource Protection or Conflict Resolution (black group)

Brainstormed ideas

- Do an analysis of how conflicts are currently being resolved (policy gap analysis)
- Create overarching guidelines and apply them regionally
- Create a place for people to go to resolve use conflicts
- Create a process to set aside areas for conservation
- Assign use areas – Ocean Zoning
- Create town or regional plans which address ways to handle future conflicts

Fleshed-out idea

WHAT: Create a Place or Process for People to Go/Use to Resolve Water Use Conflicts (Note that the discussion steered to reducing conflict through regional planning)

- A regional board that will put together a regional vision for managing coastal resources, develop policies, writes ordinances, etc.

WHO: Stakeholder board with state agency representation

WHERE: Regional – but what is the appropriate scale?

WHEN: Actions of the board would be proactive, but would also provide some management

WHY: To reduce conflict and to assist those who have been disenfranchised by their local government

Concerns/Alternative ideas:

- Regional plans are not a good idea. There are going to be conflicts in every plan created. It would take a lot of state resources and it won't be very effective.
- The board needs to be at the state level in order to support the state vision. The state board would be a citizen appeals board
- The regional board would not have state agency representation. Rather, the state agency actions would continue as they do today, but they would have to take into account any regional plans in their decision making.

Managing at the Appropriate Scale:

Brainstormed ideas

- Examine watershed management as a model
- Determine how much and what kinds of data exist at the local level
- Determine what volunteer capacity exists
- Learn more about SPO's regionalism Task Force
- Create opportunities for towns to engage in management; if they opt not to, they will not receive the benefits
- Look at models like the Cobbossee Watershed District where towns contribute funding to pay for scientists who work for them. Develop a marine analog to the Watershed Districts

APPENDIX J
INPUT RECEIVED DURING SECOND PUBLIC MEETING

- Resolve issues around confidentiality of fisheries information on a small scale (i.e. fishermen would not be comfortable having that information shared)
- Greater emphasis on use of local knowledge (fishermen, others)
- Greater emphasis on use of volunteers
- Collect bay specific data
- Ask fishermen to assist with stock assessments
- Draw on DMR's experience with their existing volunteer coordination work
- Explore the feasibility of letting regions self-select
- Explore the lobster zone council model

Fleshed-out idea

WHAT:

- Use the Lobster Zone boundaries as a methodology of dividing up the coast into smaller management units.
- DMR remains responsible for the public trust, and develops guiding principles for local groups to follow as they develop something. Require bay entities to do vision planning.
- Create a requirement that the State listen to local input. Doesn't need to follow the advice, but needs to address the comments.

WHO:

- Create regional advisory councils, with authority remaining with the State
- Designate regional DMR ecologists – to do more than clam management. Facilitates the transfer of local knowledge and issues. Would still need species coordinators statewide.

WHERE: Within the boundaries, may need to take a “nested” approach, to manage different activities at different scales

WHY: Some activities would be better managed at a smaller scale. The lobster zone boundaries are the only real lines that exist on the water. People are aware of them and use them.

Concerns/Alternative ideas

- Need to create an incentive for stewardship by giving some responsibility to local groups.
- Need to resolve how to address confidentiality issues with fisheries data in small areas with a limited number of participants.

APPENDIX K

REACTIONS TO BAY MANAGEMENT STUDY
DRAFT RECOMMENDATIONS

REACTIONS TO BAY MANAGEMENT STUDY DRAFT RECOMMENDATIONS

Four meetings were held to present and hear reactions to the study recommendations:

1. Conservation Stakeholders Group Meeting, Nov. 13, 2006
2. DMR Advisory Council Meeting, Nov. 15, 2006
3. Lobster Advisory Council Meeting, Nov. 15, 2006
4. Public Meeting in Belfast, Nov. 20, 2006

In addition, we posted the draft report online and accepted written comments and suggestions. This document provides a synopsis of comments received.

Supporting Regional-Level Initiatives

- To help ensure regional initiatives are successful, it was recommended that coastal trainers are provided to help with scientific analysis and with group facilitation, that towns receive needed technical and information support, and that lessons learned from existing regional initiatives (such as pilot projects, Casco Bay Estuary Partnership) are communicated to other areas.

Improving the Amount and Accessibility of Nearshore Data and Information

- Suggestions focused on four main issues: provide support to regional groups to collect information; use pre-existing data distribution methods, when possible; and do both sector and cross-sector research needs analyses and protect data confidentiality as needed.

Increase Amount and Diversity of Funding

- In general, most comments were related to the need for more specific information such as: total funds needed for implementation, specific funding sources under consideration and responsibilities for raising funds. In addition, two types of concerns were raised: sufficient funds can't be raised to successfully carry out all the recommendations; and that funds will be taken from existing programs that are already struggling.

State Framework

- Several comments suggested a need to be clearer about the vision behind the Coastal Policies Act; how the Policies will be implemented and how the State's public trust responsibilities are carried out
- It was suggested that, in discussing interagency cooperation, reiterate that this study was not intended to do an in-depth analysis of coordination; rather, it was examined in light of supporting regional management.
- In hosting nearshore management meetings, refer to the annual coastal waters conference as well as meetings of coastal stakeholders as two methods to encourage communication across sectors and groups and to advance towards ecosystem-based coastal management.

Reactions to Report as a Whole

- Several clarifications were requested, including: How the study will affect and interact with fisheries management, especially the lobster zone council system; How the impacts of land-use on water quality and habitats will be addressed; and What the geographical extent of the study is, including a clarification of why the term 'bay management' is not helpful and has been replaced by the term 'nearshore management'.

APPENDIX K
REACTIONS TO BAY MANAGEMENT STUDY DRAFT RECOMMENDATIONS

- Several formatting suggestions were made such as: consolidate the goals, add a table of contents, executive summary, sequential page numbers and a problem statement, and put the principles into a separate report section.
- There were some who do not believe that this report goes far enough, and believe that, even if all the recommendations are implemented, there will still be unmet needs in nearshore management.
- Several questions were raised about the process to be used for consideration of the report in the Legislature, next steps, methods of implementation and ways to ensure that the report does not “sit on the shelf”.

APPENDIX L
TAUNTON BAY STUDY

The Taunton Bay Study
A pilot project in Collaborative Bay Management

FINAL REPORT

Executive Summary

Indicators

Mapping

Economic Analysis

Governance

Outreach

Coordinating Committee

Friends of Taunton Bay

May 8, 2006

The Taunton Bay Study

Final Report

CONTENTS

- Acknowledgments (1 page)
- Basic Principles of Coastal Management (1 page)
- Executive Summary (24 pages)
- Indicators Monitoring Report 2005 (60 pages)
Steve Perrin, President, Friends of Taunton Bay
- Mapping Report (48 pages)
Steve Perrin & GIS Laboratory, College of the Atlantic
- Economic Analysis Report (20 pages)
Barbara S. Arter, BSA Consulting
- A Governance Perspective (33 pages, with 3 additional illustrations)
Steve Perrin, President, Friends of Taunton Bay
- Draft Review of Bay Management Models (20 pages)
Roger Fleming, Conservation Law Foundation
- Outreach Report (8 pages)
Lee Hudson, Frenchman Bay Fisheries
- Coordinating Committee Report (2 pages)
Frank Dorsey, Coordinating Committee Chair

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The Taunton Bay Study

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Among others

Principles of Coastal Use Management

Stakeholders who subscribe up-front to a set of principles such as these are predisposed to contribute to and support management decisions.

1. Public Trust: The coastal marine resources of Maine are held in trust by the State. Therefore, the primary coastal management goal is to sustain those resources for the long-term benefit of all citizens.

- Local users and managers are stewards on behalf of Maine citizens
- Use of public trust resources in the coastal management area is dependent on responsible actions by all users

2. Ecosystem-based Management: In contrast to single-use (or single-species) management, ecosystem-based management considers the effects of all uses on ecosystem structure and function in a given place, and on relationships between system components over time. It is not ecosystems themselves that are managed, but human behavior.

- Management decisions support the long-term sustainability of natural systems and processes
- Decisions regarding any facet of the system are recognized as affecting the whole system
- Management is both adaptive and proactive
- The economic and social vitality of human communities is considered in management decisions

3. Information-rich Management: Management decisions are informed by a broad range of both historical and up-to-date information provided by monitoring, research, and personal observation.

- Ecosystems are monitored and described scientifically
- Data are augmented by local experience and observations
- Trends are incorporated into management decisions
- Confidentiality of proprietary information required for management decisions is protected
- The processes by which such information is used are in the public record

4. Integrated Land-and-Water-Use Management: Streams, runoff, and seepage carry land-use products from a watershed into marine waters, linking the land to the sea. Coastal use management recognizes that connection, and provides a cooperative means of bringing the knowledge and responsibilities of state, regional, and local offices to bear on coastal uses and issues.

- Within state jurisdiction (out to three miles), management is coordinated throughout the subtidal marine environment, the intertidal environment, immediate coastlands, and interior coastlands to the extent of the watershed
- Management is collaborative among stakeholders and municipalities, state agencies, and federal agencies

EXECUTIVE SUMMARIES

► INDICATORS REPORT, EXECUTIVE SUMMARY

Prepared by Steve Perrin, author of Indicators Monitoring Report

Following examples provided by Peter G. Wells of Environment Canada, and the Marine Area Characterization Project of the Quebec-Labrador Foundation, among others, Steve Perrin put together an indicators advisory panel of 9 persons who developed a prioritized list of 25 indicators of bay ecosystem health and integrity divided into six categories: species of special concern, ecosystem structure and function, toxicology, physical conditions, watershed conditions, and other indicators. These indicators were divided into 3 tiers of priority.

Publicly available data were used where possible, with the Friends of Taunton Bay taking responsibility for monitoring the rest of the indicators, often in collaboration with other agencies or groups. Five of the measures were not monitored in 2005: clam pots, dissolved oxygen, commercial landings, blue mussel assay, and nitrogen. A table listing the 25 indicators and a summary of the findings to be shared with stakeholders are shown on the following pages.

Indicators include two subpopulations of Atlantic horseshoe crabs, harbor seals (with haulouts map), American bald eagle breeding success (with map), shorebird count in Hog Bay, eelgrass spread and density (with map), weather (precipitation, wind, and air temperature), bottom temperatures in Hog and Egypt Bays, coliform scores (with map of closed flats), phytoplankton (with transparency, surface temperature, and salinity), erosion, buffers of native vegetation, septic field data derived from a recently digitized parcel map, invasive species (limited to Asian shore crab), and oyster set (with monitoring sites map). Brian F. Beal prepared a report on benthic invertebrates, and Lauren Alnwick-Pfund provided an ecohistory narrative. Cartography was done by the GIS Laboratory at College of the Atlantic.

Findings from the indicators monitored in 2005 include:

- Horseshoe crabs are holding their own in both Egypt and Hog Bays
- The harbor seal population in the bay on July 20 was estimated to be 75–80
- Out of the five eagle nests on the bay, only one had reproductive success
- Flocks of migrating shorebirds were noticeably smaller than 20 years ago
- A few eelgrass beds line the lower channel, but beds on the flats have yet to recover
- Benthic invertebrate samples in Hog Bay included no clam worms, only small blood worms
- Eight clam flats remained closed because of high coliform counts
- Transparency on calm days was generally higher than in the preceding three years
- Bank erosion was evident along the Hancock shore of Taunton River
- No Asian shore crabs were found in Egypt Bay
- May was unusually cold and windy
- 2005 was the second wettest year in 110 years of recorded measurements
- Benthic temperatures generally lagged mean daily air temperature by a few days
- The number of septic systems ringing the bay was estimated to be approximately 1,033
- Salinity gradually increased from 26 to 35 ppt in the channel from April to November
- Landings data are not available for any species taken from the waters of Taunton Bay.

THE TAUNTON BAY STUDY: A pilot project in collaborative bay management

Indicators Working Group

PRIORITIZED INDICATORS, WITH RATIONALES FOR SELECTION

June 6, 2005

Indicator Types: SPC–special concern, **ESF**–ecosystem structure & function, **TOX**–toxicology, **PHY**–physical, **WS**–watershed, **OTH**–other.

• TIER 1 PRIORITY					
I. #	Indicator	Type	Rationale	Schedule	Data Source
1	Mating horseshoe crab counts Hog Bay yearly Males, Females, Total	SPC-1	This genetically distinct population is believed to live at the northerly and easterly limit of the current range of Atlantic horseshoe crabs. Sue Schaller has been collecting data since 2001, allowing trends to be detected.	Day high tide(s) during June	Maine Horseshoe Crab Survey
2	Eelgrass spread & density	ESF-1	For unknown reasons, the spread and density of eelgrass has been highly variable since the 1950s. As a primary producer, oxygenator, and provider of habitat for multiple species, eelgrass strongly influences the bay ecosystem.	Annual photo flyover	DMR, FTB
3	Benthic invertebrates	ESF-2	Invertebrates play a vital role in the intertidal food web.	Annually in fall	B. Beal, UMM (class project)
4	Clam pot study on closed flat	ESF-3	Clam pots are used to measure annual growth and predation by crabs, gulls, horseshoe crabs, allowing comparison with other regions down east.	May, November	B. Beal, UMM
5	Weather	PHY-1	Wind speed and direction, precipitation, temperature, and relative humidity are important drivers of estuarine ecosystems.	daily max/min	Ross Lane, DMR, Lamoine
6	Dissolved oxygen (DO)	PHY-2	Benthic DO in different mixing regimes (upper & lower bay) determined from drifter studies can warn of low oxygen levels.	weekly at 3 sites	FTB
7	Transparency	PHY-3	A secchi disk will be used to gauge the amount of algae and particulate matter in the water column. These data are proportional to sunlight penetration.	weekly, w. phyto. tow	FTB
8	Surface temperature	PHY-4	Surface temperature affects the growth, metabolism, and reproduction of life forms in the upper water column.	weekly, fr. phyto. tow	FTB
9	Benthic temperature	PHY-5	Since Sept. 2003, FTB has maintained two recording benthic thermometers in Hog and Egypt Bays. The data reflect conditions of benthic life forms.	hourly, by datalogger	FTB
10	Buffers of native vegetation	WS-1	A lack of intact shoreline integrity indicates a risk of nonpoint pollution.	annually	Aerial photos
11	Number of septic systems	WS-2	An estimate of the number of septic systems in the watershed provides an index of the risk of potential pollution.	annually	GIS parcel maps
12	Oyster set outside lease area	OTH-1	Required by Mike Briggs' lease agreement. Boulders and firm substrates will be examined for signs of oyster set once a year.	annually in spring	M. Briggs & FTB

• TIER 2 PRIORITY					
I. #	Indicator	Type	Rationale	Schedule	Data Source
13	Horseshoe crab spawning survey in Egypt Bay	SPC-2	The 2003–2005 horseshoe crab tracking .study suggests Egypt Bay is an important breeding site, and deserves to be closely monitored.	High tides during June	FTB
14	Harbor seal population, movements, pups	SPC-3	Using photography to identify seals on sight will tell us how many seals reside in the bay, where they go, and how many pups they produce. In the mid-1990s, 80 seals hauled out; 10 years later that number is down to about 20.	Weekly, April–Nov.	FTB
15	Shorebird count, Hog Bay	SPC-4	Migrating flocks of semipalmated sandpipers, resident in the bay mid-July to mid-September, numbered up to 5,000 individuals in 1986; but more recently only 100–200. Two bird counts are scheduled for 2005, one ea. in Jul & Aug.	2 counts/yr.	FTB & Downeast Nature Tours
16	Breeding pairs of American bald eagles, fledglings	SPC-5	Year-round residents of the bay area, five pairs of eagles now breed on these shores. They are listed here as one of Maine’s threatened species.	Annually	Wildlife Div., IFW, Bangor
17	Commercial landings (if data available)	ESF-4	Includes: lobsters, crabs, worms, mussels, clams, seaweed, oysters (aquaculture), land-based aquaculture products [UMCCAR], alewives, elvers.	Annually	Individuals, dealers, DMR
18	Blue mussel assay	TOX-1	Gulf Watch can monitor for 12 low-molecular-weight polycyclic aromatic hydrocarbons and 12 high-molecular-weight PAHs; 22 polychlorinated biphenyls (PCBs); 16 chlorinated pesticides; and 9 metals. Only if funds are available.	Every 3 years	Gulf Watch (?)
19	Fecal coliform bacteria count	TOX-2	Monitoring for health hazzards and shellfish bed closures.	Monthly	DMR, Lamoine
20	Phytoplankton	TOX-3	The protocol is designed to identify plankton as vectors of shellfish poisoning.	Weekly	FTB
21	Salinity (stratification)	PHY-6	Salinity is measured with a refractometer from water samples taken with a plankton net, and with a YSI DO probe..	weekly, fr. phyto. tow	FTB
22	Ecohistory narrative	OTH-2	Interviews conducted by Lauren Alnwick-Pfund for her COA senior project.	May, 2005	Lauren A.-P. COA Senior. Proj.
• TIER 3 PRIORITY					
23	Bank erosion	PHY-7	An annual shore walk, kayak trip, or aerial overflight identifies discharge pipes, erosion, and vegetative buffers on developed shorelands (If logistics allow).	Annually in summer	FTB shore walk
24	Nitrogen [if cost allows]	PHY-8	The cost of lab analysis is likely to make weekly monitoring unfeasible.	weekly sampling	FTB, & lab analysis
25	Invasive species	OTH-3	Bay users are asked to keep their eye out for Asian shore crabs, et al.	Watch list	All bay users

INDICATORS REPORT 2005

How's the bay doing?

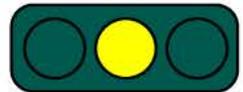
1		<p>✓ MATING HORSESHOE CRABS, Hog Bay</p> <table border="1"> <thead> <tr> <th></th> <th>2001</th> <th>2002</th> <th>2003</th> <th>2004</th> <th>2005</th> </tr> </thead> <tbody> <tr> <td>Females</td> <td>351</td> <td>276</td> <td>338</td> <td>323</td> <td>527</td> </tr> <tr> <td>Males</td> <td>982</td> <td>465</td> <td>556</td> <td>592</td> <td>998</td> </tr> <tr> <td>Total</td> <td>1333</td> <td>741</td> <td>894</td> <td>915</td> <td>1525</td> </tr> </tbody> </table>		2001	2002	2003	2004	2005	Females	351	276	338	323	527	Males	982	465	556	592	998	Total	1333	741	894	915	1525	
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2		<p>✓ EELGRASS Spread & Density</p> <p>One of the bay's primary food producers, eelgrass beds suffered a 90% decline in 2001, reducing protective habitat for juvenile fish, depleting food for ducks, geese, and other species. Recovery has been slow and uneven.</p>																									
3		<p>✓ BENTHIC INVERTEBRATES</p> <p>So much of the bay is devoted to intertidal or shallow subtidal mudflats, life in and on the flats is an important part of the food web in Taunton Bay. No blood worms and no adult clam worms were found in 20 samples from Hog Bay taken in October 2005.</p>																									
4	<p>✗ CLAM POTS</p> <p>The growth rate of clams can be told experimentally by placing seed clams on closed flats to see how they fare. Predation by green crabs, worms, and birds can also be gauged by such a study. The study will begin in 2006.</p>																										
5		<p>✓ WEATHER</p> <p>Strong winds cause shore erosion and disturb bottom sediments, increasing turbidity; heavy rains and meltwater lower salinity and increase pollution; unusual temperatures stress marine life. 2005 was unusually cool, windy, and wet.</p>																									
6	<p>✗ DISSOLVED OXYGEN (DO)</p> <p>When algal blooms die off, they sink to the bottom and decay, depleting waterborne oxygen required by other marine organisms. DO measurements were attempted in 2005, with untrustworthy results.</p>																										

7



✓ TRANSPARENCY

The depth at which a Secchi disk (photo) can be seen is a measure of light penetration through the water column. In 2005, transparency was somewhat higher than in recent years, but was measured on calm days with low turbidity.



8

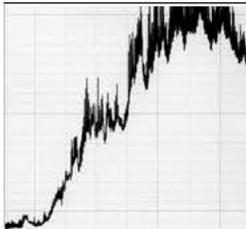


✓ SURFACE TEMPERATURE

When phytoplankton tows are made in the upper 30 feet of the water column, the temperature of the sample is taken as a measure of surface temperature. In 2005, readings held relatively steady in April and May as a result of a cool and prevailing east wind.

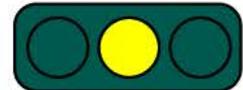


9



✓ BOTTOM TEMPERATURE

Two recording thermometers are placed on the bottom of the bay, one west of Butler Island, the other north of Round Island. In 2005, both showed the same lag in spring warming caused by cool winds off the Gulf of Maine.



10



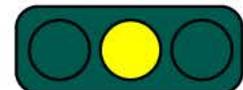
✓ VEGETATED BUFFER STRIPS

The integrity and diversity of shoreline vegetation affects the amount of nonpoint pollution reaching the bay. The broader and denser the buffer, the better. Aerial photographs show breaks in this shoreline defense against excessive runoff and potential pollution. *(Photo shows good buffer.)*



11 SEPTIC SYSTEMS RINGING THE BAY

Disposal of increasing amounts of septic waste in the watershed increases the likelihood that some of it will leach into the bay, perhaps lowering the water quality on which marine organisms depend. Mapping watershed parcels with septic systems is now complete.



12



✓ OYSTER SET

Will farmed oysters reproduce in the bay, adding a new species of shellfish that has never thrived here before? Cooperative monitoring between oyster farmer Mike Briggs, FTB, and DMR shows that has not happened yet.



13



✓ MATING HORSESHOE CRABS, Egypt Bay

From tracking studies, horseshoe crabs do not appear to mix between breeding populations in Hog and Egypt Bays, maintaining two separate sub-populations. In 2005, no tagged crabs from Hog Bay were sighted in Egypt Bay, where numbers remain strong.



14



✓ HARBOR SEALS

Study of 100s of photographs taken in 2005 of harbor seals in Taunton Bay supports a population estimate of 75–80 individual seals, including those pupped in April, May, and June. This will serve as a baseline for subsequent studies.

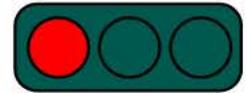


15



✓ SHOREBIRD COUNT

Flocks of sandpipers numbering in the thousands were common 20 years ago; now they are down to a few hundred. The cause of this decline is uncertain. Shorebirds feed on mud shrimp (*Corophium volutator*), which may be scarce.



16



✓ ACTIVE EAGLE NESTS & FLEDGLINGS

From Falls Point to Round Island, five breeding pairs of American bald eagles nest around the bay. Where four immature eagles fledged successfully in 2004, only one did in the wet and windy spring of 2005.

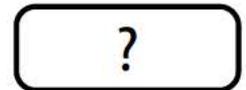


17



✗ COMMERCIAL LANDINGS

The amount of life we take from the bay affects the functioning of the ecosystem supporting all species. To assure sustainable harvests, we would like to keep track of how much is taken every year. That information is not available.

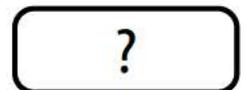


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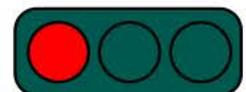
✗ BLUE MUSSEL ASSAY

Gulf Watch can tell the toxic chemical load in local waters by analyzing blue mussels tissue. The tests are expensive, and The Taunton Bay Study did not receive the funding it applied for in 2005 to cover the costs.



19 ✓ COLIFORM BACTERIA COUNT

The bacterium *E(scherichia) coli* is an indicator of fecal waste reaching the bay. When levels are high enough, shellfish beds are closed to protect human health. In 2005, eight beds were closed around the bay.



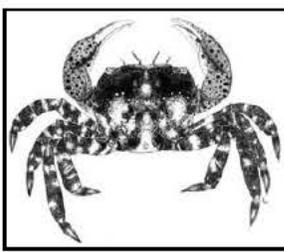
20



✓ PHYTOPLANKTON

Filter-feeding shellfish can become poisonous to humans when they eat enough of six toxic species of phytoplankton. In 2005, a few toxic species were seen, but not in sufficient numbers to threaten human health. (The species shown, *Chaetoceros* spp., is not one of the toxic species.) (Photo: Sarah Gladu.)



21		<p>✓ SURFACE SALINITY As an estuary, Taunton Bay features varying levels of salinity, largely dependent on snowmelt, precipitation, runoff, and bank seepage. In 2005, salinity off Butler Point at high tide was between 25–35 parts per thousand, gradually increasing April–October.</p>
22		<p>✓ ECOHISTORY NARRATIVE Long-term trends: flounders, eelgrass, shorebirds, urchins, scallops, and buffers of native vegetation are in decline; shoreline development, runoff, and seepage are on the rise. Longtime residents note that no two years are the same.</p>
23		<p>✓ SHORE EROSION Wind energy and rising sea level translate to increasing bank erosion throughout the bay. This is particularly evident on steeper, unvegetated bluffs, but is also seen where trees lie on the shore, and in receding soil lines.</p>
24	<p>✗ NITROGEN</p>	<p>Are nitrogen levels in the bay promoting algal blooms, depleting waterborne oxygen? Test samples are expensive to analyze, and samples should be taken throughout the year. The project budget could not support that cost.</p>
25		<p>✓ INVASIVE SPECIES Green crabs have been around so long we forget they are not native to the bay. Now, Asian shore crabs are on Schoodic Point, and heading our way. The one day we looked for them in 2005, we didn't find any in Egypt Bay.</p>

SCORECARD

7	GREEN	•Oyster Set •Harbor Seals	•Salinity •Phytoplankton	•Invasive Species •Horseshoe Crabs, Egypt Bay	•Horseshoe crabs, Hog Bay
9	YELLOW	•Benthic Invertebrates •Buffer Strips	•Septic Systems •Transparency	•Surface Temperature •Eagle Reproduction	•Bottom Temperature •Weather •Ecohistory Narrative
4	RED	•Coliform Bacteria	•Eelgrass	•Shorebirds	•Erosion
5	UNKNOWN	•Dissolved Oxygen	•Nitrogen	•Blue Mussel Assay	•Commercial Landings •Clam Pots

Contact steveperrin@verizon.net for more information.

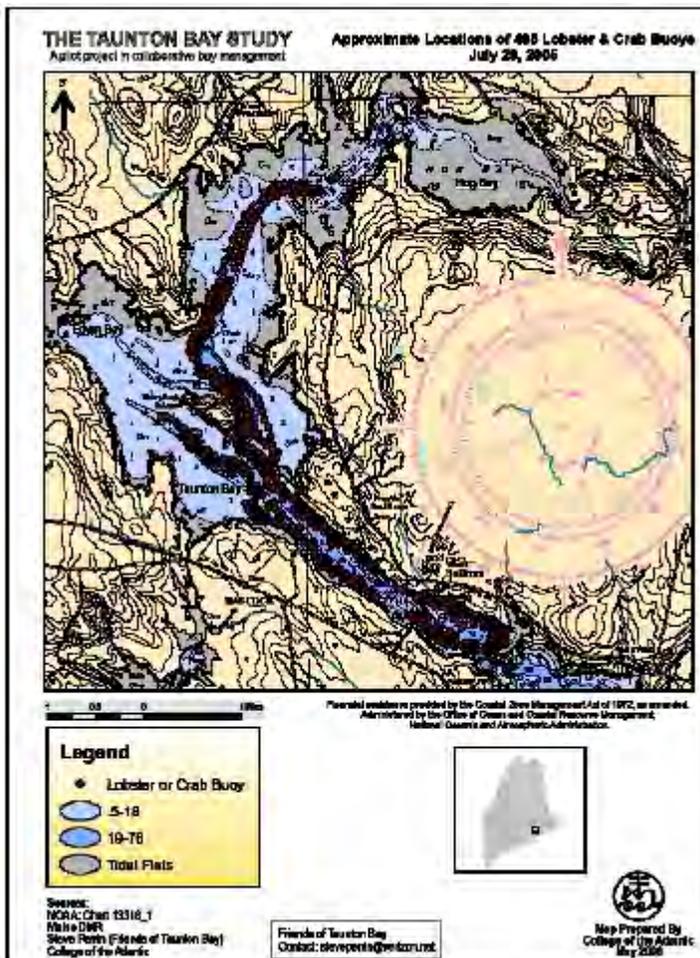
► MAPPING REPORT, EXECUTIVE SUMMARY

Prepared by Steve Perrin, author of Mapping Report

Project mapping was intended to “develop transferable community mapping capabilities to provide products useful to collaborative decision making and bay management in a watershed setting” (RFP, November 12, 2004). Cartography for the resulting 23 maps was provided by the Geographic Information System (GIS) Laboratory, College of the Atlantic (COA) in Bar Harbor. Working closely with staff and students, Steve Perrin coordinated mapping activities with The Taunton Bay Study. Cartographers working on the project were:

Gordon Longworth, Director, GIS Laboratory, COA
Lauren Alnwick-Pfund, GIS student, COA
Marianna Bradley, GIS student, COA
Julien Delarue, GIS student, COA
Apoorv Gehlot, GIS student, COA.

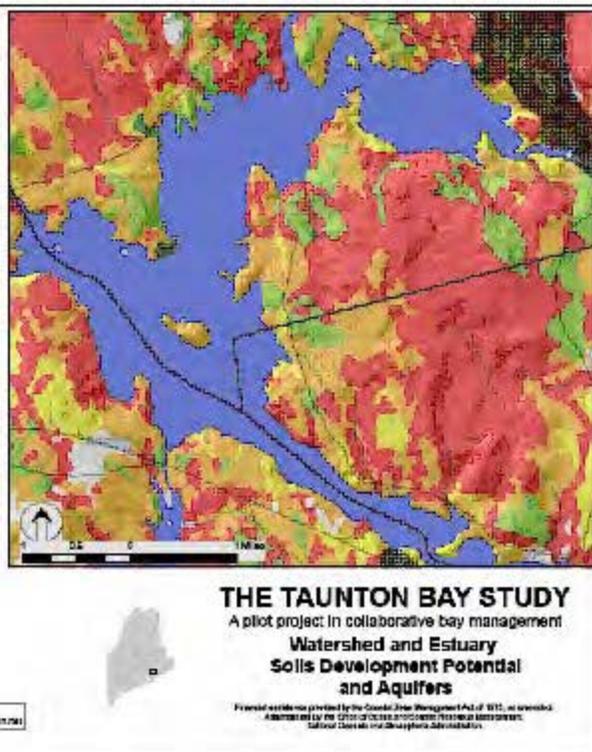
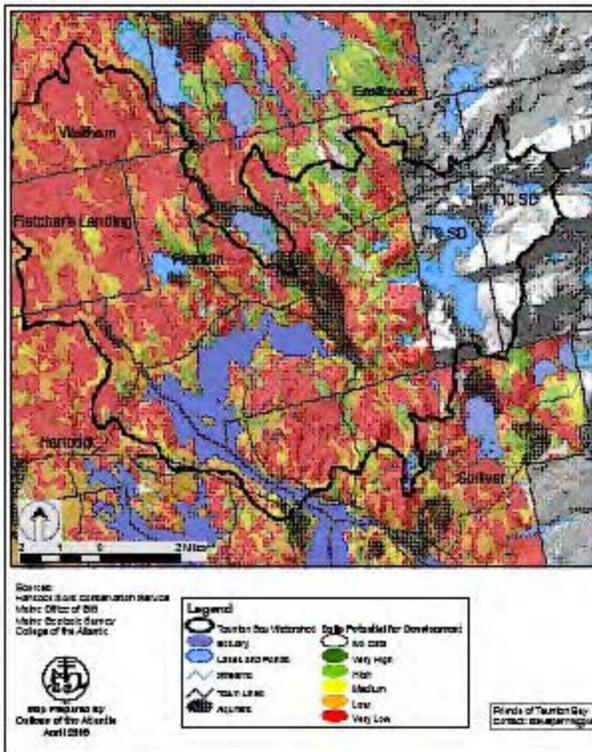
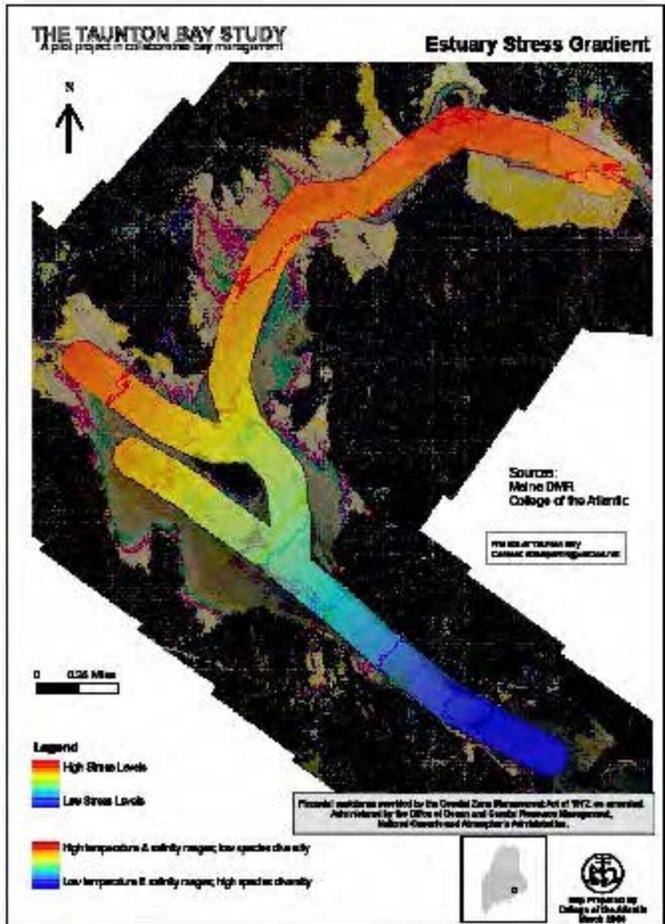
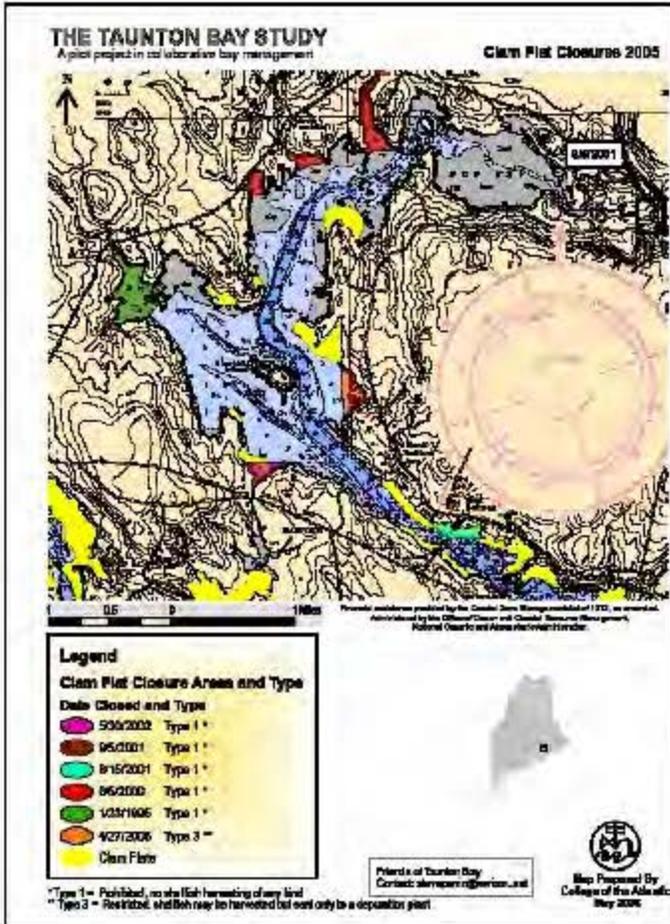
Clarity and simplicity were sought in all maps to make them useful to a wide range of users. A uniform format was desired, but with different cartographers following different schedules, was difficult to achieve. Mapping standards were discussed with the Muscongus Bay project, the Maine Office of GIS, and DMR. But standardization was not imposed to an extent that it would stifle creative problem solving by individual cartographers, who strove to find effective ways of presenting data in graphic form. The map showing Taunton Bay at a Glance, for instance, is innovative in displaying a range of information in an easily assimilated format. The Estuary Stress Gradient map combines highly detailed digital photography with a bold design enabling users to grasp a complex concept visually in a real setting without undue reliance on technical descriptions.



Ecosystem-based management is dependent on detailed and reliable information about the coastal waters to be managed. Developing a comprehensive management plan for Taunton Bay requires good data about these particular waters. Ecosystems and maps are both place-based, so in conjunction with monitoring, ecosystem mapping on a local scale is sure to play an essential role in the evolution of regional coastal management in Maine. The mapping and indicators monitoring aspects of the study are companion pieces intended to be shared with stakeholders, enabling them to take part in ongoing management discussions.

Maps were developed on the following themes:

- Hydrology
- Aquaculture
- Fisheries
- Flat closures
- Primary producers
- Eelgrass decline
- Seal haulouts
- Eagle habitat
- Horseshoe crab sites
- Wildlife
- Biodiversity
- Soils suitability
- Bluff stability
- Estuary stress
- Locating the bay (among others)



► GOVERNANCE PERSPECTIVE, EXECUTIVE SUMMARY

Prepared by Steve Perrin, author of A Governance Perspective

At The Muscongus Bay Forum in Waldoboro on March 25, 2006, NOAA Fellow Vanessa Levesque summarized the aim of the two bay management pilot projects in the form of a question: “What is the role of community in managing coastal resources?” It is clear that the additional human resources required if management decisions are to be made closer to coastal waters themselves will be drawn from local citizens who volunteer to provide a finer-grain of monitoring data and, beyond that, to play an active role in the decision-making process itself. A year earlier, on April 18, 2005, Caroline Pryor, leader at that time of the Governance Working Group of The Taunton Bay Study, had drafted a Scope of Work that set forth the tasks the group was to accomplish in somewhat more detail:

- Research bay management principles and models from other regions
- Compare various models of effective bay management involving state and local agencies in different configurations
- Refine and propose the design thought to work best under circumstances in the Taunton Bay region, with input from stakeholders
- Assess state, local, and volunteer capacity necessary to make an ecosystem-based bay management plan work in actual day-to-day practice.

In addition, she added, the Governance Committee intends to develop and propose:

- A set of management principles for Bay Management Plans
- An outline of what a Management Plan for Taunton Bay would look like.

An ambitious agenda, much of which the working group tackled in a series of 16 meetings between February 2005 and April 2006. During that time, the group focus shifted from Taunton Bay as an entity in itself to Taunton Bay as one bay among several bays within a region presenting similar or related issues. Ecosystem-based management remained a constant theme throughout the project, but coastal management on a regional basis took on greater significance as the year progressed. Visualizing what those two ideas would look like if put into practice, and how that might be accomplished, took up much of the year.

Friends of Taunton Bay is an all-volunteer organization. Its members give their time to attend meetings, which is time taken away from jobs, family, travel, and other commitments. What that meant in terms of the pilot project was that meetings could be held when all parties had open time, but getting things done between monthly meetings was always problematical. Only one member of the group was “retired,” that is, could schedule activities to suit his inclination, and could dedicate considerable time to moving the project ahead. The others had major commitments to jobs and families, and had to borrow project time from very busy lives. That they accomplished as much as they did speaks to the expertise, work habits, and dedication many of them brought to the project. Members of the Governance Working Group were:

Frank Dorsey, Vice-President, Friends of Taunton Bay

Roger Fleming, Attorney, Conservation Law Foundation

Lee Hudson, Frenchman Bay Fisheries

Vanessa Levesque, NOAA Fellow, Maine State Planning Office and Department of Marine Resources

Steve Perrin, President, Friends of Taunton Bay

Caroline Pryor, independent consultant

Barb Welch, Executive Director, Frenchman Bay Conservancy.

The Governance Working Group was instrumental in arranging a stakeholders meeting on July 27, 2005, and a meeting with state agency personnel on September 1. Four members of the group participated in panels at the Bay Management Steering Committee Workshop in Belfast on February 17, 2006. Three

meetings exploring regional coastal management issues were held in April and May 2006.

After a year of discussion, on March 23, 2006, the Governance Working Group unanimously approved a set of four principles to serve as guidelines in implementing coastal use management. The principles are worded as follows:

Principles of Coastal Use Management

Stakeholders who subscribe up-front to a set of principles such as these are predisposed to contribute to and support management decisions.

1. Public Trust: The coastal marine resources of Maine are held in trust by the State. Therefore, the primary coastal management goal is to sustain those resources for the long-term benefit of all citizens.

- Local users and managers are stewards on behalf of Maine citizens
- Use of public trust resources in the coastal management area is dependent on responsible actions by all users

2. Ecosystem-based Management: In contrast to single-use (or single-species) management, ecosystem-based management considers the effects of all uses on ecosystem structure and function in a given place, and on relationships between system components over time. It is not ecosystems themselves that are managed, but human behavior.

- Management decisions support the long-term sustainability of natural systems and processes
- Decisions regarding any facet of the system are recognized as affecting the whole system
- Management is both adaptive and proactive
- The economic and social vitality of human communities is considered in management decisions

3. Information-rich Management: Management decisions are informed by a broad range of both historical and up-to-date information provided by monitoring, research, and personal observation.

- Ecosystems are monitored and described scientifically
- Data are augmented by local experience and observations
- Trends are incorporated into management decisions
- Confidentiality of proprietary information required for management decisions is protected
- The processes by which such information is used are in the public record

4. Integrated Land-and-Water-Use Management: Streams, runoff, and seepage carry land-use products from a watershed into marine waters, linking the land to the sea. Coastal use management recognizes that connection, and provides a cooperative means of bringing the knowledge and responsibilities of state, regional, and local offices to bear on coastal uses and issues.

- Within state jurisdiction (out to three miles), management is coordinated throughout the subtidal marine environment, the intertidal environment, immediate coastlands, and interior coastlands to the extent of the watershed
- Management is collaborative among stakeholders and municipalities, state agencies, and federal agencies

Working from those principles, Steve Perrin wrote a draft Governance Report around the structure they provided. Barb Welch said the draft was too general in lacking specific details regarding Taunton Bay. Steve added a section presenting such details as based on his work with the Indicators and Mapping Working Groups, circulating the draft to the group on April 27. The group did not meet after that date.

The revised draft is divided into three sections dealing with, A) Using ecosystem-based management to frame issues in Taunton Bay, B) Regional management issues, and C) Recommendations for improving coastal management in Maine. Management issues identified in the bay include mussel dragging (a moratorium on dragging is in place until the end of June 2008); turbidity of local waters; a need for relevant ecosystem information; a need for habitat or ecosystem-structure management to insure sustainability; over harvesting of scallops, urchins, and elvers; erosion and sea-level rise; buffers of native vegetation throughout the watershed; water quality; wildlife disturbance; and lack of landings data on a meaningful scale.

At the bay management workshop on February 17, 2006, three panelists gave strong support to coastal management on a regional basis. Details differed among the three presentations, but regional coastal management stood out as an approach whose time had come. The regional management section of Steve's second draft report illustrates how regional and ecosystem-based coastal management might be combined. It deals with restructuring state agencies to accommodate regional, ecosystem-based management, public-trust management, ecosystem-based management, the need for detailed information, shifting baselines, integrated management both horizontal and vertical, enforcement, public education, conflict resolution, reliance on volunteers, need for regional staff, funding regional management, regional group coordination, developing a template for regional coastal management, principles of coastal use management, and preparing for unforeseen events.

The final section of the report presents 19 recommendations focusing attention on different aspects of regional, ecosystem-based, coastal management. These recommendations emphasize the need for a trained and supervised volunteer workforce, the need to restructure the current management apparatus to make effective use of ecosystem-based thinking, the need to revisit public-trust doctrine in light of recent Pew and U.S. Oceans Commission reports, the need for land- and water-use managers to collaborate, resolution of use conflicts, staffing and funding regional management offices, group representation on regional management bodies, adoption of a set of guiding principles for coastal management, and the need for adaptive coastal management able to respond quickly to unanticipated situations.

Three illustrations are appended to the Governance Report: 1) schematic diagram of a proposed regional management structure; 2) map of the Maine coast divided into eight management regions; and 3) a closer look at the Blue Hill and Frenchman Bay region, including a few of its organizational assets. □

► ECONOMIC ASSESSMENT OF FISHERIES IN TAUNTON BAY, EXECUTIVE SUMMARY

Prepared by: Barbara S. Arter, author of Economic Assessment Report

Compiled as a deliverable for the Taunton Bay Study, this report provides an estimate of harvesting activities and revenues for marine resources in Taunton Bay. The report reviews harvest practices, prices, and relative values for alewives, elvers, worms, lobsters, crabs, mussels, clams, kelp, urchins, scallops, oyster aquaculture, and land-based aquaculture. Three sources of data were reviewed: 1) MDMR Licensing Data, 2) MDMR Landings Data, and 3) personal interviews with harvesters, dealers, and other specialists. Since there is little MDMR bay-level landings data available, the primary source of revenue information for the report is from personal interviews.

MDMR Licensing Data indicate that 8.5% of year-round households in Hancock, Sullivan, and Franklin

depend on marine resources as a source of income and that 20% of those license-holders harvest multiple species throughout the year. The data also indicate that the four most commonly harvested species in the area are lobsters/crabs (36%), marine worms (26%), clams (12%), and elvers (7%), but the data do not indicate where this harvesting is taking place. Lastly, the data indicate that area harvesters represented 12% of county licenses between 1999 and 2004, and that there was a 20% decrease in the number of area license-holders during that time.

Using information gleaned from interviews, as well as MDMR Landings and Licensing Data, the total estimated revenue for all fisheries/resources obtained from TB during 2003-2004 ranges from \$4,170,258 to \$10,263,390. The significant range of revenue variability is most likely due to differences in effort, market, weather, and willingness to report accurate information. The four species with the greatest potential individual gross revenue currently are worm aquaculture, elvers, sea urchins, and oyster aquaculture.

Five recommendations regarding future bay-management considerations are provided:

- This report is preliminary and provides only estimates, therefore, agencies and organizations should consider a more comprehensive review of the local marine economy.
- Since bay-level data are currently unavailable, the state should work directly with local communities to devise a method whereby bay-level or harvester-level data can be shared without threatening the confidentiality of harvesters.
- Harvesters and town governments are the primary local users and decision-makers; as such, state and federal agencies and local conservation organizations should intensify efforts to engage harvesters and town officials.
- This report dealt strictly with revenues and not management issues therefore, there should be a well-planned effort to explore, document, and develop action items to address local fisheries management issues.
- There is little data on potential biomass for TB fisheries and ecosystem; MDMR and other researchers should develop local maximum sustainable yield and optimum sustainable yield models for the bay using ecosystem-based management principles.

Table 2. Marine Species Harvested from Taunton Bay and the Availability of Data

Common Name	Scientific Name	Level at which data is available
Soft shelled clams	<i>Mya arenaria</i>	Town (Shellfish Sanitation Area)
Bloodworms (wild & aquaculture)	<i>Glycera spp.</i>	State
Blue mussels	<i>Mytilus edulis</i>	County
Elvers (juvenile eels)	<i>Anguilla rostrata</i>	State
Alewives	<i>Alosa pseudoharengus</i>	State
Kelp	<i>Laminaria longicuris</i>	State
Oyster (aquaculture)	<i>Crassostrea virginica</i>	State
Lobsters	<i>Homarus americanus</i>	County
Crabs	<i>Cancer spp.</i>	County
Sea urchins	<i>Strongylocentrotus droebachiensis</i>	County
Halibut (aquaculture)	<i>Hippoglossus hippoglossus</i>	State
Scallops	<i>Plactopecten magellanicus</i>	County

Table 3. MDMR Harvest License (2004) and US Census Data (2000) for Hancock, Sullivan, and Franklin.

Town	Population (2000 Census)	# of Harvester Licenses	# of Harvesters	# of Year-round Households	% of Year-round Households with a Harvester
Hancock	2,147	118	90	983	9%
Sullivan	1,185	89	57	522	11%
Franklin	1,370	46	34	617	6%
Total	4,702	253	181	2122	8.5% (Average)

Table 4. Comparison of Regional and County MDMR Licenses, 1999-2004.

Year	TB Regional Licenses	Hancock County Licenses	% of Hancock County
1999	315	2504	12.5%
2000	293	2611	11.2%
2001	260	2516	10.3%
2002	262	2511	10.4%
2003	273	2444	11.2%
2004	253	2966	8.5%

Table 5. Approximate Number of Harvesters/Enterprises as Estimated from Personal Interviews.

Species	Approximate # of Harvesters/Enterprises in TB
Worms (Wild)	65 (License Data)
Elvers	20
Clam	32 (License Data)
Lobsters	3
Crab	3
Sea Urchin	3
Sea Scallop	3
Mussels	1
Alewives	1
Kelp	1
Oyster Aquaculture	1
Worm Aquaculture	1
Halibut Aquaculture	1
TOTAL	135

Figure 1. 2004 MDMR Licenses Issued to Hancock, Sullivan, and Franklin Harvesters by Species

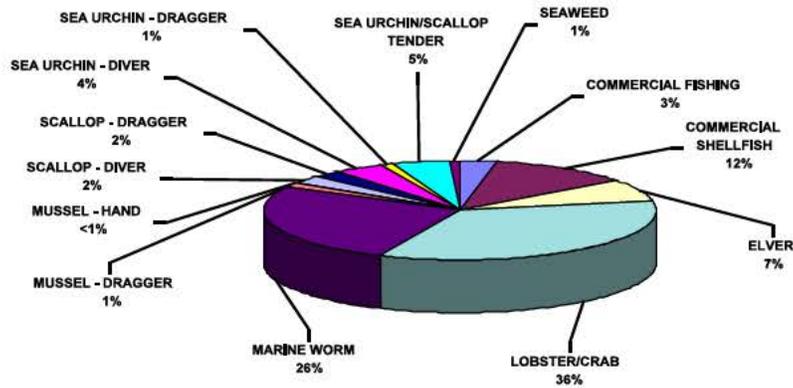


Figure 2. Clam Landings (Pounds) Reported Harvested from Franklin, Hancock, and Sullivan, Maine (1999-2003)

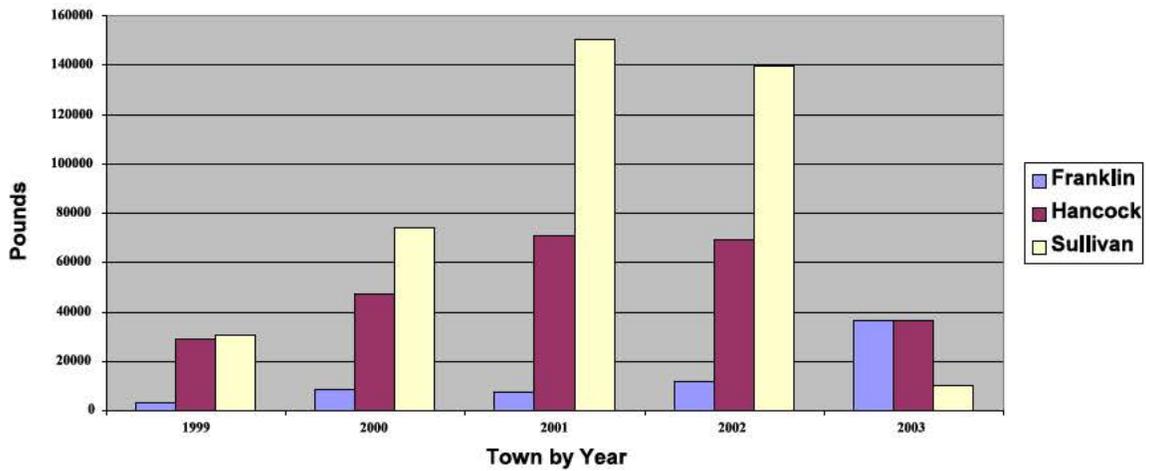


Figure 3. Clam Landing Revenues (Dollars) Reported to DMR for Sullivan, Hancock, and Franklin, Maine (1999-2003)

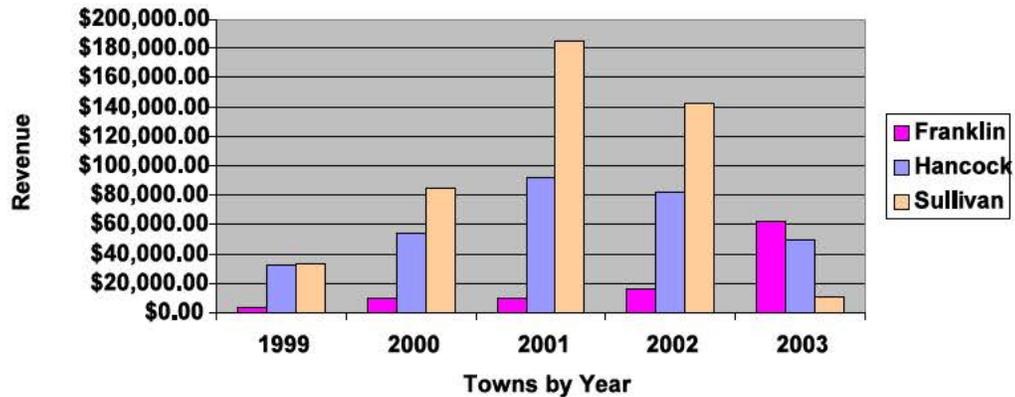


Table 6. Potential Annual Revenue Per Individual Harvester/Entrepreneur and Total Estimated Annual Revenue for Taunton Bay.

Fishery	Data Year	Potential Individual Annual Gross Revenue	Estimated # of Harvesters/ Entrepreneurs	Total Estimated Annual Gross Revenue for TB	Data Source
Clam	2003	\$3,831	32	\$122,602	2
Worms (Wild)	2004	\$36,000-\$55,000	65	\$2,340,000-\$3,575,000	1
Mussels	2003	\$95,716	1	\$95,716	3
Kelp	2004	\$4,800-\$14,000	1	\$4,800-\$14,000	1
Sea Urchin	2004	\$18,900-\$141,750	3	\$56,700-\$425,250	1
Sea Scallop	2004	\$7,500-\$81,000	3	\$22,500-\$243,000	1
Lobsters	2004	\$45,000-\$55,000	3	\$135,000-\$165,000	1
Crab	2004	\$8,000 -\$10,000	3	\$24,000-\$30,000	1
Elvers	2005	\$45,000-\$270,000	18-20	\$810,000-\$5,670,000	1
Alewives	2005	\$12,000-\$15,000	1	\$12,000-\$15,000	1
Oyster Aquaculture	2003	\$106,760-\$125,600	1	\$106,760-\$125,600	1
Worm Aquaculture	2004	\$440,000	1	\$440,000	1
Halibut Aquaculture	N/A	N/A	1	N/A	1
Total Estimated Value of All Fisheries/Resources in TB				\$4,170,258 - \$10,263,390	

- 1 = Personal Interview
- 2 = MDMR Municipal-level Landings Data
- 3 = MDMR County-level Landings Data □

► OUTREACH REPORT, EXECUTIVE SUMMARY

Prepared by: Lee Hudson, author of Outreach Report

Outlined below are the main contact methods we have used to include the public in our project. Actual documentation records of public participation, additional minutes and reports, as well as the news releases are included in project Deliverables 3c, 3d & 3e.

Coordinating Committee Meetings

The main purpose for the formation of the Coordinating Committee was to facilitate inter-workgroup coordination to avoid duplicate efforts and collaboration. Meetings were held regularly throughout most of the project, which although not publicized, were open to the public. Minutes of these meetings, with attendance records, were kept and will be included in Deliverable 3c and 3d.

Personal interviews with harvesters and general community members

- a. Barbara Arter’s interviews with at least 25 individuals which are documented in her report submitted as Deliverable 5b.
- b. Lauren Alnwick-Pfund’s report of in-depth interviews with thirty-three (33) individuals is included in Deliverable 3c.

- c. Shep Erhart's personal interviews with 6 local realtors, the raw data will be included in Deliverable 3d.
- d. Lois Johnson personally interviewed several community members using the questionnaire developed for "Landowner" stakeholder contact and her raw data will also be included in Deliverable 3d.

Town Meeting Style Public Meeting: July 27, 2005

- a. A flyer was developed and distributed and a press release generated and will be submitted in the Outreach Deliverable 3e.
- b. A variety of stakeholders (approximately 23) gathered at a facilitated meeting where the participants discussed "Hopes, Concerns and Ideas" for the future of Taunton Bay. The report of this event was written by Project Assistant Lauren Alnwick-Pfund and is included at the end of this text. The facilitated "raw data" she recorded from that meeting is included in her report.

State Agency Meeting: September 1, 2005

- a. Barb Welch's preparation document was included in Deliverable 3b.
- b. Meeting notes generated by Vanessa Levesque are included in Deliverable 3d.
- c. The attendance list for this meeting was generated and circulated as an electronic contact list and is included in Vanessa's meeting notes.

Tour of the University of Maine Center for Cooperative Aquaculture Research and the U.S. Department of Agriculture facility: October 26, 2005

In an effort to promote education and community understanding as a means of "conflict resolution" and in response to questions from a wide variety of stakeholders, this event was intended to provide an opportunity for the curious to learn more about the local facilities, which are currently raising bloodworms, halibut, cod, salmon, seaweed, and sea urchins indoors. Approximately 18 people attended and, in general, said they would recommend the tour to others. The email invitation and attendance records are included in Deliverables 3d and 3e.

DMR Listening Session: January 19, 2006

Barbara Arter's preparation document was included in Deliverable 3b.

- a. Ms. Arter sent an email copy of the press release (copy in Deliverable 3e) invitation to approximately 20 people and made approximately 15-20 phone calls to personally invite people.
- b. A poster announcing the meeting was created and about 30 posters were hung in the area; see Deliverable 3e.
- c. GIS maps showing what the harvesters drew on the maps that evening are being created by Vanessa Levesque (Deliverable 7a)
- d. 28 people attended this session and a report of the meeting by Barbara Arter can be found following the report of the town meeting at the end of this text.

REPORT OF THE TOWN MEETING JULY 27, 2005 (excerpt)

Lauren Alnwick-Pfund, Project Assistant

The Meeting

The event facilitator, Ron Beard, gave the welcome and introduction. Following the outline for the session and a brief description of the Taunton Bay management pilot project, he provided some ground rules to help foster an atmosphere of trust and mutual respect. These included basic guidelines for discussion such as: listen to understand, ask questions, share the "air time" (one person speaks at a time), focus on interests, not positions, and disagree openly and respectfully. Stakeholders were informed that their input and comments would be compiled and forwarded to the State.

The facilitator then reiterated the suggestion that was broached during the session outline encouraging the group to divide itself into smaller focus groups, which quickly and smoothly became the Fisheries and the Landowners. The group split up quite easily along the lines of fisheries and landowners, but did not necessarily end up unifying (i.e. actually talking to each other across stakeholder/cultural boundaries). That communication was lacking at the meeting reflects trends in the general community. This project faces an important challenge: the task of opening up channels of communication between folks whose paths generally don't cross, all with the aim of increasing mutual understanding (if not acceptance) of one another.

The smaller group sessions were the most intensive and therefore were planned to be the longest segment of the meeting, taking up at least 45 minutes to an hour. To begin, facilitators prompted participants to speak to the three topics outlined above and recorded what was said in large print on flip charts. After brainstorming, the group reviewed the material they generated and starred the important ideas they wanted to share in the larger forum. Following that was a refreshment break with a dual role of taking a break and giving facilitators time to write the key items identified by the group onto 8 ½ by 11 sheets and place them on a large blank sheet at the front of the room.

After the break, the attendees regrouped and the event facilitator invited the focus group facilitators (or any other participant) to report their key findings. Next was a discussion of the findings, guided by the following questions:

- What hopes and concerns are shared across all groups?
- Where are there areas of potential or actual disagreement?
- Are there some shared beliefs or principles that should guide this project as it goes forward?

Raw Meeting Data

The following is a verbatim transcript of the data that was gleaned from Town Meeting participants and recorded onto flip-charts by facilitators. Following the transcript is a list of the common ground hopes, concerns and ideas shared across the groups.

Fisheries Focus Group

Hopes

- There will be a fishing industry for the children, so they can continue their family's lifestyle
- The bay will be opened up for mussel dragging once again, as it was in the past.
- Mussels won't be wasted. (Mussels are growing fast and losing economic value. They are too large and also have pearls. Too large + pearls = no good for market)
- There will be a long, sustainable harvest for generations to come
- Seaweed harvesters are afforded the same rights as other fisheries
- There would be better access to the bay
- There would be a *good* management plan
- Resources (*and therefore people?*) prosper
- Water quality should be a priority of any management plan for Taunton Bay
- Nonfishing people understand the fishing industry better

Concerns

- Unfairness, a major theme—in the current and any proposed regulatory frameworks; for example, if a large corporation were to come in the bay and take seed mussels; also, that perhaps not everyone is being fairly represented in the process of developing a bay management strategy (skepticism and wariness on the part of marine-resource harvesters towards “porch seat managers” who know even less about fisheries than does the State and who imagine they could manage the resources in the bay that fishermen depend on to make a living)

- That individual leases would be given in separate areas of Taunton Bay (don't do it)
- That mussel dragging would ever be unrestricted (don't allow unrestricted mussel dragging)
- UMCCAR
 - Effluent discharged into the bay with chlorine, other chemicals (?)
 - Impact on eelgrass?
 - Questions of scale, more and more fish grown leading to more development, more pollution?
 - Funding is pouring in, how much power will they have?
- Fisheries decision-makers do not appear to put enough consideration towards the economic impacts their decisions have on real people doing real things. That is, decisions made "from above" cause hardworking local people (who perhaps have a long family history of and pride in their traditional lifestyle) to lose their livelihood, resulting in personal bankruptcy and the collapse of small companies, in short, social disintegration
- Loss of livelihood
- Loss of tradition
- Little working access to the water
- Confidentiality of economic information provided
- If we take care of the bay, benefits might not be local (design mechanisms to promote local economies, reward reinvestment and efforts)
- Management decisions for Taunton Bay might be made by locals who know little about the bay's resources
- Quality, ecosystem health, (trash, faulty septic systems, clear cutting, erosion, recreation, etc.)
- Bay management model may not include fishermen (*Really?*)
- People aren't being represented
- Dragger are concerned about the loss of harvestable area statewide, and not being able to survive, driven into areas because of lobstering pressures

Ideas

- Joint lease site for experimental mussel seed
- If seaweed-harvesting conflicts can't be solved at the state level (preferable), try resolve at the local bay level
- State needs to resolve seaweed-harvesting issues, don't try to work it out at the local bay level
- Experimental harvesting of mussels by hand or by dragging
- Make eelgrass zones no dragging zones
- Put in access point at old L.A. Gray
- Seed harvesting permit decisions go through a committee (not just the Commissioner)
- Track the economic worth of harvesting in Taunton Bay (including seed harvesting)
- Confidentiality of economic information would have to be provided
- Use proceeds of fisheries in the bay to fund research in the bay
- Manage so locals receive benefits, the benefits of taking care of the bay are open to taking by fishermen from other areas (relates to rewarding effort, the idea of local resource users managing their own resources, staying within your own resources, not going to some other place, encourages responsibility and sustainability)
- Develop a clear process for TTBS, for making management decisions *within the organization*, (as well as for the study goal of making management recommendations)
- Develop a conflict resolution process to deal with these issues in Taunton Bay
- Rebuild trust within the project
- Use a different type of outreach to fishermen

Landowners Focus Group

Hopes

- Healthy water quality
- Abundant wildlife
- Sustainable jobs
- Inclusive local voice in bay management
- As natural as possible
- With respect for marine harvesters
- *Balance
- Limits on development
- Keep the bay scenic
- Education for property owners on shoreland management (e.g. erosion)
- Conserve the bay
- Understand the bay

Concerns

- Industrial development/scale of development for a small bay
- Erosion
- Can we ever know enough to adequately protect/manage the bay?
- Pesticides/herbicides on blueberries
- Motorized traffic (jet ski doos)
- Noise pollution
- Overharvesting of marine species
- Too much aquaculture
- Development that pollutes (e.g. septic, fertilizer)
- Loss of wildlife habitat
- Damage to ecosystem
- Water access (few access points and too many users)
- Regulatory decisions made without sufficient information (ecological, social, economic)
- Inappropriate development
- Lack of coordination between towns
- Inadequate monitoring of shoreland zoning

Ideas

- More monitoring (therefore more money)
- Agree on a vision for the future
- Agree on management principles
- Teach landowners to be good stewards and make it easy
- Educate all bay users on how to take care of the bay
- Coordination among towns
- Property owners and fisheries folks learn to talk to each other AND work together
- Manage the bay as an ecosystem

Common Ground

What hopes, ideas and concerns are shared across all groups?

- Property owners and fishery folks learn to communicate and work together
- Education on all fronts (everyone's a teacher)
- Make it easy for people to be good stewards, reward efforts
- Questions about aquaculture operations on Taunton Bay
- More monitoring as a source of jobs as well as information

- Good management plan
- Sustainability, both ecological and economic

Roger Fleming, a member of the Taunton Bay Study Governance Working Group from the Conservation Law Foundation, summed up the areas of agreement reached at the meeting very well.

For example (and I don't mean to be inclusive), everyone wants the bay to be managed for both ecological sustainability and economic sustainability, everyone saw the need for education of both landowners and resource users about how to take care of the bay and be good stewards, and everyone wants a more inclusive management process and for everyone to understand each other's views better. From the perspective of someone who does not live or work directly on the bay, I was very impressed by the amount of common ground I saw in the concerns and hopes for the bay, and the level of recognition for others' needs and viewpoints.

DMR Listening Session: Harvesting and Fisheries Management in Taunton Bay

January 19, 2006, 7:00 pm Franklin Community Center

Submitted by Barbara S. Arter, BSA Environmental Consulting

On January 19, 2006, a Listening Session was held at the Franklin Community Center to discuss harvesting and fisheries issues in Taunton Bay. The meeting, which was held in conjunction with the Taunton Bay Study, had two major objectives: 1) to begin a dialogue between harvesters and the Friends of Taunton Bay (FTB) for the purpose of providing input into the Taunton Bay Study and 2) to gather input and information for the development of MDMR's forthcoming Taunton Bay Comprehensive Resource Management Plan. John Sowles, MDMR, was present to hear from harvesters on a variety of issues for the plan. Barbara S. Arter, BSA Environmental Consulting, facilitated the meeting and Vanessa Levesque, MSPO, was present to answer questions about the Bay Management Study and to assist with facilitation and notekeeping.

Attendance

There were 28 individuals representing 6 towns in attendance at the meeting. Of the 28 participants, 20 were harvesters and 8 were nonharvesters (riparian landowners, selectmen, recreational users). Table 1 lists the number of harvesters by town of residence. The majority of harvesters in attendance (70%) reside in the towns of Sullivan (35%) and Hancock (35%). Of the 8 nonharvesters in attendance, 7 were from Franklin and 1 was from Sullivan.

Table 1. Number of Harvesters by Town of Residence.

Town of Residence	Number of Harvesters
Sullivan	7
Hancock	7
Franklin	3
Cherryfield	1
Milbridge	1
Eastbrook	1

On the attendance sheet, participants were asked to identify their fishery. Of the 20 harvesters present, 12 indicated that they harvested only 1 species, 7 harvested 2 species, and 1 indicated that he harvested all species. Table 2 lists the number of participants in each fishery represented at the meeting. The two fisheries with the highest number of representatives were lobster (31%) and clam (19%).

Table 2. Number of Harvesters per Fishery.

Fishery	Number of Harvesters
Lobster	8
Clam	5
Mussel	3
Scallop	2
Elver	2
Worm	2
Smelt	1
Seaweed	1
Alewife	1
All	1

Pre-Meeting Discussions

Since many harvesters arrived 30-40 minutes ahead of meeting time, the consultant had an opportunity to introduce herself and discuss the purpose of the meeting with the harvesters one-on-one. All of the harvesters were eager to share their fishery concerns and all of them had a very positive attitude. When asked how they found out about the meeting and why they came, several answered that they had heard about the meeting via word-of-mouth and that they came because they heard that someone was “shutting the fishery down” and they were greatly concerned.

Meeting: Part I

After introductions were made, Vanessa briefed the group on the state’s Bay Management Study and Barbara discussed the Taunton Bay Study and the Economic Assessment Report. The remainder of the meeting was dedicated to the MDMR Taunton Bay Comprehensive Resource Management Plan.

The following is a list of issues raised in Part I of the meeting:

1. A participant asserted that the “Colonial Ordinance” suggests that the local fishery belongs to the town. Who owns a local fishery? The town or state? It was agreed that this needed investigation.
2. John Sowles discussed how the moratorium legislation requires that the moratorium extend to 2008 and that MDMR must propose a Comprehensive Resource Management Plan for Taunton Bay by 2007.
3. There is concern that Friends of Taunton Bay and MDMR are advocating to shut down the fishery in Taunton Bay.
4. TB Pilot Study will generate many maps and data. The question is what will data/maps show? And how will the information be used.
5. For the Resource Plan, MDMR is seeking local knowledge: What used to be harvested, where, the quality, quantity, etc. How does it compare with today?
6. The town of Sullivan has a shellfish ordinance and as such, they control the distribution of their shellfish licenses. However, Franklin and Hancock do not have such an ordinance and as a result, harvesters from other towns can harvest in their flats. It was generally agreed that the three towns should develop a 3-town ordinance for the bay that is locally controlled and not influenced at the state level. Towns should also consider becoming part of a larger Frenchmen Bay Ordinance.
7. Clamflats could be managed and the towns could work together to rotate flat harvesting and possibly establish a clam flat seeding program.
8. Although clams can and should be managed, most agreed that worms should be “left alone” and allowed to go through their natural cycle.
9. Any management plan created for the bay should be overseen by the towns and not by conservation organizations.
10. Is there a problem with the fisheries in Taunton Bay? Is there a need to manage, other than what is currently done? Why manage? Some concerns that could be addressed in a management plan are:
 - a. Many feel that worms are undersized but some argue that that is the natural cycle. Are harvesters OK with waiting out the cycle?
 - b. Some harvesters feel that the West shore had more worms. Why?

c. Concerns about septic pollution

11. Most agreed that cooperation is needed for any form of management at both local and state level.

Meeting: Part Two

The second part of the meeting was dedicated to working with harvesters individually and in small groups to obtain individual feedback about where they harvest and trends relating to quality and quantity. Harvesters were encouraged to draw on large maps to indicate their fishery.

Although the mood of the first part of the meeting was slightly antagonistic, the mood in the second part of the meeting was very conciliatory. Harvesters were very willing and proud to share information about their livelihood. The atmosphere was genuine and convivial. Upon leaving, most harvesters said they were glad the meeting was held and they were looking forward to the “next one.”

Conclusions and Recommendations:

1. It is apparent from both previous interviews and the atmosphere of this meeting, that most harvesters do not feel antagonistic about sharing information if they are approached one-on-one or in small group. In fact, all of the harvesters who had been interviewed previous to the meeting (phone interview for the Economic Report) had a positive attitude toward this meeting. Antagonism appears to surface primarily only in the group setting. Therefore, it is recommended that the best way to communicate or establish a relationship with harvesters is individually or in small group.
2. Since most harvesters left the meeting with a positive attitude and desire for more meetings, more interaction in the form of interviews, listening sessions, pot luck suppers, etc, is recommended.
3. Most harvesters and local community members have an extremely negative attitude regarding the motives of Friends of Taunton Bay (FTB). Most of these individuals believe that FTB would like to close the bay to all harvesting activities and that FTB has an adversarial agenda and inappropriately strong influence at the state level. Therefore, in order for FTB to be an effective leader in bay management and to gain respect in the community, they should develop a campaign that creates a better image for the group. Some examples of steps that the organization could take to enhance their standing in the community include:
 - a. The Executive Committee should review its policy and FTB’s stand on the dragging moratorium. It is unclear if the organization, or just a few individuals, supports the moratorium. This policy should be made clear to the public.
 - b. Enhance newspaper coverage that clearly states FTB mission and agenda.
 - Advertise ALL meetings in the newspaper and invite the public to attend.
 - Host presentations that are inclusive to harvesters (e.g., “Alewife Harvesting in Taunton Bay”)
4. If the state decides to adopt Bay Management principles statewide, then state agencies should initiative, encourage, and support the creation of multi-stakeholder bay coalitions. These coalitions would be comprised of state, federal, and municipal government representatives, conservation organizations, harvesters, industry, and residential landowners. They would act as a vehicle to solve problems, provide input to regulating agencies, and provide information transfer and outreach. □

► COORDINATING COMMITTEE, EXECUTIVE SUMMARY

Prepared by: Frank Dorsey, Coordinating Committee Chair

The study is organized into five work groups: Economics, Governance, Indicators, Mapping/Information and Outreach, coordinated by monthly meetings of work group representatives. Overall policy and budget decisions were made by the Friends of Taunton Bay Executive Committee.

Participants representing the five Taunton Bay Study workgroups met monthly from April 2005 through December 2006 to report on completed, in-progress and planned activities, thus keeping mutually informed on the entire project and avoiding duplication of effort. The group met in Hancock with a total of 59 attendees. Meetings totaled more than 150 hours of person time exclusive of travel from as far as Deer Isle and Augusta. Attendees came from 10 towns and at least 14 organizations. The group had expertise in mapping, land conservation, economics, several fisheries, statistics, local history, biology, water quality, organizational change, meeting facilitation, photography,

mediation and other study-related fields. Attendees reported back to their own work groups and to the State so that all interested parties were fully aware of activities.

The Coordinating Committee also suggested policies to the Friends of Taunton Bay Executive Committee, leading to the following executive committee-approved policies for TTBS confidentiality and publications:

Confidentiality: All material or information provided to the Taunton Bay Study will be considered public information. It is an obligation of each person involved in the Study to make this known to interviewees

Publications: Taunton Bay Study draft reports and State of Maine deliverables will be circulated to the appropriate group(s) in time for a one-week period for comments to the author(s). All comments will be acknowledged, and if not incorporated in the report, minority reports and/or comments will be included if submitted within one week of acknowledgement.

Since the bulk of the study work was performed within the workgroups, the Coordinating Committee proved useful as a forum, a vehicle for communication and as a mechanism to avoid redundant efforts by workgroups with overlapping areas of interest. □

APPENDIX M
MUSCONGUS BAY STUDY

**FINAL REPORT: BAY MANAGEMENT PILOT PROJECT
MUSCONGUS BAY, MAINE**

SUBMITTED BY
QLF/ATLANTIC CENTER FOR THE ENVIRONMENT
TO THE MAINE COASTAL PROGRAM
MAY 2006

I. Summary

In Muscongus Bay, the Quebec-Labrador Foundation/Atlantic Center for the Environment (QLF) and its Muscongus Bay Project Steering Committee conducted the bay management pilot project with financial support from the State Planning Office as well as additional funds from the Wallis Foundation and the Birch Cove Fund of the Maine Community Foundation.

A. Tasks

Our goal was to develop an informed understanding about the local capacity for and interest in managing Muscongus Bay as a connected marine region. We did not design this pilot to reveal local views on how a new bay level of management would be structured or administered. The Muscongus Bay region was not ready for this second order of inquiry as its residents had never been asked to consider the first set of issues.

To conduct the initial investigation, we designed, organized and conducted four basic elements including: a random mail survey of property owners, roundtables with primary stakeholders and local leaders, GIS mapping of bay uses and habitats, and a final Muscongus Bay Forum for the general public. Each of these components performed very successfully, yielding the information we sought through a strong level of local participation. Each one also resulted in a separate summary report which is appended to this document along with other evidence of project results.

We did not perform, however, two of the proposed tasks as outlined in our original workplan. The first was “Task 5 – Marine Area Characterization”. We originally proposed to describe and document, using GIS maps, present uses of the bay as well as the ways in which these uses are currently managed. Instead, we created GIS maps which depict current uses and habitats of the bay’s marine and coastal environment. Although some of these maps include a management reference (i.e. to Lobster Zone districts, NRPA protected species, etc.) less management information is depicted on the maps than originally anticipated. The time and resources required to simply locate and integrate existing data layers was formidable. Often we found that the layers we were seeking did not exist so we had to use substitute layers to convey certain information. As a result we could do very little original mapping. What time we had, we devoted to documenting aspects of recreational use and making contacts for subsequent mapping work.

We also did not complete “Task 6 – Expand the Muscongus Bay Project Committee”. In short, as the pilot progressed, we came to believe that expansion was premature. First we needed to conduct the pilot to help clarify not only how the overall project would proceed but also whether

it would continue. Given the strong level of public interest and support for the pilot, we now believe that we have identified a course of action which may facilitate bay management. We do not intend to take on the management task ourselves. To proceed into our next stage we need representation from fishing, tourism, local government, and coastal development. Plans to recruit these individuals are current being discussed.

B. Clarification on Approach to Bay Management

Throughout the pilot, we deliberately avoided the term “bay management”. We were concerned that discussion over its precise meaning might detract from more informative exchanges during the pilot process. Instead, when seeking input on bay management, we asked for responses to some of the ideas which appear to be embedded in the bay management concept namely:

1. The State should change its approach to marine and coastal management
2. Certain coastal or marine issues would be better managed at a bay level (rather than a state or municipal level.)
3. Local people and entities (governmental and non-governmental organizations, associations, businesses) identify themselves as part of a particular bay region
4. Local entities want to participate in the management of their bay
5. Local entities within the same bay region would collaborate to resolve shared marine or coastal issues
6. Local entities within the same bay region are sufficiently connected, motivated, staffed, and supported to engage in and sustain collaboration at a bay level.

Again, we did not specifically seek local feedback on what kind of governance approach, methods or structure would be best for a new regional level of marine and coastal management. We decided early on that this question could only be answered after residents had had an opportunity to fully consider the initial issues. On occasion, however, opinions did surface which were related to the governance question. These opinions are reflected in this report as are ideas which emerged during Project Steering Committee discussions.

II. Local Reactions

A. Opportunities

Responses to and discussions within project elements pointed to a number of supportive circumstances and opportunities which would advance bay management in Muscongus Bay. These included:

1. *Local entities in Muscongus Bay are open to the possibility of collaborating on marine and coastal issues.* The roundtables suggested that the bay’s towns face remarkably similar issues and pressures. Collaboration, although challenging, was perceived by stakeholders and survey respondents to be a rationale way to approach specific issues so long as the potential benefits are likely to outweigh the costs. In one roundtable session, a local selectman even suggested that the bay’s towns should form their own county.

2. *Issues exist which would likely benefit from a regional rather than municipal approach to resolution.* Stakeholders recognize that many of their towns and organizations are dealing with the same issues in isolation such as: clam management, tourism development, public access, shoreland zoning, working waterfront, dock development, loss of historic artifacts, freshwater supply, lack of baseline environmental data, or subdivision development. Local entities represented at the Forum and the roundtables agreed that they could benefit from sharing experiences, information, resources and ideas as well as collaborating on the management of specific issues.
3. *Local collaboration has already been shown to benefit the management of specific marine issues in this region.* To support the concept of collaboration, a number of roundtable participants spoke about the positive results of several efforts from this area (initiated by either the State or local interests) to address marine issues at a regional level. These included: the Georges River Clam fishery, the lobster zones, the striped bass fishery, and gear conflicts.
4. *Local residents believe their towns should collaborate to improve or prevent declines in marine and coastal resource “health”.* Survey respondents are dissatisfied with the results of current efforts to manage or redress pollution, habitat loss, coastal development, public access, and commercial fishing. Further, a significant majority of those surveyed believed that towns should cooperate to address a wide range of natural and cultural resource issues, from tourism to habitat health.
5. *Local residents respond positively to the concept of a Muscongus Bay region.* All components of the pilot project confirmed that the Muscongus Bay identity is weak yet local residents and organizations respond enthusiastically to efforts to gather information and share concerns about this marine area. Residents, towns and organizations appear ripe to feel part of a bay region.
6. *Bay management provides a new opportunity for regional action by land-based entities.* Land trusts, towns, and other entities traditionally engaged in the management of terrestrial areas have found it difficult to take a regional approach to land use issues because of the profusion of property and jurisdictional boundaries that separate them. The bay appears to provide them the opportunity to escape these jurisdictional constraints and pioneer cooperative approaches to resource and issue management.
7. *Local residents have remarkably similar perspectives on the qualities that define this bay’s character.* Participants in all four components of the project spoke to the bay’s beauty, its relative isolation and peacefulness, and its rural, working qualities. They proudly described it as a working bay that accommodates pleasure boats (some calling it a “small boat bay”) as opposed to a bay for recreation that allows some commercial fishing.
8. *Local residents clearly recognize connections between the health of the bay and the health of their local economy, businesses, and culture.* Survey respondents clearly

indicated that the link between the bay and their town's economy was strong. A similar connectedness was acknowledged between the bay and local culture. Further, conversations during roundtables and the Forum rarely discussed one of these regional aspects without connecting it to another.

9. *An emergent local group exists to help foster a regional, collaborative approach to bay issues.* QLF's Muscongus Bay Project has begun to establish itself as an impartial and trusted entity. The information it has developed and distributed was accepted and discussed without challenge or controversy. In fact, at the Forum praise and appreciation for the project's efforts and focus were repeatedly given.

B. Challenges

The results of our project suggest that challenges to bay management in Muscongus Bay are as follows:

1. *No informed consensus exists in this bay about the efficacy of the current approach to marine and coastal management.* Neither the public nor local leaders nor decision makers are familiar with the full range of management activities that currently take place within the bay. The general public, as evinced by our property owners survey, appear to rely on their own senses (what they see around them) and the local media to form their opinions about the management and status of marine and coastal resources. Local leaders and stakeholders seem better informed but only about the narrow band of management activities and resources that fall within their specific activities and responsibilities.
2. *Limitations placed on the current system concern residents more than the structure of the system itself.* The most significant complaint about state management was not about how it was structured but rather the low level of funding and resources it has to carry out its assigned responsibilities. Some criticism surfaced about the "cookie cutter" approach to resolving problems which vary significantly in origin, expression, and impact from one municipality to another. Other complaints included: inadequate enforcement of existing environmental laws, insufficient support for emerging industries, insufficient amount of research and monitoring, inadequate support for locally identified needs, too complex and internally competitive to be effective, and it is seen as conflict or crisis driven.
3. *Coastal and marine use sectors are relatively insular.* Although stakeholders from different sectors are aware of one another's general activities and interests there appears to be significant disconnection and lack of communication between sectors, especially between those whose actions primarily occur on land on those whose actions primarily take place on the water. This also can be said for those who reside in the area on a seasonal basis and those who live here year round.
4. *Those who would appear to have the greatest stake in bay management appear to be the least interested in the process of exploring it.* Representation in the pilot's components by the fishing and marine trades industries was minor compared to their presence on the

bay. How to involve these stakeholders in the development of bay management presents a serious challenge. Admittedly the pilot components were not ones which regularly draw the participation of watermen. The costs and time involved in the kinds of approaches that do work, however, far outweighed the resources available to this pilot project. Further, the work of the pilot did not present an immediate threat or opportunity to people who must put the daily operation of their businesses before the exploration of new governance ideas.

5. *Local entities do not currently have the resources to undertake new management responsibilities.* Currently there are no meaningful incentives and insufficient resources to enable local entities to undertake the additional costs and time associated with collaborative approaches to shared issues, including the necessary development of marine area management information, capacity, and skills.
6. *Issues in Muscongus Bay which would benefit from a collaborative approach are multifaceted, cumulative, and complex.* There is no single galvanizing threat, such as finfish aquaculture, port development, dredging or disposal in Muscongus Bay which dominates the landscape of local concern. Instead, environmental and social impacts of coastal development as well as the perceived vulnerability of the fishery are foremost in the minds of bay residents.
7. *Information necessary to support management of this bay is scarce and disbursed.* Basic information on the bay's oceanography, physiography and biology as well as human use patterns both past and present is lacking. Current research and monitoring efforts are disconnected and designed to inform a diversity of objectives and interests. To gather, access and apply environmental, social and economic information requires a significant investment of time and resources as it is kept in a variety of locations, situations, and conditions.

III. Local Governance Recommendations

A. Issues to be included

In Muscongus Bay we discovered several issues that appeared to be ripe for some aspect of management at a bay level. To create a shortlist we looked for concerns which were identified as 1) important in our local roundtables and survey and 2) as a priority by a local entity capable of taking leadership. Five topics rose to the top and one additional one, although out of the scope of this project, deserves consideration. These included:

1. *Coastal Development:* Changes in property ownership and use were among the most common causes for concern raised during the roundtables. The Forum's session on this issue drew the largest crowd. Impacts of development on the marine environment, the local economy, and local culture were clearly identified as significant issues through the survey. The drivers and consequences of new development and use conversions are

complex and difficult to govern. Legal remedies, such as shoreland setbacks and town zoning ordinances were seen as insufficient. Absent an effective alternative, towns are reluctant to cede any of their existing authority although they recognize the need for better bay-wide communication and planning. Stakeholders also pointed to the need for better monitoring and more research on the relationship between coastal development and the bay's health.

2. *Clam harvesting*: Clamming is a significant part of the bay's fishing economy. The Georges River's five town, co-management program has been highly successful. Towns around the rest of the bay could benefit from the lessons of that approach. There is initial interest among towns, clammers, and conservationists in simply sharing management knowledge and methods among the bay's towns in order to ensure the implementation of successful practices around the bay. It is also hoped, however, that this initial communication stage could lead to a shared research, monitoring, administration, regulations and enforcement based on the Georges River model.
3. *Shoreline access*: Demand for access to the bay and its estuaries is increasing, particularly among recreational boaters. At the same time, locally known yet unofficial sites are threatened by changes in property ownership or owner attitudes towards public use of their lands. Access pressures affect every town in the bay. Some towns resist demands for new or additional access fearing the influx of new users. Yet, unsanctioned locations are being used without permission. Municipalities with greater access opportunities are burdened by overflow from neighboring towns. Businesses which rely on access have decided to buy coastal or island properties (e.g. Chewonki Foundation, Maine Sport) rather than rely on public areas. This situation requires not only the addition of new sites but also better management of existing sites and better care of sites by individual users. Local approaches appear to be too limited to effectively resolve this bay-wide problem.
4. *Working Waterfront*: Both the causes of and concerns about the loss of working waterfront are shared region-wide. The significance of this infrastructure to local culture and economy is remarkably similar from one Muscongus Bay town to the next. Further watermen often use waterfront in more than one town as part of their commercial activity. Resolution of this issue at a bay scale would more effectively capture its impacts.
5. *Environmental and Biological Monitoring*: To date no assessment of the state of Muscongus Bay has been conducted. No baseline environmental characterization exists either. The public bases its opinions about the bay's environmental "health" largely on their own experiences and the absence of crisis. Yet there are at least thirty-five different continuous or limited monitoring efforts occurring in Muscongus Bay and its estuaries. Fourteen or more organizations are involved in these activities. The public is largely unaware of these efforts or what they reveal about the state of the bay and its resources. Many of these programs face similar challenges in terms of volunteer recruitment, public education and fundraising. Few are aware about one another's efforts. Some kind of

bay-wide coordination and networking is clearly needed if the results of these efforts are to benefit management of the bay's environment.

6. *Historic preservation/interpretation*: Muscongus Bay is exceeding rich in pre-historic artifacts. Its significance is only just beginning to surface. Its history of European settlement is also undervalued. Inadequate regulations are in place to preserve the archeological record from damage due to coastal development. Few efforts have been made to present a historical account of the bay which assimilates the experiences of its towns. A Muscongus Bay regional identity would likely be strengthened by collaborative local efforts to celebrate the region's past and protect its significant historic and pre-historic resources.

B. Issues to be avoided

No issues were specifically removed from consideration for bay-wide management. Our project indicated, however, that some were simply less important or compelling to residents and stakeholders at this time. As a result, they might not serve as suitable "carrots" to encourage local collaboration at a bay level in Muscongus Bay. Others were seen as "too large" to be managed at a bay scale regardless of the location. The list of issues which may be currently unsuitable includes:

1. *Shellfish aquaculture*: This is not perceived to be a particularly contentious or difficult issue bay-wide. The most significant concern was the need to facilitate industry growth because it provides a viable part-time income for local residents. Given its relatively low profile in this bay, however, it is not likely to catalyze a cooperative management approach by local towns at this time.
2. *Recreation (boating, harvesting, swimming, etc.)*: There were few recreational issues which caused concern. The related issue of public access is discussed above. Although mention was made of conflicts which can arise between lobstermen and recreational boaters in certain towns (buoys impeding waterways, kayakers causing a nuisance to or suffering harassment from commercial fishermen) the need for a bay-wide response was never raised. Similarly, the lack of pump-out stations was noted, but not identified as critical given current boating patterns.
3. *Lobster harvest*: Significant concern was expressed about the vulnerability of the lobster industry and the impact of any declines on the bay's economy and culture. Neither the bay nor its municipalities, however, were suggested as appropriate alternative scales for management of the harvest itself. (The bay may be an appropriate scale, however, for managing the physical infrastructure necessary to support the fishery as well as other related issues.)
4. *Harvest of other species*: Only fish/shellfish populations and habitats, which from a biological perspective, could be meaningfully regulated and monitored at a bay scale were considered candidates for bay management. These were thought to include clams,

worms, elvers, urchins, seaweed, alewives, mussels, and striped bass. By *inference*, stakeholders appeared to exclude groundfish, herring and other pelagics, lobster, crab, scallops, and shrimp.

C. Governance approaches to be included

Based on the ideas, issues and opinions which surfaced during the course of the Muscongus Bay pilot, QLF and the Muscongus Bay Project Steering Committee have concluded that there are several aspects which should be part of a plan to develop and implement bay management in Muscongus Bay. All reflect our preference for a process which would enable a bay scale of management to emerge locally (with state oversight and support) as opposed to a single governance structure and administration mandated by the state for all bays.

1. *Once the legislated Bay Management Study concludes, maintain a connection between local bay management initiatives and Maine's official marine and coastal management policy.* Bay management programs will not emerge from a policy vacuum. The success of the Muscongus Bay Project was due in part to the legitimacy and credibility it gained through its affiliation to a legislated program of the State. Had we attempted to conduct a similar series of components as a stand-alone study, we suspect that we would not have experienced the same level of interest or participation. A close link to state policy is critical to the emergence of efforts involving public trust resources, particularly in parts of the State where there is no major galvanizing threat.
2. *Develop an enabling policy which fosters and guides the emergence of bay management programs.* Provide a means by which bay management programs can emerge and receive official state sanction or recognition. Provide an overarching set of principals to which state sanctioned programs must adhere. Clarify the roles, rights and responsibilities for management that must be agreed upon between sanctioned programs and the state. Include incentives for programs to seek official state recognition.
3. *Communicate any state or federal targets or goals relative to the development of bay management.* Should the State determine that it is necessary to establish qualitative or quantitative measures to evaluate the development of bay management, local programs would benefit from an understanding of these parameters. Any deadlines or expectations which motivate or determine the State's actions or interests need to be thoroughly understood by groups which may be affected by these institutional drivers.
4. *Realign appropriate government services and functions to reinforce the emergence of bay management programs.* Bay management cannot effectively emerge out of a system which is not structured to utilize and serve it. Local collaborations will be undermined by the current structure of state and federal government which is designed to deliver and receive services and functions to and from individual towns and counties. In order to support the emergence of a level of management organized around marine geography, relevant government agencies must make changes over time in their structure and approach.

5. *Develop and manage the basic GIS information that all bay management initiatives will need to operate.* In Muscongus Bay, GIS maps played a critical role in fostering discussion about bay management. They enabled residents to recognize relationships between towns, uses, habitats and issues for the first time. They provoked the idea of a bay region. They will clearly assist in decision making within institutions at both local and regional levels. Developing these maps, however, was an exceptionally time-consuming effort which required a level of expertise that few organizations have available. The emergence and operation of bay management programs would be greatly facilitated by a reliable, centralized and managed system for collecting, managing, and distributing basic GIS data layers relevant to a bay scale.
6. *Enable all bay management programs to generate and manage the basic physiographic, oceanographic, biological and socio-economic information necessary for sound management.* Few if any bay regions have the data needed to make management decisions about bay-wide uses. Baseline environmental data, historical and current use information, and real time monitoring data are all needed, at a bay scale. How to develop, interpret, analyze, communicate, store, distribute, revise, and apply this data are critical aspects of management. The state must determine what role it will play in ensuring that all bay management programs are able to develop and manage this information at some threshold level. This could include stewardship education and training, protocols for research and data management, centralized data storage, state sponsored research programs, incentives for bay research by other institutions, and more.
7. *Allow bay management programs to develop in a manner and pace suitable to their region.* In Muscongus Bay, prior to instituting any new regional level of governance, it is important for local entities to test collaborative approaches to managing shared resources and to assess the drawbacks and benefits to that approach. Further, municipal representatives from Muscongus Bay prefer a cautious approach to collaboration that initially focuses on one locally relevant and engaging bay-wide issue.
8. *Provide a mechanism to foster communication between and about bay management initiatives.* If programs develop in isolation from one embayment to the next, the opportunity to learn from and improve approaches will be lost. The State should actively facilitate communication and networking between programs. Where possible opportunities to cooperate and share resources or methodologies should be encouraged. Programs will also be enhanced through a state effort to communicate to other audiences, including the general public, about the need for and role of a bay-wide approach to marine and coastal management.

D. Governance Approaches to be avoided

1. *Do not establish a single governance structure for all bays until efforts at the local level develop evidence that soundly demonstrates which core components are necessary.* Information on the most appropriate structure will only emerge through experience at the local level. The state must enable bays to test and refine different structures, and to share

the results of their efforts, before determining what aspects should be mandatory for all bay management bodies.

2. *Do not predetermine which issue(s) is(are) most appropriate for bay-wide management.* The State should not pre-select or prioritize the issues or groups of issues which are suitable for bay management (other than to clarify which issues or parts of issues, by law, cannot be managed at the bay level, e.g. tuna fishery). There is likely to be significant variation from one bay to another on which issues will provoke and sustain local collaboration. By creating a short list of state-preferred issues, the State runs the risk of inadvertently discouraging the formation of efforts which could have been critical to the development of bay management.
3. *Do not rely on the ability of local entities to raise the funds necessary to initiate and sustain a bay management effort.* Bay management, although important to the State of Maine, has not been embraced by the private foundation or donor community as a funding priority. If groups have to rely solely on outside support to raise the funds, they will either spend the majority of their time and resources raising that money or they will fail. It is critical that the state become a partner in helping to fund and to develop new sources of support for these initiatives.
4. *Do not strictly mandate the composition or structure of local bay management programs.* Although each bay shares a similar constellation of stakeholders, the significance, power and influence of these sectors vary from one marine area to the next. The representation of stakeholders in one region may not be appropriate for another. In addition, the most appropriate structure for the development of a bay management program depends largely on the culture of the communities and sectors involved. Allow the leadership within each area to determine, through local knowledge and experience, what approach to developing and operating a representative group is most appropriate. Provide support to that leadership as well as principles that shape composition and operation so that it is fair, balanced, inclusive, and democratic.

E. Governance Actions to be included

Few, if any, specific management measures or actions were advocated by residents or stakeholders involved in the pilot. Those that did arise were aired by individuals and not the product of any broader consensus. They included:

1. *Shoreland zoning:* A recommendation in one round table was made that the state establish a greater minimum setback requirement for shoreland areas and not wait, as New Jersey did, until most resources have been lost before the action is taken.
2. *Education:* Individual attitudes which place personal gain over community need were seen as a key part of the problem. On more than one occasion, round table participants expressed concern that not enough resources were dedicated to educating the next

generation about the bay, its resources, and its limits. Some felt that too many resources were spent trying to correct actions by adults who were incorrigible.

3. *Research & monitoring*: Good science is critical to good management. Stakeholders frequently lamented the absence of good baseline data. Bay management must include plans to encourage and support programs of research at the bay level. In particular, bays need good environmental baselines against which to measure the impact of new and changing uses (such as subdivision development). Baselines are also necessary to identify the most appropriate focus for monitoring efforts, as well as to assess the data from those efforts.

F. Actions to be avoided

No specific actions to be avoided were identified during the pilot project. Current state approaches which gave rise to criticism included: the “cookie cutter” approach to resolving problems (which vary significantly in origin, expression, and impact from one municipality to another), inadequate enforcement of existing environmental laws, insufficient support for emerging industries, insufficient amount of research and monitoring, inadequate support for locally identified needs, too complex and internally competitive to be effective, and it is seen as conflict or crisis driven.

In essence, it appears that the State should avoid being perceived as promising more resources or support for bay management than it can actually deliver. Its role and approach not only must address the needs and interests of bay communities but also must be achievable given available resources and funds.

IV. Success of Public Participation Approaches

The local response to the pilot project far exceeded our expectations.

- A. Fifteen percent of the 980 property owners in the bay’s ten towns who received our mail survey (> five percent of the 17,900 property owners) completed and returned it. Their input helped us to clarify what the general public thinks are the key environmental issues for our region. (“Survey Results” attached)
- B. Ten percent of the 380 stakeholders invited to our roundtables actually came to one of our five, two-hour meetings to discuss their concerns and outlooks on resource management in Muscongus Bay. (“Roundtable Results” attached.)
- C. Our summer intern uncovered 130 existing GIS data layers on bay uses and habitats from the systems of state and federal agencies, university researchers, NGO’s, and local businesses. Working with QLF’s Center for Community GIS, we used these layers to create just under 30 new maps of the region which, once locally verified, will be

distributed as a CD-ROM Atlas to area towns, NGO's and businesses. (List of Maps and Maps attached.)

- D. Over seventy residents turned out for our Saturday forum in March, 2006 to learn about the project's results and to participate in further discussions on several bay-wide issues including clam management, public access, coastal development, and research and monitoring. As a result the Muscongus Bay Project has been able to refine its direction and role in the region. ("Forum Summary" attached.)
- E. In addition, the activities of the pilot were well covered by local media. Early on local newspapers printed press releases about the project's components. Towards the end of the project, local papers were writing their own stories about the results of the Forum. In total, at least 20 articles were printed by six local newspapers, one state paper, and two organizational newsletters. (Articles attached.)

V. Project Scale

Muscongus Bay and its estuaries are encircled by nine mainland towns and one island community. It encompasses an estimated 182 square miles of open water (21 mi² of which is within the estuaries) and 10 square miles of islands.

The size of the area did not pose any significant problems to the operation of the pilot project. A few organizational aspects were more time consuming due to the number of towns involved (i.e. obtaining lists of property owners) but these were not serious obstacles. For some aspects, such as the development of GIS maps, the size made the project easier. In a smaller region, the data resolution for many layers would have been too low to be meaningful or there may be no data at all.

VI. Capacity Needs

- A. *Competent and continuous local leadership:* For a bay management program to evolve it needs a local champion that is readily accepted by area residents and institutions. Currently our champion is the Muscongus Bay Project. Staffed by QLF, the Project relies on foundation support for QLF's Marine Program and for the specific activities the MBP undertakes. Without this year to year support the project could not continue. In addition, the group relies on the volunteer time of its Steering Committee members. Groups who have dedicated paid staff to the project tend to be better represented in its decision making than individuals who are volunteering their time.
- B. *Local Trust and Support:* The MBP and QLF have proceeded strategically in order to create an identity and approach that garner support, trust and interest of local residents. We have endeavored not to be a voice for a specific objective or outcome but rather

allowed the interests of the local public to be heard. We believe that the time invested in laying this foundation is critical to the long term success of this effort.

- C. *Support for municipal collaboration:* The resources, leadership and time available to the operation of municipal government are fully utilized. In order for local governments to sustain any meaningful level of participation in a collaborative effort, they will need additional resources and support. They are unlikely to seek funds for this work from the taxpayers, at least not until the collaboration proves its worth. The type and level of support will likely differ based on the nature and structure of the collaboration.
- D. *State policy framework:* As noted above, these efforts cannot emerge in a policy vacuum. Nor will they thrive in a policy vice. The state needs to create an enabling environment that encourages and guides the development of these early programs.
- E. *GIS Services and data:* As noted above, this work is currently handicapped by the absence of bay scale GIS layers which effectively illustrate bay uses and habitats. And even if the data were available, there are very few groups with the capacity to properly interpret the information to create maps which illuminate relationships between uses and habitats. This requires not only mapping expertise but also a working understanding of marine and coastal resources, resource management and uses.
- F. *Science & monitoring:* Again, to be able to manage the impact of human uses on the environment, economy and culture of a bay region, it is critical that groups engaged in any level or part of bay management have access to reliable and accurate information. The research and monitoring data currently available at the bay scale appears to vary significantly from one area to the next. Some of the most important physical data is all but absent for most bays.
- G. *Educational materials:* Resource materials which accurately describe the state's role and interest in bay management, as well as the rationale for the study, were well received and quite helpful to the Muscongus Bay pilot project. The State should continue to provide communication materials that enable groups to establish the management and policy setting to which their programs are responding.
- H. *Internet presence:* Also effective although underused was the state's web page which attempted to bring together local experiences and results with state information. Providing a single site which provides information on all activities would be a valuable resource for programs.
- I. *State coordination:* A website alone is insufficient to help support the emergence of this work. The state needs to dedicate staff to help these projects grow and learn from one another. The most valuable resource the state provided to the Muscongus Bay Pilot Project was Vanessa Levesque.

- J. *Funding*: Just as land trusts benefit from state bonds to help them purchase significant properties, local bay management groups would benefit from pools of money targeted to the accomplishment of specific tasks which benefit the state as a whole. The most likely candidate are funds to support and encourage research about bay environments, particularly the physiographic and oceanographic conditions within them.

VII. Preliminary MBP Steering Committee Workplan for 2006 - 2007

Following the pilot's conclusion, the Muscongus Bay Project Steering Committee has met twice to consider how they want to proceed with this effort.

First, the group has reaffirmed its role as a neutral source of information and a convener. We do not intend to advocate any specific outcome for the region or to take positions on any issues. We want to advance the ability of this region to make sound decisions about how it will use and relate to the bay and its resources. Further, we do not perceive our group to ultimately be the body which manages the bay.

We have clarified that a bay scale of management should be devoted to enabling the bay region to maintain its fundamental qualities (economic, environmental and social) in the face of change. The most important issues poised to change the bay at this time are the decline of the commercial fishing industry and the uncompromising pace of coastal development. The interplay between these two issues is poorly understood. Both are highly complex and difficult to influence, yet at a bay scale, they were the most commonly expressed concern. We agreed that rather than take on a single smaller issue that enables collaboration among our members, we needed to lead the effort to address issues that unite this region around their bay.

The Muscongus Bay Project has decided to sketch out a work plan to address these interwoven concerns head on. We believe that these issues cross all sectors of our region and could, if not addressed, lead to irrevocable and large scale shifts in our bay's environment, economy, and culture. To begin the development of our basic plan, we will look at an effort to address a remarkably similar intersection of issues (the decline of ranching and the acceleration of ex-urban development in the rangelands bordering the U.S. and Mexico) which has been in operation for the last decade. We hope that the process used there, one which emphasizes the ability of science to build community and foster better decision making, will help us to identify a promising approach for our work.

In order to proceed we understand that we will need to expand our Steering Committee to include people active in other use sectors such as development, fishing, local government and tourism. Our first task will be to clarify our mission, approach and past efforts so that they are clear to those who may want to join the Committee. Although we had proposed to expand our Committee during the pilot process it was clear, as our efforts progressed, that the timing was not right. As a group we needed to better understand our role and direction before we involve others in the development and shaping of this new group.

While we develop our plans to address the larger issue of the bay's future, we plan to delve further into the need to reinforce the connections between bay communities and how they use and impact the bay. QLF has received a grant from the Association of U.S. Delegates to the Gulf of Maine Council on the marine Environment begin this work by continuing the GIS mapping component of the pilot project. Working with local stakeholders to revise and ground truth our current suite of maps, we are going to co-create a CD-ROM Atlas of bay uses and habitats. This Atlas will be available to all local entities. Groups and municipalities will also be encouraged to build and use the database illustrated by these maps by working directly with QLF's Center for Community GIS.

APPENDIX N

BAY MANAGEMENT PILOT PROJECTS: SELECTED FINDINGS

BAY MANAGEMENT PILOT PROJECTS: SELECTED FINDINGS

Two community-based organizations were funded for one year to carry out bay management pilot projects. These projects were based in Taunton and Muscongus bays. Based on observation of meetings and interviews with project participants, the following analysis provided the bay management staff team with feedback on engaging communities in nearshore management.

A. Context: The following observations highlight the unique qualities of nearshore environments and governance that form the context in which the pilot projects were operating and in which we are now looking to create improved governance structures.

1. Nearshore areas are different, ecologically and socially, than land or open water areas
 - a. Large range of ecosystems, from coastal bluffs to tide pools to mudflats to open water
 - b. Less is known about these environments than land, especially the land-water interface
 - c. Broad array of consumptive and non-consumptive users
 - d. Those who most directly rely on health of bay (fishermen) cannot control many of the factors that affect those resources (e.g., coastal development, recreational boat props)
 - e. Public resources – yet appear to some to be private (e.g., leases for moorings, aquaculture, ‘back yard’ syndrome, docks, traditional fishing use)
2. Nearshore areas have unclear planning or governance responsibilities (to most people)
 - a. No overarching governance structure for nearshore area
 - b. Property owners own to low tide, towns control harbors, clam flats and shoreland zoning, state can issue aquaculture leases and permits, feds can issue permits
 - c. Both a piece-meal approach (no comp plans/public ‘lands’ plan/overarching policy) and a cookie-cutter approach (no allowance for region specific needs)
 - d. Current models for community involvement don’t fit unique qualities of nearshore areas. For example, watershed planning focuses on land use and doesn’t typically engage consumptive resource users. Community-based fisheries management focuses on one subset of water users, but doesn’t typically consider other users.

B. Lessons learned: The pilot projects provide an opportunity to examine the potential role of communities in nearshore governance. These lessons about community involvement are perhaps best viewed as questions to consider as we develop bay management approaches.

1. Define ‘community’
 - a. Who are we really talking about? When people talk about engaging and empowering local communities, some people mean municipal governments, others think local non-profit groups, others think fishermen’s organizations.
 - b. The pilot projects probably did not represent the ‘community’ as whole - certain voices (especially harvesters and municipal officials) were underrepresented.
 - c. Lesson: Be clear about which topics require involvement by certain groups (i.e. harvesters in fisheries issues, municipalities in water access issues). Target specific groups for increased involvement in pieces that matter to those groups.

2. Define ‘involvement’
 - a. What does it mean to be involved or engaged? It could be helping to plan, coming to internal meetings, attending a public session, participating in a GIS exercise or answering a survey.
 - b. Pilots also struggled with this – they wanted to get more people involved but didn’t know what the new people would ‘do.’
 - c. Lesson: There is likely to be only a core group that does the majority of planning in any given initiative. Yet this group needs to be able to know when and how to reach out to others, whether for ‘low involvement’ (e.g. surveying concerns) or ‘high involvement’ (e.g. completing specific projects).
 3. Decide who will get authority to do what
 - a. Does anyone actually want more authority? People might want more control over what happens in their area but few said they want the responsibility for having authority over managing certain uses. The exception: those interested in community-based fisheries management.
 - b. No one group is likely to be able to manage a bay. Some groups are just too small or lack the organizational ability to be able to carry out a bay management effort. Others might not have enough grassroots support.
 - c. Lesson: The appropriate role at this time for community groups might be more related to improving coordination at a regional level and carrying out discrete projects such as data collection rather than authority to manage any particular use. However, this would mean that potentially no one would be ensuring that the most important issues in a bay would be dealt with.
 4. Not all issues are best served by a regional/bay focus
 - a. While almost any issue could be examined and managed at a regional level, both groups found that different issues require different scales. Some things are best dealt with at a town level or state level. Others could benefit from regional cooperation – it’s these issues that should be tackled first.
 5. Community involvement can, but will not necessarily meet other needs identified during the bay management study such as: encouraging regional thinking, improved government coordination, improved use of science, improving resource management
- C. *Suggestions for moving forward: In contrast to the many uncertainties regarding how to structure community involvement in nearshore governance, there was a clear message to the State as to what is needed from them in any effort to engage communities in a new initiative.*
1. Provide clear guidance and expectations without imposing a strict structure
 - a. Both pilots were uncertain about what the State was looking for with these projects. There is a need for the State to be extremely clear about what groups could and could not be responsible for. At the same time do not impose such a strict structure that each area isn’t free to address locally relevant issues in a locally relevant manner.

2. Provide scientific data and GIS support at a regional level
 - a. There is not enough ecological or social data at a bay level to manage intelligently. Local groups cannot possibly collect all the needed information. The State must help – they could develop a research plan, compile existing data into one place, encourage bay level organization of data, and conduct research.
 - b. GIS maps were one of the most prized outcomes of the projects and yet took relatively more effort than any other component. Both projects had outside GIS experts help them, which might not be available everywhere. The State should look at ways to support GIS map development as it moves forward with bay management. Regional community GIS centers are one way to do this.
3. Maintain regular communication and coordination with regional initiatives
 - a. Both groups discussed the benefits of having regular communication with the State. People generally find state bureaucracy difficult to navigate and appreciate having a point person to go to.
 - b. Both groups also talked about the benefit of doing their work as part of a larger state initiative. Create a state policy framework to continue with this.
 - c. Lastly, both groups mentioned their communication with each other as beneficial, even if it was limited. If there was some sort of loose system for inter-regional communication, that could be useful.
4. Clarify the relationship between fisheries management and “bay management”
 - a. Fishermen are the predominant users of the water yet are generally missing from these projects.
 - b. Most project members believe that fisheries must be a part of bay management but don’t know how to do that.
 - c. Those involved in fisheries management strongly believe that it should become more community-based, but that it should be kept separate from bay management until capacity is developed.
 - d. Most people think that, once developed, community-based fisheries management should feed into a broader bay management initiative in some formal manner
 - e. Yet if we allow bay management initiatives to emerge locally, it is not clear how or if fisheries will be included, and if it would follow the above process.
5. Replace the term “bay management”
 - a. People involved in these projects consistently said the term ‘bay management’ triggers negative reactions (or looks of confusion) from most people. We aren’t necessarily ‘managing’ anything and not all areas are bays. Find another term for what we are doing.

APPENDIX O
ALTERNATIVE DISPUTE RESOLUTION

ALTERNATIVE DISPUTE RESOLUTION

There are several established conflict resolution and alternative dispute resolution (ADR) mechanisms in Maine. These mechanisms allow for facilitated discussions while avoiding lawsuits and decisions by judges or juries.

1. Court Alternative Dispute Resolution Service (CADRES)

- ADR is available through the Maine courts in domestic relations matters, small claims, larger civil and commercial cases, and in land use and environmental disputes.
- Under Maine's rules of civil procedure (see Rule 16B) parties are required to participate in some form of ADR in Superior Court civil case, unless the case is exempt or the requirement is waived by a judge.

2. Land Use Mediation Program

- 5 M.R.S.A. § 3341 provides for mediation as an alternative to litigation in land use matters
- Mediation must be initiated by a private landowner who has either sought and failed to obtain a permit or variance from a municipality or has sought and failed to obtain a permit for a land use from a state agency
- Municipalities are not required to participate in mediation, but state agencies are required to do so
- The landowner applies for mediation through the superior court, who sends the application to CADRES
- CADRES assigns a mediator

3. Natural Gas Pipeline Mediation

- 5 M.R.S.A. § 3345 provides for mediation in disputes concerning acts or omissions occurring during the construction, maintenance or operation of any natural gas pipelines that result in property damage
- A private landowner may apply for mediation if he or she has suffered property damage as a result of an act or omission by a person surveying, constructing, operating or maintaining a natural gas pipeline on, over or under the landowner's land
- The landowner applies for mediation through the superior court, who sends the application to CADRES
- Participation in the mediation process is voluntary for all parties and may not be compelled by the mediator or any other person
- CADRES assigns a mediator

4. DEP Enforcement Actions

- 38 M.R.S.A. § 347A(4)(E) provides that when an alleged violator and the Maine DEP cannot agree on the terms of an administrative consent agreement, and the DEP elects to bring a civil enforcement action in district court, the court must refer the parties to mediation if either party requests mediation and the parties must meet with the mediator at least once and "try in good faith to reach an agreement"

Research also uncovered some examples where ADR was used to resolve specific natural resource related conflicts outside the established State ADR programs. One example is:

1. Monhegan Island Lobster Zone

- In November of 1997, the Department of Marine Resources assisted in convening mediation between lobster fishermen from Friendship and Monhegan after 6 lobster fishermen from Friendship set gear in waters that were traditionally fished exclusively by Monhegan residents.
- Following 2 days of meetings with a professional mediator, an agreement was reached amongst the fishermen. The provisions of the agreement served to allowed the lobster fishing season in the area to begin on schedule without conflict. It spelled out how lobster fishing in the area would proceed until the Legislature could convene and act. The Friendship fishermen also agreed not to challenge in court any legislation that the Legislature might pass regarding the Monhegan Conservation Area.
- Rules and statutes were soon developed to further define the Monhegan Conservation Area and to clarify the rules for those wanting to register to fish there.
- It should be noted that the mediation produced a private, interim solution to the conflict satisfactory to the particular parties involved. A lasting fix to the conflict had to be made by law, in a public process, by the Legislature and DMR, since the dispute was over public trust resources, not resources amenable to ownership or management by the disputants.

Parties to any dispute who wish to employ the services of a mediator or other dispute resolution professional may find such professionals through the following organizations:

1. CADRES maintains a roster of neutrals for ADR (<http://www.courts.state.me.us/courtservices/adr/directory.html>)
 - The directory may be searched by type of process and type of case, i.e. environmental
 - Neutrals set their own fees, which may either be hourly or a flat fee
2. Maine Association of Dispute Resolution Professionals (www.madrp.org)
3. New England Chapter of the Association for Conflict Resolution (www.neacr.org)

APPENDIX P
DATA & INFORMATION NEEDS ASSESSMENT

**BAY MANAGEMENT STUDY
DATA AND INFORMATION NEEDS ASSESSMENT
DECEMBER 2006**

INTRODUCTION

Limitations in scientific data about the nearshore are often cited as a major constraint in moving forward with improved nearshore management. This data and information needs assessment was carried out to more fully examine this assertion. More specifically, the goals in carrying out this data and information needs assessment are to:

- 1) determine the range of nearshore data and information needed for bay management;
- 2) identify what data currently exists and where it is located;
- 3) identify limitations in data and information;
- 4) assess the current state of data availability and sharing; and
- 5) recommend steps to improving the availability of nearshore data and information.

We are interested in learning what nearshore data and information are available, where such data are located, how they are shared and exchanged and what limitations exist in the data and in information flow. To do this we looked at representative types of data and the most common locations for the data; we were not comprehensive and we did not attempt to provide a complete data inventory. This report is not meant to be a guide for someone who wants to find nearshore data. Rather, the information gathered in this report is intended to support solid recommendations about data needs for bay management.

The terms 'data' and 'information,' in this report, refer to both raw data and numbers and to analyzed or processed data that provide information and a greater understanding about a topic. Data and information can be in many forms including tables and charts, text reports, in-depth analyses and assessments, and Geographic Information System (GIS) layers to create maps.

Methods:

This assessment was carried out by two Department of Marine Resources and one State Planning Office staff. We reviewed major publications and websites regarding nearshore data to come up with a range of data needed for bay management (see references). To identify who creates and maintains data and the limitations of those data, we drew heavily upon staff knowledge, review of other agencies' and organizations' websites, and targeted phone calls. While we wanted to identify who maintains the relevant data, we did not attempt to carry out a complete nearshore data inventory for the State of Maine and likely neglected some organizations' data (especially those collected by academic researchers). The Findings and Recommendation sections are based on analysis of data availability, results of two bay management pilot projects, and reports from three GIS needs assessment studies including a 2006 Maine Marine GIS Needs Assessment.

Organization:

This report is organized into three major sections: Current Data Availability and Exchange; Findings (based on assessment of data availability and exchange); and Recommendations (optimal endpoints and how to get there). All acronyms are listed at the end of the report.

SECTION 1: CURRENT DATA AVAILABILITY AND EXCHANGE

Because ‘bay management’ actually refers to a suite of activities ranging from working on a specific issue in a bay (e.g. regional water access planning) to engaging bay communities (e.g. regional visioning process) to multi-resource area management, the type of data (and the resolution and scale of that data) needed for bay management will vary. While it is difficult to know every type of data that might be needed, it is, however, possible to list the types of data that would be useful for many kinds of bay management projects.

The following list of data could be used to characterize a bay. A comprehensive characterization would be a complex undertaking and would involve new data collection, synthesis or processing of existing data, and knowledgeable application. A smaller subset of the following data could be used to more generally describe an embayment and provide baseline data. This type of work requires compiling existing data and collecting priority new data, but, with some funding and expertise, could be a starting point for many bay management efforts. Finally, a given bay management project may only need one or two of these data types to inform an issue or problem at hand.

Nearshore Data and Information Relevant to Bay Management

This list of data has been divided into three categories: Physical/Chemical Information, Biological Information, and Social Information. The left hand column specifies the specific type of data, and the right hand column provides information about who primarily collects that data (not a comprehensive list), if it is available as a GIS layer, and what limitations exist (e.g., with scale, resolution, geographic extent, availability).

Physical/Chemical Information

<i>Data Type</i>	<i>Data Availability</i>
Bay specific circulation patterns and relation to GOM	<i>Who has data?</i> Researchers at UMO, USGS, and Texas A&M have each studied different bays
	<i>GIS layers available?</i> Yes, for some
	<i>Limitations?</i> Circulation data is only available for Cobscook, Casco and Penobscot bays. There is more limited flow/hydrographic data for other areas such as Stonington, Blue Hill Bay, Sheepscot, Damariscotta and lower Kennebec.
Tides	<i>Who has data?</i> NOAA NOS, GOMOOS, UMO
	<i>GIS layers available?</i> No
	<i>Limitations?</i> Tide predictions are often quite different than real time data. Locations for tide predictions and measurements are limited; local knowledge fills in where predictions lack.

Physical/Chemical Information, continued

<i>Data Type</i>	<i>Data Availability</i>
Nutrients, Temp. and Salinity	<i>Who has data?</i> GOMOOS; DMR; EPA National Coastal Assessment; Local groups such as Friends of Casco Bay
	<i>GIS layers available?</i> Yes for some (e.g. GoMOOS has satellite data) but not for most.
	<i>Limitations?</i> Local groups often collect this type of water quality data, but there is no one place where that data is stored or referenced, so it is not clear where there are gaps along the coast.
Bathymetry	<i>Who has data?</i> MGS (10m contours); NOAA soundings
	<i>GIS layers available?</i> Yes
	<i>Limitations?</i> Nearshore data is variable in quality and all this data is below MLW.
Benthic substrate	<i>Who has data?</i> MGS (primary source); UMO and DMR to lesser extent
	<i>GIS layers available?</i> Yes
	<i>Limitations?</i> Different levels of resolution depending on location. There is very little CMGE information below mean low tide. UMO data is mostly deep water and most of coast is extrapolated.
Geology	<i>Who has data?</i> MGS has inner continental shelf surficial geology data, but bedrock geology has not been determined.
	<i>GIS layers available?</i> No
	<i>Limitations?</i> Very limited spatially
Coastal air quality/ atmospheric deposition	<i>Who has data?</i> DEP (some stations on coast) National Atmospheric Deposition Program (2 coastal sites)
	<i>GIS layers available?</i> Yes (location of monitoring sites)
	<i>Limitations?</i> Limited locations
Weather	<i>Who has data?</i> NOAA; GOMOOS (wind, temperature); DMR – Boothbay weather and sea conditions
	<i>GIS layers available?</i> yes? (wind speed and direction for GOM)
	<i>Limitations?</i> Limited locations
Climate Change	<i>Who has data?</i> UMO and Bigelow
	<i>GIS layers available?</i> Sea level rise for Wells (at MGS)
	<i>Limitations?</i> Not bay specific

Biological Information

<i>Data Type</i>	<i>Data Availability</i>
<p>Species specific data: abundance, location, condition, requirements for all species of commercial, recreational, and ecological significance</p> <p>(phytoplankton, macrophytes, invertebrates, fish, birds, marine mammals)</p>	<p><i>Who has data?</i> DMR – commercial and noncommercial fish (e.g. inshore trawl survey); rockweed; eelgrass; horseshoe crabs IFW – Bald eagle nest sites; piping plover/least tern nest sites; seabird nesting islands USFWS – Atlantic salmon; seabird counts on islands in Maine Coastal Islands NWR; wintering waterfowl surveys; Darling Center/UMO – marine mammals, invertebrate taxonomy and ecology, deep sea biology, phytoplankton Allied Whale/COA – marine mammals Nat'l. Audubon – puffins, terns, black guillemot, laughing gull Bigelow – invertebrates including lobster, phytoplankton incl. red and brown tides DEP – contaminants in some marine tissues (e.g. mussels, lobsters and cormorants) GoMOOS – chlorophyll/sunlight data to estimate phytoplankton biomass GOM Ocean Data Partnership – fish abundance and distribution for GOM GMRI – Herring acoustic survey, shrimp survey, lobster diet study, cod-tagging</p>
	<p><i>GIS layers available?</i> Some</p>
	<p><i>Limitations?</i> Much of the information available about specific species is general; rarely is there data available about the distribution, condition and location of species in a specific area.</p>
<p>Habitat data: location and condition of coastal, intertidal, subtidal and open water habitats</p>	<p><i>Who has data?</i> MGS - CMGE maps show basic habitats for intertidal areas; beach profiles; bluffs, sand dune photos, inner continental shelf IFW – salt marsh habitat mapping in some areas; tidal waterfowl/wading bird habitats; Roseate tern essential habitat DMR – eelgrass; marine worm habitat USFWS – waterfowl coastal habitat; anadromous fish habitat Wells Reserve – Salt marsh habitats and communities; Reserve habitat values for fish, shellfish and birds; Salt marsh degradation and restoration GOM Ocean Data Partnership – benthic and pelagic seascapes Specific studies done by researchers. Gulf of Maine Council on the Marine Environment – salt marsh restoration, riparian buffers, seafloor mapping</p>
	<p><i>GIS layers available?</i> Some</p>
	<p><i>Limitations?</i> Limited habitat data exist for specific coastal regions. No central repository for the specific studies that have been done by researchers or local groups.</p>

Biological Information, continued

<i>Data Type</i>	<i>Data Availability</i>
Species interactions/ communities; Ecosystem components and functions	<i>Who has data?</i> DMR, NMFS, and Research institutes (e.g., Bigelow, Darling Center/UMO, UNH)
	<i>GIS layers available?</i> No
	<i>Limitations?</i> This research appears to be opportunistic and not usually location-specific. We generally lack good information about species interactions, communities and ecosystem functions, especially at a bay-scale.

Social and Human Use Information

<i>Data Type</i>	<i>Data Availability</i>
Human population	<i>Who has data?</i> US Census Bureau; SPO
	<i>GIS layers available?</i> Yes
	<i>Limitations?</i> Organized by town and county, not by ecoregions
Residential data (type & distribution; development trends)	<i>Who has data?</i> Bob Faunce (consultant) time series of development using USGS maps for 14 midcoast towns done for ME DOT; MEGIS – expansion of CMP utility lines since 1993
	<i>GIS layers available?</i> Yes: utility lines
	<i>Limitations?</i> Limited in geographic extent
Water access (commercial and recreational): location, conflicts	<i>Who has data?</i> Island Institute (in progress); DOT/DMR port inventory; DEP – dock permits
	<i>GIS layers available?</i> Yes
	<i>Limitations?</i> The Island Institute inventory is more detailed than anything done before, but the private access points will most likely be kept confidential and only the public access made available.
Fisheries – for each resource used: where, frequency and intensity, benefits, impacts, threats to the resource	<i>Who has data?</i> DMR (landings data for 32 species; research projects); shellfish growing area classifications; lobster zones, pounds and dealers NMFS Atlantic Salmon Commission DMR and GOMOOS – Northern shrimp catch
	<i>GIS layers available?</i> Yes: Drag areas; Lobster zones. Not much else
	<i>Limitations?</i> We don't have enough data about fisheries use. Landings data is not available at a bay level. Data is for the port of sale, not for where the resource is harvested. Confidentiality of some data limits its use.

Social and Human Use Information, continued

<i>Data Type</i>	<i>Data Availability</i>
Aquaculture – locations, impacts, benefits	<i>Who has data?</i> DMR and DEP (compliance data for finfish sites) DMR for shellfish sites
	<i>GIS layers available?</i> Yes
	<i>Limitations?</i> DEP's finfish data are not analyzed and may be difficult to interpret. DMR's finfish data are pre-2003. Confidentiality of some data limits its use.
Recreation – where, what, intensity, trends	<i>Who has data?</i> DMR – recreational fishing; MITA – island use; MASKGI; Sea Grant – kayaking; Maine Port Authority – dock/marina locations; Maine Marine Trade Association – clean marinas list
	<i>GIS layers available?</i> Unlikely
	<i>Limitations?</i> Scattered data; Data about many types of recreational uses and issues is lacking.
Marine transport	<i>Who has data?</i> Individual port records; Maine Port Authority website; DOT (Office of freight transport); Coast Guard
	<i>GIS layers available?</i> Yes: Ferry routes
	<i>Limitations?</i>
Dredging and spoils locations	<i>Who has data?</i> US Army Corps of Engineers; DEP
	<i>GIS layers available?</i> Some (limited sites)
	<i>Limitations?</i> Old data in paper files, making access difficult.
Energy projects (tidal, wind, hydro?)	<i>Who has data?</i> Private industry; SPO
	<i>GIS layers available?</i> No
	<i>Limitations?</i> Emerging use – limited information available
Water quality & Pollution (point and nonpoint) amounts and impacts	<i>Who has data?</i> DEP – point source, OBDS, Gulf Watch (mussel contaminants), hazardous and oil spills, water quality data for Atlantic salmon rivers, pumpout locations; DMR – human health impacts, mostly bacteria; EPA – Nat'l Coastal Assessment (toxics and nutrients); SPO/DMR – Healthy Beaches program; MGS – Landslide hazards; Wells Reserve – estuarine water quality; Gulf of Maine Council on the Marine Environment; Individual organizations (e.g. Friends of Casco Bay)
	<i>GIS layers available?</i> Yes for most this data

Social and Human Use Information, continued

<i>Data Type</i>	<i>Data Availability</i>
	<p><i>Limitations?</i> Data collection is not systematic; it occurs in areas where money, resources and interest emerge. Little to no analysis of how specific land uses/NPS pollution impacts coastal water quality, habitats and organisms.</p>
<p>Economic benefits tied to use of nearshore environment</p>	<p><i>Who has data?</i> DMR landings values; USM natural resource economist Charles Colgan (Ocean Economics Project?)</p>
	<p><i>GIS layers available?</i> No</p>
	<p><i>Limitations?</i> Very limited information and what exists is not bay specific</p>
<p>Cumulative impacts of multiple uses</p>	<p><i>Who has data?</i> No known studies</p>
	<p><i>GIS layers available?</i> No</p>
	<p><i>Limitations?</i> Virtually non-existent</p>
<p>Conserved or protected areas (locations and types)</p>	<p><i>Who has data?</i> MCHT (provides master database for individual land trusts); NPS, USFWS – federal protected lands; BPL, IFW – state protected lands (SPO has a conserved lands GIS layer that displays state and some federal and private lands) Municipalities – town lands; NOAA survey of marine managed areas (in progress - ME data not displayed yet); IFW - Beginning with Habitat</p>
	<p><i>GIS layers available?</i> Some. For example, MEGIS – conserved lands layer (state and national lands) and BwH data layers</p>
	<p><i>Limitations?</i> MCHT has a conserved lands registry for all coastal lands owned or protected by individual land trusts but this data is not available to others. Land trusts can access their own information through a website for the registry. Some conserved areas (i.e. some lands/easements owned by land trusts) may be confidential or proprietary and not available for others to use. BwH focus areas are not protected, but are presented to towns as valued areas</p>
<p>Marine Archeology</p>	<p><i>Who has data?</i> Darling Marine Center Maine Historic Preservation Commission</p>
	<p><i>GIS layers available?</i> Some at the National Register of Historic Places website</p>
	<p><i>Limitations?</i> MHPC compiles information about archaeological sites, but uncertain if includes marine areas</p>

Social and Human Use Information, continued

<i>Data Type</i>	<i>Data Availability</i>
Stewardship activities; Monitoring activities	<i>Who has data?</i> DMR/SPO/Cooperative Extension – Partners in Monitoring; GOMC; and Individual groups
	<i>GIS layers available?</i> Unlikely
	<i>Limitations?</i> Data collection is not systematic; it occurs in areas where money, resources and interest emerge. Some groups consistently collected data over time, while others fizzle out, which means data quality varies by place.
Shoreland zoning	<i>Who has data?</i> DEP and municipalities
	<i>GIS layers available?</i> No, except for that which is included in Island Institute working waterfront maps
	<i>Limitations?</i> Information on paper in DEP files or town offices.

Bay Specific Data

There have been efforts to compile existing data on a particular bay, collect new data, and analyze the data to provide more complete understanding of that area. A few examples are:

Cobscook Bay - The Cobscook Bay Resource Center conducts water quality data collection and community-based research (e.g., Cobscook Drifter study for circulation patterns), and they have published reports on the Cobscook Bay sea scallop fishery. TNC created a bibliography of studies in the area, directed a large ecosystem study of Cobscook Bay and published a special volume entitled: “Ecosystem Modeling in Cobscook Bay.”

Taunton Bay – The Friends of Taunton Bay and The Department of Marine Resources recently completed studies and analysis regarding a wide range of environmental and social factors.

Penobscot Bay –The Penobscot Bay Marine Resources Collaborative conducted research on phytoplankton communities, surficial mapping, intertidal habitat mapping, circulation patterns, intertidal lobsters, seafloor geology, and bathymetry (their website administered by Island Institute is obsolete). The East Penobscot Bay Research Center also collects data in this bay.

Muscongus Bay – The Quebec-Labrador Foundation compiled an annotated bibliography of studies completed in this region.

Damariscotta River Estuary - The Damariscotta River Association collects information about water quality and shellfish habitat. Much of the research done at the Darling Marine Center takes place in this region.

Casco Bay - More than 100 volunteers help the FOCB collect critical baseline data on salinity, dissolved oxygen, temperature, pH, and water clarity at more than 80 shore-based stations and ten profile stations. The FOCB recently published an analysis of their monitoring program that

synthesized over a decade of monitoring results. The Casco Bay Estuary Partnership also compiles information about relevant issues (e.g., stormwater, toxics, habitat conservation).

Publications that characterize the coast:

Two pre-GIS era publications provide comprehensive overviews and detailed summaries of available information for specific coastal regions. The Ecological Characterization of Coastal Maine (1980) presents a compendium of available information for certain bays. Though not all embayments are included in this publication and information on many of the areas covered was incomplete at the time, it provided a baseline for subsequent work. A second example, the Estuarine Profile Series (1991), provides descriptive information for 19 estuaries along the Maine coast. Unfortunately, these publications are out-of-print and can be difficult to obtain.

In addition to these location-specific publications there are a number of other reports that serve as a general resource for coastal areas. These include Maine's Coastal Wetlands by Alison E. Ward in which GIS was used to generate maps and summarize habitat information for coastal regions. Another example is the Distribution and Abundance of Fishes and Invertebrates in North Atlantic Estuaries by S. H. Jury and others (1994). For most embayments, these can serve as general guides to habitats and biota but do not provide embayment specific detail that often is required for good management decisions.

Current Status of Marine GIS in Maine

Three GIS needs assessments have been completed in Maine over the last 18 months. The Department of Marine Resources report, "Maine Marine GIS Needs Assessment" focused on the status of marine GIS at the State level. It asserts that marine-focused organizations have unique needs that are not being addressed by current land-focused GIS initiatives. More specifically, 12 of the 17 bottlenecks to better implementation of marine GIS in Maine are related to lack of data and metadata. Furthermore, there has been no coordinated, comprehensive effort among organizations that work in the marine environment to share data and many smaller organizations are not aware of what data are available. See the appendix for more detailed results and recommendations from the "Maine Marine GIS Needs Assessment."

The Maine Coast Protection Initiative (MCPI) report, "Geographic Information System Needs Assessment: Survey Results for Coastal Land Trusts in Maine," found that while most coastal land trusts collect geospatial data and make regular use of GIS for map production, a vast majority need capacity-building to make more effective use of GIS (more than 50% of those responding (26 organizations) had dial-up internet connections!). In addition, there are a number of important spatial data needs including digital parcel data, aerial and satellite imagery, priority habitat areas, and public access locations. As an outcome of this study, MCPI is funding three GIS resource centers for coastal land trusts: University of Maine at Machias (new center), Wells Reserve (existing), and Sheepscot Valley Conservation Association (existing). These centers will provide trainings to both seasoned and new GIS users, offer no- or low-fee mapping services, and provide a data bundle and ArcReader so all land trusts can access information via basic GIS. While the focus of these centers is to improve efforts of coastal land trusts and not necessarily to invest in marine GIS, these centers (especially Wells and Sheepscot) may be able to provide assistance to others (municipalities, conservation organizations) on nearshore projects.

The Maine Library of Geographic Information (Maine GeoLibrary) report, “GIS Needs Assessment & Requirements Analysis For Maine County Government” was based on a series of workshops with county, state, regional planning agency, and municipal officials from June 2005 until January 2006. They found that regionalization of data services is an important goal and that county offices could serve as regional GIS centers, although current staffing levels and technical knowledge would need to be increased to do so.

In addition to the information provided by these broad GIS needs assessments, two bay management pilot projects carried out GIS exercises that highlight the opportunities and limitations of GIS to assist with bay management initiatives. Both groups emphasized that GIS capabilities and the maps produced were essential for their efforts. Visualization of spatial information was pivotal to meaningful discussions during their respective studies. However, several specific major limitations arose:

- a. Several pivotal marine GIS layers are lacking (e.g. human use; habitat maps). Of the ecological and social data that do exist, much are not available at the bay level (i.e. it is at a very site specific scale or much larger coastal or Gulf of Maine scale). Local groups cannot possibly collect all the needed information.
- b. GIS maps were one of the most prized outcomes of the projects and yet took relatively more effort than any other component. Identifying and assembling the proper data layers takes considerable expertise, hardware and software that is beyond the capabilities of most local entities. Both pilot projects had GIS experts to help, but this help might not be available everywhere.

The Muscongus Bay pilot study by QLF provided eight recommendations highlighting the need for more and better data and documentation. An overriding need expressed by QLF was for centralized data storage and distribution on the part of State government. The following are QLF observations and recommendations:

- Paucity of readily available GIS data for the marine environment.
- Creating seamless data sets across the land/sea interface.
- Paucity of fine-scale, or bay-scale GIS data.
- Primary data gathering is essential for generating human use data, but it takes time.
- Absence of regional data on coastal development.
- Sensitivity of data sets.
- Lack of documentation for non-OGIS data sets.
- Aggregating data on the final maps.

Data Exchange: Storage, Sharing and Accessibility of Data and Information

Even without doing a complete data inventory (which would undoubtedly uncover additional locations of data), we identified 8 federal agencies, 8 state agencies, at least 6 university research centers (some of which are located out-of-state), 13 organizations (e.g. GOMOOS, GMRI, Island Institute, etc.), and at least 200 local groups and municipalities (a GOMC search came up with over 200 local research and monitoring organizations in Maine such as Friends of Casco Bay and Damariscotta River Association) that collect data about Maine’s nearshore and marine environment. At the same time, no entity attempts to catalogue where to find data about the nearshore. A few state agency websites have links to available data, but those links to data are

rarely all in one place and data can be very difficult to track down. It is even more difficult to learn about what data exist outside of federal and state government.

A recent NOAA study (Bricker et al 2006) that examined eutrophication of Maine's coastal waters also concluded that "Acquiring data was the most difficult part of this study and inadequate data was a limiting factor. Data were found in a number of places and had to be retrieved from a number of investigators; other forms of data collection proved unsatisfactory. Inadequate data was a limiting factor for both the eutrophication assessment and the development of the human-use indicator." Thus, even a well-funded study looking for limited data (only water quality) found it extremely difficult to locate and acquire needed data.

Information transfer can be accomplished in a variety of ways and for many purposes. There can be a physical place such as an office or library or a virtual space such as a website. The internet allows electronic access, searching, and delivery to meet a range of needs. Some examples include email listservs, websites and portals. The GOMOOS site is an example of a website geared to assist with information access and distribution. It provides regional (Gulf of Maine) near-real time data and a data archive that can be accessed for a range of parameters. On the national level, the NASA Global Change Master Directory, a comprehensive directory earth science data and applications, serves as an example of collaboratively maintained, data discovery portal that can function at any scale. The Maine Office of GIS provides a more traditional data catalogue that can be searched based on key words. However, at present, few if any formats provide adequate access to the range of information needed for even the simplest nearshore management applications.

SECTION 2: FINDINGS

Data Availability

- There are major gaps in basic nearshore data. There are many types of data about the nearshore that do not currently exist, as well as many existing data sources that are too outdated or at the wrong scale to be useful. A few of the major data acquisition priorities include: nearshore habitat mapping; human use mapping (what, where, when, how much); distribution of most species; cumulative impacts; species interactions/ecology; and land use impacts on nearshore water quality and habitats. For a list of the most needed marine GIS data sets, see the Marine GIS Needs Assessment recommendations in the appendix.
- Available nearshore data are scattered in topic and geographic area. Agencies and organizations that collect and manage marine data differ in that regulatory agencies collect different data than do management agencies, and government agencies in general are limited to collecting data related to their missions and funding sources, which may not be relevant to those outside of government. Agencies and organizations have wide ranging geographical foci and scales of interest, collecting data about very specific places, a bay, the entire coast, a particular watershed or even the Gulf of Maine. The different priorities for type and scale of data collected results in a compendium of unrelated or disconnected

data. For example, data about coastal land is often not compatible or analyzed in conjunction with data about nearshore waters. Furthermore, agencies and organizations involved in nearshore issues have different and sometimes contradictory research priorities. A more complete understanding of nearshore environments could be enhanced by working to develop a common list of priority data and research needs.

Data Exchange

- It is extremely difficult to find and gather existing data. State and Federal government websites are generally inadequate in making data available; not only is there no central place on their websites to access data, but their search engines are limited, often returning large numbers of unrelated hits to a query. Non-governmental organizations are scattered, and some do not have the capacity to make data easily available to others. Furthermore, all entities can be reluctant to share data for several reasons: desire for ownership or credit, fear that data might be misused or misinterpreted, belief that data is confidential or sensitive, or knowledge that the data collection or analysis is still in progress.
- It is helpful that so many types of organizations are collecting data, but this situation calls for careful documentation (i.e. creation of metadata or clear methods) and sharing of data. There is no designated group focused on compiling or creating data exchange agreements for nearshore data.
- While larger organizations (state agencies and large non-profits) in Maine are well set up for internet communications including data transfer, many local organizations still use dial-up connections or use older hardware and software. Efforts to improve data exchange need to consider such technological limitations.

Marine GIS

- Marine GIS in Maine is limited in its ability to assist with understanding nearshore environments and to assist with decision making. GIS data acquisition in Maine has been dominated by land-side data and issues. There has been no concerted effort on the part of marine-focused organizations to create a more integrated, coordinated, comprehensive, and targeted marine GIS.
- The Maine Marine GIS Needs Assessment found the following impediments to GIS data exchange and implementation, most of which are probably relevant to non-spatial data as well: data problems (inaccurate/out-of-date, inconsistent formats, no metadata), data exchange (hard to find data, assistance needed to view/analyze data), and priorities (tight funding, politics of data access/not sharing, lack of coordination).
- The MEGIS online data catalog and web viewer <http://apollo.ogis.state.me.us/catalog/> is the primary way that state agencies make their GIS data sets available to other organizations and the public. The Maine Marine GIS Needs Assessment found that while the most used web site is MEGIS, only about ½ of the organizations report using it. Furthermore, data not on MEGIS are very difficult to discover.

General

- Scientific inquiry will rarely produce definitive answers. For this reason, science is not likely to reduce debate and contention in nearshore management, especially when human values are at stake. Science can provide data and information to be used to help define a range of options, but must be paired with good decision-making processes and policies to be useful in any bay management endeavor. Furthermore, joint or cooperative data collection can be a constructive way to build trust and consensus.

SECTION 3: RECOMMENDATIONS

Recommendation 1: Create a Long-Term Coastal Marine Science Plan

The Department of Marine Resources should lead an initiative to bring together representatives from DEP, DMR, MGS, SPO, IFW, DOC, municipalities, universities and NGOs who work in the marine environment to develop a long-term plan for coastal marine science. The purpose of this science plan would be to identify common needs and priorities to support regional nearshore management and develop a strategy to address them. While some institutions, like DMR and Sea Grant have a set of research priorities, not all organizations that work in coastal waters have them nor were all plans developed to look at marine science in a regional coastal management context. This long-term coastal marine science plan would attempt to integrate related initiatives and priorities (e.g. Sea Grant aquaculture research plan, Gulf of Maine Council's Environmental Monitoring Plan, and EPA's National Coastal Assessment) when creating a coastal research plan. Tasks are listed in order of loose priority; however, it is not necessary that they be done in this order.

Task 1: Establish a science advisory committee

A multi-disciplinary committee with emphasis on nearshore management and science will be established to provide advice on tasks as outlined in this recommendation.

Task 2: Conduct sector-specific and cross-sector research needs assessments

The assessment will identify and prioritize top research and monitoring needs from various marine and nearshore entities (state and local governments, industry, non-profits). In addition, this assessment will determine research and monitoring needs of multi-sector issues such as cumulative impacts and carrying capacity. The research and monitoring needs assessment will put Maine in a positive position to seek funding through grants, programs, and partnerships. More importantly, it will guide agency policy makers and program managers by identifying priority needs in the context of Maine's coastal communities.

Timeline – 1 year startup, with ongoing review

Cost ~ 1 FTE equivalent or \$60,000 to start and \$10,000/year thereafter

Task 3: Develop a human use and resource atlas

Coastal and bay management suffers from lack of information on the location and condition of coastal resources and their uses. This GIS-based atlas will compile information from various sources and incorporate both quantitative and local knowledge. It will be used to set priorities and identify ecological relationships, especially between habitat and species requirements and

their vulnerability to human exploitation. Once the base atlas has been developed, it can be updated as new data from the larger coastal monitoring program is gathered.

Timeline – 5 year

Cost ~ 1 FTE - \$60,000/yr

Task 4 – Establish Long-term Monitoring Stations

Distinguishing natural variability from that caused by humans is important. Trying to manage natural events is futile and resources are better spent on managing those impacts that are truly manageable. Long-term monitoring, although not glamorous, is essential in creating long time series that documents the ebbs and flows of nature. A network of index stations would monitor changes in living resources and physical and chemical parameters of sediments and water.

Opportunities exist to integrate this long-term network into other ongoing and supported programs such as the Integrated Ocean Observing System, EPA's National Coastal Assessment, and NOAA's Status and Trends Program. However, to serve the needs of coastal management, the long-term network would place more emphasis on the very near shore coastal waters and their land-sea interface.

Timeline – Ongoing

Cost ~ \$200,000/yr. (multi-agency and NGO partnership)

Task 5: Compile information on historical baseline conditions

There is already much information that has been collected on the condition and quality of coastal resources. However, much of this is in the form of paper files, agency reports, and inaccessible archival material. Decision makers are unable to assess changing conditions in our coastal systems. For example, the Maine State Archives contains Critical Areas Program files that characterize intertidal benthic communities along the entire coast from the 1970s. Incorporating these data into Task 4, above, would extend the time series inexpensively. Older data need to be made available digitally to measure natural variability, identify sensitive habitats and biological communities, and enhance our ability to assess environmental impacts after human or natural events. Funding is needed to prioritize, catalogue and digitize earlier publications and data sets so that the information contained is accessible for use by resource managers and scientists.

Timeline – 1 year

Cost ~ 1 FTE - \$60,000

Recommendation 2: Enhance Information Exchange and Marine Geographic Information Systems in Maine

DMR should lead an initiative to identify information exchange needs and develop information management, delivery and exchange mechanisms that will provide wide access to coastal marine data. DMR should also take the leadership role in coordinating and advocating for better Marine Geographic Information Systems (GIS). Together with a coordinated coastal Maine science plan, information management and exchange is a powerful tool for regional management.

Task 1: Develop a nearshore management information portal

A portal similar to that used by Chesapeake Bay Program (<http://www.chesapeakebay.net/>) would be developed to provide access to available information and foster communication among

those interested in bay management. The portal should provide simple tools for data and information access, as well as background and updates on regional bay management initiatives. It should be integrated with InforME (<http://www.maine.gov/informe/>) and also take advantage of innovative regional and national information technology such as those being explored by the Gulf of Maine Ocean Data Partnership

Timeline – 3 yrs

Cost ~ \$100,000/yr

Task 2 – Engage in a focused effort to develop marine GIS data layers, standards and exchange

Only through a concerted and specific focus will Maine be able to develop marine GIS robust enough to aid in coastal understanding and decision making. There is currently not enough marine ecological or social GIS data at a bay level to manage efficiently. The Marine GIS Needs Assessment (see Appendix G), concluded that most GIS needs would benefit from better coordination and planning by DMR and that the Maine GeoLibrary and MEGIS could offer the organizational structure to fully integrate marine GIS with other GIS activities in the state.

The State can help by collecting and compiling marine GIS in a way that enables bay level organization of data. To make data exchange most useful, spatial and non-spatial data must be created with common standards and associated with good documentation or metadata. Data standards such as those developed by the Maine GeoLibrary for parcel data will need to be established for marine data sets and accompanied by FGDC compliant metadata. As data are developed according to established standards, the marine GIS could be integrated into the MEGIS and the GeoLibrary so that it is easily accessible. The State should develop Web Mapping Services such as ArcIMS applications or other OpenGIS services that can be used in support of marine GIS. Additional GIS staff based at DMR are needed to manage and coordinate this effort.

Timeline – 3 yrs

Cost ~ \$150,000/yr

Task 3 – Provide support to existing community GIS centers

Two GIS needs assessments and both bay management pilot projects pointed to the need to have regional GIS resource centers to support regional initiatives. Most local groups do not have the capacity and knowledge to find and analyze data on their own and state staff cannot dedicate the time needed to help individual groups. A community GIS center is one way to provide this link. The Maine Coast Protection Initiative has provided trial support to three such GIS centers, and the Applied Geographics County Needs Assessment suggested using county government offices for such centers (although no work has begun on this yet). The State should evaluate the effectiveness of and provide additional support (training, funding, and data) to those pre-existing GIS resource centers most able to assist regional bay management initiatives. If a gap exists along the coast (e.g., Frenchman's Bay area), the State could look to supporting an existing group to could become a resource center. Supporting resource centers will build local capacity and will equally benefit state resource managers as it does regional centers.

Timeline – Ongoing

Cost - \$150,000/yr

ACRONYMS

BPL - Maine Bureau of Parks and Lands (in Department of Conservation)
BwH - Beginning with Habitat (program of IFW)
CMGE – Coastal Marine Geologic Environment (data layer maintained by MGS)
COA – College of the Atlantic (in Bar Harbor, ME)
DEP – Maine Department of Environmental Protection
DMR – Maine Department of Marine Resources
DOT – Maine Department of Transportation
EPA – US Environmental Protection Agency
GIS – Geographic Information System
GMRI – Gulf of Maine Research Institute (in Portland, ME)
GOM – Gulf of Maine
GOMC – Gulf of Maine Council on the Marine Environment
GoMOOS – Gulf of Maine Ocean Observing System
IFW - Maine Department of Inland Fisheries and Wildlife
MASKGI – Maine Association of Sea Kayak Guides and Instructors
MCHT – Maine Coast Heritage Trust
MCPI – Maine Coast Protection Initiative (MCHT, SPO, NOAA and Land Trust Alliance)
MEGIS – Maine Office of GIS
MERI – Maine Environmental Research Institute (in Blue Hill)
MGS – Maine Geologic Survey
MITA – Maine Island Trail Association
NASA – National Aeronautics and Space Administration
NMFS – National Marine Fisheries Service
NOAA – National Oceanic and Atmospheric Administration
NOS – National Ocean Service (part of NOAA)
NPS – National Park Service
NWR – National Wildlife Reserve (administered by USFWS)
OBD – Overboard Discharge
QLF – Quebec-Labrador Foundation
SPO – Maine State Planning Office
SVCA – Sheepscot Valley Conservation Association
TNC – The Nature Conservancy
UMO – University of Maine
UNH – University of New Hampshire
USGS – US Geological Survey
USFWS – US Fish and Wildlife Service

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APPENDIX Q

EXAMPLES OF EXISTING REGIONAL EFFORTS

EXISTING REGIONAL EFFORTS

Existing regional efforts provide examples of the types of work that could be supported by enhancing State support of regional initiatives. In many areas along Maine's coast there are interested and active members of the public that have taken it upon themselves to organize into regional groups in order to make a positive contribution to improved nearshore marine management. These groups vary in their mission statements and purpose, but all work regionally to advance the goals of their organization. In many cases, a bay is the geographic area around which they are organized (Friends of Casco Bay, Friends of Taunton Bay, Friends of Blue Hill Bay, Friends of Merrymeeting Bay, East Penobscot Bay Environmental Alliance, etc). In other cases, watersheds are the geography around which a group may form. In addition to these citizen initiated groups, there are also entities that have been more formally created in Maine statute to provide for the regional management of river and lake resources, including the Saco River Corridor Commission and the Cobbossee Watershed District. Finally, federal designations can be the impetus for a regional effort, as in the case of the Casco Bay Estuary Partnership.

The majority of the examples of existing groups are citizen groups organized for stewardship or advocacy of their region with a focus on environmental health. Some examples of these groups and their mission or purpose statements include:

- Friends of Casco Bay: Friends of Casco Bay works year-round to improve and protect the environmental health of Casco Bay.
- Friends of Merrymeeting Bay: To preserve, protect, and improve the unique ecosystems of Merrymeeting Bay. We fulfill this mission through education, research, membership activities, and the promotion and stewardship of conservation easements.
- Friends of Blue Hill Bay: Friends of Blue Hill Bay is a nonprofit organization dedicated to preserving the natural ecology, traditional marine fisheries and the unique aesthetic quality of Blue Hill Bay.
- Friends of Taunton Bay: The purpose of the Friends of Taunton Bay is to organize citizens for the well-being of the bay and for its protection from all forms of degradation.
- East Penobscot Bay Environmental Alliance: The mission of EPBEA is to conserve our coast and to promote the environmentally appropriate use of East Penobscot Bay.

Some regional stewardship efforts are organized around watersheds, as in the following example:

- Bagaduce Watershed Association: The Bagaduce Watershed Association seeks to act as Riverkeepers for the Bagaduce River, to protect indigenous flora and fauna to live and prosper on the River, and to encourage and maintain the highest possible quality of the River environment, including water, air, adjoining field and forest land, views and existing commercial and recreational uses.

There are also a number of Resource Centers in Maine, include one in Cobscook Bay and one in Penobscot Bay. These entities emphasize a community based approach to resource management and sustainable economic development, and function as information repositories. Their mission statements are as follows:

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EXAMPLES OF EXISTING REGIONAL EFFORTS

- Cobscook Bay Resource Center: To encourage and strengthen community-based approaches to resource management and sustainable economic development in the Cobscook Bay region, the Bay of Fundy, and the Gulf of Maine.
- Penobscot East Resource Center: To energize and facilitate responsible community-based fisheries management, collaborative marine science, and sustainable economic development to benefit the fishermen and communities of Penobscot Bay and the Eastern Gulf of Maine.

Some regional entities are codified in Maine statute. The Saco River Corridor Commission is one such example:

- Saco River Corridor Commission: The Saco River Corridor Commission is committed to protect public health, safety and the quality of life for the State of Maine through the regulation of land and water uses, protection and conservation of the region's unique and exceptional natural resources and through the prevention of impacts caused by incompatible development.

Other regional entities are the result of a federal designation. Casco Bay was designated an “estuary of national significance” in 1990, and included in the U.S. Environmental Protection Agency’s National Estuary Program. As a result, the Casco Bay Estuary Partnership was formed. Their mission is as follows:

- Casco Bay Estuary Partnership: The Casco Bay Estuary Partnership is devoted to protecting and restoring the water quality, and fish and wildlife habitat of the Casco Bay ecosystem, while ensuring compatible human uses.

While this is just an illustrative list of the types of efforts that currently exist, a more complete listing of non-governmental entities with an interest in the Gulf of Maine and its watershed can be accessed through the website of the Gulf of Maine Council on the Marine Environment. A search tool is provided at: http://www.gulfofmaine.org/ngo_directory.

APPENDIX R

SUGGESTED CRITERIA FOR REGIONAL INITIATIVES

SUGGESTED CRITERIA FOR REGIONAL PROJECTS

Regional nearshore projects eligible to receive staff and funding support should:

- **Demonstrate relevancy to state nearshore management goals**

Regional entities may request support for a wide range of activities including capacity building, stewardship activities, the development of action plans, scientific research or data collection, and initiatives designed to identify and meet local needs. Rather than specify activities that would or would not receive support, a group should demonstrate that their approach is consistent with the Coastal Policies Management Act and any subsequent nearshore management goals adopted to implement the Act.

- **Demonstrate adequate stakeholder participation**

Several types of organizations may request assistance from state agencies, including advocacy groups, municipalities, ‘neutral’ organizations, industry groups and those that are newly formed for the purpose of regional coastal management. These entities may contain specific stakeholder groups or a wide range of stakeholders. Rather than specifying what type of group is eligible for support, the entity should demonstrate that it is constituted as needed to tackle the task it is proposing, for example, involvement of two or more municipalities with commitment to implement the initiative (pursuant to an interlocal agreement if necessary); balanced representation of the range of stakeholder interests (if applicable); or the presence of partnerships with other relevant organizations.

- **Demonstrate sufficient capacity to carry out proposed tasks**

Entities carrying out bay management initiatives will have different organizational capacities and relationships with others in their region. While different types of entities may receive support depending on the type of project, guidelines should be established to help evaluate the ability of an entity to carry out its proposed work. These might include:

- appropriate staffing levels;
- matching funds;
- sustainability of effort after state support;
- ability to use scientific information;
- measurable objectives by which the efficacy of the initiative may be assessed.

- **Conduct work on a regional scale**

For the purpose of supporting regional initiatives, we do not see a need to formally divide the coast into new planning units. Rather, entities involved in marine and coastal resource issues should “self-define” their geographic area of focus to correspond to the issues and projects they are working on. While there is no one scale at which regional initiatives should be conducted, the initiative should include or consider a regional perspective. This may take several forms, including:

- Engaging all towns adjacent to water body being discussed;
- Using biophysical rather than political boundaries;
- Developing and using regional-scale data;
- Considering impacts from or to the surrounding region.

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SUGGESTED CRITERIA FOR REGIONAL INITIATIVES

- **Minimize duplication of or conflict with similar efforts**

While the State may support more than one project (activity based) in a region, projects should demonstrate that they are not working at cross purposes. Multiple and similar planning initiatives in any one region may not be eligible for support.

- **Commit to, and be capable of using, best available and appropriate information**

There are many types of data and information that may be appropriate for use in any given project. An initiative will need to document its intention to use or develop information including: appropriate Geographic Information System maps; local knowledge; and available scientific information. Furthermore, any data and products that receive public money must make their products available (except if limited by existing confidentiality agreements).

APPENDIX S

BACKGROUND INFORMATION ON INTERLOCAL AGREEMENTS

BACKGROUND INFORMATION ON INTERLOCAL AGREEMENTS

Under current law, municipalities and other units of government are able to act jointly to address regional issues pursuant to locally adopted interlocal agreements. To date, this tool has been little used to address coastal management issues.

Statutory Authority:

- 30-A M.R.S.A. § 2201, *et seq.* Interlocal Cooperation
- The statute enables public agencies to “cooperate on a basis of mutual advantage and thereby to provide services and facilities in a manner and pursuant to forms of governmental organization that will accord best with geographic, economic, population and other factors influencing the needs and development of communities.”

Entities That Can Enter into an Interlocal Agreement:

- Any political subdivision of the State or any adjoining state. Political subdivision is any municipality, plantation, county, quasi-municipal corporation and special purpose district, including, but not limited to, any water district, sanitary district, hospital district, municipal transmission and distribution utility and school administrative unit.
- Any agency of state government or the federal government

Authorities That Can Be Jointly Exercised:

- Any powers, privileges or authority exercised or capable of exercise by a public agency of the state may be jointly exercised with any other public agency of the State, or of the federal government to the extent federal law allows.
- In order to jointly exercise a power, at least one of the parties must be capable of exercising that power within the entire jurisdiction of the agreement, or each party must be able to exercise that power within each of their jurisdictions.
- No agreement relieves a public agency of its responsibilities except to the extent it is actually and timely performed by the entity created by the agreement.
- No essential legislative powers, taxing authority, or eminent domain power may be delegated to a joint authority.

APPENDIX T
MAINE MARINE GIS NEEDS ASSESSMENT

Maine Marine GIS Needs Assessment

Prepared for the
Maine Department of Marine Resources

by



In association with

Northern Geomatics

June, 2006

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1 Executive Summary

Maine has made a significant commitment to geographic information system GIS technology in many departments. The Maine GeoLibrary Board, the GIS Executive Council and others are working to create a more coordinated GIS system to reduce redundancies and improve data, analysis and decision-making across the state. Marine oriented organizations have much in common with more land-based programs, but they also have special needs that have not always been addressed by current efforts. The purpose of this project is to look at the current activities and needs of these organizations and recommend ways to improve development of marine GIS within state government and thereby improve coastal management.

Summary of Findings:

- A marine GIS user group should be formed to advocate strongly for the needed GIS resources of the marine community. The interviewed organizations vary in their mission and areas of interest, especially between those focused on the nearshore and offshore environments, but they have much in common and their needs are not currently being met as well as they could be.
- Marine groups should work with existing Maine GIS programs both to get better service from them and to avoid duplication of efforts. Key issues are data and metadata development and data distribution.
- Several data sets identified as needed by the marine organizations are being planned and produced by other GIS entities, including new orthophotography, parcels, watersheds and onshore hydrography. This highlights the need for marine GIS efforts to work closely with existing land-oriented GIS programs.
- Several high-demand marine data sets do not exist in GIS or are out of date. These include detailed nearshore bathymetry; benthic habitats; an update of marine geology; and human uses of the shoreline and nearshore environment. These data are expensive to produce and need a focused effort to get them developed.
- The agencies and organizations that work in the marine environment have made efforts to share data and geographic analysis on an ad hoc basis, but to date a coordinated effort has not been undertaken. Smaller organizations do not always know the data resources that are available. Better outreach and education is needed.
- Existing data is often badly documented, thereby reducing its value and making it difficult for users to find and use the data appropriately. However, at the present, it is quite difficult and time consuming to make metadata fully compliant with state and federal standards. State and federal resources and attention needs to be

focused on this issue; i.e. to assist data developers quickly and accurately create compliant and useful metadata.

- The Maine Department of Marine Resources, given adequate resources, is the state agency best positioned to take a leadership role to coordinating and advocating better marine GIS throughout Maine and the Gulf of Maine.

The marine environment is a dynamic and important part of Maine. Organizations focused on the marine environment will make better use of GIS to monitor and manage this invaluable resource if they coordinate their activities.

2 Overview of the Maine Marine GIS Needs Assessment

The unique geography and feature richness of Maine's marine environment makes gathering and analyzing good, broad based data both complex and expensive. Unique factors include its large area with often indefinite boundaries, its three dimensional nature (the marine atmosphere plus the water column plus benthic geology), its convoluted morphology caused by tides, currents, and geology, the great amount and complexity of data available to be and being collected, including time sensitive data, and the fact that this environment is largely invisible to most people, and therefore much of its thematic data sets must be gathered remotely. Additionally it is difficult to integrate and analyze data sets collected at different times and/or on base maps that have made varying interpretations of shoreline and other boundaries.

Add to this the facts that:

- the marine environment has great cultural, monetary and strategic value to its many stakeholders
- GIS is a wonderful tool to enable groups to map and analyze this region for many types of issues
- GIS technology, computer software, hardware and networks in the past few years have become cheaper, faster and much easier to use without extensive training,

and we have a situation where many groups are developing and working with GIS for a great variety of purposes.

The Maine Department of Marine Resources (DMR), the state agency directly focused on the Maine marine environment, believes that better coordination, collaboration and information sharing between key stakeholder organizations could lead to more efficient and effective coastal management. This Maine Marine GIS Needs Assessment was commissioned by DMR. It has the overall goal of improving the use and coordination of GIS to inventory, study and manage the marine resources of Maine. Numerous organizations are focused on the Maine coast and a great many are currently using GIS. However, it must be noted that several of the organizations interviewed for this study have a broader geographic interest than the Maine coast, either inland or encompassing the entire Gulf of Maine. These groups include MEGIS, MEIFW, UMO, GoMOOS. Two of the organizations (WellsNERR and SVCA) represent groups with a very focused area of interest, as often do the academic groups for their various projects.

The specific tasks of this study are to:

- develop a questionnaire and conduct detailed interviews with GIS and related staff of approximately 20 government agencies, academic groups and non-governmental organizations (NGOs) having interest in the Maine marine environment
- analyze the responses to determine the nature of each groups current GIS operations, including significant goals, applications, data and sources, budget, software and hardware
- identify the high priority GIS needs of organizations that would be most beneficial to effective coastal management
- identify bottlenecks to a more coordinated relationships between these groups including an analysis of the redundancies and gaps
- make recommendations to DMR that would address these limitations and problems in order to meet the goal of a more coordinated group of Maine marine GIS users
- estimate the costs of implementing these recommendations

2.1 Background of GIS Planning in Maine

The State of Maine has a long history of using geographic information system (GIS) technology to study and manage geographic data for a variety of state, regional and local issues. It has been estimated that over \$20,000,000 has been spent on GIS in Maine since the 1980's. The Maine Legislature, in 2001, believing that more coordinated statewide GIS efforts could result in a more efficient and effective Maine GIS, set up the Resolve 23 Committee to study this issue and make recommendations. The 2002 Resolve 23 plan by this committee was called "*State of Maine GIS Needs Assessment and Requirements Analysis and Strategic Plan to Develop the Maine Public Library of Geographic Information*".

The Strategic Plan was adopted by the Legislature and its recommendations are being implemented. The Maine GeoLibrary is an established entity. The GeoLibrary has a Board of Directors with 15 members that represent stakeholders from State agencies, counties, regional councils, municipalities, public utilities, the University of Maine, environmental groups, the public, and the private sector. The Maine Office of GIS (MEGIS) within the Maine Office of Information Technology serves as technical staff.

This Marine GIS Needs Assessment is an effort to build upon the Resolve 23 study and its implementation to specifically focus on the needs of agencies and organizations and programs focused on the marine environment.

All of the state agencies interviewed for this study were also interviewed in the needs assessment portion of the Resolve 23 study. In addition, the Maine Audubon Society and the Island Institute were also interviewed as representative of the non-governmental organizations (NGOs). Maine Audubon has a seat on the GeoLibrary Board to represent Environmental Interests.

While the specific needs of marine GIS were not explicitly addressed in the Resolve 23 report, many of the overall recommendations now being implemented from that study will nicely support many of the identified needs from this study, and the successful and continuing implementation of statewide GIS in Maine is a key factor to help solve the bottlenecks and limitations identified by the marine GIS users.

Another innovative and relevant study is the ongoing **Maine Bay Management Study** authorized by the Maine legislature in 2004 and scheduled to conclude early in 2007. It is funded by the federal Coastal Zone Management Program and overseen by the Land and Water Resources Council. The overall goal is to develop innovative approaches managing Maine's embayments. The identification of mapping and information transfer needs is one of the main goals of the study. The GIS-related results of this study should be used to inform and prioritize future marine GIS initiatives.

The **Maine Coast Protection Initiative** (MCPI) is a collaboration between public and private conservation partners to leverage funding, technical assistance, and other resources for organizational capacity building to conserve important areas along Maine's coastal zone. They developed their program in consultation with approximately 70 organizations to increase coastal land protection. Most of these groups are local land trusts. The principal project sponsors are the Maine State Planning Office, the Maine Coast Heritage Trust, NOAA Coastal Services Center and the Land Trust Alliance.

MCPI conducted a small but interesting GIS needs assessment of the 47 Maine land trusts. They gathered and aggregated data on the experience and opinions about GIS and issued a report in May 2005. Their insights about the GIS needs of small land trusts are factored into the Recommendations section of this document.

3 The Marine GIS Questionnaire and Database

In collaboration with DMR staff, a 63 question form was developed to solicit a wide variety of answers and opinions from the participants. It was designed to be sent to the participants in advance of the actual face-to-face interview in order for the participants to be able to think about and prepare his/her answers. A copy of the questionnaire is attached as Appendix A of this report and the list of respondents is in Attachment B. The full survey responses were put into an Access database for aggregation and analysis within this report. In addition, the full database and various queries and reports is to be delivered as a part of this report to enable further analysis and future updating.

The following categories of questions were asked and answered during the survey:

Section 1: General Stakeholder Information. This includes contact information for both the individual being interviewed and his/her organization.

Section 2: Existing GIS Activities. This comprises 17 questions about the staffing, funding, data needed and produced, applications, and relations with other GIS operations and collaborative efforts.

Section 3: Technology Infrastructure. This section solicits information on the organizations GIS software, operating system(s), network and internet connectivity.

Section 4: Marine Data Sharing and Exchange. This section gets at the existing nature, both formal and informal, of what data is shared with other organizations, and what data

is received from others. It also asks what data currently unavailable is required by the organization to do a better job with marine GIS activities.

Section 5: Marine GIS Applications. This section asks what GIS applications the organization is currently involved in and what additional applications they would like to develop or use.

Section 6: Looking Forward. The final section solicits opinions on what type of GIS support would be most valuable to the organization; the interviewees perception of existing bottlenecks limiting marine GIS in Maine; and ideas for improving marine GIS in Maine.

4 The Questionnaire Responses

4.1 Stakeholder Information

The Maine Department of Marine Resources provided the list of organizations most involved in the Maine marine environment and the staff most knowledgeable about GIS issues. There are 20 organizations and a total of 26 interviewees. The Maine Office of GIS was interviewed as the lead agency for GIS in Maine. The goal was to gain the insights of a cross-section of agency and organization types including large government agencies, academic and science research organizations, land trusts and conservation groups for the purpose of gaining the widest possible representation of perspectives. One respondent from each agency responded with the exception of DMR, which had three respondents, and SPO, USM, MCHT, WellsNERR, who had two respondents each.

Organizations Interviewed - Sorted by Type		
Type	Name	Acronym
State	Maine Department of Marine Resources	DMR
State	Maine Office of GIS	MEGIS
State	Maine Department of Environmental Protection	DEP
State	Maine State Planning Office	SPO
State	Maine Department of Conservation	DOC
State	Maine Department of Inland Fisheries and Wildlife	MEIFW
Science Research	Gulf of Maine Research Institute	GMRI
Science Research	Gulf of Maine Ocean Observing System	GoMOOS
School	University of New England	UNE
School	University of Maine, Department of Geology	UMO
School	University of Maine, School of Marine Science	SMS
School	College of the Atlantic	COA
School	University of Southern Maine	USM
Land Trust	The Nature Conservancy	TNC
Land Trust	Maine Coast Heritage Trust	MCHT
Federal	U.S. Fish and Wildlife Service	USFWS
Federal	Wells National Estuarine Research Reserve	WellsNERR
Conservation Group	Maine Audubon	MA
Conservation Group	Sheepscot Valley Conservation Association	SVCA

Organizations Interviewed - Sorted by Type		
Type	Name	Acronym
Conservation Group	Island Institute	II

While these organizations vary widely in mandate, focus, thematic concerns, and geographic area of interest, they already share strong, if often informal, relations concerning GIS activities concerning particular projects. The goal for this project is that these groups can develop a more organized and overarching relationship going forward.

The survey reveals a long history of marine-related GIS operations with most of the groups interviewed. 75% have had in-house GIS for between five and 10 years, and 45% for over 10 years. The staff respondents themselves had even more experience with GIS, having a total average of over 10 years working with GIS at least part of the time at both their current organization and previous jobs. This depth of experience was similar across all organization types.

4.2 Existing Marine GIS Activity

The questionnaire in Appendix A lists all questions. The following is a summary and an aggregation of the most significant responses.

4.2.1 GIS Staff and Operations

All state and federal agencies reported operational multi-user GIS systems. Other organization self-identifications were split between multi-user systems, limited operational systems and under development, although all organizations also report providing GIS mapping to multiple users.

There is great penetration of GIS within these organizations. They report a total of 1193 professional staff. There are 154 active GIS users within this staff, or about 13 percent. In addition, these GIS staff serve 164 other staff regularly and intermittently serve an additional 171, for a total GIS-served population of 489, or 41% of the overall professional staff of these organizations.

These percentages are generally similar for all types of organizations interviewed. In addition to in-house GIS services, several organizations have active GIS web applications that serve GIS data and maps to an outside user community. These facts establish that GIS has become a significant part of core operations in these organizations and that professionals and the public are currently being served by GIS.

4.2.2 Existing Budget and Expenditures

Only 12 of the 20 respondent organizations identified a yearly budget for GIS. The total identified GIS budgets for these organizations totaled \$1,582,500. It must be noted that all of these funds are not devoted to marine GIS related activities, especially the MEGIS and MEIFW budgets.

Identified GIS Budgets

Agency	GIS_budget
University of Maine, School of Marine Science	\$400,000
Maine Office of GIS	\$350,000
Maine Department of Inland Fisheries and Wildlife	\$285,000
University of New England	\$105,500
University of Maine, Department of Geology	\$100,000
College of the Atlantic	\$80,000
U.S. Fish and Wildlife Service	\$80,000
Gulf of Maine Research Institute	\$60,000
The Nature Conservancy	\$60,000
Wells National Estuarine Research Reserve	\$30,000
Maine Audubon	\$20,000
Sheepscot Valley Conservation Association	\$12,000

4.2.3 Focus of Expenditures

The questionnaire attempted to derive the percentages of GIS budgets devoted to various aspects of GIS costs- software, hardware, operations, data development, staff and application development. However very few organizations broke out these numbers in their responses, so an overview of this situation is not possible. It is possible to say that most respondents to this question described most of their expenditures as operational and only two respondents (both universities) described any expenditure as application development.

Since the principal purpose of GIS is to enable analysis and decision making based on good data, the overall trend in GIS should be towards more analysis. The fact that this is not evident in this user population is an indication that marine GIS in Maine is not yet in a mature state. However, Section 4.5 shows the extent of GIS applications currently underway. The fact that respondents had a difficult time breaking out these numbers is perhaps a further indication that GIS has become a normal part of operations in these organizations.

4.3 Technology Infrastructure

4.3.1 Software-

All organizations but two identified ESRI ArcGIS software products the main GIS software in general use. The two others were GoMOOS which used open-source MapServer software, and the University of Maine School of Marine Science, which uses

IDL, a data visualization and analysis software package. The University of New England uses both ESRI and ERDAS software. Most organizations use the Windows operating system. Three use Windows and LINUX, and GoMOOS uses FreeBSD.

4.3.2 Internet access

All organizations are connected to the internet, and all but three have high-speed connections of T1 or T3 level. SVCA has a DSL connection and the USFWS and Maine Audubon have commercial cable connections. Overall the interviewed organizations are very well set up for internet communications including GIS data transfer and GIS internet application access.

4.3.3 Existing GIS Data

The 20 organizations interviewed currently use a great number of data sets in their operations. A total of 153 unique data sets were reported to be in use. These data sets come from over 35 different sources. Included are 20 different base map data sets and an additional 8 that are boundary files. By and large the most used base map used for general purpose mapping applications are those provided by MEGIS, including the digital 1:24,000 USGS data with its coastline and orthophotography where it is available.

GIS Data Sets in Use	
Data Type	Number of Data Sets in Use
Base Map	20
Boundaries	8
Fauna	21
Fisheries	30
Flora	7
Geology	19
Infrastructure	5
Regulatory	6
Remote Sensing	4
Synthesis	14
Water Quality	19
TOTAL	153

The following chart shows the great wealth and variety of mainly thematic marine-related data sets that the interviewed organizations develop and maintain. Many of the data sets of other organizations are available to research, view and download via the MEGIS online data catalog and related web viewers <http://apollo.ogis.state.me.us/catalog/>. Currently there are 137 data sets available via this service, including many marine related ones. This is the main way that state agencies make their GIS data sets available to other organizations and the public.

Sources of Data Sets in Use

Source Organization	Number of Data Sets Produced and/or Maintained
DMR	49
MGS	8
USFWS	8
MDIFW	7
DEP	6
NOAA	4
MEGIS	3
WellsNERR	2
NMFS	2
GoMOOS	2
DMR/MADMF	2
UNE	2
COA	2
USGS/WHOI	2
GMRI	2
DMR & Island Institute	1
COA and Land Trusts	1
II	1
Maine Audubon & MNAP	1
MCHT	1
MDIFW & MNAP	1
MDIFW & USFWS	1
MEGIS/UMO	1
MNAP & MDIFW	1
NASA	1
NMFS/ NOAA	1
NOAA?	1
SPO	1
TNC	1
TNC/Suffolk Univ	1
UMO	1
UMO/MGS	1
USGS/Mass CZM/UMO	1
MEGIS / Specific Organization	1
Unidentified Source	32

It is very positive that so many organizations are taking the initiative to produce GIS data sets. However, this heterogeneous production environment makes it vital to follow good production and metadata standards. Unfortunately many of the data sets do not have adequate metadata to allow others to use them effectively and efficiently. Some users are not even sure of the source agency of some of the data sets they are using. This is

symptomatic of a situation where GIS data is exchanged informally without adequate metadata.

4.4 Current Marine Data Sharing and Exchange Initiatives

All interviewed organizations except two of the conservation groups provide GIS data sets to other organizations on at least an intermittent basis. When asked about the nature of data exchange agreements with other organizations, nine of the 20 organizations report formal or semi-formal data exchange agreements with other institutions. The others are very informal and seem to be generally ad hoc agreements.

4.4.1 Data Sharing Agreements

The following chart summarizes the responses to the request to “describe your formal agreements for data exchange”:

Current Marine Data Sharing Agreements	
Organization	Description
Maine Department of Marine Resources	Member of GOM ODP;
Maine Department of Inland Fisheries and Wildlife	Data release form
Maine Office of GIS	Have data editing agreements with some agencies (e.g., hydrography editing)
Gulf of Maine Research Institute	Project partners agree to semi-formal data publishing protocols
University of Maine, Department of Geology	One on one with agency - we collect, they manage and visa versa
University of Southern Maine	Agreement with partners to provide data on regular basis
University of Maine, School of Marine Science	Agreements with NASA, NOAA to download data from satellites
Maine Coast Heritage Trust	Not for redistribution or publication
U.S. Fish and Wildlife Service	Data exchange agreements with MassGIS and MDIFW
Island Institute	Will be developing one in next 6 months
Maine Audubon	Have policy on what may distributed to who for specific uses
Sheepscot Valley Conservation Association	Hold conservation property boundaries for other Conservation Assoc.

4.4.2 Collaborative Marine Focused Initiatives

In addition to the above-described exchange agreements, several more formal arrangements are in place with established organizations. The principal one already discussed is the Maine GeoLibrary with its many data sets available to all users. Additional collaborative arrangements are as follows. See below the chart for a definition of the acronyms. In the context of this GIS report, at present Beginning With Habitat (BWH) is primarily a user and distributor of GIS data, not a data generator. The other two initiatives, the Gulf of Maine Mapping Initiative (GOMMI) and the Gulf of Maine Ocean

Data Partnership (GOM ODP), are primarily focused on offshore data and analysis. There is at present no self-identified collaborative group focused on the nearshore region.

Existing Collaborations	
Organization	Collaboration
Maine Department of Marine Resources	GOM ODP, GOMMI, Beginning with Habitat
Maine Department of Conservation	Some work with BWH
Maine State Planning Office	BWH
Maine Department of Inland Fisheries and Wildlife	BWH
Maine Office of GIS	Provide some data to BWH
Gulf of Maine Ocean Observing System	GOM ODP, GOMMI
University of Maine, Department of Geology	GOMMI
University of Southern Maine	GOM ODP, GOMMI
The Nature Conservancy	BWH
Maine Coast Heritage Trust	BWH
Wells National Estuarine Research Reserve	GOM ODP, GOMMI, BWH
U.S. Fish and Wildlife Service	GOM ODP, BWH
Island Institute	Maine Coast Protection Initiative
Maine Audubon	BWH

Beginning with Habitat (BWH) is a habitat-based landscape approach to assessing wildlife and plant conservation needs and opportunities. The goal of the program is to maintain sufficient habitat to support all native plant and animal species currently breeding in Maine by providing each Maine town with a collection of maps and accompanying information depicting and describing various habitats of statewide and national significance found in the town. These maps provide communities with information that can help guide conservation of valuable habitats. (from the BWH website).

The Gulf of Maine Mapping Initiative (GOMMI) is a U.S.-Canadian partnership of government and nongovernmental organizations to conduct comprehensive seafloor imaging, mapping, and biological and geological surveys. GOMMI grew out of a mapping workshop in October 2001 that was sponsored by the Gulf of Maine Council on the Marine Environment and the National Oceanic and Atmospheric Administration. (from the GOMMI website). This group is currently focused on new mapping of the seafloor in the Gulf of Maine, not including the very near shore areas.

The ***GOM Ocean Data Partnership (GOM ODP)*** was formed to promote and coordinate the sharing, linking, electronic dissemination, and use of data on the Gulf of Maine region. The nineteen research and government participants have decided that a coordinated effort is needed to enable users throughout the Gulf of Maine region and beyond to discover and put to use the vast and growing quantities of data in their respective databases. (from the GOM ODP website). This is a fairly new initiative that aims to integrate vast amounts of data into an integrated computer system that will allow visual display and analysis. Currently much of its data is offshore biologic information.

4.4.3 Data Exchange Impediments

The need for more efficient and effective data exchange is clearly one of the major issues confronting the marine GIS user community. The questionnaire asks the respondents to list what they perceive as the main impediment to efficient data exchange with other organizations. Several listed more than one impediment. The specifically identified impediments to improving data exchange are in the following chart.

Data Exchange Impediments	
Type of Impediment	Number of Organizations
Lack of clear and consistent metadata	7
Data not in a standard format	5
Effort required to create metadata	3
Lack of user knowledge	3
Hard to Find Data	2
Inaccurate and out-of-date data	2
Problem Managing large data sets	2
Politics of data access, Not sharing	2

These identified impediments match up closely with data-related answers to a question on overall GIS bottlenecks discussed in Section 4.7.

4.4.4 Web-based GIS Data and Access

The respondents were asked how they currently use the web in their GIS activities. Web technology is fast becoming a principal way to find and distribute data, metadata and applications to view and analyze GIS data. Much effort has been put into this area by many companies, and many of the interviewed organizations are deeply involved in developing these capabilities. Indeed, the main purpose of one of the organizations, GoMOOS, is to collect, archive and efficiently distribute timely weather and oceanographic data from weather buoys and other sensors via their website <http://www.gomoos.org/>. This website also allows efficient statistical analysis of tabular data.

Nineteen of the twenty organizations use some type of on-line GIS user interface. The most used ones are hosted by MEGIS. Other ones are developed and maintained by GoMOOS, Gulf of Maine Mapping Portal (GoMMaP), NASA, JPL, NOAA, USGS National Atlas, Northeast Consortium/UNH, and several municipal parcel level data viewers.

Use of GIS via the Web	
Organization	Web Application
Maine Department of Marine Resources	NOAA NOS Chartmaker, MEGIS IMS services, MassGIS & GRANIT data catalogs; Whale sighting, cod tagging, shrimp viewers
Maine DOC	MGS ArcIMS publication search site; MEGIS Ortho viewer, ftp
Maine SPO	MEGIS Orthoviewer and Wetland Characterization Sites, DMR Aquaculture IMS
MEIFW	ArcIMS
Maine Office of GIS	Orthoviewer, Basemap viewer, other in-house IMS sites
Maine DEP	DEP version of MEGIS viewer
Gulf of Maine Ocean Observing System	GoMOOS maintains a web mapping service for distributing some of the GoMOOS data and we consume various web mapping and web feature

Use of GIS via the Web	
Organization	Web Application
	services for some of our web based mapping products
GMRI	Cod and Haddock ArcIMS websites
UMO	MEGIS
UNE	Online maps of marine animal tagging data (http://nemo.une.edu)
USM	GMBIS, OBIS
COA	Use ArcIMS for small pilot projects
SMS	Imagery made available via: http://wavy.umeoce.maine.edu/
TNC	Use ftp to transfer data, MEGIS Orthoviewer
USFWS	GOM Watershed Habitat Analysis IMS site
WellsNERR	SWIM - Seacoast Watershed Information Manager, MEGIS and GRANIT on-line data catalogs, NOAA Coastal-change Analysis Program, MEDEP
Island Institute	MEGIS and Island Institute Lobster Tales ArcIMS site
Maine Audubon	Download data from MEGIS and other organizations. Use MEGIS Orthoviewer
SVCA	Email

There is a great variety in the purposes and focuses of these web-based GIS servers. The most used web site is MEGIS, but only about ½ of the organizations report using it. Some, like the MEGIS data catalog, allow one to research available data sets and download appropriate data for use in a local GIS program. A second type (e.g. the MEGIS Basemap Viewer and several MoMOOS viewers) allows one to compose maps based on available data. A third type is developed around a very specific application, designed for a single-purpose. An example of this would be the GIS viewer of the Northeast Regional Cod Tagging Program <http://www.gmamapping.org/codmapping/>.

A developing web technology called “web services” provides a standard means of interoperating between different web-based software applications, running on a variety of platforms and/or frameworks. This allows data in one web application to be combined with another one, transparently to the user. Many of GoMOOS’s applications are built upon web services. MEGIS is developing the capability to serve out the many data sets in the GeoLibrary to other web applications.

If an organization had a compatible in-house internet/intranet application, a web service connection would greatly reduce the need for an organization’s GIS staff to:

- track the data sets
- determine when they have been updated or otherwise changed
- downloading and installing (replicating) them

4.4.5 Data and Metadata Standards

Only the state and federal agencies and one conservation group have declared a wholehearted commitment to the FGDC (Federal Geographic Data Committee) metadata standards for GIS data, which is the MEGIS standard. While this is much less than half of the 20 organizations, these organizations account for the great majority of the data sets

identified as developed and/or managed. FGDC is a fairly rigorous standard, but such a detailed standard is necessary for widespread and efficient distribution of the great variety of data sets produced by these organizations.

4.4.6 Needed Marine GIS Data Sets

The questionnaire asked which marine-related GIS data sets the respondents need. The following are the data sets that are identified as not currently available, or not available in a form usable by the interviewed organizations. This list is sorted by the number of requesting organizations.

Maine GIS Data Requested / Needed	
Data Set	Number of organizations
Detailed Inshore Bathymetry	12
Detailed Offshore Bathymetry	5
Docks, piers, wharves, marinas	4
Surficial Geology of Maine Inner Continental Shelf	4
Surficial Geology for the Gulf of Maine	4
Benthic Habitat	3
Coastal Marine Geologic Environments	3
Near Shore Trawls Surveys	3
NOAA Raster Nautical Charts (RNCs)	3
Outfalls (Stormwater)	3
Overboard Discharge	3
Feature Labels (marine place names)	3
LIDAR (elevation data)	2
Horseshoe Crab Spawning Areas	2
Public Access Sites	2
Color Digital Orthoquads	2
Dams and Barriers	2
Closed Areas (pollution)	2
Chlorophyll	2
Species Abundance	2
Circulation patterns	2
Lobster Harvest Zones	2
Shipping Lanes and Anchorages	2
Shell	2
Sea-surface Temperature	2
Conservation Lands	2
Coastal Watershed Boundaries	1
Coastal Assessment Areas	1
Essential Fish Habitat	1
Contaminants	1
Rainfall amounts	1
Marine Worms	1
Water quality classifications	1
Urchin harvest zones	1
Statistical Area Boundaries	1

Maine GIS Data Requested / Needed	
Data Set	Number of organizations
Species Management Areas	1
Special Areas for Protection (SAPs)	1
Shoreline Fragmentation	1
Regulatory Areas	1
Fishing Effort	1
Ports	1
Physical and chemical oceanographic data	1
Parcel-based landuse and zoning	1
Multibeam Bathymetry	1
WWTP Zones	1
Aquaculture Lease Sites	1
Land Use/Land Cover	1
Kelp	1
Seaward Boundaries for Coastal Towns	1
TOTAL: 49 unique data sets	101

There is a significant need identified for Inshore and Offshore bathymetry data. Currently there are generalized bathymetry data sets available for the Maine coast, but the majority of organizations require a more accurate and detailed one for many of their needs. Other important required data sets are geology, additional habitat data and data on human uses of the shoreline (e.g. docks, piers, wharfs, marinas, outfalls). These will be discussed in the Recommendations section of this report.

4.4.7 Existing GIS Data Needing to be Updated

While a number of the following data sets are available via MEGIS and other sources, the respondents reported that many are out-of-date, incomplete or inadequate, in a difficult to use format, or simply not known about by the requester. The Coastal Marine Geological Environments, for example, are 30 years old and are based on even older aerial photography. The following data sets were identified by the study participants as likely to be in need of updates now or in the near future.

Marine Data Needing Updating	
Category	Name
Boundaries	Conservation Lands
Fauna	Coastal Wading Bird and Waterfowl Concentration Areas
Fauna	Invertebrate Concentrations
Fisheries	Herring Spawning Areas
Fisheries	Species Management labs
Fisheries	Species Management Areas
Flora	National Wetland Inventory
Geology	Coastal Marine Geologic Environments
Geology	Mean High Water Line
Infrastructure	Docks, piers, wharves, marinas

Marine Data Needing Updating	
Category	Name
Infrastructure	Public Access
Synthesis	Focus Areas of Statewide Ecological Significance
Water Quality	Outfalls
Water Quality	Overboard Discharge

4.5 Marine GIS Applications and Analysis

While the reported GIS budgets in Section 4.2.3 do not include much expenditure for GIS based analysis, in fact GIS is currently being used for many varied and valuable projects as is shown in the following chart. This is not meant to be an exhaustive list, but it gives a good summary of the many ongoing projects using and needing good quality GIS data.

GIS Analysis Currently Being Done	
Organization	Analysis
Maine Department of Marine Resources	Species area and volume, change analysis. Water quality analysis related to fishery regulation (shellfish closures); WWTP Impact zones
Maine Department of Conservation	Shoreline change, coastal flooding, coastal hazards, mapping coastal geology. Development of integrated MGS Beach Scoring System
Maine State Planning Office	Effects of land-based activities on near-shore environments
Maine Department of Inland Fisheries and Wildlife	Vulnerability to oil spill
Maine Department of Environmental Protection	EPA National Coastal Assessments (see: http://www.epa.gov/emap/nca/)
Gulf of Maine Ocean Observing System	Don't do analysis - fund some analysis done by others (e.g., circulation)
Gulf of Maine Research Institute	Movements, mixing, reporting rates and weighted data analyses related to cod and haddock tagging
University of Maine, Department of Geology	Offshore sand inventories, archeological and fisheries research on seafloor types
University of New England	Habitat analysis of marine animals (whales/sharks) - not limited to GOM, includes entire Atlantic. Currently bathymetry stands in for habitat
University of Southern Maine	Habitat analysis for whales and prey
College of the Atlantic	Landuse impacts on coastal environments, Whale migration and population studies, Coastal habitat change analysis, Eel grass change analysis, Biodiversity, Habitat analysis and critical habitat identification
University of Maine, School of Marine Science	Statistical analysis on time-series imagery to identify fronts, wind effect and other phenomena
The Nature Conservancy	Coastal ecology ranking to define conservation targets
Maine Coast Heritage	Aquaculture impacts on holdings (visual/noise/odor). Analysis of

GIS Analysis Currently Being Done	
Organization	Analysis
Trust	ecological value of potential properties.
U.S. Fish and Wildlife Service	Watershed habitat analysis
Wells National Estuarine Research Reserve	Marsh vegetation monitoring, tidal restrictions, beach/marine debris monitoring, water quality monitoring
Island Institute	Comprehensive plans for island communities, community GIS education
Maine Audubon	Shoreland habitat analysis

4.6 Future GIS Analysis

The following chart lists the many additional applications the organizations would like to expand or develop in the future if they have adequate data and other resources. Several of these listed applications are actually calls for more and/or better data sets. Others are planning to use multiple data sets to do predictive modeling of marine animal occurrence, comparing species abundance to habitat, habitat change analysis, and historical analysis of coastal development.

Planned Future Marine GIS Analysis	
Organization	Type of Analysis
Maine Department of Marine Resources	Historical analysis of closures, acreages of closures, analysis of WWTP inputs to coastal waters using bathymetry to calculate embayment volume, monitor activities based on bathymetry and habitat
Maine Department of Conservation	Remap CMGEs. Map shallow marine environments using multibeam and aircraft-based tools
GoMOOS	Add water quality data to circulation models
GMRI	Too busy to even contemplate this question
UMO	More detailed bathymetry and habitat mapping through multibeam
University of New England	Develop predictive models for marine animal occurrence using copepod and benthic habitat data
USM	Association of species abundance to habitat
College of the Atlantic	Coastal ecosystem sustainability
SMS	More detailed imagery would allow analysis closer to shore. More frequent imagery would allow tidal effects to be studied.
The Nature Conservancy	Identify conservation targets in the marine realm such as habitats that support sea urchins or commercial fisheries.
MCHT	Cultural aspects of fishing industry on holdings. Impacts on wildlife/nesting bird islands. Historical analysis of coastal development.
USFWS	Refining watershed habitat analysis
WellsNERR Reserve	Benthic habitat change analysis, coastal segmentation and effects of zoning on water quality
Island Institute	Same as existing analysis, but more

4.7 Bottlenecks to More Success with Maine Marine GIS

The respondents identified numerous types of limitations and bottlenecks keeping them from meeting all of their programmatic and organizational goals. These have been aggregated and summarized below:

Bottlenecks to Better Marine GIS Implementation		
Type of Bottleneck	Summary	% organizations identifying this problem/issue
Tight funding means lack of staff to develop and maintain data and little opportunity to get training needed to develop needed skill to manage and analyze data. Some organizations hardware and software is old and outdated.	Lack of Funding/Staff/Training	40%
Data that does not completely encompass a given area (e.g., Maine's coast or the Gulf of Maine). Examples include bathymetry, herring and horseshoe crab spawning areas	Incomplete Data	35%
Need to spend time researching data	Lack of Metadata	25%
Long delay between when data is collected or changes and is released/updated. Examples include NMFS survey data, closed area boundaries	Data Timeliness	20%
Need assistance to develop applications to view/analyze/distribute data. Lack of support/expertise at State level for IMS applications.	Lack of Development Support	15%
Developing complete, state or GOM-wide datasets requires long-term commitment, and for organizations to take ownership for "their" data	Commitment to Data Acquisition	15%
Difficult to use interfaces for data download sites. Examples include MEGIS, Northeast Consortium	Poor User Interfaces	15%
Time and effort required to find and access data	Collecting Data	15%
Data with features or attributes that are inconsistent. This can be spatial (i.e., accuracy varies from location to location) or tabular (i.e., field type definitions). Examples of former include Closed shellfish areas, bathymetry, and where bathymetry and topography meet	Inconsistent Data	15%
Organizations fail/refuse to release non-sensitive data that should be made available (old boy network) Example - historical whale sightings	Data Hoarding	10%
Adding metadata is time-consuming. Format is difficult to follow. Must re-post existing metadata for use by GOM Ocean Data Partnership	Metadata	10%
Time is required to educate users about data before releasing it. Examples include fisheries abundance data	User Education	10%
Lack of standards	Data Standards	10%
Time required by organizations to prepare and organize data before distributing it. Large files sizes also make distribution difficult	Data Distribution	10%
Data layers that represents the same information, but has slightly different features and/or attributes. Examples include: 1:24k coastlines, drainage divides, water quality sampling data	Duplicative Data	5%
Datasets can be very large and are difficult to organize and backup. Examples include imagery, sidescan sonar	Archiving and managing large datasets	5%
Lack of coordination (communication) between organizations and organizations result in duplicative efforts to create same data	Lack of Coordination/Duplicative effort	5%

Note that 12 of the 17 listed bottlenecks involve data and metadata. These are shaded in the Summary column above. The others bottlenecks are:

- lack of funding and staff
- applications needing upgrading
- lack of user education
- lack of communication between organizations

4.7.1 Ranking types of potential GIS Support

The questionnaire gave the interviewees the opportunity to rank the usefulness of various types of hypothetical support they could be given for their GIS programs. The following chart is a summary of these options. The columns have been sorted so that the leftmost column (Financial Support) is ranked the highest overall, and the rightmost one (Web Hosting) is ranked the lowest. These rankings and requests will be factored into the recommendations section of the report.

Ranking Requested Support for GIS Activities													
Name	Financial Support	Shared Planning	Training	Data Distrib Assist	GIS Stand-ards	User Group	Coord App Dev	Ad Hoc Assist	Land Based Coop	Blanket Purchase Contract	Free Software	Seminars	Web Hosting
DMR	4	4	4	5	3	2	2	3	1	3	2	1	2
DOC	5	3	3	2	2	3	4	3	2	2	4	1	2
Maine SPO	5	4	3	4	4	4	3	3	4	4	2	3	4
MEIFW	5	5	1	1	3	3	3	1	1	1	1	3	1
MEGIS	5	5	4	4	5	3	5	3	1	5	3	4	5
DEP	5	3	3	3	5	1	4	1	4	2	2	2	3
GOMOOS	5	4	4	5	5	4	3	3	3	2	3	3	2
GMRI	4	2	5	5	2	4	2	4	1	4	5	4	2
UMO	3	1	5	2	1	4	1	4	4	1	5	1	1
UNE	5	4	5	4	2	5	3	3	3	5	3	3	1
USM	5	5	3	5	5	5	5	5	5	3	3	3	3
COA	5	4	4	3	2	4	1	3	4	1	1	3	4
SMS	5	4	1	4	1	3	3	1	2	3	1	2	1
TNC	2	4	4	5	3	5	2	2	3	1	1	2	1
MCHT	5	5	5	3	5	4	4	5	4	5	5	2	1
USFWS	5	4	2	5	4	3	4	4	5	2	4	3	1
WellsNERR	5	3	5	4	3	2	5	5	3	5	4	4	4
Island Inst	5	5	4	2	3	4	3	4	4	5	5	5	4
ME Audubon	5	5	5	2	5	1	5	4	5	2	1	4	4
SVCA	5	4	5	4	5	2	4	4	4	5	5	4	4
TOTAL	93	78	75	72	68	66	66	65	61	61	60	57	50
RANK	1	2	3	4	5	6	6	7	8	8	9	10	11

5 Needs and Recommendations

5.1 Overview

Based on the research described in the previous sections, it is clear that the efficiency and quality of marine-related GIS endeavors can be improved. Challenges exist, but a focused effort by the players in the marine community to coordinate their work where practical, and to build upon ongoing efforts in the wider GIS community can lead to a real improvement even without large infusions of money. Furthermore, with additional financial and staff support, many of the bottlenecks and individual organization shortfalls can be mitigated and overcome.

The emphasis of several of the recommendations is on encouraging the marine users to work in a more coordinated manner both with each other and with the larger GIS community in Maine including the state agencies that deal with whole state, and the federal and Canadian agencies that deal with the entire Gulf of Maine, i.e. those participating in and contributing to the GOMMI, GoMOOS and GMRI projects.

It is also important for the Maine marine community to take advantage of existing opportunities and resources. Therefore some of the following recommendations are incremental in nature and utilize current resources to the extent possible. The Maine GeoLibrary and MEGIS staff has developed a true statewide GIS program. They have consolidated numerous data, software and staff expertise that form a foundation for GIS in Maine. While impetus for this came out of the public sector, MEGIS and the GeoLibrary have included a wide range of private and nongovernmental interests in their planning and activities. Many of the efforts now underway are of value to the marine GIS community, and should be taken full advantage of. The marine community should also make its presence and needs known in order to get the service it needs going forward.

5.2 Needed: Financial Assistance

The questionnaire responses in Section 4.7.1 showed that the #1 requested type of support is financial. Significant new funding has not been identified as a likely resource for marine GIS activities in the near future. However, we will recommend several ways that GIS activities can and will become more efficient going forward, which should allow for more results even without extensive additional funding. That said, marine GIS users should continue to pursue grants and other funding.

5.3 Needed: Shared Planning & Marine GIS User Group

While a user group ranked only in the middle of the types of assistance offered in Section 4.7.1, an effective marine user group would also be a good forum to advance the second and third most requested types of assistance- Shared Planning, and Training, as well as strengthen interpersonal bonds that may also lead to better ad hoc technical assistance availability from other users (another type of assistance that ranked in the middle).

One way to raise the visibility and strength of marine GIS in Maine is to form a marine GIS user group to promote the development of marine data and applications and assist its

members in the use of GIS. It could be affiliated with the Maine GIS user group (MEGUG) which meets three times a year and provides other services to its members. There could be a marine breakout session when MEGUG meets, but the marine GIS group could principally be a 'virtual' user group that communicates electronically.

A recognized marine group would give the marine users potentially more clout within the Maine GIS user community. This should lead to influence on broad policy issues, such as the specifications for new base map development and potential other data and GIS infrastructure projects, and ensure that the unique needs of marine users are not ignored or overlooked. Everyone is busy, but a user group does not have to be elaborate or particularly time-consuming.

5.3.1 Marine GIS User sub-groups

Geographically and culturally the 20 organizations interviewed for this needs assessment have greatly different organizational and programmatic goals. They split along several planes:

- Their type of organization as used as a differentiator in this report (state, academic, research, land trust, federal, conservation)
- Government vs. Private
- Science vs. Policy
- Large vs. Small

However, perhaps the most useful differentiator may be their principal geographic area of interest- near-shore vs. Gulf of Maine. This is because of two related factors:

- the type of data that has been and is currently generated for these areas has very little overlap
- the focus of interviewed marine organizations is generally on one area or the other.

While the ultimate goal of GIS is to have integrated data sets that enable work on a large regional basis, e.g. the entire Gulf of Maine, in the short term more data and application coordinated goals can be pursued and accomplished towards that long term aim.

Therefore the recommendation is to think in terms of 2 subgroups, one with a nearshore focus and one for offshore marine interests. While this may appear to dilute the marine focus, in fact it allows each group to sharpen their focus onto the issues they each are most interested. While there are data overlaps between nearshore and offshore (e.g. fisheries studies and geology), there is currently not extensive overlap in the projects or data required by the near-shore and offshore focused groups. The goal here would be to expand the merging of data sets and applications over time, and ultimately have relatively seamless data from inland Maine to its offshore borders and beyond into the full Gulf of Maine.

5.3.2 Nearshore Marine Mapping Subgroup

The subgroup of those focused on the near-shore marine environment should be self-selected, but probably includes all of the groups interviewed for this study with the exception of GoMOOS, and most of the academic research groups, (excepting COA, which has a history of nearshore GIS activities). This subgroup has several needs that most of them are concerned with:

- Nearshore data sets including natural resources, human use, and pollution data
- Onshore data on property ownership, conservation lands and other land uses
- Watershed characteristics as it may affect the marine environment
- Identification of areas to conserve and protect
- Coastal morphology and ecology
- Better integrating data and applications with the land-based organizations and their GIS and mapping activities.

It is obvious that the shoreline and near-shore marine environment is a zone of transition between the land and the sea, and this has also been the case in terms of mapping and data gathering over a long period of time. From the first time accurate maps were made, with the possible exception of some DesBarre charting from the late 18th century and the US C&GS charts of the late 19th and early 20th centuries, most maps have been compiled to focus either on the land or the near shore environment or, less frequently, on the open sea.

The map projections have been different, the definitions of the shorelines they have used are quite different, i.e. whether the datum is based on mean high water (MHW) or low low water (LLW) or other datums. It has been left to individual users of these resources to bring the information together when needed. Add to this the changeable nature of the marine environment and the different dates when the data were compiled and the integration of these data resources is a complex and nuanced issue. GIS can ‘theoretically easily’ bring any of the geographic data sets together, but to do it in a coherent and planned way is a significant challenge.

The new orthophotography will partially bridge the divide, but it was not flown to consciously capture low tide, or to extend far enough into the ocean to cover all shallow and near-shore areas (DMR does have some imagery flown in synch with low tide).

5.3.3 Offshore Marine Mapping Subgroup

As shown in the first part of this study, offshore focused programs are excellent at gathering and analyzing accurate and scientific data sets of the geology, biology, habitat, atmosphere, and marine water column. They do this primarily with remote sensors and sampling techniques.

What is missing from the group of 20 that were interviewed for this study are those mainly federal groups that plan the global sensors and data development exemplified by the vast data being gathered into the GoMOOS website and the GOMMI efforts to

coordinate and find funding to advance multibeam seafloor mapping. However, the groups that were interviewed are very cognizant of these activities and are well positioned to keep the near-shore groups apprised of trends and activities. They are also likely to be early adopters of GeoPortal technology as a way of efficiently using data sets from multiple sources without having to replicate them on their own networks.

5.4 Needed: Better Data Distribution

The fourth most requested type of assistance is data distribution. The heart of the Maine GeoLibrary is its warehousing of GIS data sets to provide internet-based cost-free access to the data by all users (government, NGOs and the public). While MEGIS has allowed searching and downloading of data sets for some time, the Geolibary is implementing a “GeoPortal” which extends and standardizes this capability within standards established by the Open Geospatial Consortium (OGC). The new system will allow for extended search capability, including direct connection to other OGC compliant portals so that those repositories, including NOAA, other federal agencies and GeoConnections (which is developing Canada’s Geospatial Data Infrastructure) can be searched. Also built into the portal design is the ability to directly view data sets from multiple portals within a browser session. This is the ‘web services’ described in Section 4.4.4. While this technology is still being implemented, it points to the potential for the Maine marine GIS community to much more effectively find and use GIS data for their required applications. As this technology matures over the next few years, the marine community will have the choice of loading data sets into the GeoLibrary portal, other OGC portals. All this capability presupposes data and metadata standards.

Many of the data sets currently being used by most of the 20 marine organizations and others are currently within the GeoLibrary warehouse, and additional data of general interest produced in the future should also be formatted for inclusion in the GeoLibrary or other data portal. This would help the user community in two ways- the data producer could point data requesters to the GeoLibrary rather than having to take the time and make the effort to respond to individual requests for the data. Also, if good data is in the GeoLibrary, others can more easily find it and include its information in their studies.

The current system is not perfect. It has limited funding, and is still under development. Some data is awkward to use for large areas, as it is currently stored as relatively small tiles. Some user find the metadata requirements daunting and this inhibits them submitting good data sets for inclusion in the GeoLibrary where they could benefit many users. However, the state has made a major commitment to this infrastructure, and it is recommended that they be engaged by the marine community of users and strongly encouraged to provide the services they need. Once data is loaded into this system, it will be much easier to access and distribute via simple internet downloading.

The Maine GeoLibrary is set up to archive “out-of-date” data sets in conjunction with the MEGIS data warehouse. This resource will, over time, become more and more important to many marine applications that need to quantify change in the human use of coastal areas and watersheds.

5.5 Needed: Data and Metadata Standards

The fifth most requested type of assistance is with data standards. The GeoLibrary has adopted several types of standards for GIS related data and metadata. The primary documentation standards are the Federal Geographic Data Committee (FGDC) standards for metadata creation and management, and the MEGIS data standards <http://apollo.ogis.state.me.us/standards> which are focused on the accurate map compilation and automation.

FGDC compliant metadata is a requirement for data sets to be included in the GeoLibrary. The FGDC metadata standards focus on proper and full documentation of GIS data sets to allow users to rapidly understand the strengths and weaknesses of existing data as they evaluate it for relevance within their own applications. Data and metadata issues dominated the list of bottlenecks in Section 4.7. as well as the list of data exchange impediments in Section 4.4.3. Ironically there are many complaints both about how hard it is to create metadata and complaints that incomplete metadata makes it difficult to understand and appropriately use data. Data development is very expensive and time-consuming and unless there are security or confidentiality issues, the data should be made available to the wider GIS community in a manner that is easy to use. Marine GIS users must make the effort to rectify this situation by finding time to create metadata for marine data that they produce.

Software such as ESRI's ArcCatalog and Intergraph's Spatial Metadata management System (SMMS) and Metavist are designed to produce FGDC compliant metadata. Many marine users use ArcGIS, which includes ArcCatalog. It can create some of the fields of FGDC compliant metadata relatively easily, but the users need to add additional data to be fully compliant. If the user community can reduce the level of effort needed to find and distribute GIS data, it will have more time for new data development, marine focused applications and other initiatives.

MEGIS staff Kate King is ready and willing to assist in the review of GIS data sets, review of metadata and installation of data in the Maine GeoLibrary. This and other MEGIS staff expertise should be utilized when needed, in a responsible way. Maine DMR would likely be in a good position to assist if the organization developing the data were without much experience in this type of transaction and the data were judged to be of value to the marine user community.

While MEGIS has always offered a limited amount of no-cost technical assistance to state agencies and affiliated group, it relied on fee-based MOUs for additional and larger projects. There is a plan in place to change this to a system built into the Maine Office of Information Technology assessment. Depending on how this moves forward, MEGIS may have added capacity to provide technical assistance to its user community.

5.6 Needed: Outreach and Education

MEGIS provides some outreach and education. Their website has extensive information on GIS theory and practice, available data and metadata, links to other GIS users, including many focused on marine issues, trouble shooting tips for hardware and

software problems, etc. In addition staff is available to answer specific queries. Marine users should take advantage of MEGIS resources; it is a solid and still developing asset for the state and its many GIS activities. The marine GIS community should work with MEGIS to get the services they require.

5.7 Needed: Marine Data

MEGIS and the larger GIS user community have prioritized production of several data sets also of great interest to the marine organizations interviewed. The user community should keep up-to-date on these projects and use the data when it is available. These include:

- up-to-date orthophotography base map managed by MEGIS - southern coastal Maine is complete (2001 imagery) and the remaining coastal areas are scheduled to be delivered by late Fall 2006. This is excellent color imagery- 1' pixels in the South and 2' pixels further down east. Existing samples show some features underwater and visibility in shallow waters should add to its utility for the near-shore marine users. While the extent of the imagery below the shoreline might not be adequate in all locations, this will be a good new source as a base map and for facilitating the compilation of visible features into vector data sets (e.g. docks, piers and wharfs).
- land parcels- there is an active program underway with the GeoLibrary board distributing \$366,000 to over 70 communities to enable them to produce GIS parcel data to a common standard. Parcel automation and attribute standards were established and data is being funded and gathered on a town-by-town basis. The common production and data standards are key for organizations to efficiently and seamlessly use parcel data from multiple communities in their mapping applications.
- A data set not identified by the organizations interviewed, that would be very useful for some applications are detailed layers of land hydrography and watershed boundaries. There is currently a statewide data set available and USGS is nearing completion of an updated data set.

As noted above, new software, data and metadata standards and tools, and general data viewers will continue to come from the greater GIS community, but marine data sets will only come from those requiring the data, i.e. the marine GIS user community. The following data sets are of high priority the Maine marine GIS community as identified in Section 4.4.6:

- By far the most requested (Section 4.4.6) and by far most expensive data set to produce would be detailed near-shore bathymetry created by multibeam sonar. This is a core marine 'base map' equivalent to topography on land, without which thematic data sets such as flora, fauna and geology are not 'pinned down' to an accurate vertical base reference.

Numerous projects have created detailed bathymetry for small areas of the Maine coast. Organizations doing this include NOAA, UNH and Woods Hole Oceanographic. Current US Army Corps of Engineer standards call for horizontal and vertical accuracy standards to be more accurate than the current MEGIS 24:000 USGS land basemap, e.g. 1' vertical and 6' to 16' horizontal accuracy in less than 15' of water, although a project of this extent would need to develop its own standards. Production of this data would be an excellent long-term project/goal for the marine user group, perhaps led by DMR, to plan and build over the long term. The pricing for this data set is not possible to predict without extensive research beyond the scope of this study.

The existing NOAA nautical charts are being vectorized by NOAA. Creating a bathymetric data set from this would be easy to accomplish, but also be significantly less accurate and detailed than the multibeam data described above. The harbors have larger scale manuscript maps (e.g. 1:5,000; 1:10,000; and 1:20,000), but less populated and used parts of the coast are at 1:40,000 and 1:80,000, which is a very small scale. It would take a staff person on the order of 6 months to take the vectorized data and create a statewide data set from it. A private vendor might charge \$40,000 to \$60,000 for the work. It is possible that a vendor will create it as a product and license it to the state for a much lower cost, and this should be explored.

- The Coastal Marine Geologic Map series show the locations of over 50 types marine and on-shore environment types, e.g. mud flats, beaches, salt marshes, etc. These maps are used extensively, but are out of date, having been originally published in 1976 and 1977 and subsequently digitized. The Maine Geological Survey created them originally. The series is in need of an extensive revision. The cost of this has not been estimated.
- Benthic habitat data exists on a very limited basis. Some of the basic research has been done with the Maine Geologic Survey's sidescan sonar for some of the coast which reveals bottom type. This project would build upon near-shore bathymetry data when and it is collected. There is an existing Gulf of Maine benthic point data set that has been adopted as the current standard. R. P. Signell is the principal creator of it. It is an excellent product compiled and created from many manuscripts and research projects. The one complaint is that the depth points are generalized to a ½ kilometer grid, which is adequate for Gulf wide studies but not larger scale projects. Some offshore researchers would like a more detailed representation of the benthic surface. An estimate of the cost of upgrading this data sets has not been made for this study.
- Some existing data is available for docks, piers and wharfs. The DEP has, for about 5 years, collected a database of dock and wharf permits. In addition, The Island Institute is compiling data on public and commercial docks, piers, wharfs and related rights-of-way. They say that about 90% of communities are cooperating in this survey. In addition, the new state orthophotography is clear

enough to see these structures. It is estimated that a project to pull all this information together into a GIS point data set would take approximately ½ a person year, assuming the Island Institute survey was completed for the participating communities.

5.8 Needed: Hardware, Software and Applications

Some organizations noted that their hardware (computers, plotters, and other peripherals) were out of date, but the interviewees did not highly rate the need for assistance with blanket purchases of hardware or software. ESRI does have software blanket purchase agreements with the state agencies, the university system

Much of the need for GIS applications can be met with basic GIS software and the growing number of simple, robust data viewer applications, more and more of which are based on web browser technology. As discussed in Section 4.4.4, there is great effort in the GIS community being put into web-based applications and web services, and the marine GIS users will be able to benefit from these developments at MEGIS, federal agencies and user groups, and from vendors such as ESRI and Google. Marine users, especially from smaller organizations, will be able to largely piggyback on these developments rather than spending the time learning to develop their own user interfaces for simple data viewing and map creation.

That said, if an organization has a specific need for an application with unique capabilities and/or sophisticated analysis, these applications currently should be developed on desktop GIS systems. If the application is also of general interest outside of the organization a customized browser can be the best method of making the information available. An excellent example of this is the ArcIMS based Northeast Regional Cod Tagging Program <http://www.gmamapping.org/codmapping/> described in Section 4.4.4.

5.9 DMR coordination role

DMR has funded this study. We believe it clearly demonstrates that a focused, coordinated effort is required to significantly advance the quality and capabilities of marine mapping in Maine. As the state agency primarily involved with the Maine marine environment, DMR is well positioned to take a leadership role in coordinating and promulgating marine GIS activities. In addition to promoting the recommendations made herein, the following tasks would be basic to this role:

- Be a core driver of the recommended marine user group
- Advocating needs of the marine GIS community to MEGIS, GIS Executive Council and Maine GeoLibrary
- Provide outreach and education to the marine GIS community, advising them on:
 - existing and planned data and data analysis resources
 - getting new data collected in a standard manner
 - assist in getting important new data sets funded, produced, documented and installed in GeoLibrary which gives the user community ready access
 - providing ad hoc technical assistance to marine users
 - provide or notify about workshops and training opportunities

- Maintain and update the Access database created as part of this report
- Support ongoing email/web page/wiki communications highlighting data, application, and staffing issues and decisions among marine users and related other groups, include information on any marine user group initiatives

Appendix A – Survey Form

Appendix B - Survey Participants

ORGANIZATION	NAME
Maine Department of Marine Resources	Seth Barker
Maine Department of Marine Resources	John Fendl
Maine Department of Marine Resources	Carl Wilson
Maine Office of GIS	Dave Kirouac
Maine Department of Environmental Protection	Steve Harmon
Maine State Planning Office	Liz Hertz
Maine State Planning Office	Janet Parker
Maine Department of Conservation	Steve Dickson
Maine Department of Inland Fisheries and Wildlife	Don Katnik
Gulf of Maine Research Institute	Shelly Tallack
Gulf of Maine Ocean Observing System	Tom Shyka
University of Maine, Department of Geology	Joseph Kelley
University of Maine, School of Marine Science	Andy Thomas
University of New England	Stephan Zeeman
University of Southern Maine	Matthew Bampton
University of Southern Maine	Nick Wolff
College of the Atlantic	Gordon Longsworth
The Nature Conservancy	Dan Coker
Maine Coast Heritage Trust	Megan Shore
Maine Coast Heritage Trust	Christina Epperson
U.S. Fish and Wildlife Service	Bob Houston
Wells National Estuarine Research Reserve	Susan Smith
Wells National Estuarine Research Reserve	Megan Tyrrell
Maine Audubon	Barbara Charry
Sheepscot Valley Conservation Association	Maureen & Paul Hoffman
Island Institute	Shey Veditz