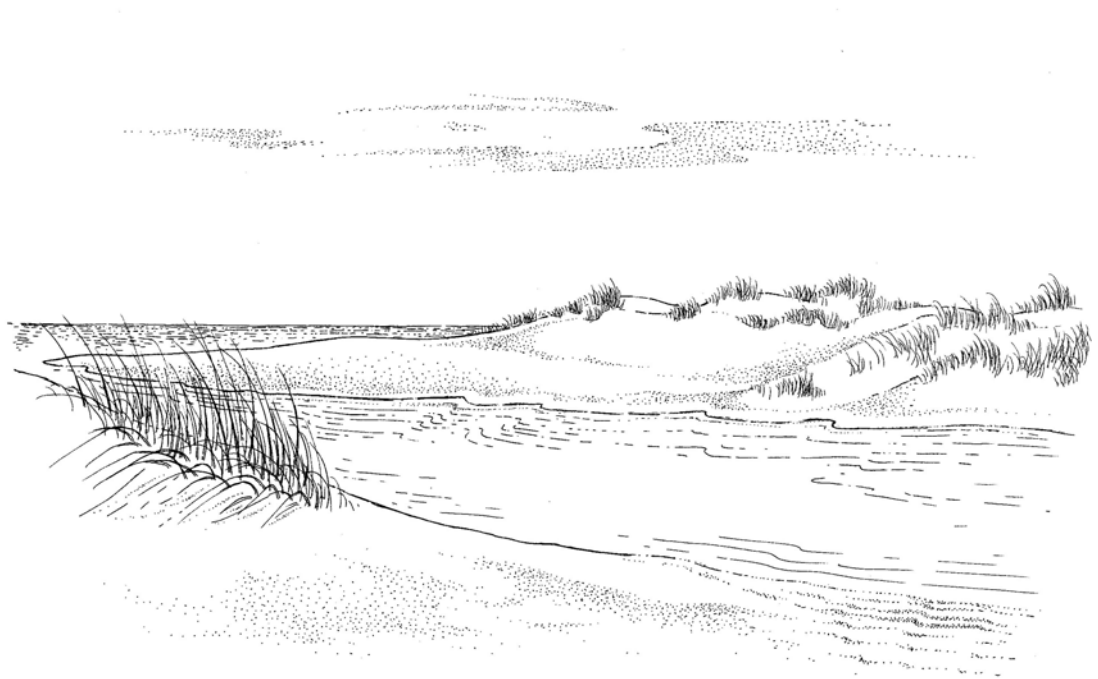


Protecting Maine's Beaches for the Future

A Proposal to Create an Integrated Beach Management Program



A Report of the Beach Stakeholder's Group
to the Joint Standing Committee on Natural Resources
122nd Maine Legislature, 2nd Regular Session

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

Account #013-07B-3650-012-6001

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Maine State Planning Office
Maine Coastal Coalition
Maine Innkeepers Association
Conservation Law Foundation (CLF)*

Maine Department of Conservation
Save Our Shores Maine
Maine Audubon
Timson and Associates

** Although not a signatory to the framework document, CLF representatives fully participated in the stakeholder group's activities and decisions*

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PROTECTING MAINE'S BEACHES FOR THE FUTURE

A Proposal to Create an Integrated Beach Management Program

I. Executive Summary

Maine's sand beaches are among our state's most important natural resources. Beaches are an integral feature of the natural or "green" infrastructure that supports our state's natural resource-based tourist economy. Currently, state agency staff administers statutes and rules to *regulate* activities on our beaches, our agency scientists *study and monitor* our beaches, and through a few programs we work with local volunteers to *steward* our beaches. However, as a state, we do little to actively *manage* our beaches. Without active management and increased attention and future investment on the part of the state, Maine's beaches will continue to suffer from chronic erosion, thus diminishing public recreation opportunities, storm buffering capabilities, habitat, and property values and eventually affecting the quality of our tourism industry.

Protecting Maine's Beaches for the Future: A Proposal to Create an Integrated Beach Management Program presents the work of a stakeholder group convened by the Department of Environmental Protection in response to a directive from the 2nd Regular Session of the 121st Maine Legislature (PL 2003 Resolve 130). Stakeholders representing southern Maine beachfront property owners' associations, the hospitality industry, and environmental advocacy groups joined staff of the DEP, Maine Coastal Program in the State Planning Office, and Maine Geological Survey to propose an integrated system of regulations, incentives, public investment and hazard mitigation aimed at:

- Reducing the threat or risk of erosion to beaches;
- Enhancing beachfront for habitat;
- Enhancing the beach for recreation and tourism;
- Improving public safety;
- Improving coastal public access; and
- Protecting existing residential and commercial development and public facilities

In **Sections II and III** (*Introduction* and *Background*, respectively) the report highlights the importance of Maine's beaches as sources of recreation, critical wildlife habitat, storm protection, and as highly desirable residential and business locations. By highlighting these values and describing current risks to beaches, these sections of the report present a case for investment in active management of Maine's beaches.

As reflected in **Section IV** of the report – *Specific Elements of Maine's Integrated Beach Management Program* – the stakeholder group worked hard to balance competing interests and

to identify tools and techniques that are appropriate for use in Maine. While other states continue to allow “armoring” of their shorelines with seawalls, jetties, groins and other erosion control devices, Maine’s approach to active beach management includes a) soft solutions such as beach nourishment and dune restoration, b) hazard mitigation techniques to reduce the threat to existing structures, including willing-seller acquisition, and c) in some cases, no action -- letting natural processes work to allow the beach to grow and diminish over time in tune with a more natural cycle. The authors of this report chose to refer to this proposal as an “*Integrated Beach Management Program*” to underscore the concept that no one tool or technique is sufficient to bring about active management in Maine.

In addition to evaluating individual management tools, **Section V** of the report – *Evaluating Beach Management Techniques for Specific Areas* – presents a framework for evaluating among different management actions. This section of the report provides a cursory look at management priorities.

Section VII, *Funding Maine’s Integrated Beach Management Program* presents the findings of an analysis of existing and potential future funding sources. It sets the stage for additional, interim steps to be accomplished over the next two years in preparation for an eventual request for state funding to improve Maine’s beaches. Because Maine’s dry sand beaches are predominantly privately-owned, the report, in earlier sections, also discusses the public benefit associated with investment in beaches and discusses when public support is appropriate and under what conditions.

In its entirety, the report details six specific elements of an *Integrated Beach Management Program*, and offers 31 recommendations needed to implement the program. The six elements, and a short summary of the recommendations in each, are as follows:

1. **Recommendations Concerning Beach Nourishment (Section IV.A)**
Sand nourishment (sometimes called “replenishment”) can serve several of the objectives above. The recommendations include amendments to the current coastal sand dune rules, and focus on establishing criteria, refining priorities, and estimating funding needs for specific beach nourishment projects undertaken with public funds. All the recommendations are directed toward increasing the use of sand renourishment in certain cases where it is appropriate.
2. **Recommendations Concerning Wildlife Habitat (Section IV.B)**
Maine’s beaches provide nesting habitat for several endangered and threatened species, chief among them the piping plover and least tern. Active management of Maine’s beaches may result in wider sand beaches and additional habitat, but healthier beaches may attract more visitors. The report recommends establishment of best management practices to protect shorebirds through cooperative agreements, permit conditions, and landowner agreements.
3. **Recommendations Concerning Willing-Seller Acquisition of Storm-Damaged Properties (Section IV.C)**
Purchasing property from willing sellers, removing at-risk or storm-damaged structures and restoring the property to open space is one way to eliminate risk to buildings and public safety. The report establishes principles to guide willing-seller land acquisition in

the beach system and recommends additional analysis of at-risk areas, creation of new funding sources, and collaboration among existing emergency management and conservation programs.

4. **Recommendations Concerning Hazard Mitigation (Section IV.D)**

Hazard mitigation refers to a variety of practices that can help municipalities and homeowners reduce their risk for storm damages, including elevating and floodproofing structures, and relocating roads and utilities, among others. These recommendations center on improving interagency coordination, enhancing education and outreach efforts, and assuring that available funds are directed toward local efforts to mitigate coastal hazards.

5. **Recommendations Concerning Education and Outreach (Section IV.G)**

New outreach, particularly to local municipalities, will be key to implementing the program. This section of the report describes outreach to be conducted via meetings, workshops and through print materials.

6. **Recommendations related to Funding (Section VII)**

The stakeholder group recognized that existing, available funds are not sufficient to accomplish the objectives of the *Integrated Beach Management Program*. To secure additional funding, further work is needed to develop more precise estimates of costs for various management strategies. A funders' workshop, economic impact study, and a tourism infrastructure funding workshop are suggested ways to move towards securing additional investment in beach management.

Section VI of the report – *Implementing Maine's Integrated Beach Management Program* – creates a timetable and series of activities to implement an active management program. This section:

- Identifies information needing to be gathered in order to secure support for new funding, and set priorities for projects based on geologic and habitat considerations, and acquisition and management strategies.
- Proposes the establishment of an inter-agency advisory group, also including representatives of municipalities, land owners, and environmental groups, to continue the work of the stakeholder group and oversee the next steps. The group would oversee the development and maintenance of priority lists, and could serve as the review body for requests for state funds.
- Encourages municipalities and other local entities to develop beach management plans.

This report presents a significant new policy direction in the way we consider sand beach resources in Maine. The report's authors welcome your critical review of the ideas presented herein and hope that this product is a start towards an even larger public consensus about the future of Maine's beaches.

II. Introduction

For social, recreational, economic and environmental reasons, beaches are among Maine's most prized natural resources.¹ Due to persistent erosion, sea level rise, past unsound harbor improvement and past unsound public and private development practices, Maine's beaches are also threatened. This report is the product of an eighteen month-long stakeholder process, created at the direction of the 2nd session of the 121st Maine Legislature (see PL 2003 Resolve 130 contained in Appendix A). The report describes existing problems with current beach management and proposes a series of recommendations, including the creation of a new Integrated Maine Beach Management Program. This Program proposes an integrated system of regulations, incentives, public investment and hazard mitigation aimed at improving the physical, economic and environmental quality of Maine's beaches and the communities where they are located as places in which to live, work and play. This proposed program is compatible with the intent of the Natural Resources Protection Act, which in effect, calls for ongoing continuous improvement to "facilitate research, develop management programs and establish sound environmental standards that will prevent the degradation of and encourage the enhancement of these resources."²

A Resource of Statewide Significance

Beaches comprise only about two percent or seventy-five miles of Maine's coastline. Sand beaches account for less than 40 of the 75 miles, with coarser gravel and boulder beaches comprising the remainder. Most large sandy beaches occur along the southern coast between Kittery and Cape Elizabeth, although a few miles of sandy beaches also occur in midcoast Maine near the mouth of the Kennebec River. Public ownership of sand beaches (permanent preservation of beaches in federal, state or municipal ownership), consists of approximately 19 miles of shoreline.³ In areas that are not publicly owned, established public rights include fishing, fowling and navigating in the intertidal zone, that area between low and high tides.⁴ There is a strong tradition however, of public recreational use of intertidal areas and dry sand beaches in Southern Maine. Public use of privately owned areas is dependent on the informal consent of landowners in exchange for good "visitor-behavior" on the part of the public.

Maine's beaches provide multiple values to many different user groups.

- Beaches permit unsurpassed recreational activities to Maine's residents and visitors. In terms of numbers of trips (a statistic commonly used in travel and tourism

¹ In 38 MRSA, Section 480-A the Maine Legislature declared that "the State's ...coastal sand dune systems are resources of state significance. These resources have great scenic beauty and unique characteristics, unsurpassed recreational, cultural, historical and environmental value of present and future benefit to the citizens of the State and that uses are causing the rapid degradation and, in some cases, the destruction of these critical resources, producing significant adverse economic and environmental impacts and threatening the health, safety and general welfare of the citizens of the State."

² 38 MRSA, Section 480-A

³ This figure is a "best estimate" provided by the Maine Geological Survey in 2006. A more accurate figure can only be arrived at by conducting a parcel-by-parcel review of property deeds.

⁴ As established in *Bell v. Town of Wells*, 557 A.2d 168 (Me.1989)

analyses), the Southern Maine coast is Maine's most important tourism region and the ocean and its beaches are the key attractions for visitors to the region.⁵

- They provide a natural barrier that protects the shoreline from catastrophic storm events.
- Beaches provide habitat for numerous shorebirds and a variety of plants and animals including critical habitats for endangered and threatened birds, the piping plover and the least tern.
- Maine's beaches are desirable places to live. Real estate along Maine's beaches is some of the most highly valued property in the state, contributing significantly to municipal valuation in coastal communities.

Southern Maine Beaches as an Economic Engine

Tourism is Maine's largest industry. In 2004, the tourism industry in Maine yielded \$6.2 billion in spending and represented more than 176,000 jobs, 3.8 billion dollars in wages and 531 million dollars in tax revenues.⁶ Selected statistics show the relative importance of beaches to Maine's tourist market.

- The Southern Maine Coast (south of Greater Portland) is the most frequently visited region in Maine - 45% of visitors to Maine visit this area while they are in the state.
- For 29% of visitors to Maine, the Southern Maine coast is their final destination.
- 54% of people say that "visiting the beach" is their most pleasurable experience on an overnight trip to Maine.
- 43% of those that visit Maine for sports and recreation activities visited an ocean beach.
- 14% of Maine's overnight trips are to beach areas, the third most important activity after "touring" and "outdoor activities."
- 11% of day trips are to beaches, third behind shopping and outdoor activities.
- Maine ranks 17th among the 50 states for overnight beach trips.

Local stakeholders report anecdotally that their beach neighborhoods are becoming more economically vibrant on a year-round basis as formerly absentee homeowners are establishing year-round residency.

Maine's Beaches are at Risk

Erosion problems in Maine are caused by a persistent rise in sea level, storm activity, changes in sand availability, and pre-1983 oceanfront development,⁷ including the construction of jetties and seawalls. The Maine Geological Survey (MGS) estimates that

⁵ Longwoods International, June 2004, Travel and Tourism in Maine, The 2003 Visitor Study, Southern Maine Coast.

⁶ The source of all statistics in this section, unless otherwise noted, is Longwoods, International, July 2005, Travel and Tourism in Maine, 2004 Visitor Study Management Report.

⁷ Maine's sand dune rules were adopted in 1983, preventing further development in frontal dunes and prohibiting the construction of new hard erosion control structures.

about 50% of Maine's sandy beaches are "armored" with these types of "hard" engineering structures, such as seawalls, that limit the natural ability of beach and dune systems to maintain themselves.

About 10% of Maine's beaches are highly erosional. In general, highly erosional shorelines have erosion rates of over two feet per year. Some of these beaches have seawalls along the frontal dune, while few have no seawalls. Most are in need of beach replenishment to replace eroded sand. Along many of these shorelines, there simply is no beach for about half of the tidal cycle.

About 50% of Maine's beaches are moderately erosional. Along some of these beaches where seawalls are present, the seawalls are regularly overtopped during winter coastal storms, and a limited number of seawalls have been undermined during severe coastal storms. At some beaches classified as "moderately erosional" with seawalls, undermining has been localized. Here, overtopping also occurs once or twice a year in winter, but is usually restricted to limited areas of beachfront properties. Natural beaches in this category have chronic dune scarps (steep drop-offs) and frontal dune erosion. Many beaches in this category have exposed gravel berms and limited recreational opportunities at high tide.

About 40% of southern Maine beaches are only slightly erosional.⁸ Appendix B provides more information about the characteristics of Maine's beaches, including development status, beach replenishment history, shoreline armoring status, and shoreline change status.

Erosion compromises the ability of beaches to:

- buffer adjacent development from storms and flooding;
- provide vital natural habitat; and
- successfully accommodate recreation and attract tourism.

The loss of character of beaches due to erosion is nationally the number one concern that tourists have about beaches.⁹

Ongoing Management Challenges and a Call to Action

The attributes of Maine's beaches, coupled with the very real threat of loss of beaches from chronic erosion and sea level rise, merge to create complex challenges for beach management. Property owners want to protect their homes and businesses; municipalities want to protect their tax base; environmental groups want to maximize habitat and minimize damage to the natural beach system; public resource managers want to maximize public access, minimize risk, and limit unsound public spending. Despite previous attempts at resolving these issues, differences have persisted among regulators, property owners, municipalities and environmental groups about the best way to manage Maine's beaches.

⁸ Slightly erosional beaches have slow erosion rates or variable erosion and accretion rates, often have a sandy summer berm and seasonal exchanges of sand with the offshore, have a fairly large frontal dune, may or may not have seawalls and offer recreation opportunities at all tide levels.

⁹ Hall, C. and Staimer, M., 1995, "Concerns about the Coast," USA Today, Page 1A, August 9, 1995.

In spring 2004, after a contentious Legislative session that saw debate on competing bills to amend Maine's sand dune rules, the 121st Maine Legislature directed the formation of a multi-party stakeholder group to discuss a wide range of topics with the intent of reaching compromise.¹⁰ The parties that signed the stakeholder agreement committed to "a facilitated broad ranging discussion...over the next two years to improve relations, strengthen all parties' commitment to coastal sand dune protection and enhancement, hazard mitigation, wildlife habitat management and improvement, beach nourishment, improved construction standards in high risk areas, and improved public access."¹¹ The "Framework Agreement on Sand Dunes and Coastal Management" is included as Appendix C of this report.

As specified in the "Framework Agreement," the stakeholders agreed to deliberate and report back to the Legislature on the following topics:

- A proactive State beach nourishment policy that establishes priority areas, and evaluates public and private funding sources, implementation timeframes and public access easements;
- Wildlife and wildlife habitat management in the sand dune system;
- A program for voluntary acquisition of storm-damaged properties or properties for dune enhancement or public access;
- Improved state coastal hazard mitigation plans to direct federal spending;
- Improved and increased public and private voluntary hazard mitigation programs; and
- A series of regulatory changes including reconstruction of buildings in the frontal dune and v-zone;¹² removal of the existing statutory prohibition on use of outdated v-zone maps; and regulatory incentives to encourage construction or reconstruction outside of the frontal dune.

A New Approach

Upon convening in the summer of 2004, the stakeholder group made a number of preliminary findings including:

- Maine's current method of managing sand dune resources relies almost exclusively on laws and rules that regulate activities in the sand dune system. This approach has resulted in frequent attempts at reform that are often contentious and counter-

¹⁰ PL 2003 Resolve 130, see also Appendix A of this report.

¹¹ Framework Agreement on Sand Dunes and Coastal Management in Maine, March 10, 2004. Signatories to this agreement included the Commissioner of the Maine Department of Environmental Protection, the Commissioner of the Maine Department of Conservation, the Director of the Maine State Planning Office, the President of Save Our Shores - Maine, the President of the Maine Coastal Coalition, a representative of the Maine Innkeepers Association, the Advocacy Director of Maine Audubon, and a private consulting geologist. The Conservation Law Foundation, while not a signatory to the agreement, participated in the stakeholder process at the consent of the group.

¹² A frontal dune is the area consisting of the most seaward ridge of sand and gravel and includes former frontal dune areas modified by development. V-zones are land areas of special flood hazard subject to a one-percent or greater chance of flooding in any given year, and subject to additional hazard from high velocity water due to wave action.

productive. Appendix D provides a chronology of major events associated with beach management in Maine.

- The current system *regulates* development activities on Maine’s beaches, but does not work to proactively *manage* beach resources.
- An integrated “package” of beach management techniques is needed to protect Maine’s beaches for the future. An integrated package is needed because no one technique will be successful in mitigating erosion, rebuilding dunes and reducing risk from coastal storms.
- A new approach to proactively manage Maine’s beaches should include regulatory changes, beach nourishment in selected locations, dune restoration in selected locations, acquisition of properties from willing sellers, and improved wildlife habitat measures.
- Implementation of a proactive beach management program will require funding, including new sources of state, municipal and private funding. Maine’s sand beaches are critically valuable to the Southern Maine regional economy and the State’s economy. Effective beach management is a key to a sustainable natural resource-based economy.

The stakeholder group also created the following list of eight goals to guide the management of beach resources in Maine. Each of the specific program elements discussed in Section IV of this report helps meet one or more of these goals.

Goal 1: Protect, Preserve, Restore and Enhance Beaches

Proactive management is vital to maintaining and enhancing the environmental and aesthetic character and economic value of Maine’s sandy beaches. Therefore, Maine’s Integrated Beach Management Program will work to protect, preserve, restore, and enhance Maine’s beaches. The selection of appropriate management techniques will be based on careful analysis of the geologic, environmental, economic and social characteristics of individual beaches.

Goal 2: Avoid and Reduce Coastal Hazards

Southern Maine remains at high risk for property damage due to coastal storms, flooding and erosion. A documented rise in sea level exacerbates this risk. Maine recognizes the need to implement a policy of hazard avoidance, reduction, and mitigation along its sandy shorelines to counteract and delay the impacts of these natural forces. Maine’s Integrated Beach Management Program will guide activities to avoid coastal hazards, and where that is not possible, to reduce the influence of coastal hazards. The Beach Management Program should work in partnership with local officials and residents to pursue federal assistance to mitigate the effects of unsound harbor improvement projects that continue to threaten public and private property and habitat.¹³

¹³ Several members of the stakeholder group were particularly interested in active mitigation of damages to beaches caused by federal navigation projects. Of several federal navigation projects in Maine, one (at Camp Ellis in Saco) was determined by the federal government to have damaged and threatened public and private property, by negatively altering the sediment budget of the natural beach system.

Goal 3: Improve Public Access

“Access to the resource” was identified by the Governor’s Summit on Natural Resource-Based Industries as a key element of a sustainable nature-based tourism economy.¹⁴

Improved public access to beaches in Maine is needed to support both a growing population and a growing tourist economy. Private property ownership, limited parking, lack of undeveloped land and high property prices provide challenges for improving public access to sand beaches. While the focus of Maine’s Integrated Beach Management Program is to enhance the health of sandy beaches in the state, the program will look for opportunities to enhance public access through partnerships with land protection and conservation efforts.

Goal 4: Protect Endangered and Threatened Species Habitat

Activities associated with beach management can have both positive and negative impacts on endangered and threatened species and their habitats. Beach management activities will avoid, minimize, and compensate for negative effects to endangered and threatened species or their habitats, and optimize opportunities for enhancement of habitat.

Goal 5: Maintain the Value of the Beach Resource

It is well established that beaches are the main attraction for many overnight visitors to Maine, as well as a popular destination for resident day trippers. Maine’s Integrated Beach Management Program will work to increase the attractiveness of beaches and maximize recreational opportunities to strengthen the local, regional and state economy.

Goal 6: Maintain the Quality of Beach Neighborhoods

In addition to the recreational and tourist-based economic value of Maine’s beaches, many coastal communities rely on the property tax base created by high values associated with coastal properties. Preserving high quality neighborhoods as places that draw investment and reinvestment is important to local, regional and state economies.

Goal 7: Improve Public Education

An outreach program implemented by state and nongovernmental agencies that provides clear and accurate information on the status of Maine’s beaches should be established to help residents and visitors act as stewards to protect, preserve, restore and enhance Maine’s beaches.

Goal 8: Improve State’s Beaches Database

Proactive beach management requires a thorough understanding of local and regional coastal processes,¹⁵ sediment budgets,¹⁶ and beach profiles.¹⁷ Developing a database on beach conditions and trends is vital to the successful implementation of Maine’s Integrated Beach Management Program.

¹⁴ For more information on Governor Baldacci’s Natural Resource-based Industries, see <http://www.state.me.us/spo/natural/gov/priorities.php>

¹⁵ “Coastal processes” are natural forces that affect the shoreline such as tides, currents, waves, flooding, and wind.

¹⁶ A “sediment budget” provides an understanding of accumulation areas and volumes of sediment and the paths and rates that it moves between different areas.

¹⁷ A “beach profile” includes series of elevation measurements from a dune across the beach to low tide or beyond that is perpendicular to the shoreline.

III. Background – Rationale for an Integrated Beach Management Program

A new proactive approach to beach management in Maine offers the opportunity to meet many objectives shared by the group of stakeholders that contributed to this report, including:

- Reducing the threat or risk of erosion to beaches;
- Enhancing beachfront for habitat;
- Enhancing the beach for recreation and tourism;
- Improving public safety;
- Improving coastal public access; and
- Protecting existing residential and commercial development and public facilities.

Like many well-intentioned public environmental policies, it will be difficult to maximize all objectives and tradeoffs that reflect the complex nature of Maine's beaches as natural and human habitats must be made. Therefore, the selection of specific management techniques appropriate for use in any given beach segment must be subject to a thorough evaluation of a number of factors, including beach geomorphology, economic value of existing uses, public uses, wildlife habitat management, and opportunities for hazard mitigation.

Three general management approaches are discussed briefly in this section to provide a context for more specific, subsequent sections of this report. Where beaches are eroding, there are several general management approaches that can be employed to address the erosion problem, including:

- allowing natural process to occur;
- mitigating hazards (including relocating or acquiring threatened structures); and
- altering or enhancing the shoreline.

These general management approaches are not mutually exclusive, so that more than one might apply in a given circumstance to a particular beach segment. The proactive beach management program proposed in this report recognizes that different beach segments each have different geological, ecological, and economic considerations that warrant the use of different tools. A summary of each approach follows:

- *Allow natural processes to occur.* This approach of “non intervention” allows natural processes to change the shoreline. In many cases where permanent structures are not present, this approach will be preferred, particularly where critical habitats are involved. In some instances, this approach will best serve the goal of hazard avoidance or reduction.
- *Hazard Mitigation.* The mitigation of coastal erosion refers to a series of techniques that lessen or reduce the effect of erosion on the built environment. Relocating development away from high hazard areas, purchasing at-risk properties from willing sellers, elevating buildings, road and utilities, elevating and floodproofing building systems such as heating systems, and improving a building's ability to withstand

storms through different construction practices are all considered hazard mitigation tools.

Relocating development away from erosive areas and/or acquiring properties that are at risk is the most direct and lasting response to shoreline erosion since it eliminates the immediate erosion threat. In this way it serves the two goals of hazard avoidance and reduction, and protection of endangered species habitat. Relocation of structures out of hazardous areas may not always be technically or economically feasible.

- *Alteration or enhancement of the shoreline.* In situations where relocation or acquisition of threatened properties is not viable, human intervention to alter the shoreline and dune system is sometimes useful to reduce shoreline erosion. In general, there are two types of alteration/enhancement strategies: hard approaches and soft approaches.

Hard Approaches: Hard approaches are so named because they “armor” the shoreline or “harden” it. Construction of jetties, seawalls, groins, revetments and bulkheads are all considered “hard” approaches. Aside from emergency actions,¹⁸ Maine does not permit the construction of hard protection structures due to scientific documentation that such structures harm the beach and dune system.¹⁹ This proposal to create an Integrated Beach Management Program does not propose any changes in the prohibition of new, hard approaches and further clarifies provisions for emergency repairs to existing structures as described in Section IV.E of this report. Section IV.E also describes situations where reconstruction of seawalls is permissible provided the structure is relocated landward.

Soft Approaches: Soft approaches generally refer to the introduction of sand into the beach system to help reduce shoreline erosion. Beach nourishment²⁰ and dune restoration are considered soft approaches. Beach nourishment restores beaches by depositing sand updrift, directly on beaches, or in nearshore waters off beaches. Sand sources for beach nourishment in Maine include the beneficial reuse of dredged material, rare nearshore or offshore deposits, estuarine deposits, upland sand deposits and sediment trapped beside federal navigation structures such as jetties (see Section IV.A and Appendix E of this report for more information on sand sources). Not all sand deposits are accessible or available due to physical or environmental constraints. Benefits of beach nourishment include a wider, more protective beach, the restoration of sandy beach habitat, and increased recreational space for public and private use. As is discussed in later sections of this document, when public funds are being used for nourishment, careful evaluation of the benefits and costs of using this technique is warranted. In some cases, the costs associated with periodic and ongoing re-nourishment to maintain the beach may be high. Appendix F provides a very preliminary analysis of the potential costs for beach nourishment in Maine.

¹⁸ “Emergency actions” are defined in 38 MRSA §480-W and Chapter 305, Permit By Rule.

¹⁹ See Chapter 355: Coastal Sand Dune Rules.

²⁰ Beach nourishment is defined as “the artificial addition of sand or gravel to a beach or subtidal area adjacent to a beach”

In the State of Maine, three techniques (allowing natural process to occur, hazard mitigation and soft protection) are generally viable options for the management of eroding, sandy shorelines. In situations where shorelines are threatened by erosion, the specific circumstances of a given beach segment should first be evaluated. Any decision on options would then consider the feasibility of the use of one or more of these techniques. It is expected that in some circumstances, a combination of these approaches will provide the preferred management option. Each of these management options is discussed in more detail later in this report. Section V is devoted to methods for evaluating among preferred management options.

IV. Specific Elements of Maine’s Integrated Beach Management Program

A. Beach Nourishment

Charge to the Stakeholder Group

The “Framework Agreement on Sand Dunes and Coastal Management in Maine” directed the stakeholder group to deliberate on “a proactive State beach nourishment policy that establishes priority areas, and evaluates public and private funding sources, implementation timeframes and public access easements.” The following section describes the current status of beach nourishment in Maine and provides recommendations for future action.

Current Status of Beach Nourishment

In other parts of the country, coastal states, coastal counties and municipalities have proactive beach nourishment programs that target specific areas for nourishment and help finance projects with dedicated sources of state and municipal funds. Appendix G includes a list of state programs consulted during preparation of this report. In contrast, aside from placement of sand on beaches and in nearshore waters associated with US Army Corps of Engineers (USACE) river and harbor maintenance dredging projects, Maine has had limited experience with beach nourishment. Appendix B of this report documents the history of sand replenishment along Maine’s sand beaches. There is currently no source of state funding for beach nourishment or other forms of active beach management.

Maine’s *de facto* approach to beach nourishment can be characterized as both “reactive” and “opportunistic”. In a regulatory context, state agencies react to public and private requests for beach nourishment and are opportunistic in trying to maximize the environmental and social benefits of proposed nourishment projects. Prior to the most recent changes in Chapter 355, Sand Dune Rules (see below and also Section IV.E of this report), beach nourishment projects within Maine were regulated under Chapter 305: Permit-by-Rule.²¹

In cooperation with the state and coastal municipalities, the USACE provides for routine maintenance dredging of federal navigation channels, typically, performing two to three

²¹ <http://www.maine.gov/sos/cec/rules/06/096/096c305.doc>

dredging projects in Maine each year.²² Provided the dredged material is suitable for disposal onshore, and provided that onshore or nearshore disposal is the least-cost option for disposal, the USACE cooperates with state and local officials to provide this material for beach nourishment.

Through its Regional Sediment Management Program, the USACE is actively working to increase “beneficial reuse” of dredged materials, that is, to dispose of dredged materials in ways that benefit regional sand supplies. Coastal states continue to push the USACE to reform its policies that require “least cost” options for disposal when other options (such as beach replenishment) would provide for greater environmental and social benefits.

Where beach nourishment has been accomplished in Maine in association with federal dredging projects, federal funds have supported the dredging projects, and disposal of the sand in the onshore or nearshore environment has been arranged through state and municipal cooperation with the USACE. In these cases, the USACE has required municipalities to establish agreements or easements in order to place the material on the beach. The Corps requires that costs for these projects be shared by the sponsors of these projects and to date, no state funds have been used for these projects in Maine.

The stakeholder group, in discussing the potential for the more frequent use of beach nourishment in Maine, discussed ownership of sand that either accretes naturally or through enhancement of a beach from active renourishment. One consideration of the group was whether property owners could build new structures on these enhanced beaches. Chapter 355 currently precludes new development on “new” beach areas that would result from beach nourishment projects, and prohibits the expansion of frontal dune development in nourished areas.²³

Recommendations Concerning Beach Nourishment

1. Change Reactive and Opportunistic Nourishment Approach to Proactive Strategy

Maine realizes the positive economic impact of beaches and acknowledges that unabated shoreline recession may degrade beaches and diminish public use, and degrade facilities and private property. Beach nourishment, in certain cases, can provide vital storm protection and be a viable alternative to allowing the shoreline to migrate landward. Thus, beach nourishment, in certain settings, will be useful to help manage beach erosion by providing both shoreline protection and maintaining or creating opportunities for public recreation. To ensure that beach nourishment is used properly and in ways that maximize environmental, social and economic considerations, additional regulations and criteria are necessary to guide its use (see also Recommendation #3 in this section).

²² The Maine Department of Transportation maintains a dredging priorities list that guides the selection of projects, and municipalities can also directly make requests for dredging projects.

²³ While the V-zone would increase in size after beach nourishment, the percentage of the lot that is V-zone is excluded under Chapter 355.

2. Amend Coastal Sand Dune Rules to Establish Standards for Beach Nourishment

As described in the Department of Environmental Protection's interim report to the Legislature on the stakeholder group's progress, the group worked together to craft a series of changes to the Coastal Sand Dune Rules (Chapter 355) while simultaneously working on other sections of this report. Recognizing the group's interest in increasing the use of beach nourishment in Maine in the future, the revised rules²⁴ (provisionally adopted by the Board of Environmental Protection on November 17, 2005) contain a new section on beach nourishment. Future beach nourishment projects will be regulated on a site-specific basis under Section 8 of the Coastal Sand Dune Rules (Chapter 355). This new section of the rules establishes standards for beach nourishment projects, including standards for:

- materials to be used;
- compatibility with the profile of adjacent beaches and dunes;
- time of year during which nourishment activities may take place;
- monitoring requirements;²⁵
- consideration of sediment sources;
- no new structures in nourished areas;
- legal arrangements with private property owners for public recreational use and access on beaches nourished with public funding, or nourished projects sponsored by public agencies; and
- legal arrangements with private property owners to allow for management of significant wildlife habitat on nourished beaches.

As further discussed in Section IV.E of this report, four of the eight stakeholders objected to the final changes made to the provisionally-adopted rules after the close of the public comment period. While the stakeholder group attempted (in its final meetings and correspondence) to resolve outstanding differences such that a consensus on the new beach nourishment standards could be presented in this report, this failed to happen. Specifically, the issues that are of continued concern to four members of the stakeholder group involve public access requirements and habitat management requirements on private property. The Department of Environmental Protection will be submitting amended language to the Committee that attempts to resolve these issues of concern.

It should also be noted that a subset of the stakeholders group interpreted the rule changes to negatively affect privately-funded nourishment projects, municipal nourishment projects and nourishment projects associated with federal harbor management projects. Nothing in this report or the revised sand dune rules is intended to a) restrict the ability of landowners to conduct beach nourishment with private funds; b) restrict the ability of towns to create their own tests for public benefit and to create their own requirements when municipal funds are used for nourishment; or c) to create additional requirements for federally-funded projects beyond what is required by federal law, rule or policy. Again, amended language will be brought before the Natural Resources Committee to clarify these issues.

²⁴ Coastal Sand Dune Rules, 06-096 CMR 355, as provisionally adopted November 17, 2005.

²⁵ Appendix H of this report provides a discussion of monitoring requirements for nourishment projects.

3. Create Additional Criteria for Consideration of Beach Nourishment Projects Undertaken with Public Funds

Aside from the regulatory requirements provided in the Coastal Sand Dune Rules, discussed above, the use of beach nourishment in Maine requires additional policy guidance due to its potential environmental and social impacts on beach systems and beach communities.

- Beach nourishment should be considered in conjunction with alternative strategies of: letting natural processes occur, dune restoration and hazard mitigation (including relocation of structures and/or willing-seller acquisition). Municipalities are encouraged to work together and with state agencies to create regional beach management strategies that use information produced by the Maine Geological Survey (MGS) and other sources to identify the best mix of tools suitable for specific stretches of beach.
- Beach nourishment requires a sediment source. In Maine, material dredged from navigation channels has been the main sediment source for nourishment projects. However, there are several other sources of sediment that may be acceptable for beach nourishment within Maine. Appendix E includes a discussion of these sediment sources. In general terms:
 - ➔ The continued beneficial reuse of clean²⁶ dredged material resulting from federal projects for beach nourishment is encouraged.
 - ➔ The use of clean upland sources of material for beach nourishment is encouraged.
 - ➔ The use of nearshore or offshore sediment sources for beach nourishment warrants further investigation and is considered acceptable only under certain conditions.
 - ➔ Dredging lower portions of a beach profile is unacceptable under most circumstances.

4. Further Clarify Specific Mechanisms for Public Access and Public Recreational Use

- As discussed above, the provisionally adopted coastal sand dune rules²⁷ contain language related to the establishment of public access and public recreational use in areas nourished using public funds. The federal government has established precedent for these types of arrangements when federal funds are used for shorefront protection projects.²⁸ The mechanics

²⁶ As used in this context, “clean” materials or sources meet all chemical standards as determined by state and federal regulations.

²⁷ Coastal Sand Dune Rules, 06-096 CMR 355, as provisionally adopted November 17, 2005.

²⁸ For the USACE to enter into an agreement with communities for shorefront protection projects that use beach nourishment, public ownership of the nourished beach is required. See <http://www.usace.army.mil/inet/usace-docs/eng-pamphlets/ep1165-2-1/c-14.pdf>, Section 14-6, #s 8) and 9). “Shoreline protection projects” should not be confused with “federal navigational dredging projects”. The beneficial reuse of dredged material for beach nourishment as part of the USACE federal navigational dredging projects does not require public use or access. Rather, in these projects, the USACE requires perpetual

of formalizing public recreational use in a low-water state²⁹ such as Maine need to be further researched and documented.

- Related to the above, the stakeholder group realized the need to ensure that beaches nourished with public funds were actually accessible to the public, via parking, walkways, etc. An additional criterion that “adequate public access and services for public use of nourished beaches should be provided if public funds are used to support the nourishment project” should be created, pending resolution of public trust/private property considerations mentioned in the bulleted section above. This criterion might be best placed in future rules that would be developed to govern the administration of new sources of state funds for beach nourishment.

As stated previously, nothing in this report or the revised sand dune rules is intended to a) restrict the ability of landowners to conduct beach nourishment with private funds, b) restrict the ability of towns to create their own tests for public benefit and to create their own requirements when municipal funds are used for nourishment; or c) to create additional requirements for federally-funded projects beyond what is required by federal law, rule or policy.

5. Clarify Opportunities for Use of Other Sediment Sources

The stakeholder group discussed situations in Maine where deposits of sand exist that might be potentially suitable for beach nourishment but the availability of such sources is questionable due to legal considerations (for example, sand that builds up adjacent to jetties and sand placed on the beach through nourishment projects that migrates elsewhere). Further clarification of the ownership and availability of these sand sources is needed.

6. Further Refine Priorities for Beach Nourishment

The Framework Agreement on Sand Dunes and Coastal Management in Maine directed the stakeholder group to investigate the establishment of priority areas for beach nourishment. This document outlines a proactive approach for making decisions about how to manage our beaches, including the use of beach nourishment. It provides guidelines and methodologies, agreed upon by the stakeholder group, which can be used to create a priority list of areas for beach management, including beach nourishment. This approach requires that additional information be obtained on: a) geological processes at particular beaches; b) biologic wildlife and habitat characteristics; and c) on the cost and benefits of beach management activities at specific locations. Presently available, initial information on the geologic settings of Maine beaches allows for a rough, screening-level assessment of the potential of each beach to support nourishment from a geologic perspective. The initial

easements for the placement of equipment and dredged material, so as to allow for the completion of subsequent projects in the future.

²⁹ In Maine, as established in common law, most shoreline properties can claim that their ownership extends over the dry sand beach to the low water mark. Only a narrowly defined public easement provides limited public rights in the intertidal area for fishing, fowling and navigation.

information below, as with the biologic and economic information presented in this report, must be further refined and integrated into the broader decision-making approach presented here.

The “Beach Scoring System”³⁰ developed by the Maine Geological Survey (discussed in more detail in Section V.A of this report) was used to provide a qualitative analysis of beaches that might benefit from the use of beach nourishment. It should be stressed that this is a very preliminary, qualitative analysis. This information should not be taken as a determination of any particular beach's ultimate priority or suitability for a nourishment project.

The stakeholder group agreed that a more complete set of physical and geological criteria needs to be added to the Beach Scoring System before it can be used for a final analysis of beach nourishment priorities. Importantly, a more complete, future analysis would include an estimate of the project longevity and hence the need to renourish the beach at regular intervals. Final decisions on beach nourishment projects would include other types of data and information as discussed above.

The results of this preliminary suitability analysis are provided in Table 1. Beaches are divided into three categories and listed by municipality. A rating of H-High, indicates that the beach, based on limited evaluation, is potentially highly suitable for beach nourishment. A rating of M-Medium indicates that the beach is a possibly suitable for beach nourishment. A rating of L-Low indicates beaches that likely to exhibit low suitability for nourishment, except possibly after extreme erosion events or cycles. Other beaches not listed in this table (but further discussed in Appendix I) are also rated L-Low.

Section IV.F and Appendix J of this report provide a more detailed recommendation for the refinement of the Beach Scoring System and other evaluative criteria for use in actual selection of beach management tools and for use in decision-making for beach management funding and projects.

7. Estimate Funding Needs for Beach Nourishment

As stated in Recommendation 1, the stakeholder group agreed that Maine should have a proactive strategy that includes the use of beach nourishment as an acceptable management tool when evaluative criteria suggests that is a suitable technique. While private funds can support beach nourishment projects at the present time, new sources of state and local funding (in addition to enhanced federal funding) are needed to finance a proactive beach management program, including additional beach nourishment, *i.e.*, beyond what occurs at present through the beneficial reuse of dredged material and occasional privately-financed projects. Based on a very cursory estimate of the costs of funding beach nourishment

³⁰ The current Beach Scoring System is based on an evaluation of erosion rates, dry beach width, topography, geography, and coastal engineering structures. Improvements are needed to the system to tailor its capacity for use in prioritization or project evaluation.

Table 1
Suitability of Maine Beaches for Nourishment
Based on Geological Selection Criteria Only

Municipality	Suitability for Beach Nourishment	Beach Name
Town of York	H	Long Sands Beach
	M	Short Sands Beach
Town of Wells	M	Wells Beach
	M	Drakes Island Beach
	M	Moody Beach
Town of Kennebunk	H	Goochs Beach
	M	Great Hill to Middle Beaches
City of Biddeford	H	Hills Beach
	M	Fortunes Rocks Beach
City of Saco	H	Camp Ellis Beach
	M	Ferry Beach
Town of Scarborough	M	Western Beach
	M	Scarborough Beach
	M	Higgins Beach
	L	Pine Point Beach
City of South Portland	M	Willard Beach
Town of Phippsburg	L	Hunnewell Beach

(presented in more detail in Appendix F) 20-year cost estimates³¹ (in 2006 dollars) range from a low of \$1.2 million for Great Hill to Middle Beach in Kennebunk to a high of \$32 million for Camp Ellis beach in Saco.³² It is recommended that additional refinement of potential beach nourishment costs be performed as part of the development of a funding strategy for beach management. More information is also needed about the economic benefits of beach nourishment. It is recommended that detailed cost/benefit analyses be performed to inform decision-making about beach nourishment.

³¹ In order to estimate costs of projects in a uniform manner, it is necessary to look at the need over 20 years. The cost for any one project in a particular year can be generally estimated at a rate of \$2-4 million *per* mile of beach. Based on erosion rates and other factors, beaches will need to be renourished at certain intervals. For example, over 20 years a project with 10-year longevity will have 2 nourishments; a 5-year cycle will have 4 nourishments. At the end of the 20 years, the beach may need nourishment again.

³² These estimates do not include discovery, evaluation, testing, permitting, and other factors such as monitoring and wildlife management that may be required in a nourishment project.

8. Work to Increase Federal Mitigation of Erosion Control Caused by Federal Navigation Projects

Some jetties constructed for federal navigational purposes may negatively alter the natural transport of sand in beach systems. This disruption can lead to areas of increased erosion or accretion. The Integrated Beach Management Program should consider these federal projects for the applicability of beach nourishment or some other management activity, including federal mitigation programs. There are numerous different federal authorities under which the federal government can act to address negative shoreline impacts of federal navigation projects.³³

B. Wildlife and Habitat Management

Charge to the Stakeholder Group

The stakeholder group was charged with exploring wildlife and wildlife habitat management in the sand dune system and providing recommendations for improved wildlife management initiatives.

Current Status of Wildlife Management

The piping plover, a small sandy-colored shorebird that nests on beaches from Newfoundland to North Carolina, is imperiled throughout much of its range in the United States and Canada. Once common on sandy beaches in southern Maine, the piping plover is listed as endangered under the Maine Endangered Species Act. The east coast population of piping plovers is also federally-listed as threatened. In 2005, 49 pairs of piping plovers nested in the entire state of Maine.

Least terns were abundant in all suitable locations along the Atlantic Coast from Massachusetts to Florida prior to the late 1800s, but were nearly annihilated by hunters seeking their plumes, eggs and skins. Populations rebounded after the passage of the Migratory Bird Treaty Act of 1918. However, the population declined in many areas between 1950 and the early 1970s. Reasons for the decline include habitat degradation due to development of nesting habitat, predation and pesticide contamination. Regionally (ME, MA, RI, CT, and NY), the number of least tern adults and colonies increased between 1972 (5,200 adults) and 1987 (11,315 adults). Numbers have fluctuated since then, but the regional population has remained fairly stable. Low reproductive output, habitat loss or degradation from development and human recreation, combined with human disturbance and predation underscore the need for continued protection and management. Least terns are listed as endangered under Maine's Endangered Species Act.

Habitat loss and lack of undisturbed nest sites are two of the primary factors jeopardizing populations of piping plovers and least terns. Historically, Maine had more than 30 miles of suitable nesting beaches that may have supported up to 200 pairs of piping plovers.

³³ These include, among others, Section 111 of the Rivers and Harbors Act (1968).

However, the construction of seawalls, jetties, piers, homes, parking lots, and other structures along Maine's sand-beaches has dramatically reduced the extent of suitable nesting habitat for both species. The capability of the remaining habitat to support nesting plovers and least terns is further reduced by continued development and intense recreational use. Ensuring the availability of this limited habitat is essential for the continued existence of piping plovers and least terns.

Management and monitoring of the piping plover population in Maine began in 1981 and in 1979 for least terns. In response to management, Maine's piping plover population began to expand in the early 1990s often increasing 20-30% annually. Unfortunately, least terns have not responded as dramatically to various management techniques.

Activities within the sand dune system occur within a protected resource area under the jurisdiction of the Maine Department of Environmental Protection (DEP). Many projects and activities (such as moving sand, maintaining seawalls, expanding or remodeling a structure, erosion control measures, altering vegetation) require a permit from the DEP.

In addition, some beaches and adjacent marshes are nesting or feeding habitat for piping plovers and least terns and have been designated by the Maine Department of Inland Fisheries and Wildlife (IF&W) as Essential Habitat under Maine's Endangered Species Act (ESA).³⁴ Once an area becomes designated as Essential Habitat, the Maine ESA 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. If a project occurs partly or wholly within an Essential Habitat, it must be evaluated by IF&W before state and/or municipal permits can be approved or project activities can take place. No additional permits or fees are required. Designation of Essential Habitat simply establishes a standardized review process within existing state and municipal permitting processes. Activities of private landowners are not affected by Essential Habitat designation, unless they require a state or municipal permit, or are funded or carried out by a state agency or municipality.

The Essential Habitat designation has provided the process for IF&W to work with towns to develop individualized management agreements that allow town officials to carry out certain activities on beaches they manage in a way that will not put endangered species at risk. These agreements are regularly updated.

The USACE has participated in dredging, beach nourishment and sand movement activities on some of Maine's beaches. If the resource contains federally listed species then the federal ESA requires all federal agencies to consult with the United States Fish and Wildlife Service (USFWS) to ensure that any actions they authorize, fund or carry out do not jeopardize a listed species.

Recommendations Concerning Wildlife Habitat

Improved beach management has the potential to contribute to the recovery of threatened and endangered shorebirds in Maine, but restored beaches may also result in increased

³⁴ 12 MRSA Part 13, Subchapter 3 - Endangered Species

recreational use. Therefore, proposals to actively manage beaches should address the potential conflict of attracting piping plovers or least terns to an improved beach only to have them fail because of increased human activities and disturbance.

9. Coordinate Beach Management Activities with Other Agencies

All proposed beach nourishment, dune restoration, sand fencing, planting and trail plans should be coordinated with USFWS, IF&W, DEP and the USACE to ensure that state and federal regulations are adhered to and that piping plovers are not adversely affected.

10. Establish Best Management Practices (BMPs) for Shorebird Habitat Protection and Enhancement Through Cooperative Agreements, Permit Conditions, or Landowner Agreements

The following recommendation calls for the institution of best management practices on nourished beaches. Since shorebird habitat occurs on private property, cooperative efforts with landowners are needed for successful habitat management. Prior to the development of this report, towns and private landowners have already entered into cooperative agreements to manage endangered and threatened species and these agreements are currently in effect. Nothing in this report is intended to suggest that these agreements should be rendered invalid or that they should be renegotiated. Rather, this section of the report calls for the establishment of standard and improved best management practices to be formalized through additional cooperative agreements and other mechanisms as part of new beach management projects. Landowner cooperation and agreement is necessary ingredient for implementation of all of these best practices.

Standard BMPs should include the following:

❖ Beach Infrastructure and Maintenance

Movement and/or redistribution of sand, control of public access, beach cleaning, or use of any essential vehicles on the beach must not jeopardize nesting or feeding activities of endangered piping plovers or least terns. It is the responsibility of the town to ensure their activities do not threaten a listed species.

❖ Recreational Activities

If piping plovers or least terns are nesting on the beach, recreational activities that could interfere with nesting and brood rearing activity should be restricted to non-nesting areas through use of fencing and signs. Enforcement of restricted areas may become the responsibility of local governments.

❖ Animal Control

Dogs can be a significant source of disturbance and mortality for ground nesting species such as piping plovers and least terns. Ideally dogs should be leashed from April 1 through August 31 as specified in the USFWS Piping Plover Recovery Plan.

❖ **Management - Symbolic Fencing and Enclosures**

Piping plover nesting areas and least tern colonies should be fenced and signed beginning April 1. Fencing is intended to allow nesting to be initiated by territorial pairs, to prevent accidental crushing of nests and repeated flushing of incubating adults and to provide an area where chicks can rest and seek shelter when large numbers of people are on the beach. Only persons engaged in piping plover monitoring should enter the fenced areas. Fencing should be maintained on the beach until all chicks in the vicinity have fledged or territorial pairs are no longer present.

❖ **Predator Control**

Predation by crows, gulls, foxes, dogs and cats is a major source of nest failure for piping plovers. Therefore, piping plover nests should be enclosed in accordance with USFWS guidelines and authorizations issued by IF&W.

Predator management may become necessary if predation of adult plovers, eggs, or chicks is severe. Predator management is the responsibility of IF&W.

❖ **Monitoring**

On nourished or town-managed beaches³⁵ a coordinator should be employed to recruit and manage volunteers to conduct regular monitoring of nesting piping plovers and/or least terns to determine the success or failure of nesting. Regular monitoring should include: documentation of the number and location of nests, nest attempts, nest success, number of chicks fledged, and causes of egg or chick mortality if known. Other duties may include maintaining temporary fencing and signs and help erect nest enclosures.

In the event that a crushed nest or dead adult or chick is found, both the USFWS and IF&W law enforcement personnel must be contacted immediately.

❖ **Education and Outreach**

Wherever the public has access to beaches with nesting endangered species, effective outreach should be conducted to educate beach users on how they can help protect piping plovers and least terns while they are at the beach. Interpretive signs, personal interactions with lifeguards or other town officials, information at the town hall for dog owners, etc. should be explored.

C. Voluntary Acquisition of Storm-Damaged Properties or Properties for Dune Enhancement or Public Access

Charge to the Stakeholder Group

The stakeholder group was charged with developing recommendations for a state program for acquisition of storm-damaged properties.

³⁵ Some beaches in Maine, although not publicly-owned, are actively managed by municipalities, for example, Pine Point in Scarborough and Wells Beach.

Current Status of State Programs for Acquisition

Under Maine's current Coastal Sand Dune Rules (Chapter 355 3.B(1)(b)), property owners are responsible for removing structures and restoring the site to a natural condition within one year "if the shoreline recedes such that a coastal wetland, as defined under 38 MRSA §480-B(2), extends to any part of the structure, including support posts, but excluding seawalls, for a period of six months or more.

The Maine Emergency Management Agency or MEMA (with resources from the Federal Emergency Management Agency) offers limited and sporadic funding to work with willing landowners to acquire storm-damaged properties, remove structures, relocate residents and return properties to natural conditions. MEMA administers several federal grant programs (Flood Hazard Mitigation Program – FMA – Section 404, Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM))³⁶ that can be used to acquire hazard prone property and convert it to open space (among other projects and planning efforts.) The primary purpose of these programs is to reduce risk in high hazard areas. Maine receives considerably less funding than other states because of fewer federal disaster declarations, fewer numbers of structures significantly damaged by storm action and smaller numbers of repetitive claims on flood insurance policies. Successful acquisition and relocation projects have been implemented in inland areas of the state.

Aside from MEMA's programs that are aimed directly at hazard reduction, Maine has several statewide land acquisition programs and works with many public and private partners to achieve state goals for land conservation and recreation. If storm-damaged parcels have conservation or public access value, funds from other state conservation and recreation funds might be available. Due to the high price of real estate in beach locations and typically small parcel sizes, these programs have not been active in beach locations. The same holds true for local land trusts and private conservation groups. Programs established for conservation and recreation purposes usually do not acknowledge storm hazard mitigation in their program objectives.

Maine's existing land acquisition programs such as Land for Maine's Future and others could conceivably fund acquisition projects along Maine's beaches under current criteria and rules. However, public access and conservation of natural resources are the primary objectives of these programs, rather than hazard mitigation. Requests for funding for acquisition of individual lots would tend to fare poorly in some aspects of existing proposal review criteria because of small parcel size, neighborhood as opposed to regional significance, and potential lack of public or neighborhood support for new access facilities. Additionally, these programs are not set up to provide an immediate response to emergency acquisition requests following storm events.

While acknowledging the fact that land acquisition is a beach management technique that is appropriate only in specific geographic areas and under certain circumstances, the stakeholder group agreed that in general, property acquisition from willing sellers is a viable hazard mitigation tool for use in Maine. A formal land acquisition program could provide

³⁶ Information about FEMA's hazard mitigation grant program is available at <http://www.fema.gov/fima/mitgrant.shtm>

compensation to willing sellers while achieving beach management goals such as preserving recreational and conservation lands, allowing for natural shoreline processes, improving public access, restoring dunes, and reducing public expenses for storm damages. Several members of the stakeholder group expressed concern that public entities, after acquiring property from willing sellers, might remove seawalls on these properties, thus endangering adjacent properties.

Recommendations Concerning Willing-Seller Acquisition of Storm-Damaged Properties

11. Establish Principles to Guide Land Acquisition in Beach Systems

The following principles are suggested to apply to any new or enhanced land acquisition initiatives associated with Maine's Integrated Beach Management Program.

- Acquisition programs must always involve willing sellers.
- The purpose of a willing-seller land acquisition program along Southern Maine beaches is for public benefit, e.g. a) to increase storm buffering capabilities by reestablishing natural beach profiles and reconstructing dunes; b) to reduce public expenditures in post storm repairs; c) to enhance public access opportunities; d) to enhance wildlife habitat. A secondary benefit of public acquisition of these properties is to assist a willing seller to move away from coastal high hazard areas.
- The purpose of a willing-seller land acquisition program is not to institute management measures (such as removal of seawalls) that would endanger adjacent properties. Active management on public properties that would affect private property should be planned, discussed and negotiated in an open, public process that allows for expression of, consideration for, and mitigation of, adjacent landowner concerns.
- The current sand dune rules allow rebuilding of storm-damaged structures, provided required standards are met. When making a decision about whether to rebuild after a storm, willing-seller acquisition is one option for homeowners to consider when making choices about their properties over the long term. The process of working with a willing seller to acquire a storm-damaged property should not be conducted in association with an application for rebuilding.³⁷ Brochures and handouts with information about willing-seller acquisition opportunities should be made available to coastal landowners.

³⁷ The stakeholder group discussed at length the appearance of impropriety if a state agency denied an application for rebuilding of a storm damaged property and acquired the property at a late date. The stakeholder group strongly recommended a clear separation between licensing and land acquisition activities.

- Any acquisition program must be responsive to the needs of homeowners, particularly in a post-storm situation. Fairness, courtesy, respect and responsiveness need to be hallmarks of any acquisition effort.
- Acquisition projects that serve multiple objectives (e.g. hazard mitigation, wildlife habitat enhancement, dune restoration and public access) warrant greater attention by state funding programs and have better potential for successful financing by multiple partners. Existing disparate funding sources need to be creatively combined to work within this context.
- Acquisition of beach front properties in an opportunistic, case-by-case manner could potentially result in public ownership of isolated parcels up and down the shoreline, creating difficult property management challenges. To avoid this scenario, acquisition of properties from willing sellers under Maine's Integrated Beach Management Program should be based on an established regional plan or strategy that pre-identifies focal areas. The best opportunities for accruing public benefits will be gained by concentrating land acquisition efforts on regional focus areas.

12. Conduct Background Planning

- Conduct a GIS analysis, for planning purposes only, to identify a) areas of repetitive storm damage; b) areas where recreational access is or will be inadequate for residents and visitors; c) areas where there is potential for restoration/enhancement of dunes and other habitats; and d) areas where there is repeated public investment in roads and utilities.
- Using the above, create focal areas where acquisition might be a viable beach management tool.
- Monitor erosion, access and habitat characteristics to further establish priorities within identified focal areas.
- Determine whether smaller, neighborhood beach access points would complement the Department of Conservation's parks infrastructure, or boating access infrastructure.

13. Work with Existing Emergency Management and Conservation Programs to Enhance the Presence of these Programs in Beach Systems

- Maine Emergency Management Agency
 - ➔ Create partnerships between MEMA and land conservation programs for multi-objective projects.
 - ➔ Include a representative from MGS or the Maine Coastal Program on the statewide hazard mitigation team that makes decisions about FEMA funds.

- ➔ Amend the State Hazard Mitigation Plan to include greater specificity for coastal areas.
- Land for Maine’s Future and other State Land Acquisition Programs
 - ➔ A coordinated, long term proposal could be offered by the Department of Conservation, a town or towns, or a private conservation organization for consideration by LMF using the focal area analysis described in a previous section.

14. Increase Outreach to Other Potential Partner Organizations and Towns

- Cultivate relationships with local land trusts and other private conservation organizations, towns and landowners.
- Better publicize all existing funding opportunities for homeowners. These programs benefit landowners by fairly compensating them when the growing risk and other factors related to their investment cause them to consider abandonment/relocation.
- Help towns include acquisition strategies in hazard mitigation programs to improve their eligibility for federal funds.

15. Create New Funding Sources

A new source of beach management funds needs to be created at the state level. As further described in other sections of this document, these funds would be available for multiple purposes, one of which would be land acquisition from willing sellers. To support the creation of this funding source, the following activities should take place.

- Complete the focal area analysis as described above. (The Maine Coastal Program with input from Department of Conservation, Bureau of Parks and Lands and the Maine Geological Survey and the Maine Emergency Management Agency)
- Determine range of funds needed for one or more focal areas. (SPO)
- Determine the mechanics of program (lead agency, etc.). (All)

16. Work to Clarify Outstanding Questions Concerning Land Acquisition

- Evaluate the use of “life estates” as a method to be used in the future for allowing homeowners to retain residency and contribute to conservation and hazard mitigation goals at a later date.
- Overcome difficulties associated with the timing of the preparation of an appraisal of property value, *i.e.*, in a post-storm, emergency situation, the property’s value may be diminished from its pre-storm condition.

- Clarify and resolve obstacles concerning the typical “matching requirements” of government programs, i.e. the provision of local funds to serve as a “match” for state and federal acquisition funds.

D. Hazard Mitigation

Charge to the Stakeholder Group

The stakeholder group was charged with developing recommendations to improve state coastal hazard mitigation plans that direct federal spending and to make recommendations to improve and increase public and private voluntary hazard mitigation programs.

Current Status of Hazard Mitigation

According to the Federal Emergency Management Agency, hazard mitigation “is the cornerstone of emergency management.”³⁸ Hazard mitigation includes a broad range of activities to lessen the impact that natural hazards have on people's lives and property through damage prevention. By definition, hazard mitigation includes a wide variety of techniques including regulations, land-use planning, building codes, land acquisition, etc., some of which have been discussed separately in other sections of this document.

The Federal Disaster Mitigation Act,³⁹ passed in 2000, created new requirements for state hazard mitigation plans and mandated that all localities that wish to continue receiving Federal Emergency Management Agency (FEMA) funding after hazard events must prepare a local hazard mitigation plan. At the state level, the *2004 State of Maine Hazard Mitigation Plan*⁴⁰ was adopted to satisfy these requirements.⁴¹ Through the County Emergency Management Agencies (EMAs) and Maine's Regional Planning Commissions, county-level hazard mitigation plans with sections specific to each municipality were also adopted.⁴² In addition to directing state, county and local efforts, these hazard mitigation plans provide a blueprint of activities that qualify for federal funding through FEMA's grant programs.

The various plans evaluated the risks associated with natural hazards and created goals and strategies to mitigate hazards. In Maine, the most serious risk statewide is associated with flooding, followed by winter storms and hurricanes.

³⁸ See <http://www.fema.gov/fima/>

³⁹ DMA 2000 P.L. 106-390

⁴⁰ Available at <http://www.maine.gov/mema/forms.htm>

⁴¹ Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 93-288, as amended) for federal disaster assistance and enacted under the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390).

⁴² For an example, see <http://www.smrpc.org/hazamitpage.htm> for the York County Hazard Mitigation Plan and its municipal annexes.

Several findings from the State Hazard Mitigation Plan⁴³ are worth noting, in particular:

- MEMA has acknowledged that risks associated with coastal erosion and risks related to northeaster storms are not adequately represented in the 2004 State Plan and plans further cooperation with MGS prior to the next plan revision in 2007.⁴⁴
- Coastal Maine communities typically experience most hurricane damages and much of this is from storm surge flooding. New storm surge inundation maps show that larger areas may become flooded than what is shown on the Flood Insurance Rate Maps (FIRM). Unfortunately, Maine communities use the FIRM maps for their floodplain ordinances and not inundation maps. There have been no planning, regulatory or other program requirements based on hurricane storm surge inundation flooding and much of Maine's residential development has taken place since the last major hurricane in 1985.
- The 2004 State Plan acknowledges major limitations in state, regional and local staffing, and limitations in grant funding for hazard mitigation. Lack of knowledge among the public about natural hazards and about the value of hazard mitigation was also cited as being problematic.

Recommendations Concerning Hazard Mitigation

At the time that PL 2003 Resolve 130 was created, directing the work of the stakeholder group, significant progress towards the development of recommendations for improved statewide hazard mitigation had already been made through MEMA's State Hazard Mitigation Plan and county-level hazard mitigation plans. The stakeholder group devoted one meeting to the topic of hazard mitigation and involved MEMA's mitigation planner and the state's floodplain manager from the State Planning Office.

It would be a duplication of the recent planning efforts (described above) to create proactive recommendations for increasing hazard mitigation for Maine's sand beaches in this document. Experts at the state, county and local levels have already delved deeply into this area of emphasis during their recent planning processes. The 2004 State Hazard Mitigation Plan, after a ranking process, has already identified eight goals and objectives and 16 priority actions, many of which apply directly to hazard mitigation near sand beaches. There are several ways, described below, that Maine's Integrated Beach Management Program could assist in hazard mitigation efforts. In addition to these recommendations, the reader should also refer to the section of this report concerning willing-seller land acquisition, also considered to be a hazard mitigation technique.

17. Improve Interagency Coordination on Coastal Hazard Mitigation

The Maine Emergency Management Agency is responsible for working with all Maine towns on hazard mitigation. Creating increased or enhanced coastal hazard mitigation will require increased cooperation among a variety of state agencies. MEMA should be encouraged to

⁴³ <http://www.maine.gov/mema/forms/hmsection4-mitiationstrategyrev.pdf>

⁴⁴ A common criticism of the National Flood Insurance Program is that erosion risk is not portrayed on Flood Insurance Rate Maps. Discussions at the national and state level continue about modernizing maps to include this information.

include staff from the state's coastal zone management program (the Maine Coastal Program at SPO) in interagency efforts.

18. Enhance Educational Programs and Informational Outreach about Hazard Mitigation

The Maine Coastal Program (MCP) partners with the Wells National Estuarine Research Reserve (WNERR) on the Reserve's Coastal Training Program (CTP), an outreach program primarily serving southern Maine community officials and other residents. The MCP should be encouraged to work with the CTP to develop a targeted outreach program on hazard mitigation. The University of Maine's Sea Grant Advisory Program (which houses a staff person at the WNERR) has created a preliminary scope for this type of outreach program.

19. Provided that new sources of funding are made available for the Integrated Beach Management Program, ensure that a percentage of those beach management funds that are administered by state agencies be directed towards hazard mitigation activities at the local level.

As identified in state and county plans, there are myriad ways to reduce the risk of coastal erosion storm damage through preventative activities. There is, however, a severe shortage of funding available to towns and property owners for these purposes. For municipalities with critically important beach resources, it may be feasible to conduct a more in-depth analysis of hazard mitigation options in beachfront neighborhoods. Such an evaluation would include specific strategies for floodproofing, elevation of structures, improvement of roads, and could identify focal areas for land acquisition from willing sellers. With additional state funds, grants could be made to municipalities for projects identified in these more in-depth strategies.

E. Regulatory Framework in Sand Dunes

Charge to Stakeholder Group

The stakeholder group was charged with developing a series of regulatory changes including reconstruction of buildings in the frontal dune and v-zone;⁴⁵ removal of the existing statutory prohibition on use of outdated v-zone maps;⁴⁶ and regulatory incentives to encourage construction or reconstruction outside of the frontal dune.

⁴⁵ A frontal dune is the area consisting of the most seaward ridge of sand and gravel and includes former frontal dune areas modified by development. V- zone's are land areas of special flood hazard subject to a one-percent or greater chance of flooding in any given year, and subject to additional hazard from high velocity water due to wave action. From 1993 to 2003, structures located in the frontal dune, damaged by more than 50% of their value could not be rebuilt. In 2003, the Board of Environmental Protection provisionally adopted new rules (Coastal Sand Dune Rules 06-096 CMR 355 as provisionally adopted June 19, 2003) that allowed landowners to apply for permits to reconstruct storm-damaged buildings.

⁴⁶ MRSA Title 38 Chapter 3, Section 480-E(9). In 1999, the Natural Resources Protection Act was amended to effectively prohibit the DEP from using pre-1999 maps of velocity zones during review of sand dune permit applications. This change was made in response the Town of Wells' challenge to a federal remapping effort that inaccurately identified high velocity flood zones.

Current Status of Regulations

New development, reconstruction, and other activities in Maine's beach and dune areas have been regulated for many years under provisions of the Natural Resources Protection Act (NRPA), Chapters 355 (Coastal Sand Dune rules) and 305 (Permit by Rule); and by 38 MRSA §480.

Other regulatory programs at the federal, state and local level apply to coastal sand dune systems, such as the National Flood Insurance Program, the Federal Endangered Species Act, the Coastal Barrier Resource Systems Act, the Essential Habitat regulations of the Maine Endangered Species Act, shoreland zoning, etc., but these are not the focus of this report.

In the context of a new, proactive beach management program, a regulatory program must be implemented by partner agencies in a coordinated fashion. Aside from ensuring adequate protection to the resource, regulations should:

- Provide property owners with clear, practical guidelines for the development, construction, reconstruction, and repair of structures in dune areas;
- Assure a collaborative approach to maximizing the protection and enhancement of wildlife species habitat, with particular attention to the needs of threatened and endangered species;
- Provide guidance for dune nourishment, restoration, and construction projects;
- Set enforceable standards that support the three primary management options previously identified; and
- Offer a framework for decision-making by municipalities and other interested parties.

As previously discussed, the stakeholder group tackled regulatory issues simultaneously with other policy issues discussed in this report. Revisions to the Coastal Sand Dune Rules (Chapter 355) were proposed for the following reasons: 1) to respond to concerns with the current rules, expressed by the stakeholder group,⁴⁷ and 2) to make minor changes to clarify issues with the rules that have been noted by Department staff since the current rules took effect in July 2004. The Department proposed revisions to the rules based on discussions with the stakeholder group, and submitted the proposed rules to the Board of Environmental Protection. They were posted for public comment on June 17, 2005.

The Board received comments on these proposed rules during a public hearing in Portland on August 11, 2005. Written comments were accepted into the record through August 25, 2005. It should be noted that four of the eight stakeholders objected to changes made after the public hearing, indicating that the changes were substantive enough to require further

⁴⁷ "The Framework Agreement on Sand Dunes and Coastal Management in Maine" a) established a sunset provision for the current sand dune rule of April 1, 2006, b) directed the DEP to report back new provisionally adopted sand dune rules to the second regular session of the 122nd Legislature. The submission and approval of the revised rules in the second session of the 122nd Legislature will eliminate the sunset provision. Without the approval of revised rules by the 122nd Legislature, the current version of the rules is due to be repealed on April 1, 2006.

public comment. The Maine Attorney General's office, however, did not require additional public comments. The Board provisionally approved the revised rules on November 17, 2005.

The major amendments to the rules include:

- Adding additional language to the definition of “erosion hazard area” to include any area mapped as an AO flood zone,⁴⁸ to the definition of “significant wildlife habitat, and to the definition of “V-Zone” to specify identification on the effective FEMA Flood Insurance Rate Maps.
- Changes to Section 5(E) that, in concert with proposed changes to 38 MRSA §480-W, clarify what temporary and permanent actions can be taken to repair and replace seawalls. It further clarifies landowner responsibilities for reporting to the Department on emergency actions taken. Temporary material placed to protect threatened seawalls under Section 480-W would now have to be removed within 18 months and the Department would have to be notified when the material is placed. This section would also allow seawalls or similar structures to be replaced with a structure of different dimensions or in a different location if the replacement would be less damaging to the coastal sand dune system, existing wildlife habitat and adjacent properties than replacing the existing structure as it is.

It should be noted that four of the eight stakeholders have objected to changes proposed to be made to Section 480-W. Two of the stakeholders strongly objected to the requirement of removal of temporary material within 18 months since this runs counter to the provisions of current state law which allow the material to remain until a project to eliminate the risk to property is undertaken. One stakeholder would agree with the 18 month limit so long as the landowner was guaranteed within the 18 months the right to rebuild the damaged seawall with one constructed of the same material and dimensions in exactly the same location as the damaged structure. The group has developed a revised version of the changes to 480-W that were agreed to by all but two stakeholders. This language will be submitted to the Legislature for their consideration.

- The addition of a new beach nourishment section (as described in more detail in Section IV A of this report). As discussed in that section, four of the eight stakeholders have expressed concerns with the language of the provisionally adopted rules. The DEP will provide amended language to the Committee.

⁴⁸ A-Zones are land areas of special flood hazard subject to a one percent or greater chance of flooding in any given year. FEMA recommends Coastal AO-Zones be treated as V-Zones for design and risk analysis. In terms of sand transport and flooding, AO-Zones act more like V-Zones, with only a foot of sea-level rise (or lowering of the beach and dune profile) an AO-Zone will become a V-Zone.

- Modification of section 6B clarifies exceptions relative to the provision of handicap access.
- Sections 6C, 6D, 6E and 6F were rewritten to clarify the standards for reconstruction in frontal dunes and to provide new standards for the reconstruction of buildings damaged by wave action from an ocean storm in the entire frontal dune area. These include new language requiring setback to the extent practicable.
- A mitigation and enhancement standard was added to Section 5, Standards for all projects.
- A definition of "practicable" was added to replace the word "possible".

Additional information about the revised provisionally adopted rules can be found at <http://www.maine.gov/dep/blwq/topic/dunes/index.htm>.

F. Data Development, Maintenance and Distribution, and Mapping Needs

Implementation of the proposed Integrated Beach Management Program requires additional field monitoring, acquisition of new data, new methods of storing and sharing data, and development of new models and tools. The Maine Geological Survey at the Department of Conservation is proposed to be the lead agency for implementation and oversight of the 17 recommendations detailed in Appendix J – *Enhancing State Agencies' Ability to Manage Maine's Beaches - Data Development, Maintenance and Distribution and Mapping Needs*.

G. Education and Outreach

Charge to the Stakeholder Group

While the stakeholder group was not expressly charged with developing recommendations for education and outreach, the group agreed that this is an integral part of a new coordinated approach to beach management.

This section of the report outlines an education and outreach strategy intended to a) inform people about the new proactive beach management program, b) help residents comply with new regulations and c) help towns and residents practice sound beach management techniques. The audience for the products recommended in this strategy includes coastal municipal officials, coastal property owners and members of selected interest groups (e.g. conservation groups, land developers.) The principal methods for education and outreach will be a) direct outreach to stakeholder groups; and b) production and dissemination of printed materials.

Current Status of Outreach and Education

The stakeholder group established by the Framework Agreement on Sand Dunes and Coastal Management in Maine included key individuals and organizations involved in beach issues in Maine. Private sector members of the stakeholder group worked to inform their constituents⁴⁹ during the course of the stakeholder proceedings. State agency outreach to other interested parties was undertaken through e-mail correspondence, through the Maine DEP website, through presentations at the 2005 Maine Beaches Conference and through a public hearing on the proposed changes to Chapter 355 Sand Dune Rules. Nonetheless, the design of stakeholder group was not meant to be inclusive of all interested parties. In particular, coastal municipalities were not represented on the group.

Recommendations Concerning Outreach and Education

20. Once the Maine Legislature has made final decisions on changes to the Natural Resources Protection Act and the Coastal Sand Dune Rules and accepted or revised the recommendations of this Report, the Maine Coastal Program and DEP will conduct a series of meetings in the principal beach towns of southern Maine, during the summer months, designed to provide information and answer questions from local officials and the interested public.

21. The Maine Coastal Program should coordinate the production and distribution of the following print materials, as prepared by DEP, DOC and MGS. All of these materials will be sent to town offices, local and regional planning commissions, and landowner organizations.

- A brochure for property owners, “Managing your Beachfront Land.” This would include:
 - ➔ Regulations applying to the building, use, maintenance, and repair of beach properties and structures;
 - ➔ Suggestions for habitat and wildlife enhancement “best practices.”
- A brochure for municipal officials, highlighting town responsibilities for beach management;
- A targeted brochure, “Beach Nourishment,” directed to those likely to be interested in this subject, including information on how priorities may be set, beaches scored, etc.; and
- Once additional funding sources are created, a brochure, “Funding Options for Beach Management,” identifying sources of funding for nourishment, willing-seller acquisition, and other techniques identified in this report.

⁴⁹ Save Our Shores Maine, Maine Coastal Coalition, Maine Audubon, Maine Innkeepers Association and the Conservation Law Foundation are membership organizations.

22. *The Maine Coastal Program, DEP, DOC and MGS should collaborate with the University of Maine Sea Grant Program and the Coastal Training Program at the Wells National Estuarine Research Reserve to design and conduct a strategic marketing program to increase the use of best management practices and hazard mitigation by homeowners. Strategic marketing programs involve pre-outreach surveys, focus groups and other queries to understand motivation, level of knowledge, values and concerns of the target audience. The design of the outreach products is geared toward the target audience such that measurable improvements are achieved in levels of knowledge, increased use of best management practices, etc.*

V. Evaluating Beach Management Techniques for Specific Areas

A dominant theme of the proposed Integrated Beach Management Program is that “one size doesn’t fit all.” That is, the selection of a management tool (or suite of tools) for use on a specific Maine beach, or whether to intervene with active management at all, is a decision that involves the evaluation of numerous factors. While it was beyond the scope of existing resources and the time constraints associated with preparation of this report to fully evaluate and recommend specific management options for individual Maine beaches, the following section describes a proposed framework for evaluating beach management options. Using existing data when possible, more information has been provided for selected parameters (beach nourishment, economic value.) Where additional analysis is needed (habitat, environmental factors), it has been noted.

Figure 1, the Beach Management Decision Tree, depicts in graphic form the framework suggested by the stakeholder group for evaluating beach management options. It proposes a series of evaluative steps under each of the following general questions:

1. Does the beach require an active management decision?
2. What are the characteristics of the beach?
3. What are the approaches for management intervention?
4. What are the economic consequences of this action?
5. Is funding available or can it be sought?

The stakeholder group spent a good deal of time over the course of its 18-month discussion on Question #3 above, clarifying the types of evaluative criteria that would be used to determine specific management options. Five types of evaluative criteria related to beach management are discussed below. It is the intention of the Integrated Beach Management Program that each of these evaluative tools be used to determine the final management outcome. No one evaluative method should be used in isolation to determine beach management needs.

BEACH MANAGEMENT DECISION TREE

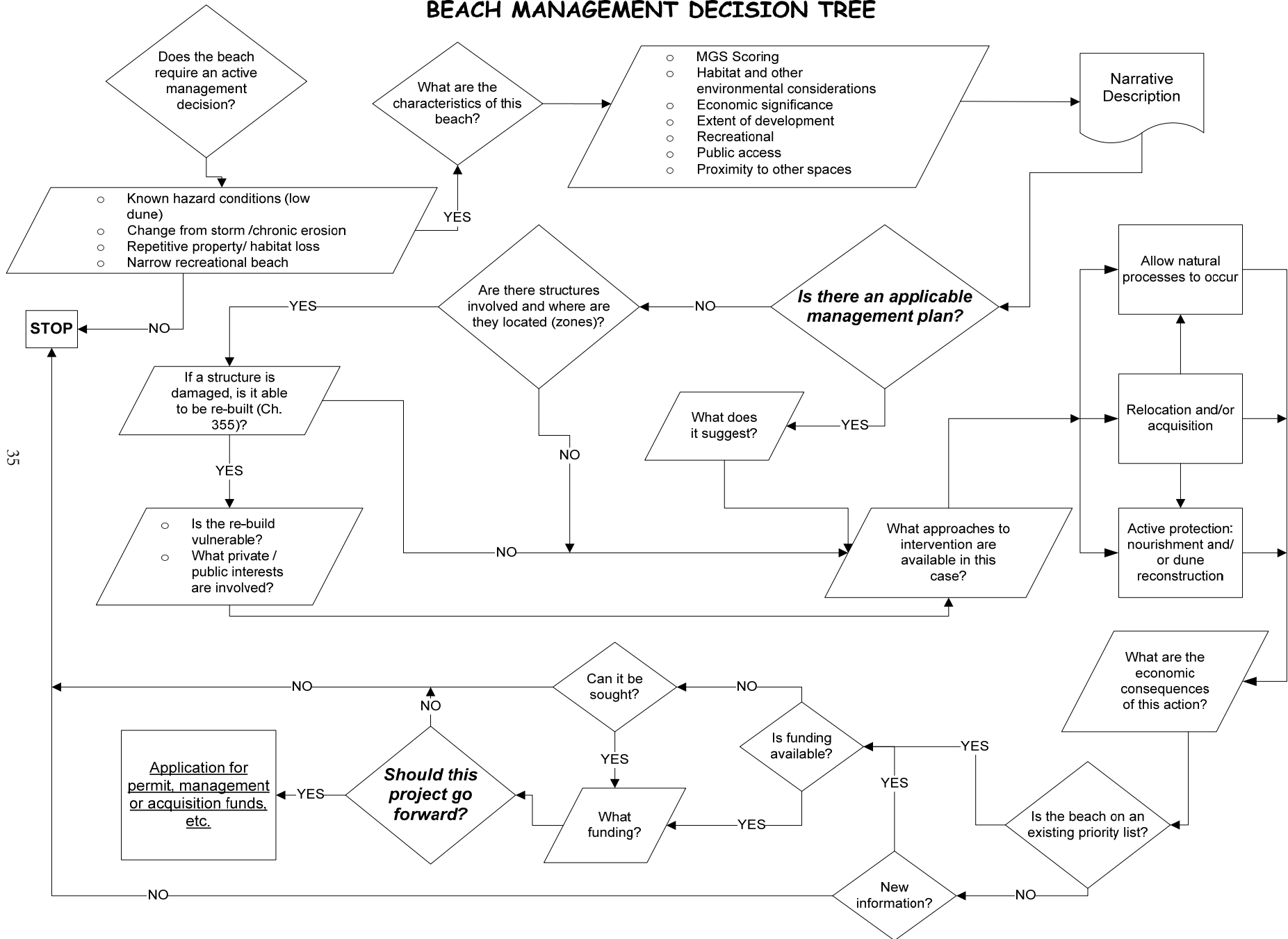


Figure 1

- Geologic Considerations. Maine Geological Survey's beach scoring system can be used to evaluate the physical characteristics of Maine beaches and help to determine the best steps to lessen erosion in different shoreline segments.
- Habitat considerations can help maximize the habitat conservation and restoration potential associated with beach management decisions.
- Economic considerations can help direct funds towards beach improvements that will provide economic benefits.
- Land acquisition considerations can help evaluate whether state investment in property acquisition meets public policy goals.
- Recreational considerations. The Maine Recreational Beach Rating Scale (see Appendix L) can help direct public investment to highly desirable recreational beaches or to improve the desirability of selected beaches.

A. Geologic Considerations

The Maine Geologic Survey (MGS) developed a scoring system model⁵⁰ to aid coastal planners in identifying sections of shoreline needing management and determining the most appropriate beach management action(s) for different shorelines, based on physical criteria.

A simplified Geographic Information System (GIS) interactive tool was created that can be used to present various physical characteristics of the shoreline, including the following:

- Historic shoreline change rate (ft/yr)
- Volumetric shoreline change rate (cy/ft/yr)
- Shoreline type (e.g., dune, seawall, combination)
- Dry beach width (ft)
- Total width (ft)
- Difference from Base Flood Elevation (ft)

Analysis of the physical attributes above yields a recommendation for which stretches of beach are good candidates for a) beach nourishment, b) dune restoration, c) a combination of the two techniques, or d) no action.

A draft version of the scoring system for most of the sandy beaches in Maine has been completed by MGS. In Section IV.A of this report, the current scoring system was used to establish a qualitative evaluation of suitability for beach nourishment. Staff are currently

⁵⁰ The model was developed from work by Trudnak et al. (2002) for several southern Florida beach communities.

working to include additional characteristics to make the scoring system more robust and more usable.

B. Habitat Considerations for Migratory Shorebirds, Piping plovers & Least terns

Section IV.B of this report characterized the current status of threatened and endangered bird populations and provided recommendations for improving habitat management on sand beaches. The following report section includes a list of more specific questions that should be used to evaluate the habitat implications of beach management activities. As stated previously, habitat considerations are one among several evaluations necessary to determine the appropriate mix of specific beach management tools.

Current Habitat Conditions

- ☐ Is there a historic or current record of piping plovers or least terns nesting at the site?
- ☐ Is the area designated or does it qualify for designation as Essential Habitat?⁵¹
- ☐ Is the area currently designated or does it qualify for designation as Significant Habitat for Migratory Shorebirds?⁵²

Threats to Habitat and Populations

- ☐ Is the site threatened with alterations or degradation that will diminish its shorebird carrying capacity?
 - ➔ Disturbance?
 - ➔ Development?
 - ➔ Contaminants?
 - ➔ Physical Alterations?
 - ➔ Chronic Erosion?

Restoration Potential

- ☐ Is the habitat of special importance to the restoration of endangered and threatened species?
- ☐ Are the site characteristics⁵³ consistent with breeding habitat of piping plovers or least terns even though the site does not yet have record of breeding pairs?

⁵¹ 12 MRSA Part 13, Subchapter 3 – Endangered Species

⁵² 38 MRSA, Section 480A et.seq and Significant Wildlife Habitat 06-096 CMR 335

⁵³ Appropriate nesting substrate and beach slope, presence of frontal dune and beach grass (*Ammophilla* spp.) etc.

Habitat Significance

- ☐ Is the habitat considered to be rare?
 - ➔ due to range limitations?
 - ➔ due to encroaching development?
- ☐ Is the habitat essential to the conservation of rare or endangered species?
- ☐ Is the habitat considered essential to the achievement of the Maine Department of Inland Fisheries and Wildlife's management goals and objectives for piping plovers or least terns?

C. Other Habitat Considerations

The stakeholder group noted that there are other types of habitat considerations that need to be evaluated during decision-making processes concerning beach management alternatives – most notably marine habitats. As the evaluative criteria discussed in this section of the report are refined, information about other habitat and environmental considerations should be included after consultation with other state agencies (Department of Marine Resources, Department of Inland Fisheries and Wildlife).

D. Economic Considerations

Two aspects of economic valuation⁵⁴ were discussed by the stakeholder group. At the broadest level, the group discussed the need for documentation of the importance of beaches to the state's economy to support an eventual request for state investment in beach management. Secondly, the group discussed the need for information about the value of specific beaches and cost/benefit analysis to support decision-making at the project level.

The stakeholder group felt strongly that a study documenting the economic value of southern Maine's beaches should be undertaken. This recommendation was originally made in the Improving Maine's Beaches report in 1998.⁵⁵ A study of this scope, which would include primary research (including surveys of beachgoers) would be expensive, and has been beyond means of current budgets. Members of the stakeholder group will continue to work with the new Center for Tourism Research at the University of Southern Maine to raise funds to conduct this research. It is envisioned that it will provide the documentation necessary to support requests for state, municipal and federal funding for active beach management. In the meantime, absent a proactive study, information about the value of beaches to the state's economy was drawn from studies performed for the Maine Department of Economic and Community Development by Longwoods International Inc. and included in the introductory sections of the report. In addition, Appendix K contains a

⁵⁴ Economic valuation refers to a series of techniques used to assess the financial implications of decision-making and looks at the impact of decisions on the environment, people and communities. Techniques used typically include market and nonmarket valuation, and cost/benefit analysis.

⁵⁵ Available at http://www.state.me.us/spo/mcp/downloads/improving_maine%27s_beaches/improving_maine%27s_beaches.pdf

brief analysis of the economic impact of beach tourism in York County. This information in this appendix analyzes the impact of coastal towns vs. non-coastal towns in the regional economy.

The second aspect of economic valuation discussed by the stakeholder group is the need to evaluate the costs and benefits of different beach management techniques as applied to specific beach segments. Again, it is envisioned that cost/benefit analysis is one evaluative tool to be used in conjunction with the Beach Scoring System, habitat evaluations and other evaluative tools to arrive at sound decision-making about beach management options. Considerations that might be used for more in-depth analysis might include, but not be limited to:

- ☐ Number of users of the beach area (including all sectors of users such as recreational fishermen, swimmers, sunbathers, etc.).
- ☐ Potential increases in the number of users due to enhanced public access made possible through active beach management.
- ☐ Changes in the regional economy due to increased visitation and spending by beach goers.
- ☐ Value of the recreational experience to beach goers.
- ☐ Property values and potential increases in property values if beaches are “healthier” after application of active management.

Members of the stakeholder group were also interested in answering the questions: Which locations are the most economically important? Which warrant the most attention in terms of active beach management? Again, as stated previously, economic valuation cannot be used as the sole tool to make beach management decisions. Likewise, the appropriate data at the right scale does not presently exist to conduct more specific evaluations of economic significance of selected beaches.

At the request of the stakeholder group, selected economic indicators were compiled. These indicators are commonly used to look at tourism impacts and include restaurant and lodging sales, retail sales and total tourist expenditures. Examining third quarter data captures the summer tourist season. Figure 2 on the following page shows third quarter data (averaged over five years from 2000 to 2004) for typical tourism indicators for selected municipalities with sand beaches. Number of lodging units for each of these towns is also provided. This extremely limited analysis provides a cursory ranking of economic significance of selected tourist-related spending by municipality. It should be noted that important data sets were not examined for this limited view, for example, property valuation data for homes that would be affected by beach management decisions were not collected. This information is not intended for the development of conclusions regarding which municipalities should receive state support for beach management. Rather, it is provided for illustrative purposes only.

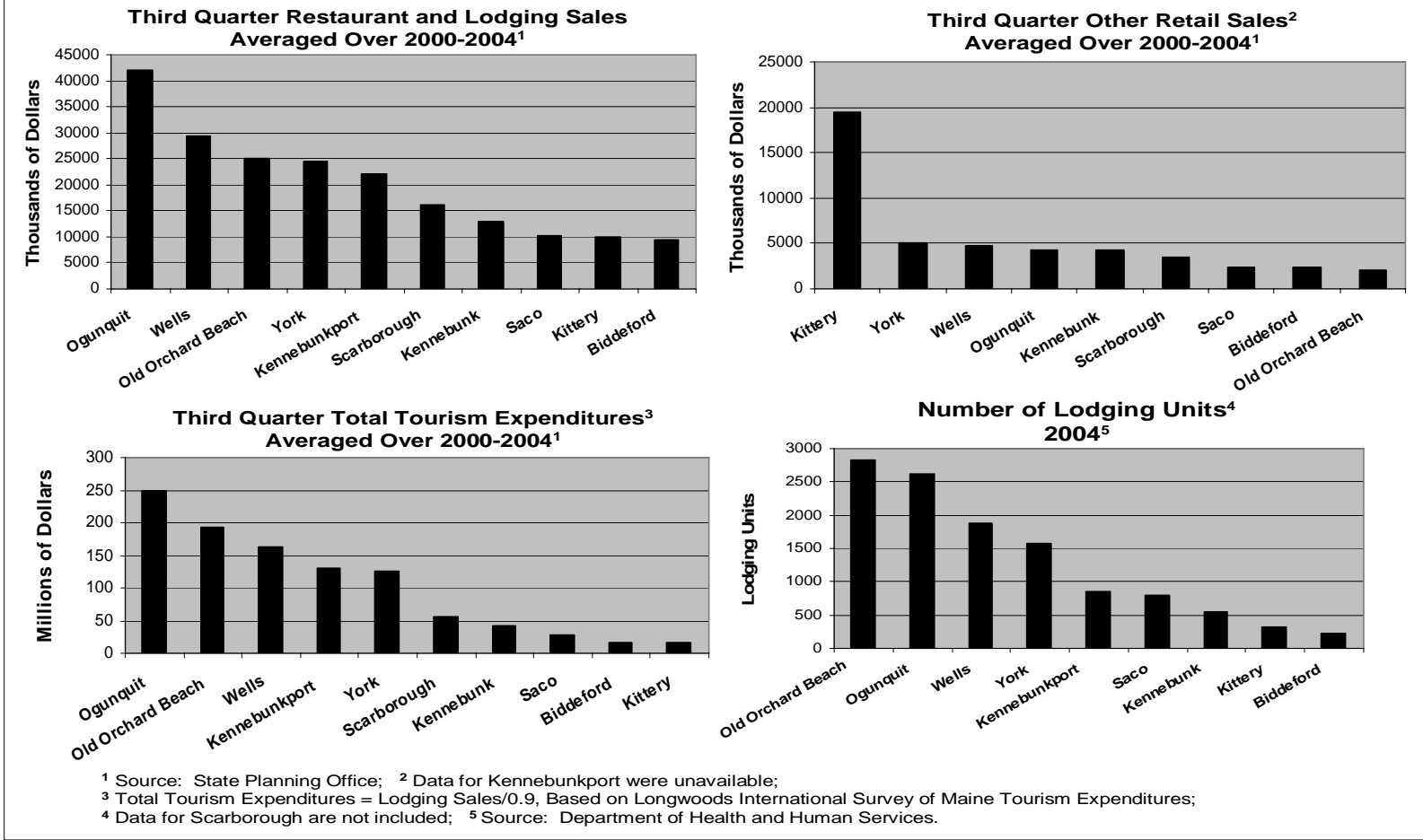


Figure 2. Selected Indicators of Tourism Activity by Town

E. Land Acquisition Considerations

Section IV.C of this report contains recommendations related to the use of willing-seller land acquisition as a beach management tool in selected locations under selected conditions. While the previous section of the report included principles and recommendations, the following section of the report highlights those considerations that should be used to further evaluate whether public acquisition and management of beachfront lands is the desired beach management tool. Again, as stated previously, land acquisition considerations are to be used in combination with other evaluative tools discussed in this chapter to arrive at the optimal mix of beach management approaches.

Physical/Risk-Related Questions

- ☐ Has the site experienced repetitive losses from coastal storms?
- ☐ What is the erosion history and what are the anticipated trends?
- ☐ Given anticipated erosion and accelerated sea-level rise, what are public recreational benefits over the long term?

Management-Related Questions

- ☐ Is the parcel part of a larger restoration/acquisition or hazard mitigation focal area?
- ☐ What is the likelihood of implementing acquisition goals in the focal area?
- ☐ What is the relationship of the parcel to existing conserved lands in the area?
- ☐ What are the existing or potential public access opportunities and recreational potential (existing or potential paths, parking, etc?)
- ☐ Does the site offer potential for commercial or recreational fishing access?
- ☐ Is the property adjacent to, or in proximity to existing public access areas? Is additional access needed? Does this property complement existing areas?
- ☐ Is there a seawall on the parcel? Does the proposed managing entity intend to propose any changes related to the seawall?
- ☐ Is proposed managing agency or entity willing to seek neighborhood and municipal input into any proposed management strategies?

Cost-Related Questions

- ☐ What is the appraised value of the property?
- ☐ What would be the effect of public ownership on municipal valuation?
- ☐ What is the present quality of the habitat or potential for habitat creation/restoration?
- ☐ What is the potential for dune restoration?
- ☐ What are the management issues on the property (removal of seawalls, public access, etc?)

Summary Question

- ☐ Are there multiple benefits associated with public acquisition of the property – hazard reduction, public access, dune restoration, habitat enhancement?

F. Recreational Considerations

When creating priority rankings and when making decisions on funding for specific beach management projects, an examination of existing and potential recreational attributes of Maine's beaches can help direct public investment. For example, state funds might be directed to those beaches that offer the best recreational opportunities for the public. Conversely state funds might be directed to those targeted areas that are most in need of improvements to increase their desirability for public visitation and use. Adapted from an existing framework,⁵⁶ Maine's Recreational Beach Rating Scale (see Appendix L) can be used to evaluate the recreational attributes and needs of specific beaches.

VI. Implementing Maine's Integrated Beach Management Strategy

Preceding sections of this report have described Maine's beach resources and problems associated with their management, presented management options, and identified criteria for their implementation. This section focuses on ways Maine plans to implement its beach management strategies. In so doing, it highlights once again the inter-relationship among the issues described already, and emphasizes the broad context within which decisions must be made in order to balance the needs of differing (and sometimes competing) interests.

Aside from Item 23 below, which requires new funding (from grants, chambers of commerce, landowner organizations, businesses and others) it is assumed that each of the tasks described in the following section will be accomplished within existing resources.

Recommendations Related to Data and Information; Priority Setting

Information Needed to Gather Support for New Funding

23. As a foundation for the establishment of state funds for beach management, a credible economic evaluation of the importance of southern Maine beaches should be completed. While beyond the scope of state budgets, the Maine Coastal Program, in collaboration with the Maine Coastal Coalition, will work with USM's Center for Tourism Research and the Department of Economic and Community Development/ Office of Tourism to raise funds for the study, with the goal of having an analysis completed by the fall of 2007.

⁵⁶ Leatherman, Stephen P., 1998. America's Best Beaches, Laboratory for Coastal Research, Florida International University. Miami, FL; 112 pp.

Information Needed to Set Priorities

24. Coordinated beach management depends on the availability of high-quality data and information about a number of different subjects. A critical initial priority is for state agencies to collaborate to complete a proactive ranking of beach suitability for nourishment, dune restoration, acquisition and other beach enhancement techniques using established criteria. While this will be particularly useful in making decisions about the allocation of state funds, should these become available, its potential use is much broader.

❖ **Geologic Priorities**

The Maine Geological Survey will complete, by March 30, 2007, its scoring of all southern Maine beaches, and the identification of the four to six beaches or beach segments in need of management and most suitable for dune restoration, beach nourishment or a combination of the two approaches.

❖ **Habitat Priorities**

The Maine Department of Inland Fisheries and Wildlife in consultation with the Maine Natural Areas Program/Department of Conservation and Maine Audubon, will, by December 31, 2006, identify those beaches with the highest habitat value considered both as in need of additional protection, and potential enhancement through any of the management strategies described in this document.

❖ **Acquisition Priorities**

The Maine Coastal Program (in cooperation with the Bureau of Parks and Lands at the Department of Conservation, the Maine Geological Survey and the Maine Emergency Management Agency) will, by December 31, 2006 document one or more focal areas with willing sellers and funding agencies and guide initial discussions regarding the use of willing-seller land acquisition as a beach management strategy.

❖ **Management Priorities**

Using the above information, by December 30, 2007, the Maine Coastal Program will create a draft priority ranking for beach management projects. Similar to the method by which the Maine Department of Transportation ranks navigational dredging projects, the MCP will conduct outreach to towns to develop the list and conduct additional outreach to ensure that towns are aware of the ranking. The ranking will be subject to change based on new information and will be updated annually.

Recommendations Related to Oversight and Coordination for Implementation; Decision-making for Funding

Beaches Advisory Group

25. An interagency advisory group under the auspices of the Maine Coastal Program in the State Planning Office, and including the Maine Geological Survey and the Maine Department of Environmental Protection, will coordinate the implementation of this policy. The Beaches Advisory Group should make an annual report to the Legislature's Joint Standing Committee on Natural Resources on The State of Maine's Beaches. The Advisory Group should include the Commissioners of the Departments of Environmental Protection and Conservation, or their deputies; the Directors of the Maine Geological Survey and the Maine Coastal Program; the Director of the Southern Maine Regional Planning Commission; and representatives of Maine Audubon, and from coastal property owners association. The Advisory Group may also ask for representation from other agencies and groups, such as the Department of Inland Fisheries and Wildlife, the Department of Marine Resources, the Maine Emergency Management Agency, local municipalities, etc., as it determines.

The Beaches Advisory Group should meet at least twice each year, with more frequent meetings as needed to “jumpstart” Maine’s Integrated Beach Management Program. The Advisory Group will at least annually receive reports on wildlife and habitat; geological change and any effects of storms; enforcement of regulations; activities in land acquisition or beach nourishment, etc., preparatory to the drafting of the annual report.

The Advisory Group should oversee the Maine Coastal Program’s development and maintenance of a priority list for beach management actions referenced above, including the identification of beach segments at greatest risk. It is envisioned that the Advisory Group would assist in the creation of formalized rules to guide the expenditure of any new state funds for beach management. The Group would also potentially be involved (in some aspect, such as project review) in the award of state funds for beach management projects.

Recommendations Related to Municipalities

Approval of this report and its recommendations by the Legislature’s Natural Resource Committee will signal a major change in state policy on Maine’s beaches, i.e. the focus of state attention on beaches will no longer consist solely of implementation of a regulatory program; rather, it creates a multi-objective program where state and federal agencies, municipalities, homeowners, non profit environmental groups work together to proactively manage healthy beaches.

26. During 2006 and continuing in subsequent years, Maine’s natural resource agencies will develop coordinated programs for technical assistance to towns and homeowners to assist in the development of municipal strategies for beach management. Using information provided by state agencies, municipalities will be encouraged to create local beach management plans, choosing an array of sound beach management

practices (nourishment, restoration, hazard mitigation and land acquisition from willing sellers.) Provided that a source of state funds is forthcoming, municipalities can apply for state cost-sharing of beach management projects. Through participation in the priority ranking list referenced above, towns will be aware of articulated priorities for state funding. Municipalities can also work independently or with state agencies to develop beach management strategies for financing with municipal funds and private funds.

VII. Funding Maine’s Integrated Beach Management Program

The proposal to create an Integrated Beach Management Program in Maine described in this report includes both ideas that can be accomplished within existing resources and concepts that require additional sources of federal, state and local funding. During its 18-month discourse, the stakeholder advisory group:

- Researched and documented the structure and funding mechanisms used by other state beach management programs;
- Researched and documented a variety of existing funding opportunities;
- Made initial connections with state agencies and other organizations that might play a role in funding aspects of the proposed beach management program; and
- Discussed methods and options for increasing the state commitment to beach management and the potential for creation of new state funding sources.

The funding sources researched by the stakeholder group are summarized in the Funding Options Table in Appendix M of this report.

Given current fiscal constraints at all levels of government, this report does not recommend the immediate creation of new funding sources for beach management. Rather, the following recommendations are aimed at continuing a productive discourse about funding needs. It is anticipated that after further discussions, a proposal for state funding for beach management will be presented to a subsequent session of the Maine Legislature for approval.

It should be noted that some members of the stakeholder group are of the opinion that aspects of this report dealing with funding and implementation did not receive sufficient attention during the 18-month stakeholder process. Others are of the opinion that this report presents a strong blueprint for future action, realistic implementation strategies and timeframes, and lays the foundation for additional investment in beach management in the future.

Recommendations Related to Funding

Further Develop Management Priorities

27. While this report provided a very preliminary estimate of the costs of beach nourishment for selected Maine beaches (see Appendix F), funding estimates for

other elements of the Integrated Beach Management Program (dune restoration, habitat enhancement, land acquisition, and hazard mitigation) have not yet been developed. As discussed in the implementation section of this report, individual agencies have been tapped to take the lead on developing more accurate priorities for management activities for specific beaches. This work will result in a more complete estimate of the costs of the Integrated Beach Management Program.

Host a Funders' Workshop

28. Upon receipt of this report by the Joint Standing Committee on Natural Resources and upon approval of the concept and direction of the ideas presented in this report by the Committee, the Maine Coastal Program will host a "funders' workshop" to introduce potential federal, state and local partners to the Integrated Beach Management Program and to further explore existing resources – grants, staff time, reallocation of existing resources, etc., that might help implement the concepts articulated in this proposal. Invitees to this workshop will include representatives of the stakeholder group, state agencies,⁵⁷ town managers and planners from beach towns, the Maine Municipal Association, selected representatives of chambers of commerce, representatives of private landowner associations and others.

Implement an Economic Impact Study

29. As discussed in other sections of this report, Maine beaches are a key element of the state's natural resource infrastructure, critical to the health of local, regional and state economies. While various pieces of the picture that convey the economic importance of the beach resource have been discussed and cited in this report, a more complete evaluation is needed to help build the case for additional state support. The implementation section of this report, assigns lead responsibility to the Maine Coastal Program to oversee fundraising efforts to complete this work, and to finalize a partnership with the University of Southern Maine's new Center for Tourism Research to complete the work.

Hold an Interagency Tourism Infrastructure Workshop

30. Investment in the sustainability of Maine's beaches is an investment in a part of our state's critical environmental infrastructure needed to support a thriving and growing nature-based tourism industry. The beach stakeholder group has been working somewhat independently in creating this report, but several high profile state efforts are related to this work, and linkages must be further developed. Some of these related efforts include: Governor Baldacci's Natural Resource-Based Industry Initiative, the state-funded Fermata Inc. nature-based tourism initiative, the recent report on the Washington County economy and the interest on the part of the Friends of Maine State Parks for a bond issue for parks infrastructure. Although this report has made a case for initial linkages to these efforts, the beach

⁵⁷ Besides agency participants included in the stakeholder process (DEP, DOC, MGS, SPO) invitees will include the Maine Emergency Management Agency, the Maine Department of Economic and Community Development/Office of Tourism.

stakeholder group's recommendations need to be more closely aligned with these efforts. As a first step, the State Planning Office, in collaboration with the Department of Economic and Community Development and the Natural Resource-Based Industries Steering Committee, should work together to design and carry out a workshop on methods for funding tourism infrastructure priorities. This workshop should take place in 2006 and its recommendations forwarded to the Governor's office for consideration.

Direct Maine Coastal Program Resources to Beach Management

- 31. The Maine Coastal Program is currently producing an assessment of issues and rating coastal priorities for approval by the National Oceanic and Atmospheric Administration (the funding entity for state coastal zone management programs). This assessment will be completed by June 2006 and will direct federal funding for five subsequent years. Although funds from this source to support implementation of the strategies contained in this report are limited, modest sums (to partially support data gathering and enhancement, production of state of the beach reports, etc.) and allocation of modest staff support through the Maine Coastal Program is feasible. MCP is collaborating with MGS to produce the assessment section on coastal hazards that will direct the allocation of future NOAA funds for the MCP. Implementation of the recommendations of the Integrated Beach Management Program should be reflected as priority actions for MCP.*

APPENDICES

Appendix A
PL 2003 Resolve 130

Maine Department of Environmental Protection
UNOFFICIAL COPY. LD 1849 as amended by H-805.
Effective date: 4/14/2004 (emergency)

Chapter 130. Resolve, Regarding Legislative Review of Chapter 355: Sand Dune Rules, a Major Substantive Rule of the Department of Environmental Protection

Emergency preamble. Whereas, Acts and resolves of the Legislature do not become effective until 90 days after adjournment unless enacted as emergencies; and

Whereas, the Maine Revised Statutes, Title 5, chapter 375, subchapter 2-A requires legislative authorization before major substantive agency rules may be finally adopted by the agency; and

Whereas, the above-named major substantive rule has been submitted to the Legislature for review; and

Whereas, immediate enactment of this resolve is necessary to record the Legislature's position on final adoption of the rule; and

Whereas, in the judgment of the Legislature, these facts create an emergency within the meaning of the Constitution of Maine and require the following legislation as immediately necessary for the preservation of the public peace, health and safety; now, therefore, be it

Sec. 1. Adoption. Resolved: That final adoption of Chapter 355: Sand Dune Rules, a provisionally adopted major substantive rule of the Department of Environmental Protection that has been submitted to the Legislature for review pursuant to the Maine Revised Statutes, Title 5, chapter 375, subchapter 2-A, is authorized only if Chapter 355 is amended in that section relating to new construction in frontal dunes and designated as section 6, paragraph B, subparagraph (1) to provide that elevators, in addition to ramps, that are required for compliance with the requirements of the federal Americans with Disabilities Act are exempt from the requirement that a new structure or addition to an existing structure may not be constructed on or seaward of a frontal dune. The rule must also be amended to provide that elevators or ramps serving buildings required to comply with the federal Americans with Disabilities Act must be designed and constructed so as to minimize intrusion on the frontal dune, including locating the structures to the rear of buildings or within areas of a lot already developed, such as a parking area. The Department of Environmental Protection is not required to hold hearings or conduct other formal proceedings prior to finally adopting this rule in accordance with this resolve; and be it further

Sec. 2. Sand dune stakeholder meeting. Resolved: That the Commissioner of Environmental Protection and the Commissioner of Conservation shall convene a meeting of sand dune stakeholders by May 15, 2004 to consider the following issues:

1. A comprehensive statewide beach nourishment policy that establishes priority areas and evaluates public and private funding sources, implementation timeframes and public access easements;

2. Wildlife and wildlife habitat management in the sand dune system;
3. A program for voluntary acquisition of storm-damaged properties or properties for dune enhancement or public access;
4. Improved state coastal hazard mitigation plans to direct federal spending;
5. Improved and increased public and private voluntary hazard mitigation programs;
6. Reconstruction of buildings in the frontal dune and v-zone;
7. Removal of the existing prohibition of the use of outdated v-zone maps; and
8. Regulatory incentives to encourage construction or reconstruction outside of the frontal dune; and be it further

Sec. 3. Statewide beach nourishment policy. Resolved: That by January 17, 2005, the Department of Environmental Protection shall report to the joint standing committee of the Legislature having jurisdiction over natural resources matters on the progress of the sand dune stakeholder meetings and shall submit draft revised sand dune rules and a statewide beach nourishment policy; and be it further

Sec. 4. Recommendations. Resolved: That by January 16, 2006, the Department of Environmental Protection shall submit to the joint standing committee of the Legislature having jurisdiction over natural resources matters recommendations on a state acquisition program, wildlife habitat management initiatives and removal of the existing prohibition of the use of outdated v-zone maps; and be it further

Sec. 5. Revised sand dune rules. Resolved: That by January 16, 2006, the Department of Environmental Protection shall provisionally adopt and submit to the Legislature revised sand dune rules. Rules adopted pursuant to this section are major substantive rules as defined in the Maine Revised Statutes, Title 5, chapter 375, subchapter 2-A; and be it further

Sec. 6. Repeal. Resolved: That the rules authorized pursuant to section 1 of this resolve are repealed April 1, 2006.

Emergency clause. In view of the emergency cited in the preamble, this resolve takes effect when approved.

Appendix B
General Characteristics of Selected Sand Beaches in Maine

Beach Name	Develop Status	Replenish. History	Armor Status#	Erosion Status*	Approx. Length (ft)^	Public Ownership+
Reid	None	None	None	Slight	3850	Yes
Hunnewell	Med	None	None	Mod	6770	No
Popham	Low	None	None	Mod	6300	Yes
Small Point	None	None	None	Slight	7400	Yes
Willard	Med	None	Low (16%)	Mod	2200	No
Crescent (Cape E.)	Low	None	None	slight	4330	Yes
Higgins	High	None	High (69%)	Mod	2700	Yes
Scarborough	Low	None	Low (32%)	Slight	7300	Yes
Western	Low	2004	None	High	3400	No
Ferry (Scar.)	Low	None	None	Slight	1200	Yes
Pine Point	Med	None	None	Slight	3800	Yes
East Grand	High	None	Med (44%)	Slight	3270	Yes
Surfside/Old Orchard	High	None	Med (59%)	Slight	10430	Yes
Ocean Park	Med	None	Low (5%)	Slight	6050	Yes
Kinney Shores/Bayview	Med	None	Med (59%)	Slight	5300	No
Ferry (Saco)	Med	None	Low (10%)	Mod	3200	Yes
Camp Ellis	Med	1919, 1969, 1970, 1978, 1982, 1992, 1996	Med (58%)	High	4200	No
Hills	Med	1989	Med (33%)	Mod	5350	No
Fortunes Rocks	Med	None	Med (56%)	Mod	11320	No
Goose Rocks	Med	None	Med (59%)	Slight	9960	No
Goochs	High	1985; 2004	High (88%)	High	3360	Yes
Great Hill Bch	Med	None	Med (47%)	Mod	1710	No
Parsons	Low	Mod	Low (14%)	Slight	3800	No
Crescent Surf	Low	None	None	Mod	3100	No
Laudholm	Low	None	None	Mod	2360	Yes
Drakes Island	High	2000-01	High (68%)	Mod	4630	Yes
Wells	High	1990, 1991, 2000-01	High (88%)	Mod	11800	Yes
Moody	High	None	High (~100%)	Mod	6280	No
Ogunquit	Low	Dune restoration 1974-75	Low (5%)	Mod	7280	Yes
Short Sands	Medium	None	High (100%)	Mod	1290	No
Long Sands	High	None	High (100%)	High	6950	Yes

* Erosion status, for this table, was determined as follows:

- High: erosion generally >2 ft/yr, high and may have contiguous seawalls.
- Moderate (Mod): chronic erosion problems, may have seawalls that are impacted by storm waves annually, or, if natural, have chronic dune scarps and frontal dune erosion; recreational opportunities may be limited at high tide.
- Slight: slightly erosional beaches have slow erosion rates or variable erosion and accretion rates; often have a sandy summer berm and seasonal exchanges of sand with the offshore, have a fairly large frontal dune, may or may not have seawalls and offer recreation opportunities at all tide levels.

More precise shoreline change values will be developed as part of data collection efforts associated with the development of these policies herein.

Armoring status determined based on approximate measurements along the high tide shoreline using the MEGIS Aerial Photography Viewer. Landward of this position, some dunes also contain buried seawalls. Determination based on interpretation of the aerial photographs and knowledge of field conditions at most locations. Status determined as follows: High (>66% armored), Med (33-66% armored), Low (<33% armored.) Values indicate the percentage of the total beach length.

^ Beach lengths estimated from high water line measurements using the MEGIS Aerial Photography Viewer. Measurements not made based on exact town or city boundaries.

+ Public ownership – a “yes” in this category means that a portion of the beach is owned by the public (town, state, etc.) Exact length of public ownership has not been estimated here.

Appendix C

Framework Agreement on Sand Dunes and Coastal Management in Maine



JOHN ELIAS BALDACCI
GOVERNOR

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DAWN R. GALLAGHER
COMMISSIONER

March 10, 2004

Framework agreement on sand dunes and coastal management in Maine

The following signatories agree that it is in each party's interest to continue improving the management and stewardship of Maine's sand dune systems. To that end, we agree to the following:

We commit to facilitated broad ranging discussion among all parties over the next two years to improve relations, strengthen all parties' commitment to coastal sand dune protection and enhancement, hazard mitigation, wildlife habitat management and improvement, beach nourishment, improved construction standards in high risk areas, and improved public access.

Through this stakeholder process we agree to deliberate upon the following:

- A comprehensive State beach nourishment policy that establishes priority areas, and evaluates public and private funding sources, implementation timeframes and public access easements;
- Wildlife and wildlife habitat management in the sand dune system;
- A program for voluntary acquisition of storm-damaged properties or properties for dune enhancement or public access;
- Improved State coastal hazard mitigation plans to direct Federal spending;
- Improved and increased public and private voluntary hazard mitigation programs;
- Reconstruction of buildings in the frontal dune and v-zone;
- Removal of the existing statutory prohibition on use of outdated v-zone maps; and
- Regulatory incentives to encourage construction or reconstruction outside of the frontal dune.

We agree to the following legislative direction to be enacted via LD 1849:

- Adoption of the BEP provisionally approved sand dune rules as submitted to the Legislature with a sunset provision effective April 1, 2006. If the sunset becomes effective it is our understanding that Chapter 355, Coastal Sand Dune rules would then no longer be in effect.

USTA
STATE HOUSE STATION
USTA, MAINE 04333-0017
287-7688
BLDG., HOSPITAL ST.

BANGOR
106 HOGAN ROAD
BANGOR, MAINE 04401
(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

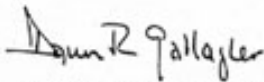
PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769-2094
(207) 764-0477 FAX: (207) 764-1507

ite: www.state.me.us/dep

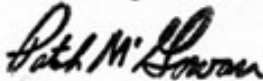
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- The DEP and DOC Commissioner will convene the first meeting of interested parties no later than May 15, 2004.
- On January 17, 2005, the DEP shall report on progress in all of the above areas and shall report back a Statewide beach nourishment policy as outlined above and draft revised sand dune rules.
- On January 16, 2006, the DEP shall report back new provisionally adopted rules and recommendations on a state acquisition program, wildlife habitat management initiatives, and removal of the existing statutory prohibition on the use of outdated v-zone maps.
- The submission and approval of new provisionally adopted rules in the second regular session of the 122nd Legislature will be cause to eliminate the sunset provision.

Signed:



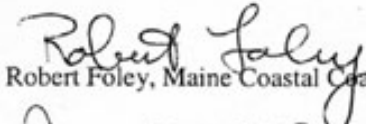
Dawn R. Gallagher, Commissioner DEP



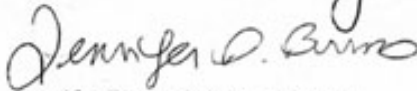
Patrick McGowan, Commissioner, DOC



Kathryn Kelly, Save our Shores Maine



Robert Foley, Maine Coastal Coalition



Jennifer Burns, Maine Audubon



Barry Timmon, Consulting Geologist



Peter Daigle, Inn Keepers



Martha Freeman, Director, SPO

Appendix D

Chronology of Significant Events Concerning Maine Beaches

- 1867 Jetty construction authorized for the mouth of the Saco River at Camp Ellis
- 1896 New pier at Old Orchard Beach destroyed by November storm
- 1935 Major seaward extension of jetties at Camp Ellis prompts first study of erosion caused by jetties
- 1961-1964 In response to requests from the town and the state, the Army Corps of Engineers constructs jetties at the mouth of the Webhannet River, resulting in major entrapment of sand and accelerated erosion on neighboring beaches
- 1962 Federal navigation structures at Scarborough River completed
- 1968 Federal navigation structures at Kennebunk River completed
- 1969 Final modifications to jetties at Camp Ellis followed by decades of erosion analysis
- 1972 Pier at Old Orchard Beach destroyed by winter storm
- 1976 Severe spring storm destroys cottages at Popham Beach, damages roads at Camp Ellis
- 1978 Severe winter storms result in major damages to property and infrastructure along Maine coast, topples the rebuilt Old Orchard Beach pier
- 1979 Governor's Advisory Committee on Coastal Development and Conservation
- 1982 Coastal Barriers Resources Act passed by the Congress
- 1983 Sand Dune Rules created
- Least terns listed as threatened species
- 1985 Piping plovers listed on endangered species list
- 1987 First State hazard mitigation plan
- 1987 Amendment to NRPA allows new seawall at Scarborough River
- 1991 March storm destroys homes at Camp Ellis
- 1991 Halloween "Perfect Storm" causes extensive damage in southern Maine
- 1993 Reconstruction allowed in frontal dunes as a result of court challenge
- 1995 Essential habitat designated for piping plovers and least terns
- 1995 NRPA amended to allow emergency rebuilding of seawalls
- 1998 Improving Maine's Beaches Report
- 1998 Cobble beaches added to definition of sand dune systems
- 1999 Legislation passed that grandfathered use of NFIP maps for determination of V-zone
- 99-02 Regional management plans developed
- 2000 Volunteer beach profiling project initiated
- 2000 First State of Maine Beaches Conference
- 2000 Plover agreement signed by Maine Audubon, the U.S. Fish and Wildlife Service, Maine IF&W, Wells town officials and residents representing their local beach communities
- 2000-1 Drakes Island beaches and Wells Beach nourished with sand from Wells Harbor dredge
- 2004 121st Legislature considers competing bills to amend sand dune rules. Legislature directs creation of stakeholder group and passes a Resolve to that affect
- 2004 Amended rules are adopted by BEP, but with a sunset provision, in consideration of stakeholder group's charge to submit revised rules in January 2006

Appendix E

Discussion of Sediment Sources for Beach Nourishment

The following sediment sources are discussed in terms of their general acceptability and expected environmental and economic considerations:

1. The beneficial reuse of dredged material resulting from a federal (US Army Corps of Engineers, USACE) dredging project. Historically, sand from harbors and river channels has been the typical source of sediment for beach nourishment projects in the State. In order for dredged material from a federal project to be used for beach nourishment, the USACE must determine that disposing of dredged material at a beach is the most cost-effective method of disposal. In such a case, the USACE typically covers the costs of dredging and disposal. Such projects typically require a local sponsor (*i.e.*, town or municipality) to receive the dredged sediment, and there may be additional costs born by the sponsor of moving materials to a nourishment site if the USACE deems it too expensive. Environmental impacts of dredging and subsequent nourishment are typically addressed through an USACE alternatives analysis and Coastal Zone Management consistency review. *The State of Maine generally encourages the continued beneficial reuse of clean dredged material resulting from federal projects for beach nourishment.*

2. The use of upland material for beach nourishment. Beach quality sediments excavated from upland sources can be utilized for beach nourishment and provide for a beneficial use of naturally occurring upland sediments. Currently in Maine, no chemical toxicity testing of upland material to be used for beach nourishment is currently required under NRPA [unless contamination is suspected?]. Economic and social considerations include the cost of transportation of material to the nourishment site, road improvements and/or road degradation, and aesthetic (noise) impacts. *The State of Maine generally encourages the use of clean upland sources of material for beach nourishment.*

3. The use of sediment from an accreted beach that originated from previous publicly-funded beach nourishment activities. In some cases, portions of public and private beaches that have been determined to have accreted as a result of the natural movement of previously placed, publicly funded, beach nourishment material, may be utilized as a source for a subsequent beach nourishment project. Proposed activities must be consistent with the Natural Resources Protection Act. Ownership of accreted sediment is a legal issue that remains to be resolved. *The State of Maine conditionally accepts the use of such sediment sources for beach nourishment.*

4. The use of material dredged from nearshore and offshore waters for beach nourishment. Dredged material from nearshore and offshore waters for the sole purpose of beach nourishment should be carefully considered since beach quality sediment along Maine's shoreline is a relatively rare resource occupying only 8% of the seafloor (Kelley et al., 1998). Plans for using material from nearshore and offshore waters must give consideration to hydrodynamic and biologic impacts to the dredge and disposal sites (pre-and-post project monitoring, refill rates, etc.), borrow-site sediment toxicity testing, methods for dredging, and costs associated with ownership and leasing, dredging, sediment transport,

and disposal. *The State of Maine conditionally accepts the use of nearshore or offshore sediment sources for beach nourishment.*

5. The use of material accreted as a result of federal navigation structures for beach nourishment. In some cases, federal navigation structures have impacted the natural sediment budget such that erosion and accretion unnaturally increases in certain locations. The use of accreted sediment adjacent to federal navigation structures for beach nourishment should be considered. Unresolved issues associated with this sediment source include sediment ownership and consistency with the Natural Resources Protection Act. *Until these issues are resolved, the State of Maine cannot take a position on the use of the material accreted as a result of federal navigation structures for beach nourishment.*

Appendix F

Beach Nourishment Cost Estimates and Explanation of Methods Used

A simple approach to estimating costs of beach nourishment was adopted using a price per linear mile of beach (Appendix I). This approach is based on costs of beach nourishment projects completed by the US Army Corps of Engineers in Wells and Scarborough in the last 5 years. In these projects there was no cost to purchase the sand and it was available locally and dredged via a suction cutter head, barge and pumped to the beach via a pipeline system. The approximate cost of these projects (paid to the dredging firm) was on the order of \$2 million per mile of beach.

In many beaches, this cost estimate will not work because there is no local sand supply or if there is one it may be insufficient for repeated nourishment projects (see Appendix I for details). Furthermore, federal costs do not include additional costs borne by a local sponsor (such as a municipality). The federal costs do not include costs of locating suitable sand from either an onshore or offshore source nor of providing documentation for federal and state permits.

If sand is dredged from an offshore source and loaded onto a barge, it would then have to be handled a second time to move it ashore onto the beach. Because of this double handling effort and a lack of estuarine and river sand in sustainable quantities for long-term nourishment, a higher cost estimate of \$4 million per mile was assumed for all beaches.

If sand from an upland source (gravel pit) is used, then there may be a cost per cubic yard of sand to include in the true project costs that might be offset by the need to discover sand in the marine environment. Sand from an upland source will also have trucking expenses and perhaps road repair costs that have not been estimated here.

The estimates in Table 1 below do not include discovery, evaluation, testing, permitting, and other factors such as monitoring and wildlife management that may be required in a project. These values are not considered part of the \$4 million per mile estimate.

In order to compare economic costs of projects it is necessary to look at the need over 20 years. Renourishment cycles (Appendix I) are generalized to 2, 5, 10, and 20 years. In other words, in the first 20 years, a project with 10-year longevity will have 2 nourishments; a 5-year cycle will have 4 nourishments. At the end of the 20 years, the beach may need nourishment again. This estimate is simply an educated guess since cycle lifetimes will vary due to factors such as the original project design, erosion rates of the filled sand, local wave and current forces that disperse the sand across the profile, the abundance and strength of future storms, etc.

Costs listed below are based on current prices and not inflated over the next 20 years. True costs will depend heavily on the volume of sand needed to rebuild the beach profile. Since costs are usually determined on the number of cubic yards placed on a beach, the project design will greatly influence the true project cost. No attempt has been made here to design projects and estimate the fill volumes needed.

Table F1
Rough 20-Year Cost Estimates for Beach Nourishment

20-yr Cost (\$Millions)	Beach Nourished	Suitability for Beach Nourishment⁵⁸
\$32.0	Camp Ellis	H
\$20.8	Long Sands	H
\$16.0	Wells	M
\$16.0	Fortunes Rocks	M
\$12.0	Drakes Island	M
\$8.0	Hills	H
\$8.0	Ferry (Saco)	M
\$6.0	Moody	M
\$4.8	Goochs	H
\$4.0	Western	M
\$4.0	Hunnewell	L
\$2.8	Scarborough	M
\$2.0	Higgins	M
\$2.0	Pine Point	L
\$1.6	Willard	M
\$1.6	Short Sands	M
\$1.2	Great Hill	M

The total cost for nourishing all of the beaches noted in the table above is \$142.8 million over 20 years (not adjusted for inflation). The annualized cost in current dollars is \$7.1 million. Broken down by municipality, the 20-year cost estimates to each community for all (H, M, and L) projects are listed in the table below.

Table F2
Rough Cost Estimates by Municipality for Nourishment of All Beaches
**20-Year Cost by Municipality
for All Beaches**

(Millions)	
\$40.0	City of Saco
\$34.0	Town of Wells
\$24.0	City of Biddeford
\$22.4	Town of York
\$10.8	Town of Scarborough
\$6.0	Town of Kennebunk
\$4.0	Town of Phippsburg
\$1.6	City of South Portland

⁵⁸ A rating of H-High, indicates that the beach (based on a qualitative preliminary evaluation of geologic information) is potentially highly suitable for beach nourishment. A rating of M- Medium indicates that the beach is a possible candidate for beach nourishment. A rating of L-Low indicates that the beach is not a likely candidate for nourishment.

Appendix G

References Used for Beach Nourishment Regulations and Funding

Funding

CA Public Beach Restoration Act

http://www.calcoast.org/restprog/ab_64_bill_19991010_chaptered.pdf

DE Beach Preservation Fund

<http://www.delcode.state.de.us/title7/c068/>

FL Ecosystem Management and Restoration Trust Fund

http://www.flsenate.gov/Statutes/index.cfm?mode=View%20Statutes&SubMenu=1&App_mode=Display_Statute&Search_String=Ecosystem+Management+and+Restoration&URL=CH0403/Sec1651.HTM

SC Beach Restoration and Improvement Act

<http://www.scstatehouse.net/code/t48c040.htm>

US Army Corps of Engineers: A guide for project Partners

<http://www.nwp.usace.army.mil/re/WhoPays.htm>

US Army Corps of Engineers Cost Sharing requirements for Shore Protection

<http://www.usace.army.mil/inet/usace-docs/eng-pamphlets/ep1165-2-1/c-14.pdf>

Regulations (and ancillary information)

NOAA OCRM review of State beach nourishment programs (2000)

<http://www.ocrm.nos.noaa.gov/pdf/finalbeach.pdf>

NOAA Beach Nourishment Guide for Local Officials

<http://www3.csc.noaa.gov/beachnourishment/index.htm>

NC Coastal Area Management Act (CAMA)

<http://dcm2.enr.state.nc.us/Rules/cama.htm>

DE Beach Policies

<http://www.dnrec.state.de.us/bechreg1.htm>

SC Department of Health and Environmental Control - OCRM

<http://www.scdhec.gov/environment/ocrm/>

NY Department of Environmental Conservation - Coastal Erosion Management

<http://www.dec.state.ny.us/website/regs/part505.html#505.7>

Appendix H

Guidelines for Monitoring Beach Nourishment Projects

The provisionally adopted (11/05) Sand Dune Rules include a new section on project monitoring for beach nourishment projects

“8D.Monitoring. To ensure that the beach nourishment project does not have an unreasonable adverse impact on the coastal sand dune system, the coastal wetland on or adjacent to the project site and wildlife habitat, the department may require pre-construction monitoring to establish a baseline and post-construction monitoring after project completion.”

Pre-application meetings with state agency staff should be encouraged for beach nourishment projects. Departments (DEP, DOC, etc.) could then provide more specific guidance on the monitoring that may be required, based on the type/size etc. of the nourishment project undertaken.

The following guidelines are included for the purpose of providing readers of this document with an idea of the extent of monitoring that might typically be required as part of a beach nourishment project.

General -- Pre-and post project monitoring programs (minimum of 1 year post-project), both geologic and habitat-related, should be designed to document the success of the project and its impacts to the geologic and environmental characteristics of the beach and dunes.

- 1) Geologic monitoring might include, at a minimum, the following:
 - a. Beach profiling. An adequate density of beach profiles should be established and monitored in order to monitor determine changes in beach shape and constrain volumetric changes in the nourished beach. The number of profiles should be determined based on the extent of the proposed project. Off-project control profiles may be required. Beach profiles should extend from the most landward to the most seaward point of the completed project, to the maximum extent practicable. Beach profiles should be conducted on a quarterly basis, at a minimum;
 - b. Sediment sampling. Sediment samples should be collected from the lower beach face, at the time of profiling. One sample per profile should be collected and analyzed in terms of textural characteristics.
 - c. Additional geologic monitoring may be required if a borrow-site is utilized.
- 2) Biological monitoring will be required. Guidelines for biological monitoring need to be developed.

Appendix I
Preliminary Analysis of Beach Nourishment

Beach Name	Length/ Nourish (miles)	Local Sand Source	Low Cost (Estimate @ \$2m/mile)	High Cost (Estimate @\$4m/mil e)	Comment	Priority/ Cycle
Reid	0.8/0.0	None	NA	NA	State Park	Low
Hunnewell	1.3/1.0	Kennebec R.	NA	\$4.0m	Clamshell	Low/20 yrs
Popham	1.2/0.0	Kennebec R.	NA	NA	State Park	Low
Small Point	1.4/0.0	Kennebec R.	None	Slight	Nature Reserve	Low
Willard	0.4/0.4	Portl. Ship Channel	NA	\$1.6m	Clamshell	Med / 20 yrs
Crescent (Cape E.)	0.8/0.0	None	NA	NA	State Park	Low
Higgins	0.5/0.25	None	NA	\$1.0m	Upland Source	Med / 10 yrs
Scarborough	1.4/0.7	None	NA	\$2.8m	Upland/Seabed	Med / 20 yrs
Western	0.6/0.5	Scarb. R.	\$1.0m	\$2.0m	Corps Project	Med / 10 yrs
Ferry (Scar.)	0.2/0.0	Scarb. R.	NA	NA	Dune Restor.	Low
Pine Point	0.7/0.5	Scarb. Delta	\$0.5m	\$2.0m	Bulldoze Bars	Low / 20 yrs
East Grand	0.6/0.0	None	NA	NA	Sufficient Sand	Low
Surfside/Old Orchard	2.0/0.0	None	NA	NA	Sufficient Sand	Low
Ocean Park	1.1/0.0	None	NA	NA	Sufficient Sand	Low
Kinney Shores/ Bayview	1.0/0.0	None	NA	NA	Sufficient Sand	Low
Ferry (Saco)	0.6/0.5	Saco R.	\$1.0m	\$2.0m	River/Upland/ Seabed	Med / 5 yrs
Camp Ellis	0.8/0.8	Saco R. and Upland	\$1.6m	\$3.2m	Needs Overfill/ Corps Sec. 111	High / 2 yrs
Hills (Biddeford)	1.0/0.5	Saco R.	\$1.0m	\$2.0m	Share with Saco	High / 5 yrs
Fortunes Rocks	2.1/1.0	None	NA	\$4.0	Upland/Seabed	Med / 5 yrs
Goose Rocks	1.9/0.0	None	NA	NA	Dune Restor.	Low
Goochs	0.6/0.6	None	NA	\$2.4	Kennebunk R. Volume Low	High / 10
Great Hill Bch	0.3/0.3	None	NA	\$1.2m	Mixed S&G from Upland	Med / 20 yrs
Parsons	0.7/0.0	None	NA	NA	Dune Restor.	Low
Crescent Surf	0.6/0.0	None	NA	NA	Dune Restor.	Low
Laudholm	0.5/0.0	None	NA	NA	Wells Reserve	Low
Drakes Island	0.9/0.75	Wells Harbor	\$1.5m	\$3.0m	Corps Project/ Upland Suppl.	Med / 5 yrs
Wells	2.2/1.0	Wells Harbor	\$2.0m	\$4.0m	Corps Project/ Upland Suppl.	Med / 5 yrs
Moody	1.2/0.75	None	NA	\$3.0	Upland/Seabed	Med / 10 yrs
Ogunquit	1.4/0.0	None	NA	NA	Dune Restor.	Low
Short Sands	0.2/0.2	None	NA	\$0.8m	Upland	Med / 10 yrs
Long Sands	1.3/1.3	None	NA	\$5.2m	Upland/Seabed	High / 5 yrs

- **High Priority:** The beach profile is low and without a seasonal berm or bar system effective to dissipate storm waves. Dune sand is not available to the beach profile in storms and the beach and dune system are in a state of disequilibrium. The beach has active seawalls year-round and storm waves can damage public infrastructure and private properties as often as annually. Short-term erosion problems are acute. This category may include natural beach systems or state beaches with high erosion rates.
- **Medium Priority:** Beaches with long-term erosion problems, some seawalls may become undermined, infrastructure and properties damaged on a 5-10 year recurring time interval. The dry recreational beach is limited by the tides. This category may include natural beach systems or state beaches with moderate erosion rates.
- **Low Priority:** Beaches with slow erosion rates or variable erosion and accretion rates so the need to nourish may be episodic or only after an extreme erosional storm. Loss of nourishment is expected to be relatively slow due to containment within headlands or to low long-term erosion rates. This category may include natural beach systems or state beaches with low erosion rates.

Sand volumes historically dredged by the Corps of Engineers are not likely to be sufficient for supplying all the local sand source needs over time at most locations.

Low Cost estimates are based on recent Corps of Engineers projects in Maine using a suction cutter head dredge in shallow harbors and channels with a pressurized pipeline that delivers sand to the beach for dewatering and shaping with bulldozers. This procedure requires calm waters for dredging and usually less than a mile between the source and the beach where the nourishment takes place.

High Cost estimates are double the low cost because dredging is likely to be in deeper water and dredged via a clamshell crane on a barge. Sand loaded onto the barge must then be offloaded or pumped onto the beach – essentially handling the material twice as much as in the Low Cost procedure. Transit between the dredge area and the beach can add considerable time to the project as well as seasonal work windows that may require work in the winter when the sea state is frequently rough.

Costs Not Included. The High Cost estimate does not take into account finding sufficient volume and quality of sand on or below the seabed. Precisely locating, analyzing, and quantifying suitable offshore sand may cost a project an additional \$0.5 to \$1.0m. Costs to analyze sediments for contamination, to document environmental impacts, or to monitor pre- and post-project conditions are also not included in the High Cost estimate.

Dune Restoration. In a few locations, the comment identifies dune restoration as a preferred alternative management action to beach nourishment. At the present time, this determination is qualitative and based on beach characteristics and the potential to improve the function of the beach and dune system with better dune management or perhaps the addition of sand to the frontal dune. More sophisticated scoring and analysis by the Maine Geological Survey is possible with funding to improve the technical ability to prioritize projects based on physical characteristics and to estimate the longevity of renourishment.

Appendix J
Enhancing State Agencies' Ability to Manage Maine's Beaches
Data Development, Maintenance and Distribution Needs and Mapping Needs

Data or Mapping Need	Purpose or Use	Status	What Needs to be Done?	Accomplish with Existing Resources or New Resources Needed
1. Enhance Beach Scoring System in two phases	Determine beach preservation, restoration and enhancement strategies Identification of priority management areas (highest economic value, highest biological value.)	Initial draft version of Beach Scoring System has been developed for most sandy beaches	Phase 1 Enhancement -- Need to add other physical characteristics to effectively rank areas of need and management activities Phase 2 Enhancement – Inventory and determine suitability of data from IF&W, DMR and Audubon; develop economic data on a compatible geographic and temporal scale Incorporate new data into scoring system	New resources needed to update/embellish scoring system. Need future funding
2. Update scoring system annually (and reevaluate data and methods every five years)	Maintains system			Need future funding
3. Create a shoreline change monitoring program	Data collection to support beach scoring system, regulatory mapping programs, and public data dissemination	Maine Beach Mapping Program (MBMP) under development; this incorporates volunteer-generated data from State of Maine Beach Profiling Project (SMBPP)	Establish locations and conduct cross-shore and along-shore surveys of beach features (repeated biannually)	Both MBMP and SMBPP need future funding for continuation of data collection and data management in the future
4. Create databases to archive beach data	Data storage to support beach scoring system, regulatory mapping programs, and public data dissemination	Currently under development	Complete project	Existing resources

Data or Mapping Need	Purpose or Use	Status	What Needs to be Done?	Accomplish with Existing Resources or New Resources Needed
5. Analyze collected beach information	Support updates to Beach Scoring System, regulatory mapping efforts, the State of the Beaches report, and the Maine Coastal Atlas.	To be developed in future years; annually	Develop system	Requires future funding
6. Create methods to disseminate data to the public	Public education and data availability to the general public, towns, consultants, etc.	Currently being developed In beginning phases; will need future efforts	Create annual “State of the Beaches” report which provides general information on shoreline changes Create the Maine Coastal Atlas, which will be a GIS-based clearinghouse for coastal data	Existing resources; will require future funding for annual analysis and updates Existing resources; will require future funding for development and annual updates
7. Update Coastal Sand Dune Boundaries	Regulatory -- Implementation of Coastal Sand Dune Rules; municipal planning	Requires review of new data; potential update every five years	Update regulatory boundaries and digitize onto geo-referenced air photographs; Distribute via Maine Coastal Atlas site.	Requires future funding
8. Erosion Hazard Area Mapping Program	Regulatory – Implementation of Sand Dune Rules Planning – identifies critical erosion areas and areas of likely future erosion	Underway – Needs review and potential update every five years	Create a full set of EHA maps; ensure that maps incorporate new definition of EHAs in Sand Dune Rules	Requires future funding to complete since Coastal Sand Dune Rules created a new regulatory definition for EHAs
9. Hydrographic surveys, research projects and special studies	Improve knowledge of coastal processes	Future		Requires future funding
10. Nelson shoreline change maps	Enhance or supplement Beach Scoring System	Future	Requires review of older photographs (pre-1960s) and T-sheets	Requires future funding
11. Additional beach profiles at project sites	Historical comparisons and design of restoration projects		Need to require submittal as part of NRPA permit; standardize requirements for profile location/method	

Data or Mapping Need	Purpose or Use	Status	What Needs to be Done?	Accomplish with Existing Resources or New Resources Needed
12. River sediment availability	Sand management decision-making; federal dredging cycles	Future	Develop full database of river sediment transport rates and sediment characteristics through literature search and research of other completed projects	Existing resources

Appendix K

Economic Impact of Beach Tourism in York County, Maine

DRAFT

1.0 Introduction

This analysis explores the economic importance of the beaches in York County by examining secondary data. Secondary data is, in this instance, “existing data that are collected on a routine basis to record market-based transactions.”⁵⁹ A thorough economic analysis of the economic impact of beaches would include both primary and secondary data. Obtaining primary data would require the development and implementation of a survey of beach visitors. Analysis of this survey would require categorizing beaches by degree of access (open or limited), and type of use (day versus overnight). Until such a survey and analyses are undertaken, these secondary data are intended to provide a “snapshot” of the economics of Maine’s beaches.

There are two components to the economic analysis of the secondary data: seasonal analysis and beach town versus non-beach town analysis. Each analysis attempts to isolate the importance of beach tourism to Maine’s economy. For the seasonal analysis, economic and traffic data from the off-season are compared with data from the peak beach tourist season. For the second type of analysis, economic data from beach towns in York County are compared with non-beach towns in that same county. Both of these analyses have revealed that beach tourism has a significant, positive impact on Maine’s economy.

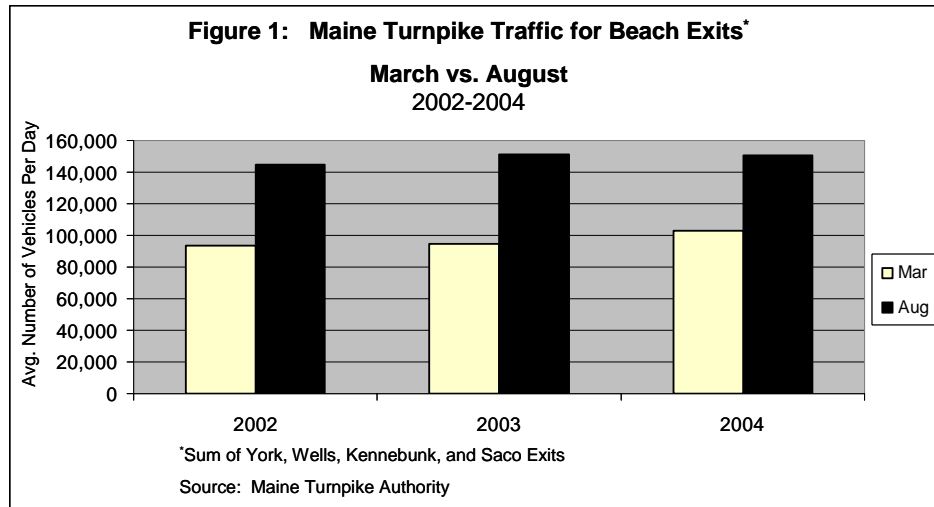
2.0 Seasonal Data Analysis

The types of secondary data for seasonal analysis include: traffic counts of vehicles, sales from the restaurant, lodging and retail sectors, and services and retail employment data. Changes in these figures from the off-season to the peak season provide information on the impact of beach tourism in York County.

2.1 Maine Turnpike Traffic Analysis

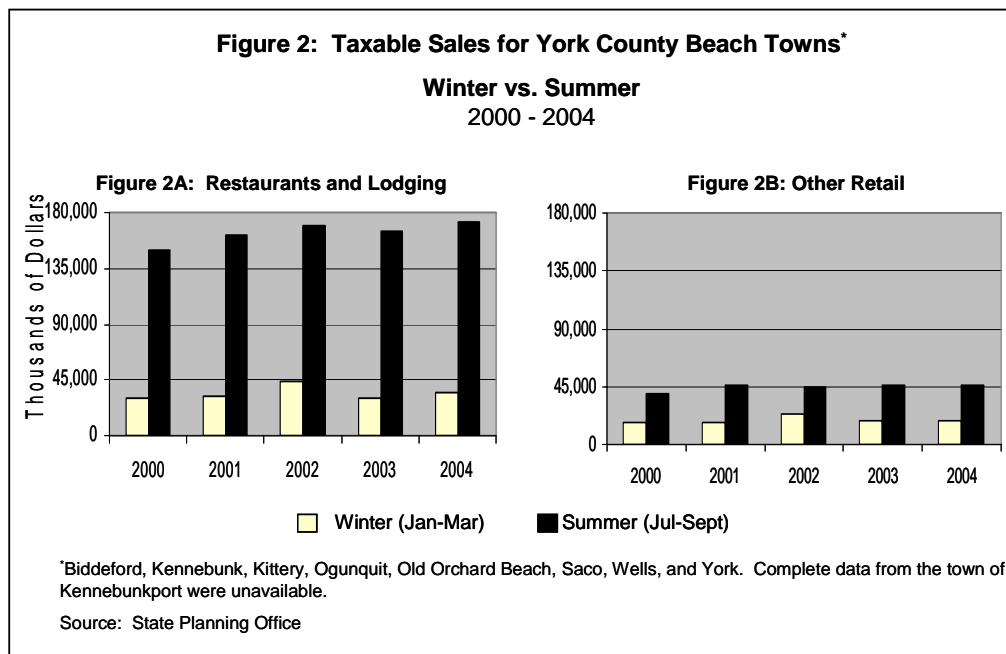
Traffic data were summed across the exits visitors use to access the southern Maine beaches, including the York, Wells, Kennebunk, and Saco exits (Figure 1). Data from March, an off-season month, were compared with August, a peak tourist season month. This data exemplifies the seasonal variation in traffic patterns. For the years 2002 – 2004, there is between a 45% to 53% increase from March to August in the number of vehicles using these exits.

⁵⁹ Wells Bay Planning Committee, Wells Bay Regional Management Plan, 2002, p. 62



2.2 Taxable Sales Analysis

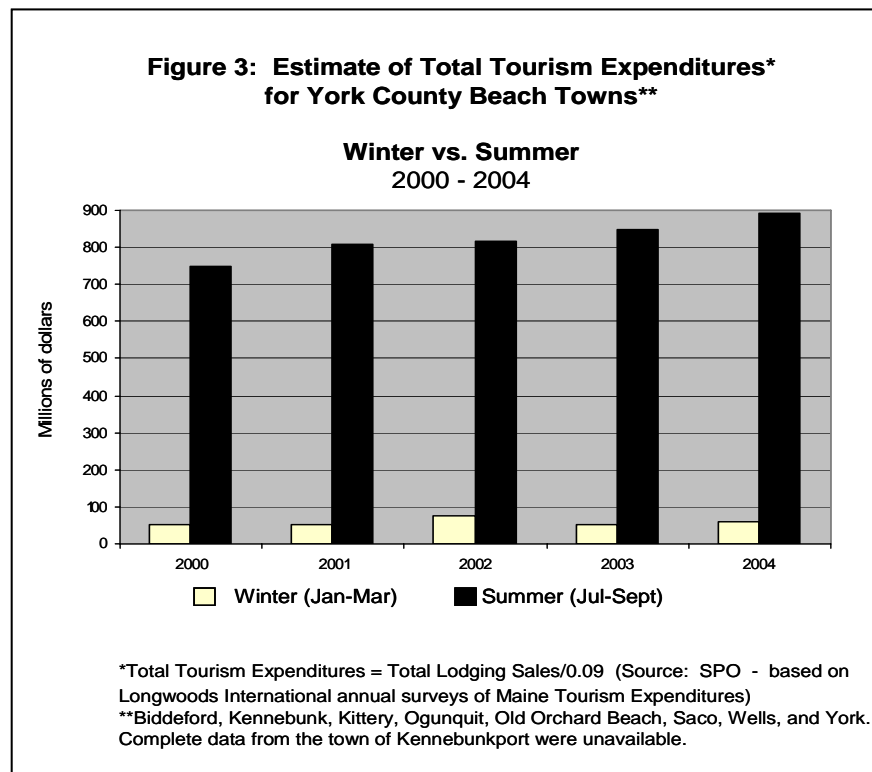
Figure 2 shows five years of seasonal variation in restaurants and lodging and other retail sales for beach communities. These data show an increase in sales from the winter or, off-season to the summer, or, peak tourism season. The increase in restaurant and lodging sales (Figure 2A) ranges from 280% to 443% with an average annual increase of 375%. The impact of seasonal change is less pronounced for sales in the retail sector (Figure 2B) in which the increase ranges from 91% to 159% with an average annual increase of 135%.



2.3 Extrapolation of Total Tourism Expenditures

Figure 3 shows the seasonal variation in total tourism expenditures. According to a tourism study completed by Longwoods International, lodging represents approximately 9% of a visitor's total tourism expenditures.⁶⁰ Given this relationship, an estimate of total tourism expenditures was obtained from data on lodging sales.

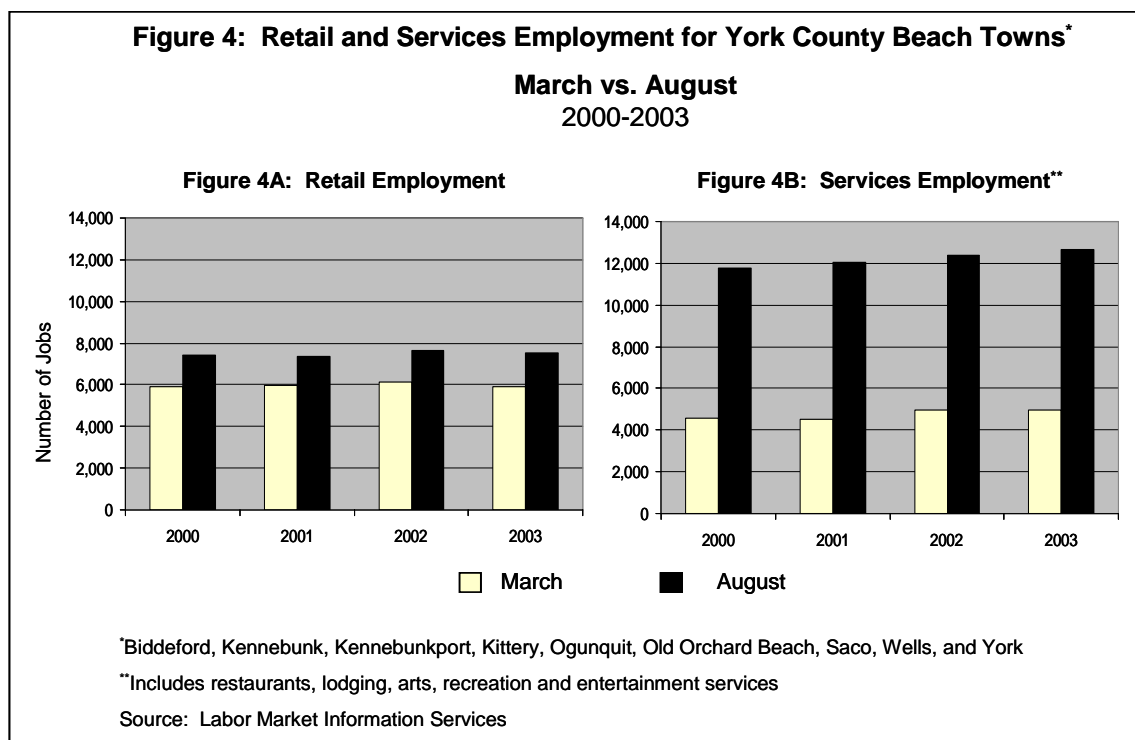
The increase in tourism expenditures from the off-season to the peak tourism season is dramatic for York County beach towns. This value ranges from 961% to 1518% with an average annual increase of 1335%.



2.4 Employment Analysis

Figure 4 shows the seasonal variation in employment for the retail and services sectors. Both of these sectors experience an increase in number of jobs from March, in the off-season, to August, in the peak tourist season. In the retail sector (Figure 4A) there is a modest seasonal increase in jobs ranging from 24% to 28%, with an average annual increase of 26%. Employment in the services sector (Figure 4B) experiences a larger increase, ranging from 148% to 166% with an average annual increase of 157%. The services sector in this case includes those services associated with tourism, specifically, restaurants, lodging, arts, recreation and entertainment.

⁶⁰ State Planning Office, based on Longwoods International annual surveys of Maine Tourism Expenditures.



3.0 Economic Analysis of Beach Towns versus Non-Beach Towns

For this analysis, nine beach towns in York County were compared to 15 non-beach towns in this same county.⁶¹ The economic differences between these two categories of towns is likely attributable in large part to beach tourism. Thus, comparing beach to non-beach towns lends insight into the economic importance of beach tourism in York County.

Figure 5 shows the proportions contributed by beach and non-beach towns in four categories: population, taxable sales, employment and number of lodging units.

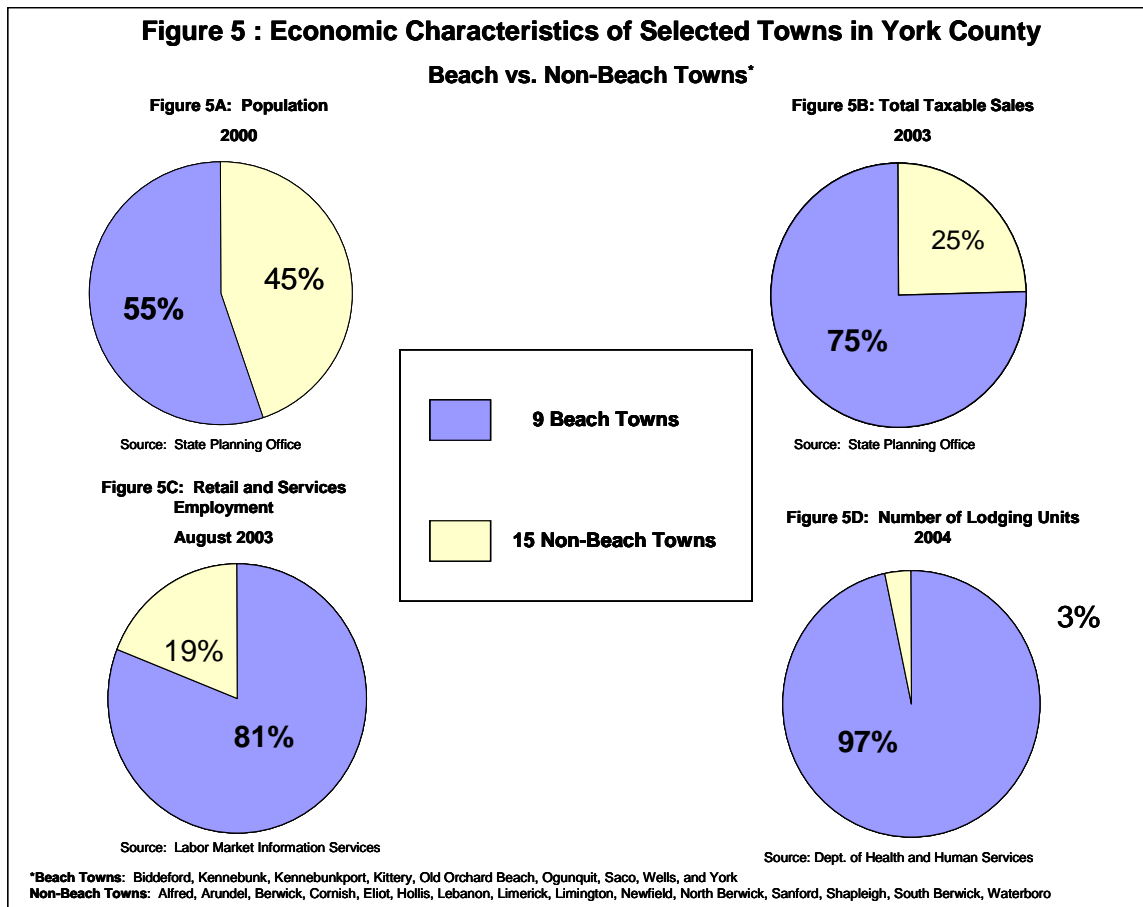
3.1 Population

Out of the total 24 selected York County towns, a slim majority (55%) live in the beach towns (Figure 5A).

3.2 Total Taxable Sales

As shown in Figure 5B, a large proportion (75%) of the total taxable sales in the 24 selected towns is contributed by the 9 beach towns of York County. Although this figure is from the year 2003, it is representative of the years 2000 to 2004.

⁶¹ Beach Towns: Biddeford, Kennebunk, Kennebunkport, Kittery, Ogunquit, Old Orchard Beach, Saco, Wells and York. Non-Beach Towns: Alfred, Arundel, Berwick, Cornish, Eliot, Hollis, Lebanon, Limerick, Limington, Newfield, North Berwick, Sanford, Shapleigh, South Berwick and Waterboro. Some non-beach towns were excluded due to missing data in one or more categories of interest.



3.3 Retail and Services Employment

The 9 beach towns of York County contribute 81% of the retail and services employment during August, a peak tourist season month (Figure 5C). Although this figure is from August 2003, it is representative of the month of August for the years 2000-2003.

During March, an off-season month (not shown), the beach towns make up an average of 73% of the retail and services employment for the 24 selected towns.⁶²

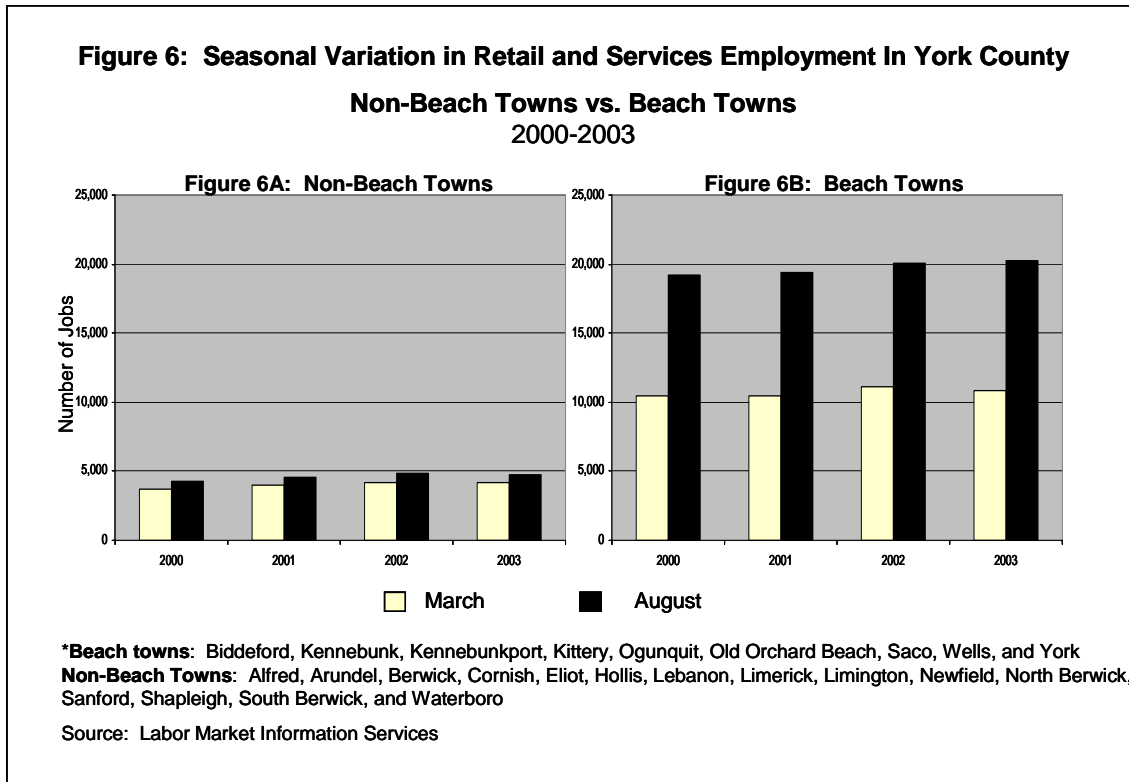
3.4 Number of Lodging Units

These data provide a proxy for comparing the degree of overnight tourist visitation between beach and non-beach towns. The 9 beach towns in York County contain 97% of the total lodging units in the 24 selected towns (Figure 5D). These data suggest that the beaches have a strong positive influence on tourist destination in York County.

⁶² Averaged over 2000-2003. Source: Labor Market Information Services.

3.5 Seasonal Variation in Beach vs. Non-Beach Towns

Figure 6 compares the seasonal increase in retail and services employment experienced by beach as compared to non-beach towns. Non-beach towns (Figure 6A) experience a minor increase from March to August that ranges from 14%-16%. Beach towns, however, experience a substantial seasonal increase that ranges from 80% to 86% (Figure 6B). These data suggest that beach tourism in these coastal towns is likely responsible for the dramatic increase in employment from the off-season to the peak tourist season in York County.



4.0 Conclusions

An analysis of secondary data was conducted to determine the economic importance of beach tourism in York County, Maine. Based on the examination of seasonal variations as well as comparisons between beach and non-beach towns, it appears that beach tourism has a significant positive impact on the Maine economy.

A thorough study, including the aforementioned beach visitor survey, is required to fully evaluate the economic importance of Maine's beaches.

Appendix L
Maine Recreational Beach Rating Scale

Physical Factors			Categories (Rating Scores)		
	1	2	3	4	5
1. Beach Width at Low Tide	<30 ft.	30-90 ft.	90-180 ft	180-300 ft	>300 ft
2. Beach Width at High Tide	0 ft	0-10 ft.	10-30 ft	30-50 ft	>50 ft
3. Beach Material	Cobble	Sand/ gravel	Coarse sand	Medium sand	Fine sand
4. Long-term Beach Health	Erosional >1 ft/yr	1<>0ft/yr	0	0<>1ft/yr	>1 ft/yr
5. Sand Softness	Hard		Medium		Soft
6. Breaking Wave Height	High/danger				Low/safe
7. Breaker Zone Width	None	0-6 ft	6-12 ft	12-18 ft	>18 ft
8. Beach Slope at low tide	Steep				Gentle
9. Longshore Currents	Strong				Weak
10. Rip Currents	Present				None
11. Beach Shape	Straight		Compartmentalized		Pocket
12. Low Terrace Conditions	Rocky, gravel		Coarse Sand		Fine sand
13. Smell (adjacent flats, rotting seaweed, etc.)	Bad				Fresh, salty air
14. Pests (flies, mosquitoes)	Common				Uncommon
15. Shorebirds	None				Plentiful
16. Sewerage on Beaches/Closures	Several Sources				None
17. Trash, seaweed	Common				None
18. Sea glass, shells	None				Common
19. Local views and vistas	None				Common
20. Far views and vistas	Confined				Unconfined
21. Access and parking	Limited				Good
22. Natural vegetation	None				Plentiful

Physical Factors			Categories (Rating Scores)		
23. Availability of amenities (showers, chairs, food)	None				Available
24. Lifeguards, boat rescue	None				Present
25. Safety record	Accidents				None
26. Domestic Pets	Many				None
27. Noise	Much		Moderate		Little
28. Presence of Engineering (seawalls, groins, jetties)	Large amount		Some		None
29. Intensity of Beach Use	Overcrowded				Uncrowded
30. Competition for uses (surfing, beach sports)	Many				Few

* Adapted by B. Timson from Dr. Beach's Best Beaches in America Rating Scale

Appendix M
Compilation of Funding Options Research

Existing Program?	Potential New Program?	Source	Program Name	Eligible Activities	Potential Amount	Caveats/Notes	Rating ⁶³
NO	YES	State	Environmental Bond for Maine's Beaches or could be a part of a Tourism Infrastructure Bond	nourishment acquisition dune restoration hazard mitigation match federal funds	Not sure. For comparison, the typical <u>total</u> for environmental bonds is \$8-15 million across all programs statewide.	Could provide state match for federal funds. Continue scoping work for potential bond in 2007 or 2008?	Yes
YES	NO but consider establishing a new focal area similar to what DAFRR has done for farmland focus areas	State	Land for Maine's Future and other land acquisition programs	acquisition (fee or easement) on significant conservation lands	500,000? for 1-2 projects	Match required; public access required. Continue work to identify focal areas	Yes
NO	YES	State	Annual appropriation from General Fund; or one time special appropriation	erosion monitoring; database development; acquisition, nourishment, dune restoration	?	Unlikely in current fiscal climate; interim step - establish in statute a Maine Beach Management Fund – to be capitalized at a later date Could provide state match for federal funds	Yes
NO	YES	State	Dedicated use of fines and penalties; required mitigation	erosion monitoring; database development; acquisition, nourishment, dune restoration	?	Fines and penalties typically go to General Fund	Yes

⁶³ A rating of “YES” denotes options that warrant further research, documentation. These options have the highest potential for resulting in funding for beach management.

Existing Program?	Potential New Program?	Source	Program Name	Eligible Activities	Potential Amount	Caveats/Notes	Rating ⁶³
NO	YES	Local	Local Option Sales Tax	various	Estimate the 4.5 million could be raised if nine beach towns had ½% increase on sales tax from May 1 st to Sept. 1 st each year ⁶⁴	Currently, no broad-based support for this idea; need outreach to tourism sector	Yes
NO	YES	Property owners and town	Municipal Special Assessment District	capital improvements signage, lighting	limited by state law; amount of funding is tied to the increase in value resulting from improvements in the District	Need more research; may require change in statute now includes: commercial industrial, blighted areas, downtowns, public purpose. Also, beach improvements accrue benefits to town/region and state. Improvement to private property values is not focus of beach management.	No
YES	No	Local	User Fees derived from beach tags, parking revenues	various, already typically used for maintenance, clean up, lifeguards, security	?	Could provide local match for dune restoration	Yes
YES	NO	Local	Municipal appropriation or Bond	various	?		Yes
YES	NO	State/fed	Community Development Block Grant	?	?	need to further research this source – current focus is on blight, job creation, urgent needs, public infrastructure low/mod income	Yes

⁶⁴ Personal communication, Robert Foley, Selectman Town of Wells; President, Maine Coastal Coalition; and member, Beach Stakeholder Group.

Existing Program?	Potential New Program?	Source	Program Name	Eligible Activities	Potential Amount	Caveats/Notes	Rating ⁶³
YES	NO	Federal	Landowner Incentive Program	protect and restore habitat on private lands	\$50 mill in '05 nationwide avg. 180K per grant	talk to IF&W, USFWS Difficult to find appropriate projects	Yes
YES	NO	Federal	Wildlife Habitat Incentive Program (WHIP)	cost share for habitat restoration	max is 10K per project	Talk to NRCS/USDA	Yes
YES	NO	Federal	HMGP Hazard Mitigation Program (FEMA / MEMA)	acquisition retrofit elevating infrastructure protection stormwater management minor flood control	?	only avail after Fed disaster declaration 75% fed 25% match admin costs ok planning component	Yes
YES	NO	Federal	FMA Flood Hazard Mitigation Program (FEMA / MEMA)	acquisition retrofitting elevating relocation infra protection stormwater minor flood control dune restoration, but not nourishment	20 million nationwide	repetitive loss CRS towns project costs only 75/25 match	Yes
YES	NO	Federal	Pre-disaster Mitigation Program PDM (FEMA)	planning projects	?	State receives funds and subgrants to towns	Yes
YES	NO	Federal	Private Stewardship Grants Program (USFWS)	endangered species on private lands	Avg is 70K 10 mill in '05	Competitive program; IF&W is contact	?
YES	NO	Federal	Congressional Authorization	beach nourishment	costs can range from 1 million/mi and up for single episode	60/40 cost share? 65/35? Cost share may be changing; higher state/local share will be required	Yes

Existing Program?	Potential New Program?	Source	Program Name	Eligible Activities	Potential Amount	Caveats/Notes	Rating ⁶³
YES	NO	Federal	Navigation Projects	Beneficial reuse of dredge material -- disposal of sand on beach	2½ million for Wells dredge and placement of 200 cy of sand	may not include all costs for studies: monitoring, etc.	Yes
YES	NO	Private	Collaboration with land trusts/other conservation groups for bridge funding for land acquisition	Land acquisition for conservation, recreation			Yes
YES	NO	Federal/state	Land and Water Conservation Fund	recreation		State funds are being cut at federal level	Yes
YES	NO	Federal	Coastal and Estuarine Land Conservation Program	Land acquisition; state priorities established in CELCP Plan – high value habitat, coastal access		Earmarked funds have been available for 2-3 years; 3 projects in ME funded.	Yes
YES	NO	State	Outdoor Heritage Fund	Monitoring, education			Yes
YES	NO	State	Shore and Harbor Improvement Fund	Focal area planning?		Unclear whether additional funding will replenish this Fund	No
YES	NO	State	Submerged lands leasing fees	unclear		Funds are currently used to support state staff, unclear about viability of this funding source	No