

A photograph of a beach with driftwood and palm trees under a clear blue sky. The beach is in the foreground, with waves washing onto the shore. The sky is a solid, clear blue. The text is overlaid on the image.

ADAPTING TO SHORELINE CHANGE

A Foundation for Improved Management
and Planning in South Carolina

Final Report of the
Shoreline Change Advisory Committee

April 2010

South Carolina Department of Health and Environmental Control



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The photographs in this report were taken by DHEC staff. The images illustrate South Carolina scenes and people. Aerial photography was provided under DHEC contract by Pictometry International Corp.

Preamble

The State of South Carolina should be commended for its foresight and early action on beachfront management issues. Recognizing increasing shoreline development and chronic erosion issues, the SC Coastal Council appointed a 25-member Blue Ribbon Committee on Beachfront Management in 1987 to make recommendations for long-term improvements in beach planning and management. Their recommendations created the foundation for the 1988 South Carolina Beachfront Management Act, and a state beach management program that was recognized nationally for its advancement of science-based policies to reduce coastal vulnerabilities and protect sensitive resources.

Two decades later, there are now enhanced capacities at the local level, a number of lessons to be learned from policy and regulatory implementation, and growing attention to threats from chronic erosion and storms. We believe that this Committee was formed at the right time, to help our state reflect on two decades of beach management and identify continuing vulnerabilities and conflicts. Our report was intended to help clarify longstanding policy, reduce community vulnerabilities, resolve conflicts, improve public and private planning, save money, enhance key resource protections, reduce liabilities, and improve public access; but more generally, to ensure the long-term health of coastal shorelines and vitality of the coastal economy.

The Committee did not perfectly represent all interest groups, but maintained consistent participation of 23 members from academia, resource agencies, the private sector, nonprofit organizations, and the public – not to “vote” on new rules, but to identify common ground and areas of disagreement to help set the context for future policy deliberations. Because shoreline management involves interweaving actions and influences at the federal, state, and local level, the recommendations we present here are targeted not just toward DHEC-OCRM, but are also for consideration by the General Assembly, other state agencies, and local governments.

The members of this Committee met in 14 full-day meetings over a two-year period. We have attended meetings in Columbia, Myrtle Beach, Beaufort, and Charleston, and spent countless hours drafting policy recommendations and debating finer details, many of which do not appear in the final report. We volunteered our time and commitment to this effort because we feel that it is of critical importance to the state, and hope that we have created a new foundation for successful shoreline management for the next two decades and beyond.

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This report would not have been possible without the extraordinary commitment of the Advisory Committee members, who persevered through lengthy meetings, presentations, and detailed policy debates for close to two years. They were asked to get up to speed on large volumes of reference materials, statutes, regulations, and plans, as well as incoming public comments, edits, emails, and logistics; and then to spend considerable time outside of the meetings working in small groups to develop and refine draft text. They have succeeded in generating a thoughtful, detailed report that will inform decision-makers, policy experts, and planners for years to come.

This report would also not have been possible without the concerted effort of a large number of DHEC-OCRM staff, who, across internal agency divisions, coordinated and supported this effort from start to finish. Aside from numerous internal coordination meetings, regulatory staff were present at all Advisory Committee meetings and public hearings to answer questions about details and procedures, policy and planning staff were present to answer questions about, well, policies and plans, and staff directly assigned to this effort spent countless day, night, and weekend hours to ensure that the process ran smoothly.

A special thanks to Nathan Strong of the SC Office of Human Resources, who facilitated meetings and provided expert advice along the way to help achieve fair and productive meetings and outcomes.

And finally, a special thanks to Matthew Slagel, who joined DHEC-OCRM as a NOAA Coastal Management Fellow in 2007 to help lead this initiative, and who truly made this effort a success. Mr. Slagel has now joined OCRM as a Shoreline Management Specialist to help identify and implement appropriate responses and actions to address the recommendations in this report.

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Acronyms

AIWW	Atlantic Intracoastal Waterway
ASBPA	American Shore and Beach Preservation Association
ASMFC	Atlantic States Marine Fisheries Commission
BACI	Before, After, Control, Impact sampling design
BERM	Beach Erosion Research and Monitoring
BIMP	North Carolina Beach and Inlet Management Plan
BMA	South Carolina Beachfront Management Act
BMP	Best Management Practice
CAMA	North Carolina Coastal Area Management Act
CBRA	Coastal Barrier Resources Act
CCCL	Florida Coastal Construction Control Line
CCU	Coastal Carolina University
CELCP	Coastal and Estuarine Land Conservation Program
CRS	FEMA Community Rating System
CSO	Coastal States Organization
CZM	Coastal Zone Management
DHEC	South Carolina Department of Health and Environmental Control
DHEC-OCRM	DHEC – Office of Ocean and Coastal Resource Management
DNR	South Carolina Department of Natural Resources
ECL	Florida Erosion Control Line
FCA	Flood Control Act
FEMA	Federal Emergency Management Agency
FL DCA	Florida Department of Community Affairs
FL DEP	Florida Department of Environmental Protection
FMA	Flood Mitigation Assistance program
GAPC	Geographic Area of Particular Concern
GI	General Investigation
GIS	Geographic Information Systems
GOMA	Gulf of Mexico Alliance
GRSMMP	Gulf Regional Sediment Management Master Plan
HHI	Hilton Head Island, SC
HMA	Hazard Mitigation Assistance program
HMGP	Hazard Mitigation Grant Program
HOAs	Home Owners Associations
IPCC	Intergovernmental Panel on Climate Change
LCBMP	South Carolina Local Comprehensive Beach Management Plan
LCSG	Lower Columbia Solutions Group
LiDAR	Light Detection and Ranging

LOV	Line of Vegetation
MA CHC	Massachusetts Coastal Hazards Commission
MEMA	Mississippi Emergency Management Agency
MHW	Mean High Water line
MMS	U.S. Minerals Management Service
MPRSA	Marine Protection, Research, and Sanctuaries Act
NC DCM	North Carolina Division of Coastal Management
NC DWR	North Carolina Division of Water Resources
NEPA	National Environmental Policy Act
NERR	National Estuarine Research Reserve
NFIP	National Flood Insurance Program
NGOs	Non-Governmental Organizations
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAA CO-OPS	NOAA Center for Operational Oceanographic Products and Services
NRC	National Research Council
OCSLA	Outer Continental Shelf Lands Act
ODMDS	Ocean Dredged Material Disposal Site
PD	South Carolina Coastal Management Program Document
PDM	Pre-Disaster Mitigation
PDRs	Purchase of Development Rights
REG	DHEC-OCRM Regulations
RSM	Regional Sediment Management
SAMP	Special Area Management Plan
SC REC	South Carolina Real Estate Commission
SCBRC	South Carolina Blue Ribbon Committee on Beachfront Management
SCDNR-MRRI	SCDNR – Marine Resources Research Institute
SCEMD	South Carolina Emergency Management Division
SDS	Spatial Data Standards
SLR	Sea Level Rise
SMP	Sediment Master Plan
SRL	Severe Repetitive Loss
US CCSP	U.S. Climate Change Science Program
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WRDA	Water Resources Development Act

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EXECUTIVE SUMMARY

Just over twenty years ago, a “Blue Ribbon Committee on Beachfront Management” was convened by the former South Carolina Coastal Council to address what was considered a “crisis” situation involving our beaches. Recognizing the threats of chronic erosion, sea level rise, increased shoreline development, and a lack of comprehensive beachfront planning and management, the panel developed recommendations that provided guidance to state regulators and legislators in developing state beach management policies. Most of their recommendations were adopted into law through the 1988 South Carolina Beachfront Management Act (SC Code §48-39-250 et seq.; Appendix 1).

Over the past two decades, the Beachfront Management Act and associated regulations have significantly influenced shoreline development and limited hard stabilization of the beachfront. However, the issues raised by the 1987 panel remain important today. We face a continuing challenge in balancing the protection of economic and environmental resources along our shorelines. Complex regulatory, economic, environmental, and legal issues, together with environmental and socioeconomic data limitations, often result in differing perspectives on future shoreline changes and our ability to adapt to those changes. DHEC’s Office of Ocean and Coastal Resource Management (DHEC-OCRM) is currently re-evaluating these issues in light of twenty years of experience and an improved understanding of shoreline dynamics in our state. In late 2007, an external “Shoreline Change Advisory Committee” was formed to: 1) identify continuing information and research needs; and 2) evaluate existing policies and policy alternatives. The Committee was made up of 23 experts from academia, government, and the private sector, and was charged with examining science and policy issues related to both beachfront and estuarine shoreline management in South Carolina, to help the state address future social, economic, and natural resource impacts of shoreline changes that may result from continued (or accelerated) rise in sea level, development encroachment into the beach/dune system, shoreline alterations, and coastal storms.

First and foremost, the Advisory Committee reaffirmed the overarching policies of the SC Beachfront Management Act and encourages the state to renew its commitment to the challenging but important principles advanced by the Legislature over twenty years ago. The state’s retreat policy does not provide for the immediate, active relocation of structures from the beach/dune system; however, by gradually eliminating erosion control structures, it ensures abandonment of property to allow the natural, inland migration of a healthy beach/dune system, **if or when** renourishment becomes unsustainable for a specific area or community. In the meantime, the Committee urges state and local governments to enact policies to ensure that sufficient **space** is provided for the natural migration of the beach/dune system and that the related risks to private and public resources are minimized.

The Committee identified four broad goals for improved shoreline management in South Carolina. The first three goals are focused on beachfront management. Goal 1, “Minimize Future Risks to Beachfront Communities,” proposes solutions to limit future exposure to losses of infrastructure, properties, and economic and natural resources that rely on a healthy beach/dune system; and to reduce the need for erosion control solutions. Goal 2, “Improve the Planning of

Beach Renourishment Projects,” presents opportunities for improved coordination and decision-making with regard to renourishment projects and other “soft” solutions to beach erosion. Goal 3, “Limit the Use of Hard Stabilization Structures,” reinforces existing prohibitions on seawalls and revetments, and recommends improved guidance for the siting, design, and use of groins, breakwaters, and temporary structures. Goal 4, “Enhance the Management of Sheltered Coastlines” presents parallel issues facing estuarine and sheltered coastlines of South Carolina, and policy and management recommendations for addressing those issues.

For each goal, several policy and management recommendations were developed to suggest potential improvements to current practices. For each general recommendation, the Committee was asked to clearly articulate the rationale (problems being addressed), existing policies and programs that are relevant to the issue, new specific policy recommendations, new planning and management actions, general costs and benefits, uncertainties, and examples from other coastal states. The 13 recommendations described in this report call for actions by a number of state agencies and local governments, as well as potential actions by the SC General Assembly. A summary of the recommendations is provided in Appendix 2 and below.

Under Goal 1, the Committee attempts to clarify and reinforce the goals and mechanisms of the state’s “retreat” policy, and lays out five recommendations for improved management to reduce risks to local beachfront communities:

1) Prevent the Seaward Expansion of Beachfront Development

- Disallow seaward movement of the DHEC-OCRM Baseline
- Local governments should establish a beachfront building line
- Re-survey public/private boundary prior to renourishment

2) Strengthen the State’s Beachfront “Setback Area”

- Increase the minimum setback distance
- Align setback regulations with statutes regarding size limitations
- Evaluate all historical shorelines and short-term variability in unstabilized inlet zones
- Limit building in the most vulnerable beachfront areas, particularly seaward of the DHEC-OCRM Baseline
- Enhance protection of sensitive dune features that are outside of the state’s “beach/dune system”

3) Eliminate Inconsistent Public Subsidies

- State should designate “no subsidy” zones in hazardous areas

4) Strategically Acquire Beachfront Lands and/or Easements

- Establish state and local voluntary acquisition strategies
- Explore and expand funding mechanisms for voluntary acquisitions, including a state “beach management” trust fund

5) Strengthen the Role of Local Governments in Beach Management and Planning

- Develop stronger guidance, new elements, and OCRM assistance for Local Comprehensive Beach Management Plans
- Integrate planning requirements for beachfront communities

Under Goal 2, the Committee describes existing procedures and implications of beach renourishment and other “soft” solutions to beach erosion, and offers three recommendations to improve local and state management practices:

6) Develop and Implement Regional Sediment Management Plans

- State should develop and implement a Regional Sediment Management Plan in cooperation with the U.S. Army Corps of Engineers

7) Strengthen Reviews of Nearshore Dredging and Other Alterations

- Heightened reviews and monitoring of any projects within 1 mile of the shoreline
- Establish Technical Committee to recommend new criteria

8) Improve Beach Nourishment Monitoring

- Require pre- and post-monitoring for all nourishment projects
- Standardize, to the extent possible, data collected and methods

Under Goal 3, the Committee recommends clarification and enforcement of existing prohibitions on erosion control structures, and describes status and trends of other hard stabilization practices in the state, including the use of temporary erosion control solutions during state or locally-declared emergencies. The Committee offers three recommendations for improved management practices:

9) Refine Criteria for Emergency Orders and Sandbags

- Establish new criteria for “emergency” – e.g. disaster declarations
- Establish new design criteria for temporary structures (sandbags)

10) Improve Guidelines for Groins and Breakwaters

- Establish Technical Committee to recommend siting/design criteria
- Leverage additional expertise in review of groin and breakwater proposals
- Identify ownership and responsibility for all existing groins

11) Expand Beachfront Real Estate Disclosure Requirements

- Expand real estate disclosure requirements for approval by the SC Real Estate Commission

Under Goal 4, the Committee describes parallel issues facing estuarine and non-beachfront shorelines in the South Carolina coastal zone, and existing policies related to shoreline developments and alterations. The Committee suggests two recommendations for improved management of estuarine shoreline change:

12) Manage Erosion Control in Estuaries

- Map and characterize estuarine shorelines
- Develop “erosion control options table” for different shorelines
- Expand education and training for property owners and consultants
- Develop Estuarine Shoreline Management Plans at state and local levels
- Promote alternatives to traditional bulkheads and revetments
- Establish minimum setback for bulkheads
- Differentiate “transgression” from erosion in OCRM decisions
- Require evaluation of alternative stabilization approaches on undeveloped properties

13) Establish Non-Beachfront Shoreline Buffer Areas

- Establish 25-ft minimum buffer for all new developments along non-beachfront shorelines in the coastal zone
- For previously developed properties, state tax incentives or credits could be considered for buffers
- Encourage local governments to establish or expand shoreline buffers

The Committee also recommends expansion of the SC Beach Restoration and Improvement Trust Fund (§ 48-40-30 of the SC Beach Restoration and Improvement Act) in several sections (Recommendations 4, 5 and 10; Goal 2). Currently, the fund is used to provide state matching funds for priority public beach renourishment projects and to support emergency response needs to repair beaches after storms. The SC Council on Coastal Futures (2004) recommended that the state should capitalize and adequately fund the trust fund. This Committee concurs with this earlier recommendation and additionally recommends that the fund should be expanded to include a broader range of beach management options, including structure relocation, land acquisition, and planning proposals. Eligibility for expanded and more predictable state beach management funds would be a key incentive for several of the recommendations in this report.

Over the coming year, DHEC-OCRM staff will propose specific responses to the policy and management recommendations identified in this report, and will present the Committee’s discussions and findings to a variety of decision-makers and stakeholders to help set the context for future plans and decisions at the state and local levels.

INTRODUCTION

Over two decades ago, the State of South Carolina developed a comprehensive beach protection and planning program to ensure that the economic, environmental, recreational, and cultural benefits of our beaches are sustained for this and future generations. The resulting laws, rules, and plans for beachfront development and stabilization are always controversial because they require a difficult balancing of private and public rights. Nearly everyone has a stake in beachfront management in South Carolina, as the coast is the largest contributor to our tourism-based economy. Healthy beaches and shorelines are essential to the quality of life along the coast, and also provide buffers for storms and critical habitats for many species of plants and animals.

Our beaches are caught between rising seas and an impenetrable line of human development. In 1987, this situation was described as a “crisis.” With over 57 miles characterized as “critically eroding,” the natural migration of beaches in developed areas was threatening the very existence of the beach/dune system, as well as beachfront property, the tourism industry, and critical habitats (SCBRC, 1988). Today, the crisis is not as immediate, but the underlying forces and challenges remain. Significant investments in beach renourishment are keeping pace with chronic erosion along most of the coast; however, there are differing perspectives on the long-term sustainability of sand replenishment (see Goal 2 Overview), and there is the ever-present threat of major coastal storms that could transform the shoreline overnight. There are also projections of accelerated sea level rise (Figure 1(a-b)) – even at the present rate, there is significant potential for the loss of coastal wetlands in the coming decades, and difficult decisions to make regarding future “armoring” of our non-beachfront coastlines.

Today, we are taking advantage of the opportunity to plan ahead rather than respond to a crisis or emergency situation. This report reflects on over twenty years of beachfront management in South Carolina, and makes suggestions for the coming decades. The goals and policy and management recommendations presented here are intended to provide a new foundation for continued shoreline planning, policy development, and program implementation at the federal, state, and local levels.

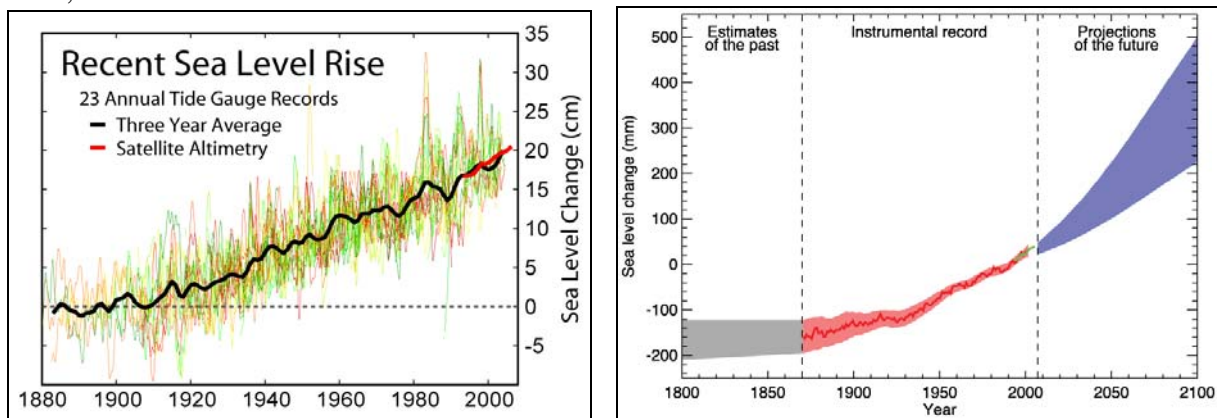


Figure 1(a-b): *Historical rates of sea level rise and projections of accelerated sea level rise.*

Sources: NOAA CO-OPS, 2009; IPCC, 2007.

Background

The South Carolina Coastal Zone Management Program was established in 1977 through the Coastal Tidelands and Wetlands Act (SC Code §48-39-10 et seq.), which authorized the SC Coastal Council (now DHEC-OCRM) to administer a permitting program for designated “critical areas” in the coastal zone (coastal waters, tidelands, beaches, and primary oceanfront sand dunes). Initially, the law provided limited beachfront jurisdiction (only over primary oceanfront sand dunes; or, where none existed, the land covered by the highest uprush of waves), and limited guidance for decisions on beachfront development and erosion control approaches. Following a succession of storms in the late 1970s and early 1980s, the Coastal Council decided to seek a more comprehensive beach protection policy. In the summer of 1986, Senator James Waddell, Jr. and the Coastal Council appointed a citizen committee to study erosion issues and make long-term recommendations for the improvement of beachfront management in South Carolina. This “Blue Ribbon Committee on Beachfront Management” was chaired by former Myrtle Beach Mayor Erick Ficken, and included 25 members from across the private and public sectors (DHEC-OCRM, 2003).

After meeting for one year, the Blue Ribbon Committee issued its final report, and found that “the South Carolina beach/dune system is now in a state of crisis,” with over 57 miles of the state’s approximately 186 miles of oceanfront beaches “critically eroding.” The Committee cited “a persistent rise in sea level, poorly planned development which encroaches upon the beach/dune system, and a lack of comprehensive planning” as the primary causes of this crisis. The Committee also found that the 1977 Coastal Tidelands and Wetlands Act “has been ineffective because too little authority over the beach/dune system was given to the Coastal Council...to prevent structures from being sited unwisely close to the eroding beach and the impact area of storms and high tides.” Among other key findings of the report were:

- “Most erosion control structures result in increased erosion, a drastic lowering of the beach profile, and a decrease in the ability of the beach/dune system to protect upland property from storms and high tides;” and as a result “dry sand beaches are rapidly disappearing;”
- “Sea level rise in this century is a scientifically documented fact,” and “the Atlantic Ocean, as a result of sea level rise and periodic storms, is ultimately going to force those who have built too near the beach front to retreat;”
- “Much of South Carolina’s coast is heavily developed...any new rational beach management policy must recognize the existence of such development and the vast differences between various sections of our coast with regard to the degree and pattern of development and the monetary investment involved;”
- “Erosion is a natural process which becomes a significant problem when structures are erected in close proximity to the beach/dune system. Therefore, it is in both the public and private interest to plan a gradual retreat from the beach/dune system by discouraging new construction in close proximity to the beach/dune system and encouraging those who have erected structures too close to retreat from the beach/dune system.”

The 1987 Committee described three possible approaches to beach management – essentially armoring, nourishing, and retreating:

“We believe that a combination of the three approaches, depending upon site-specific factors, may be the most realistic policy. We have already tried armoring the shoreline... carefully planned nourishment is certainly a more desirable approach (and) can be effectively utilized at locations where the benefits justify the costs...it is anticipated that the cost of nourishment will rise as the sea level rises and could ultimately become extremely expensive.”

The Committee therefore concluded that the “only practical approach” was a gradual retreat from eroding beaches “over a thirty year transition period, in combination with selective beach nourishment...a retreat implemented over 30 years will allow owners of structures sited too close to the beach to realize the economic life of their structures and adjust their plans over a reasonable 30-year time period. This retreat must be based on sound state and local comprehensive beach management plans.” The Committee’s report went on to offer detailed policy recommendations and implementation guidelines that established the groundwork for consideration of legislative proposals by the SC General Assembly, including the phasing out of beachfront seawalls, revetments, and bulkheads over time; removal of structures within the beachfront critical area if damaged beyond repair; establishing of setbacks based on a moving average of historic erosion rates, limitation of the size of new structures, and restriction on new structures seaward of the primary dune or baseline (SCBRC, 1988).

Many if not most of the recommendations of the Blue Ribbon Committee were acted on by the legislature the following year. The South Carolina Beachfront Management Act of 1988 amended the state Coastal Tidelands and Wetlands Act to define clear beachfront policies, expand state jurisdiction, and establish new permitting and planning support through the SC Coastal Council.¹ The new law, among other elements:

- Enacted a 40-year policy of “retreat” from eroding beaches
- Established a new jurisdictional area for permitting between a “baseline” (generally the primary dune crest or historical inlet shoreline position) and a “setback” line (based on a multiplier of 40 times the local, annual rate of erosion).
- Limited construction would be allowed within a 20 foot restricted zone landward of the baseline, and construction would be prohibited seaward of the baseline;
- Within the setback area:
 - No new erosion control devices are allowed, and existing seawalls were to be replaced with sloping structures over time;
 - New structures are limited to 5,000 square feet of heated space;
 - Homes damaged beyond repair must be rebuilt farther landward;
- Created standards for state and local comprehensive beach management plans;
- Established real estate disclosure requirements for beachfront property transactions.

¹ Please refer to the full statute for important details and policies (SC Code §48-39-10 et seq.), some of which are also covered in greater detail throughout this report. See also the associated regulations (R. 30-1 et seq.).

During the 1990 legislative session, the Beachfront Management Act was amended to eliminate the 20-foot restrictive zone landward of the baseline (which had become known derisively as the “dead zone”); and to remove the prohibition on construction seaward of the baseline by authorizing “special permits” (DHEC-OCRM, 2003). The amendment increased regulatory authority over seawalls and prohibited the replacement of structures that are damaged beyond repair (now set at 50% of structural integrity). Subsequent amendments to the Act in 2002 specifically authorized the use of groins in association with beach renourishment projects, under certain guidelines (see Goal 3 overview).

Two Decades of Experience

Since the enactment of the Beachfront Management Act, rapid population growth in the coastal counties has contributed to continuing pressure to develop or expand the development of beachfront properties. Between 1990 and 2008, the population of Beaufort County expanded by 74%, Colleton County by 13.5%, Charleston County by 18%, Georgetown County by 31%, and Horry County by 79% (NOAA, 2009). On the beachfront, renourishment has kept pace with erosion in most cases. The extent of beachfront development, renourishment, and erosion control are described in detail in the overview sections of Goals 1-3 of this report.

Less is known about shoreline changes along non-beachfront coastlines,² many of which are subject to the same pressures (chronic erosion, storm impacts, and development interests) as those confronting beach communities in the 1980s. With the availability of beachfront lots diminishing, the value of non-beachfront shoreline properties in the coastal zone has increased dramatically. And as non-beachfront coastlines have developed, they have increasingly been altered by erosion control structures, docks, and landscaping (e.g. retaining walls, lawns extending to the shoreline, etc).

Over the past twenty years, a growing body of research and technical capacity has also developed concerning shoreline change, including studies of shoreline positions, sediment budgets and erosional forcings, natural resource and community vulnerabilities, and models of future shoreline changes (Barnhardt, 2009; Nelson et al., 2009). Satellite measurements, Geographic Information Systems (GIS), aerial imagery, Light Detection and Ranging (LiDAR) technology, computer modeling capabilities, and other improvements in monitoring and understanding shoreline changes have rapidly developed over this time period. However, a South Carolina Shoreline Change “State of the Knowledge” report developed in support of this Committee’s work (Nelson et al., 2009) found that, among other needs:

- Estuarine shoreline positions, erosion rates and forcings, and ecological characteristics are poorly documented and understood;
- Overall understanding of sediment processes decreases as the distance from the coast increases...few studies are available that assess the sand transport between nearshore (beachfront) and continental shelf areas;

² Throughout this report, non-beachfront shorelines are also referred to as “sheltered coastlines,” and in some cases the focus is more limited toward “estuarine shorelines.” The latter refers only to shorelines of coastal estuaries, which are tidally influenced and where salinity typically exceeds 0.5 parts per thousand.

- Sediment interactions between estuarine and nearshore environments are poorly studied;
- Risk assessments and economic studies are needed to help coastal communities develop and prioritize responses to shoreline change projections;
- Improved modeling capabilities are needed, for example, to project coastal wetland and beach erosion, migration, and vertical accretion in response to elevated sea level rise scenarios, and to better understand inlet processes and dynamics in South Carolina;
- Few regions of the state's seafloor have been mapped sufficiently to identify long-term sources of compatible sand for renourishment.

Timing and Goals of this Study

In 2007, DHEC-OCRM launched a new “shoreline change initiative” as part of its 5-year strategy for program enhancement grants under the federal Coastal Zone Management Act (16 U.S.C. 1451 et seq.). This grant program supports states in developing programmatic changes in one or more of nine issues of high priority to the state. As part of the 5-year strategy, DHEC-OCRM developed a work plan that identified milestones for strategy implementation, including the establishment of a Shoreline Change Advisory Committee, assessment and acquisition of data and research needs, and the development of policy options.

Shoreline Change Advisory Committee

The Shoreline Change Advisory Committee is comprised of a broad cross-section of stakeholders including scientists, coastal managers, municipal officials, developers, engineers, conservationists, and legal professionals who volunteered to commit significant time and effort to this report. At its initial meeting in September, 2007, the Committee was charged with “identifying and exploring new ways to resolve use conflicts and reduce socioeconomic and environmental vulnerabilities to shoreline changes in the South Carolina coastal zone, by: 1) identifying research and information priorities; and 2) identifying and exploring options for improved management and planning for shoreline change.” For this study, shoreline change was defined as “physical and biological changes at the land/water interface attributable to: 1) natural shoreline processes and sea level rise; 2) coastal storms; and 3) human developments and alterations. The geographic scope was confined to beachfront and estuarine coastlines within DHEC-OCRM’s Critical Area, but the Advisory Committee was free to consider a wide range of policy options beyond the existing rules or authorities of DHEC-OCRM or other agencies.

Between September 2007 and September 2009, the Advisory Committee participated in 14 full membership meetings, numerous subcommittee meetings, and several public hearings. Two initial “orientation” meetings focused on existing DHEC-OCRM authorities and activities, the Committee work plan and process, and shoreline management in other states. Representatives from the Texas and North Carolina coastal programs attended and presented shoreline management issues and approaches used in their states. Two members from the original 1987 South Carolina “Blue Ribbon Committee on Beachfront Management” also provided the Committee with a historical perspective on shoreline planning and regulation development in South Carolina. The following Committee meeting (January 2008) focused on shoreline research and information needs. Subsequent meetings, on a nearly monthly basis, addressed a sequence of

management topics that mirror the organization of this report (beginning with beachfront “retreat” policy, renourishment, erosion control, the role of local governments in shoreline management, and finally estuarine shoreline management issues). Each full-day meeting consisted of presentations in the morning, followed by facilitated discussions and deliberations of the Advisory Committee in the afternoon. A range of experts were invited to speak in the morning sessions to help the Committee better understand the status, trends, and complexities associated with each management issue before beginning deliberations over specific policy options. Appendix 4 lists the 30 formal presentations to the Committee over a two-year period. At the conclusion of each meeting, a concise list of policy options to be further explored was established based on priority rankings of the Committee.

In developing draft recommendations, the Advisory Committee followed a standard template format to ensure that the many facets of a particular recommendation were fully considered and to maintain consistency between different sections. Each recommendation template was organized according to the following headings:

- A. General Recommendation
- B. Rationale
- C. New Policy Recommendations
- D. New Planning and Management Actions
- E. Existing Policies and Programs
- F. General Costs and Benefits
- G. Measures of Success
- H. Feasibility Issues
- I. Key Uncertainties/Assumptions
- J. Examples from Other States or Areas
- K. Barriers or Concerns (if any)

Once the full Advisory Committee decided which recommendations should be further explored, volunteer subcommittees developed each recommendation according to the template format above. The draft recommendations were then reviewed by the full Committee, and after further iterations, they were finalized for inclusion in the report. In sum, the Committee spent over 100 hours in full committee and subcommittee meetings and public hearings, but contributed a great deal more through countless email exchanges, reviews, and edits of draft recommendations, public comments, and the draft report.

Opportunities for Public Input

DHEC-OCRM staff sought to make this process as transparent as possible for the public. Each full Committee meeting was advertised via public notice and media release, and resulted in widespread state and local media coverage (television, radio, print, and online stories). The full record of background materials, presentations, approved meeting minutes, and public comments submitted during the meetings were posted on a special website for the Committee. Public comments, although limited, were received at each Committee meeting and two dedicated public hearings. Over 60 pages of written comments were submitted by coastal engineers, town

officials, property owners, and other concerned stakeholders. Each comment was distributed to the Committee, reviewed, and considered as recommendations were drafted. In addition, three Community Leaders Forums were organized in the Grand Strand, Charleston, and Beaufort regions to provide additional opportunity for input. Over 300 “community leaders” were invited, including representatives of municipal governments, state legislators, property owners associations, business organizations, and other community organizations, and over 100 participated across the three regions. Finally, the draft report of the Committee was widely disseminated for public comments, which are summarized in Appendix 3 and included in full in a Supplement to this report.³ The draft report was downloaded a total of 31,625 times, and a total of 35 comment letters were received.

While public and stakeholders perspectives have varied widely on state and local policy needs, several common themes emerged from the regional discussion forums. First, participants generally agreed that beach communities are more vulnerable to shoreline changes today than in 1987, generally because of increased development and infrastructure, risks associated with climate change and accelerated sea level rise, and/or economic dependencies on uncertain factors (coastal insurance, renourishment funding). Although the participants agreed that beach communities are more vulnerable today than in 1987, they also generally agreed that the beaches of the state are in better condition today than in 1987. Second, most participants generally believe that South Carolina has sufficient sand resources for renourishment for the foreseeable future, but were less certain of the sustainability of funding for renourishment at federal, state, and local levels. Third, it was clear that the state’s policy of retreat was not well understood across coastal communities and organizations. There were key differences in perceived goals and definitions, and significant challenges to the active relocation of structures in vulnerable areas. Fourth, it was agreed that non-beachfront shorelines in the coastal zone face similar issues related to sea level rise, coastal storms, and development pressures, and that more information is needed on shoreline changes and policy options for those areas. Finally, it was largely recognized that local communities have greater capacities in planning and managing beachfront issues than in 1987. It was strongly suggested that local governments be increasingly recognized and supported as partners in shoreline management in South Carolina.

Similar Initiatives in Other Coastal States

Many other coastal states have recently released, or are currently working on, recommendations to address shoreline change and other coastal hazards. Some states have assembled similar committees to formulate policy recommendations, while others have relied on updates to regulations or shoreline management plans (CSO, 2007). The following examples indicate that many of the shoreline management concerns faced by South Carolina are shared by other states.

North Carolina

The North Carolina Beach and Inlet Management Plan (BIMP) is an ongoing joint effort of the NC Division of Water Resources and the NC Division of Coastal Management to catalog,

³ The Supplement is available from the SCDHEC Office of Ocean and Coastal Resource Management, and available for download (at the time of publication) from the following website: <http://www.scdhec.gov/environment/ocrm/>

archive, and compile relevant coastal information to better manage the state's beaches and inlets (NC DCM, 2009). The planning process involves an Advisory Committee comprised of state and federal agency representatives and other stakeholders, an interdepartmental Technical Work Group, and a contracted coastal engineering firm to develop the plan. The final BIMP report will include coastal data, newly defined beach and inlet management regions, and shoreline management strategies (NC DCM, 2009).

In addition to ocean shorelines, North Carolina has also been focusing on the management of estuarine or sheltered shorelines. In 2006, the North Carolina Estuarine Biological and Physical Processes Work Group released a report which discussed the impacts of stabilizing estuarine shorelines with hard erosion control structures (Bendell et al., 2006). The Work Group identified 11 estuarine shoreline types in the state and then recommended which estuarine shoreline stabilization methods would be appropriate for each type of shoreline. For many estuarine shoreline types, the Work Group recommended that land planning (buffers, setbacks, etc.) and vegetation control (wetland or upland plantings) are the only erosion mitigation options that should be considered (Bendell et al., 2006). The Work Group also noted that groins, breakwaters, sloped structures, and vertical structures should only be considered in limited instances based on shoreline type and other site specific characteristics (Bendell et al., 2006). The recommendations of the Work Group are being used by the NC Division of Coastal Management to update its estuarine shoreline stabilization rules and to promote incentives for the use of alternatives to vertical erosion control structures.

Florida Coastal High Hazard Study Committee

The Florida Coastal High Hazard Study Committee was created in September 2005 to study and formulate recommendations for managing growth in Coastal High Hazard Areas, which are defined as Category 1 hurricane evacuation zones (FL DCA, 2006). The Committee consisted of state legislators, state officials, local officials, property owners, builders, and other stakeholders. In addition to recommendations regarding hurricane impact modeling and evacuation studies, the Committee also made the following shoreline-specific recommendations:

- The Florida Department of Environmental Protection (FL DEP) should develop a scope of work to re-evaluate setbacks and other dune protection criteria within the Coastal Construction Control Line (CCCL) regulatory program in order to provide greater protection to life, property, and the beach dune system including an economic impact analysis of potential changes.
- To help prevent damage to the beach and dune system, adjacent property owners, and marine turtles from inappropriate coastal armoring following storm events... the FL DEP should develop specific siting and design criteria for temporary coastal armoring that clarify the existing statutory criteria.⁴

⁴ Florida temporary armoring guidelines: <http://www.dep.state.fl.us/beaches/programs/pdf/gemcarlg7-07.pdf>

Massachusetts

A Massachusetts Coastal Hazards Commission was comprised of working groups of state legislators, state officials, local officials, academics, and consultants who drafted recommendations related to coastal hazards information, policy, planning and regulations, shoreline protection, and infrastructure (MA CHC, 2007). The Commission's report, "Preparing for the Storm: Recommendations for Management of Risk from Coastal Hazards in Massachusetts," was released in May 2007 with 29 recommendations, including the following:

- Conserve coastal land and minimize loss through acquisition of storm-prone properties from willing sellers in fee or through conservation restrictions and easements (Recommendation #14).
- Implement a program of regional sand management through policies, regulations, and activities that promote nourishment as the preferred alternative for coastal hazard protection (Priority – Recommendation #22).
- Identify and map potential offshore and inland sources of suitable nourishment sediment (Recommendation #25).
- Establish a Technical Advisory Committee, consisting of a broad range of qualified professionals, to evaluate and develop construction and monitoring guidance, and recommend appropriate approval conditions for those protection approaches determined to be new and innovative (Recommendation #27).

Layout of the Report

The report is separated into 4 Goal sections: 1) "Minimize Risks to Beachfront Communities," 2) "Improve the Planning of Beach Renourishment Projects," 3) "Limit the Use of Hard Stabilization Structures," and 4) "Enhance the Management of Sheltered Coastlines." For each Goal, a summary is provided of existing policies and programs, status and trends, and ongoing conflicts. Following the summary section, a series of policy, management, and planning recommendations are offered to help meet each respective goal.

*** The Executive Summary, Introduction, and Goal Overview sections of this report were originally drafted by DHEC-OCRM staff based on meeting presentations, Committee discussions, and research, and these sections were approved by the Committee. All policy and management recommendation sections were developed by Committee members with research and editing support provided by DHEC-OCRM staff.

GOALS AND POLICY RECOMMENDATIONS

The Advisory Committee identified four broad goals for improved shoreline management in South Carolina. The first three goals are focused on beachfront management, and the fourth is focused on sheltered or estuarine coastlines.

Goal 1, “Minimize Risks to Beachfront Communities” - Proposes solutions to limit future exposure to losses of infrastructure, properties, and economic and natural resources that rely on a healthy beach/dune system; and to reduce the need for erosion control solutions.

Goal 2, “Improve the Planning of Beach Renourishment Projects” - Presents opportunities for improved coordination and decision-making with regard to renourishment projects and other “soft” solutions to beach erosion.

Goal 3, “Maintain Prohibitions and Further Restrict the Use of Hard Stabilization Structures” - Reinforces existing prohibitions on seawalls and revetments, and recommends improved guidance for the siting, design, and use of groins, breakwaters, and temporary structures.

Goal 4, “Enhance the Management of Sheltered Coastlines” - Presents parallel issues facing estuarine and sheltered coastlines of South Carolina, and policy and management recommendations for addressing those issues.



GOAL 1. MINIMIZE RISKS TO BEACHFRONT COMMUNITIES

“Development unwisely has been sited too close to the (beach/dune) system. This type of development has jeopardized the stability of the beach/dune system, accelerated erosion, and endangered adjacent property. It is in both the public and private interests to protect the system from this unwise development” (SC Code § 48-39-250(4)).

“Erosion is a natural process which becomes a significant problem for man only when structures are erected in close proximity to the beach/dune system. It is in both the public and private interests to afford the beach/dune system space to accrete and erode in its natural cycle. This space can be provided only by discouraging new construction in close proximity to the beach/dune system and encouraging those who have erected structures too close to the system to retreat from it” (SC Code § 48-39-250(6), emphasis added).

Overview

Over the past 20 years, the South Carolina Beachfront Management Act has limited the degree of development and hard stabilization of the beachfront in many areas, but this has not resulted in a broad-scale “retreat” from the oceanfront beach/dune system. In fact, continued coastal population growth, expansion of tourism industries, and trends in second homes and investment properties have resulted in even greater pressures to develop, or redevelop, beachfront properties. Based on ongoing analysis of aerial imagery (Table 1), there are approximately 3,850 beachfront habitable structures in South Carolina at present; of these, 1,383 (~36%) are at least partially seaward of the DHEC-OCRM “setback line” (see below for further details). The majority of the state’s habitable structures seaward of the setback line are located in Hilton Head Island (22%), Garden City Beach (16%), and North Myrtle Beach (12%). According to a recent estimate, there are at least 65 structures statewide located partially or entirely seaward of the DHEC-OCRM “baseline.”

At the same time, most of South Carolina’s beaches have continued to experience erosion due to natural (e.g. barrier island migration, sea level rise, coastal storms) and anthropogenic (e.g. jetties, navigation projects) changes. Although beaches are inherently dynamic, and may be highly accretional or erosional over short time frames, South Carolina’s oceanfront beaches are known to be net erosional based on numerous studies and long-term observations (e.g. Kana and Guadiano, 2008; Harris et al., 2009; Figure 2(a-c)). In many cases, the primary driver of this gradual trend has been an increase in sea levels over the past century. The relative rate of sea level rise in South Carolina (the global rate of sea level rise plus local rates of land subsidence) has been measured at a rate of approximately 1 to 1.5 ft/century at Springmaid Pier and Charleston Harbor observing stations (NOAA CO-OPS, 2009). Shoreline erosion and the impacts of coastal storms are expected to increase in coming decades as sea level continues to rise and potentially accelerate (US CCSP, 2009).

TABLE 1: Habitable Structures Seaward of the Setback Line in South Carolina ^a

Area	Number of Beachfront Habitable Structures	Number of Structures Seaward of Setback Line	Percentage of Beachfront Habitable Structures that are Seaward of Setback Line	Percentage of State Total in each Beach Area	Number of Structures Seaward of Setback Line; Standard Zones	Number of Structures Seaward of Setback Line; Unstabilized Inlet Zones	Number of Structures Seaward of Setback Line; Stabilized Inlet Zones
North Myrtle Beach	415	162	39%	12%	158	0	4
Shore Dr. & Briarcliffe	28	19	49%	1%	19	0	0
Myrtle Beach	328	113	34%	8%	113	0	0
Surfside Beach	192	59	31%	4%	59	0	0
Garden City Beach	300	218	73%	16%	218	0	0
Litchfield Beach	181	24	13%	2%	22	2	0
Pawleys Island	228	68	30%	5%	65	0	3
Debidue Island	90	42	47%	3%	42	0	0
Deweese Island	24	24	100%	2%	0	24	0
Isle of Palms	342	86	25%	6%	0	86	0
Sullivans Island	118	18	15%	1%	0	18	0
Folly Beach ^b	288	0	0%	0%	---	---	---
Kiawah Island	150	0	0%	0%	0	0	0
Seabrook Island	73	2	3%	<1%	0	2	0
Edisto Island	237	87	37%	6%	80	7	0
Harbor Island	58	24	41%	2%	0	24	0
Hunting Island ^c	19	18	95%	1%	0	18	0
Fripp Island	160	96	60%	7%	54	11	31
Hilton Head Island	570	308	54%	22%	258	50	0
Daufuskie Island	49	15	31%	1%	0	15	0
TOTALS:	3,850	1,383	36%		1,088	257	38

^a These data are current at time of publication but are subject to change as the baseline and setback line positions are revised in the future.

^b There is no setback line on Folly Beach.

^c Many of the cabins on Hunting Island have been demolished recently following erosion events.

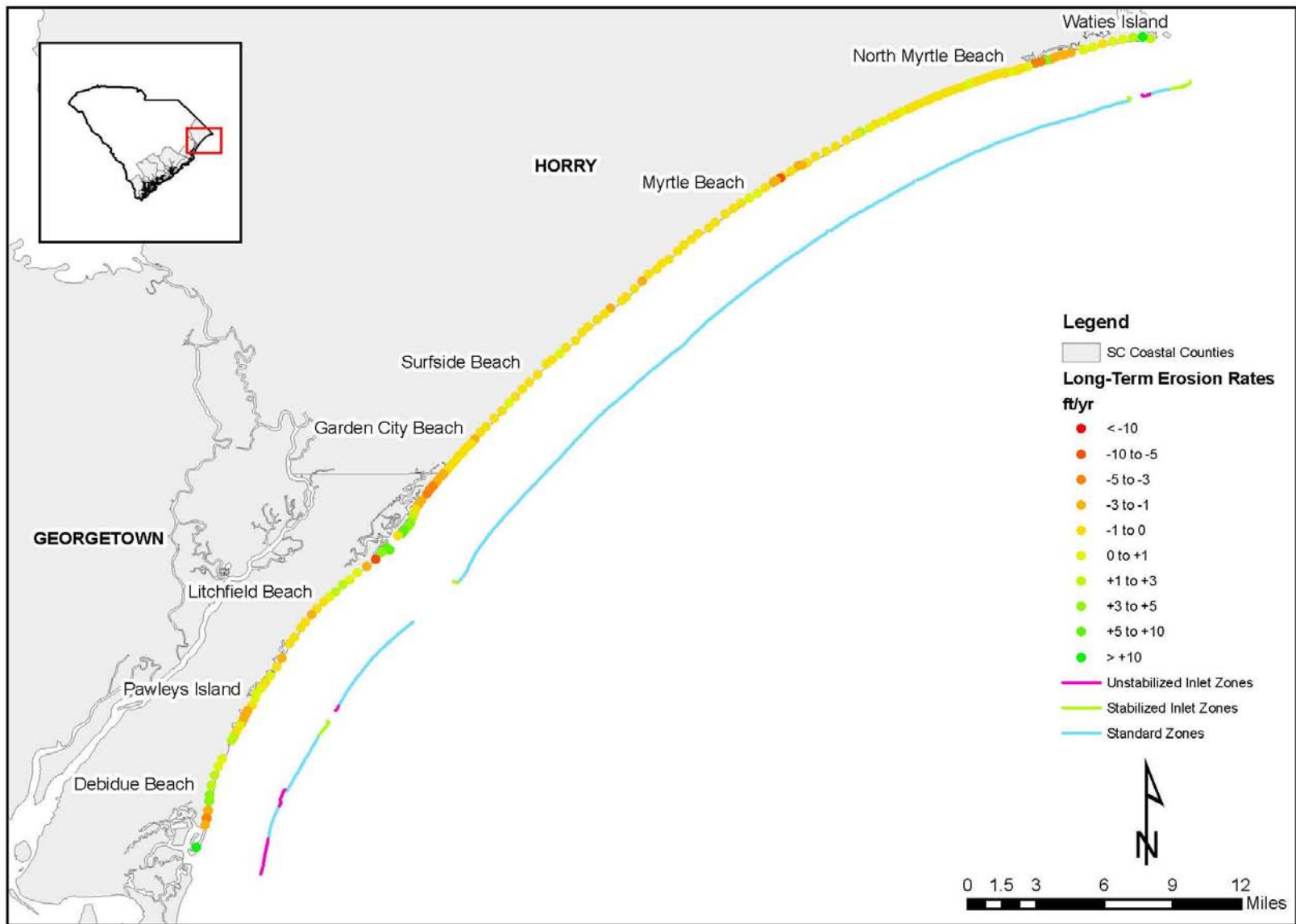


Figure 2(a): Long-term erosion rates and beach zone classifications for South Carolina's northern beaches, using historical shoreline data from the 1850s to 2006.

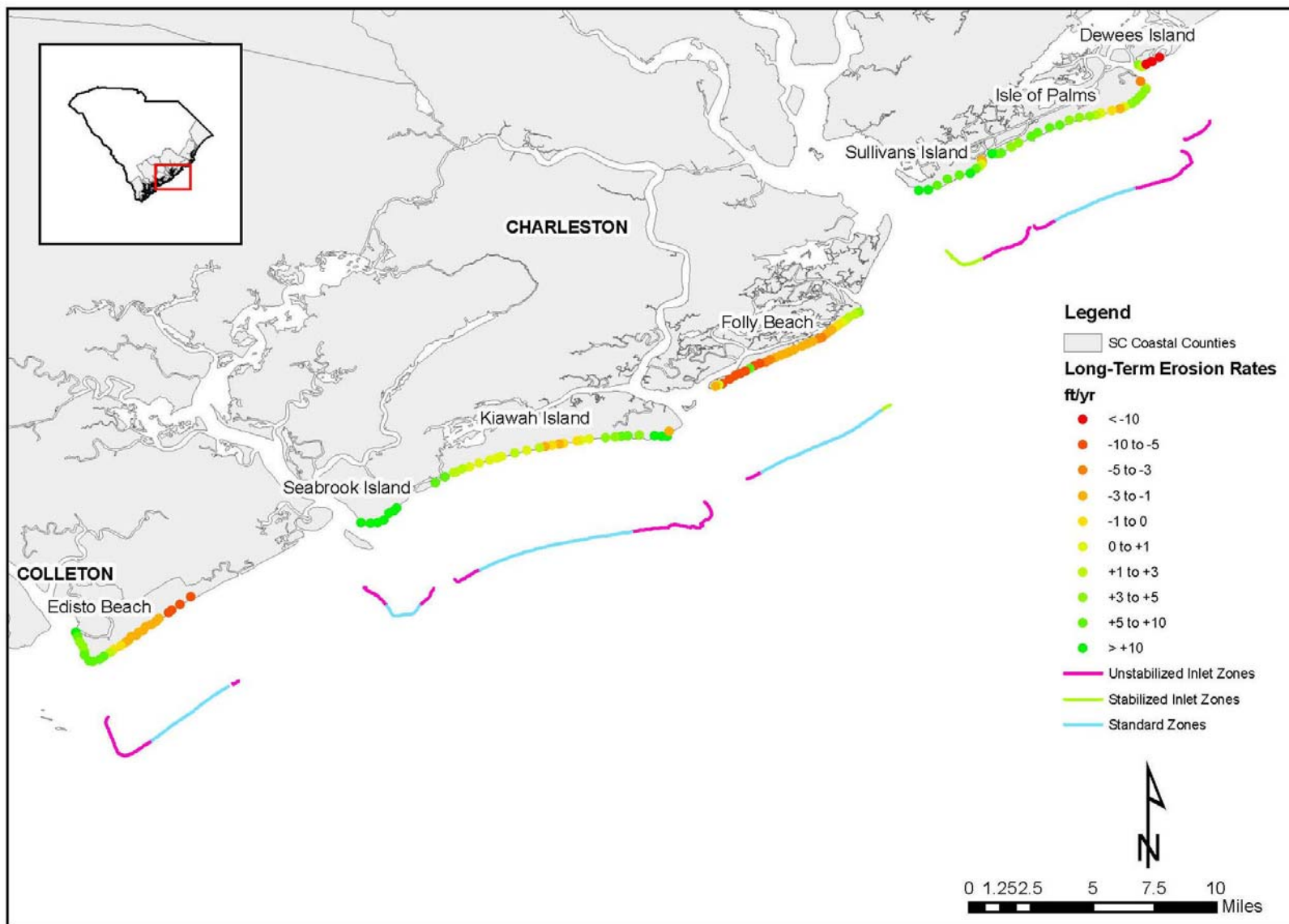


Figure 2(b): Long-term erosion rates and beach zone classifications for South Carolina's central beaches, using historical shoreline data from the 1850s to 2006.

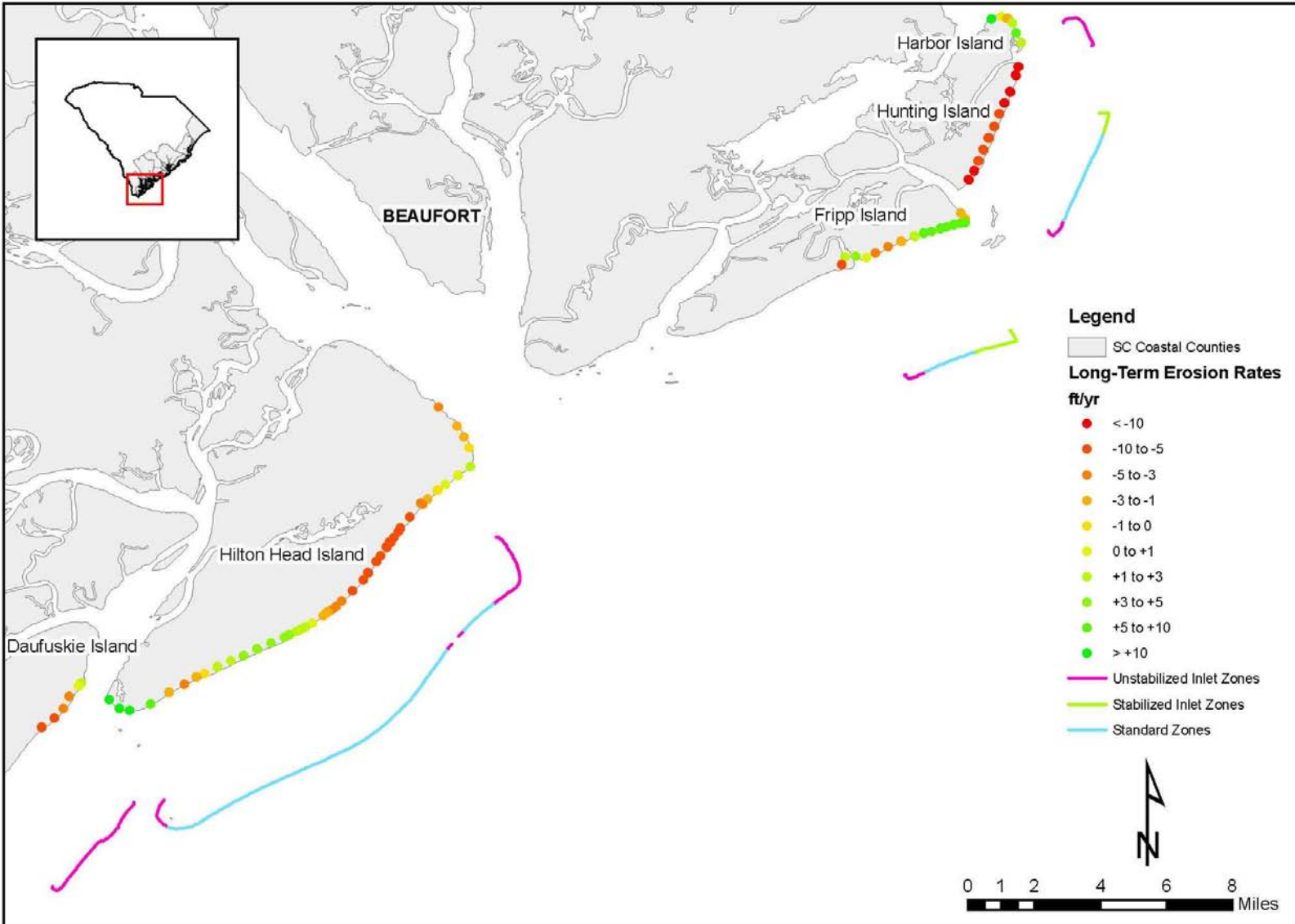


Figure 2(c): Long-term erosion rates and beach zone classifications for South Carolina's southern beaches, using historical shoreline data from the 1850s to 2006.

Clarifying the Goals and Mechanisms of the State’s “Retreat” Policy

“A forty-year policy of retreat from the shoreline is established. The department must implement this policy and must utilize the best available scientific and historical data in the implementation” (SC Code § 48-39-280).

Setback Area

The 1988 Beachfront Management Act expanded the state’s jurisdiction over beachfront development and alterations by establishing a “setback area” – that is, an area bounded by a “baseline” drawn along the primary oceanfront sand dune (in standard erosion zones), and a parallel “setback line” that is drawn landward of the baseline a distance that depends on the site-specific, long-term rate of erosion (§48-39-280; see Figure 3(a-d)).⁵ Restrictions on construction and reconstruction are established within the state setback area, and seaward of the baseline (§48-39-290). Generally, structures within the setback area are limited to 5,000 square feet of heated space; no new erosion control structures are permitted; and structures damaged beyond repair may only be replaced with structures of the original size and must be moved as far landward on the lot as possible. Development seaward of the baseline requires a special permit from DHEC-OCRM and is also subject to restrictions on size and erosion control structures.⁶ State regulations define the “beach/dune system” as “all land between the mean high-water mark of the Atlantic Ocean landward to the 40-year setback line” (R. 30-1(D)(5)). This is not an ecological definition of “beach/dune system” since the setback area, which in many cases is limited to a 20 foot-wide strip landward of the primary dune (baseline), often excludes adjacent, landward dune fields (for example, see Figure 3(a)).

State and Local Beach Management Plans

The SC Beachfront Management Act also established that the policy of South Carolina is to: *“Create a comprehensive, long-range beach management plan and require local comprehensive beach management plans for the protection, preservation, restoration, and enhancement of the beach/dune system. These plans must promote wise use of the state’s beachfront to include a gradual retreat from the system over a forty-year period”* (§48-39-260(2)). To address this policy, the Act requires local governments to provide in a local comprehensive beach management plan, a *“detailed strategy for achieving the goals of this chapter by the end of the forty-year retreat period. Consideration must be given to relocating buildings, removal of erosion control structures, and relocation of utilities”* (§48-39-350(A)(9)). State regulations also require the Department (DHEC-OCRM) to *“discourage new construction in the beach/dune system, and encourage those who have erected structures within the system to retreat* (R 30-11(D)(1)).

⁵ In unstabilized inlet erosion zones, the baseline is determined differently, as “the most landward point of erosion at any time during the past forty years” (§48-39-280(2)). The setback area is also calculated differently for inlet areas and for beaches fronted by erosion control structures.

⁶ Please refer to SC Code §48-39-290 and R. 30-15 for full details, additional restrictions, and exceptions to these rules.



(a)



(b)



(c)



(d)

Figure 3(a-d): *The DHEC-OCRM jurisdictional setback area is between the two solid lines on (a) Kiawah Island, (b) Isle of Palms, (c) Seabrook Island, and (d) Hilton Head Island. The minimum setback distance (20 feet) applies at each of the sites depicted here.*

The state's Beachfront Management Plan (R.30-21) specifically addressed the goal of retreat by establishing three sub-objectives:

- 1) Limit the size of structures within the setback area;

Within the setback area, structures are generally restricted to 5,000 square feet of heated space (SC Code §48-39-290), which may facilitate retreat since smaller structures may be more easily relocated or removed, and represent a smaller private investment.

- 2) Move buildings away from the active beach;

The Beachfront Management Act limits the rebuilding of structures “destroyed beyond repair” to their original size and requires that they be moved as far landward as possible on existing lots, but not necessarily outside of the setback area [48-39-290(B)(iv)]. There are no mechanisms for actively relocating or removing structures prior to damage, unless they were authorized by a special permit and become situated on the “Active Beach” for a set period of time (R.30-14(I)). The active beach is defined as “the area seaward of the escarpment or the first line of stable natural vegetation, whichever first occurs, measured from the ocean landward,” and only applies to structures that have received special permits from DHEC-OCRM (R. 30-1(D)(2)).

- 3) Implement mitigation guidelines/regulations for construction activity that damages beach/dune vegetation.

New structures are prohibited on the “primary dune” (R. 30-13(B)(5); and R. 30-15(F)(1)), but secondary dunes can still be impacted by development.

The Need for Improved Clarity of the Beachfront Management Act

As documented in a series of recent “discussion forums” among coastal community leaders in South Carolina, and in written comments submitted to this Committee, there is a widespread lack of understanding of, and differing opinions on, the meaning of the state's policy of retreat. This is in part due to the language in the statute. For example, the Beachfront Management Act is unclear in the following respects:

- The goal of the Retreat Policy is not clearly defined. The Act mentions “*relocating buildings, removal of erosion control structures, and relocation of utilities,*” but does not establish clear mechanisms to encourage or require active relocation or removal of structures, nor does it presently establish policies that clearly prevent new development or redevelopment in any areas within the beach/dune system or seaward of the baseline.
- The Act allows for periodic review of the location of the baseline (§48-39-280(C)) and for *seaward* movement of this line following renourishment (§48-39-280(A)(4)), thereby

allowing development to be situated even closer to the ocean and potentially impact remnants of larger, older dunes systems (*see Recommendation #1*).

- The wording of the requirement for local beachfront management plans specifies a forty-year time period for achievement of retreat (§48-39-350(A)(9)). This seems to indicate a period of time *in the future* to be established for complete removal of all structures and utilities from the setback area and seaward of the baseline. This is confusing with SC Code §48-39-280(A)(2), which refers to a method of establishing a baseline location by looking at forty years worth of erosion *history*. The 1987 Blue Ribbon Committee on Beachfront Management report indicates that retreat should occur during a “*transition period*.” The question arises as to whether the intent of the Act was to place a timeframe for removal of all structures in the beach/dune system.

Despite confusion about the long-term goals and mechanisms of retreat, the overall scale of beachfront development has certainly been reduced under the existing policies, and in several cases structures have been built farther landward on beachfront lots than would have occurred in the absence of the Beachfront Management Act and DHEC-OCRM regulations. However, in the 20 years since the Beachfront Management Act, the Committee was only able to find a few examples of voluntary relocation of structures from the setback area, and a limited number of cases of landward movement of structures within a beachfront parcel following storm damage.⁷

Reasons for the limited implementation of the retreat policy may include:

- Many beachfront lots are too small to relocate structures farther landward (within the same lot, as required if structural damage occurs that is greater than 66% of appraised value);
- Relocation to a nearby lot might not be possible, as much of the coast is now heavily urbanized and available land for relocation near the ocean is scarce or prohibitively expensive;
- Zoning, density, and code requirements might have changed since the development was first built, making the structures or land uses non-conforming. Newer laws might prohibit or severely restrict redevelopment (or relocation);
- There are relatively few financial assistance programs or incentives to relocate from beachfront lots;
- Existing federal, state, and local policies to implement retreat are limited – building is not only possible in the state’s setback area, but also seaward of the DHEC-OCRM baseline, even in areas artificially accreted through beach renourishment projects;
- There have been relatively few coastal storms or large-scale erosion events that have required emergency action on a broad scale since Hurricane Hugo (1989);

⁷ For example, 42 structures were rebuilt farther landward on their lots following damage by Hurricane Hugo; however, most were rebuilt in the same location (66) or even seaward of their prior location (10) (Beatley, 1992).

- Renourishment has kept pace with erosion in most areas, reducing the perceived need to retreat (some would argue that retreat is only needed when structures are imminently threatened and no alternative exists; while others would contend that retreat from the setback area should occur regardless of beach stabilization or accretion due to renourishment).

Since enactment of the South Carolina Beachfront Management Act, persistent public and private investment in beach nourishment techniques has considerably slowed erosion rates and landward migration of the shoreline in many areas along the coast (see Goal 2). This has greatly limited application of the state’s retreat policy. In some locations, this has even resulted in modest seaward expansion of an artificial beach/dune system, and suggests that the present practice of beach management may continue to limit the implementation of “retreat” as originally envisioned. However, there are varying perceptions of the sustainability of beach renourishment. The Committee agreed that beach renourishment appears to be viable for at least the “mid-term” for many beach communities, but that renourishment could fail as a statewide solution under several related scenarios - all of which seem plausible at some point, however distant:

- 1) decreasing sand availability (leading to higher costs per project);
- 2) increasing rates of erosion (or frequency of storms); and/or
- 3) decreasing federal, state, and local revenues supporting renourishment (or increasing reliance on local and private funding sources).

A Renewed Commitment to the Policy of Retreat

The 1987 Blue Ribbon Committee on Beachfront Management (and 1988 Beachfront Management Act) have provided strong justifications for the state’s policy of retreat from eroding beaches. Retreat from eroding shorelines, in order to minimize risks to communities, is still considered the preferred alternative to hard stabilization. Reinforcement of the state’s retreat policy will help maintain the emphasis on soft shorelines, a healthy beach/dune system, and reduced exposures to coastal hazards in the face of increasing stresses and pressures to relax existing rules. As currently constructed, the state’s retreat policy does not provide for the immediate, active relocation of structures from the beach/dune system; however, by gradually eliminating erosion control structures, it ensures abandonment of property to allow the natural, inland migration of a healthy beach/dune system, if or when renourishment becomes unsustainable for a specific area or community. This policy is similar to rolling easements found in Oregon, Texas, Maine, North Carolina, and other coastal states, and relies on common law principles of erosion and the Public Trust Doctrine for its legal foundation.⁸ It is likely to be challenged both legally and politically in the coming years. In the meantime, the Committee urges state and local governments to enact policies to ensure that sufficient space is provided for the natural migration of the beach/dune system and that the related risks to private and public resources are minimized.

⁸ A rolling easement allows construction near the shoreline, but requires the property owner to recognize nature's right of way to advance inland as sea level rises, and provides advanced notice to property owners that their land must eventually give way to the sea. For a review, see Titus, 1998.

A successful retreat policy will accomplish four long-term goals:

- 1) Minimize losses of life, property, and public investments in beachfront communities due to coastal storms and chronic erosion;
- 2) Protect and enhance the beach/dune system;
- 3) Protect and enhance public access to the beach; and
- 4) Minimize expenditures of public funds for the mitigation of known or predictable coastal hazards.

The retreat policy is based on the presumption that the long-term societal costs that would result from the loss of the beach/dune system (as rising seas meet stationary erosion control structures) exceed the shorter-term losses to private property holders as shorelines naturally migrate inland. In either case, a successful retreat policy will require long-term investments and commitments by federal, state, and local governments, property owners, and (potentially) other organizations. Property owners should plan ahead for renourishment expenses, consider long-term relocation options and assistance, and make informed decisions on purchases of shoreline real estate. Local governments can play a key role through land use planning, zoning, and regulation; while state and federal governments can provide financial, technical, and planning assistance, and continue to regulate impacts to public trust resources. State and local governments should also take full advantage of existing frameworks for comprehensive beach management planning under the Beachfront Management Act.

The following policy and management recommendations explore potential improvements to existing federal, state, and local policies and practices to reinforce an overarching beachfront management goal – to minimize risks to beachfront communities. In particular, the following recommendations seek to:

- 1) Prevent the seaward expansion of beachfront development;
- 2) Strengthen the beachfront “setback area”;
- 3) Eliminate inconsistent public subsidies that promote development in hazardous areas;
- 4) Promote the strategic acquisition of beachfront lands and/or easements; and
- 5) Strengthen the role of local governments in beach management and planning.

Recommendation 1 – Prevent the Seaward Expansion of Beachfront Development

A. GENERAL RECOMMENDATION

This recommendation seeks to reinforce the state’s beachfront policies by maximizing the space between existing oceanfront structures and the mean high water line. Key sub-recommendations would restrict seaward movements of the DHEC-OCRM “baseline,” and encourage local governments to establish “hold-the-line” ordinances that limit seaward expansion of development.

B. RATIONALE

“Erosion is a natural process which becomes a significant problem for man only when structures are erected in close proximity to the beach/dune system. It is in both the public and private interests to afford the beach/dune system space to accrete and erode in its natural cycle. This space can be provided only by discouraging new construction in close proximity to the beach/dune system and encouraging those who have erected structures too close to the system to retreat from it” (SC Code § 48-39-250(6), emphasis added).

The continued expansion of development seaward increases the exposure of life and property to well-documented (chronic erosion) and uncertain but predictable (storm) risks, and relies on the uncertain sustainability of beach renourishment practices. Further, this practice is in direct contrast to the state’s established policy of retreat from eroding beaches, and the legislature’s goal of affording sufficient space for natural beach migration (above). Existing policies that allow seaward expansion should be reconsidered or repealed.

First, the 1990 Amendments to the Beachfront Management Act provided for the seaward expansion of beachfront development by allowing the seaward movement of the regulatory baseline in some situations. Since the 1990 Amendments were enacted, there have been several instances where the baseline has been moved seaward on barrier islands or shorelines. In the early 1990s, there were individual petitions from property owners associations at Seabrook Island, Debordieu, and Hilton Head Island for moving the baseline seaward following renourishment. In the late 1990s, large sections of Hilton Head Island and Cherry Grove in North Myrtle Beach had their baselines moved seaward following large-scale renourishment projects.⁹ Requests by individual property owners have been more limited in recent years, and in all cases,

⁹ In a specific example, a beachfront property owner on Hilton Head Island petitioned DHEC-OCRM to move the baseline seaward, and this request was granted. Then, the owner sold his land to a developer who purchased the surrounding land as well. The permit from DHEC-OCRM potentially allowed the developer to disturb a 16 ft natural sand dune and build out to a 3 ft sand dune instead. In this case, however, the request did not obtain necessary approval from the local government.

the petitions must be endorsed by the local government as well. Petitions to move the baseline seaward after renourishment projects can be filed whether or not the area is currently within the 8-10 year review “window” during which time DHEC-OCRM is required to review and update as necessary the beachfront baseline and setback line (SC Code § 48-39-280(C)).

DHEC-OCRM began its current 8-10 year review cycle in 2008, and the regulatory baseline has recently moved seaward in several locations due to:

- 1) natural accretion of a new primary sand dune (elevation at least 3 feet and at least 500 feet in length);
- 2) new primary dune formation following a “stabilized” renourishment project; or
- 3) the requirement, in most cases, that only historical shorelines as old as 40 years may be used in the baseline analysis if located within an unstabilized inlet erosion zone.

For example, on Hilton Head Island along Calibogue Sound, the baseline moved seaward an average distance of 50 ft, and the baseline also moved seaward as much as 40 ft on the southwest side of the Folly. On Seabrook Island, along the large rock revetment at the center of the island, the baseline moved seaward an average distance of about 125 ft.

Second, local governments should reexamine existing policies because local ordinances can be more restrictive than the minimum state standards. For example, the Town of Hilton Head Island restricts vertical structures from a line of existing construction to the DHEC-OCRM setback line to protect the entire beach/dune system and related hazardous areas (not just the primary dune as defined by DHEC-OCRM). As a result, there are many oceanfront parcels in Hilton Head Island that have not utilized their entire buildable area, with buildings located in the middle of the parcel or even further landward. Hilton Head Island’s restriction basically “holds the line” of existing vertical construction from moving farther seaward, yet gives the property owner the ability to continue to use his property in non-dune areas, thus keeping its economic viability. Some land use amenities are allowed in this ‘transition’ area such as swimming pools, hot tubs, decks, landscape barriers, boardwalks, fire pits, picnic areas, volleyball nets, and storm water detention, retention and drainage improvements. In another example, the Town of Pawleys Island has established a “Shore Protection Line” to prevent the building of new habitable structures farther seaward than this line, which is drawn generally at the most eastward point of existing construction and across all other undeveloped property.

Third, private property owners are currently benefitting from artificial accretions (beach renourishment), and often at the public’s expense when the renourishment projects are funded in part or in whole by federal, state, or local governments. Under common law in South Carolina, land lost to natural erosion processes reverts to state ownership under the Public Trust Doctrine (*McQueen v. S.C. Coastal Council*, 580 S.E.2d 116 (S.C. 2003)). Since the public/private boundary is set at the Mean High Water line, the public/private boundary is unlikely to change over time if renourishment keeps pace with erosion. However, under common law, property owners may not be granted rights to artificial accretions (reviewed in *Titus*, 1998: see *Patton v. City of Wilmington*, 147 p. 141, 142 (Cal. 1915) (holding that artificial accretions accrue to the state); but see also *California ex rel. State Lands Comm'n v. United States*, 457 U.S. 273, 285 (1982) (holding that, under federal common law, accretions along the ocean beach accrue to the

upland owner, whether or not such accretions are artificial and whether or not the riparian owner is responsible for presence of a structure causing the accretions). This Committee is not aware of any South Carolina statute, regulation, or case law that has specifically addressed the matter of whether a beachfront landowner regains title to land raised by a public renourishment project. However, the SC General Assembly has already established a firm position on natural beach accretion beyond the original property boundary (SC Code §48-39-120(B)):

“Provided, further, that no person or governmental agency may develop ocean front property accreted by natural forces or as the result of permitted or nonpermitted structures beyond the mean high water mark as it existed at the time the ocean front property was initially developed or subdivided, and such property shall remain the property of the state held in trust for the people of the state.”

It is unclear whether a beach renourishment project could already be considered a “permitted structure” under this provision.

C. NEW POLICY RECOMMENDATIONS

- a) Disallow the seaward movement of the regulatory beachfront baseline under any circumstances.**

Specifically, the General Assembly should rescind the 1990 amendment that allows local governments or landowners to petition for a seaward extension of the baseline following a renourishment project, and the statute that provides for revisions of the baseline at 8-10 year intervals should be modified to allow only for landward movement of the baseline, never seaward movement. These changes are consistent with both the existing state retreat policy, and the intent to reduce risks to oceanfront properties and public safety that will occur due to major storms and long-term beach migration. All beachfront baselines for each standard erosion zone, unstabilized inlet zone, and stabilized inlet zone should be kept at the existing updated locations. Any subsequent baseline revisions considered at 8-10 year intervals should only result in “no change” or a landward movement of the baseline. Natural accretion or implementation of a beach nourishment project which expands the beach seaward should not be grounds for movement of the baseline seaward due to the uncertainty of sufficient funding or availability of compatible sand resources to maintain a long-term seaward baseline position.

- b) Local governments should consider a “holding the existing line of construction” philosophy to protect the area seaward of the built environment, or a determined ‘line of construction.’**

Local governments should examine and consider the model ordinances developed by the Towns of Hilton Head Island and Pawleys Island.

- c) Re-establish (re-survey) the legal boundary between private and public property prior to renourishment along shorelines that have eroded gradually over time.**

The state or applicant could re-survey the shoreline prior to any major renourishment project that has resulted from long-term, chronic erosion, to reset the legal boundary between public and private land. This may not apply to areas affected by episodic erosion (for example, from a storm event), because of the common law principle of “avulsion,” which allows property owners to reclaim land lost due to a storm event. North Carolina, by statute, makes renourished beaches property of the state, and “all such raised lands remain open to the free use and enjoyment of the people of the state” (see Case Studies section below). Florida, by statute, fixes the boundary line of private landowners whose property abuts a beach renourishment project so that they do not gain the benefit of accretions. The Florida Supreme Court held that provisions of the FL Beach and Shore Preservation Act that fix the shoreline boundary and that suspend operation of the common-law rule of accretion but preserve littoral rights of access, view, and use after the erosion control line (ECL) is recorded do not, on their face, unconstitutionally deprive upland owners of littoral rights without just compensation. The case was heard by the U.S. Supreme Court on December 2, 2009, and a decision is forthcoming.¹⁰

DHEC-OCRM could establish permit conditions on renourishment projects that require a new survey of the Mean High Water line, and essentially require the landowner's relinquishment of accretion rights seaward of the high-tide line at the time of renourishment.

Any regulatory changes would require approval from the DHEC Board for promulgation pursuant to the SC Admin. Procedures Act (SC Code Ann. § 1-23-10 et seq.), which requires review by the SC General Assembly, and must be authorized under existing statutes.

Any statutory changes would require legislative action by the South Carolina General Assembly.

D. NEW PLANNING AND MANAGEMENT ACTIONS

- 1) Through planning assistance to local beachfront communities, DHEC-OCRM should encourage beachfront communities to adopt “hold the line” building ordinances, using the Hilton Head Island example as a foundation.
- 2) In addition to the “hold the line” ordinances described above, local beachfront communities should also consider:
 - Limiting the amount, type, and location of development and redevelopment along the immediate oceanfront;
 - Establishing specific Higher Regulatory Standards for all oceanfront construction, and in broader Special Flood Hazard or Special Erosion Hazard Zones to attain improved Community Rating System (CRS) classifications from FEMA;
 - Adding stronger open space preservation areas, freeboard requirements, Cumulative Substantial Improvements, and Lower Substantial Improvements in these zones;

¹⁰ Transcript of oral arguments: http://www.supremecourt.us/oral_arguments/argument_transcripts/08-1151.pdf

- Requiring low density or prohibiting developments with high density directly next to the water on undeveloped land. For example, large high-density structures could be prohibited seaward of the first major line of infrastructure;
- Requiring land use planning controls such as deep lots and buffers, large waterfront parcels, and mandatory landward relocation during redevelopment (where possible);
- Limiting or restricting local infrastructure or subsidies that support further development in vulnerable areas. Establish a review and approval process for publicly financed infrastructure including roads, electric and drainage projects to be compatible with the objectives of this policy as part of the regional planning process (*see Recommendation #3*).
- Facilitating acquisition of properties. Local or state governments could establish land acquisition, purchase of development rights (PDRs), or easement programs for any remaining undeveloped, available, or threatened beachfront properties (*see Recommendation #4*).
- Developing a post-storm redevelopment strategy for rebuilding the beach/dune system, and relocating structures as far away from hazards as possible (*see Recommendation #5*).

E. EXISTING POLICIES AND PROGRAMS

Beachfront Management Act with 1990 Amendments (summarized)

DHEC-OCRM, before July 3, 1991, was to establish a final baseline and setback line for each erosion zone based on the best available scientific and historical data as provided in subsection (B) and with consideration of public input. The baseline and setback line were not to be revised before July 1, 1998, nor later than July 1, 2000. After that revision, the baseline and setback line were to be revised not less than every eight years but not more than every ten years after each preceding revision. The lines were revised in 1998-1999 and are currently being revised in accordance with this timeline. The requirements for establishing the baseline for each standard erosion zone, unstabilized inlet zone, and stabilized inlet zone are similar to the earlier Act. However, the following text in the 1990 amendments adds the option to move the baseline seaward following renourishment projects:

“Notwithstanding any other provision of this section, where a department-approved beach nourishment project has been completed, the local government or the landowners, with notice to the local government, may petition an administrative law judge to move the baseline as far seaward as the landward edge of the erosion control structure or device or, if there is no existing erosion control structure or device, then as far seaward as the post project baseline as determined by the department in accordance with Section 48-39-280(A)(1) by showing that the beach has been stabilized by department-approved beach nourishment. If the petitioner is asking that the baseline be moved seaward pursuant to this section, he must show an ongoing commitment to renourishment which will stabilize and maintain the dry sand beach at all stages of the tide for the foreseeable future. If the administrative law judge grants the petition to move the baseline seaward pursuant to this section, no new construction may occur in the area between the former baseline and the new baseline for three years after

the initial beach nourishment project has been completed as determined by the department. If the beach nourishment fails to stabilize the beach after a reasonable period of time, the department must move the baseline landward to the primary oceanfront sand dune as determined pursuant to items (1), (2), and (3) for that section of the beach. Any appeal of an administrative law judge's decision under this section may be made pursuant to Title 23 of Chapter 1.”

F. GENERAL COSTS AND BENEFITS

- Benefits will include reduced threats to coastal infrastructure and potentially decreased demand for expensive beach nourishment projects.
- Beach nourishment projects, while designed to protect coastal properties from further shoreline erosion, will generally have a period of time when the shoreline has migrated back to a position close to the pre-nourishment conditions, thereby necessitating the next nourishment project. During these periods, any such structures would be at risk to increased storm damage, and as noted above, there remains uncertainty that there are sufficient, affordable sand reserves to continue long-term nourishment operations in the future.
- Impacted parties will be towns or property owners who may enjoy a temporary increase in shoreline accretion that they feel could be built upon.
- Actual costs of implementing this policy are difficult to quantify, but should be minimal as compared with the cost/risk of increased development seaward of current baselines and existing lines of oceanfront structures.
- Maximizing the space between development and the shoreline would eventually be less expensive to governments as a whole by protecting the built environment better than having the structures exposed to the constant erosion and storm surge next to the water.
- A municipality's FEMA Community Rating System (CRS) classification could also improve, resulting in reduced insurance costs.

G. MEASURES OF SUCCESS

- No seaward expansion of existing oceanfront development anywhere in the state.
- Decreased insurance claims and costs.
- Decreased density immediately next to the water.
- Decreased damage to structures and decreased use of materials for repair.
- Improvement of FEMA Community Rating System classifications for local discounts on flood insurance through implementation of open space protection through easements in the beach/dunes system.

H. FEASIBILITY ISSUES

- Tighter regulations will meet stiff opposition by political leaders, real estate and development interests, and possible legal challenges involving private property rights.

- Legal challenges to pre-renourishment property surveys are ongoing and will likely affect this recommendation.

I. KEY UNCERTAINTIES/ASSUMPTIONS

- Knowing how far away to move from a shoreline, given the rising sea levels.
- Knowing how far away to move from an unstabilized inlet shoreline.
- Knowing the actions of the federal, state, or local government after a disaster.
- Assumptions that business as usual will continue to work – renourishment, etc. economic return on coastal investment... (mix of federal/state/local subsidies)
- Rate of SLR, influence on renourishment/erosion control success into the future
- Shoreline property ownership issues (related to Kings Grants and other title issues)
- Buy-in by local government officials and community leaders
- Assuming that seaward movement of the baseline could be a fairly common request

J. EXAMPLES FROM OTHER STATES OR AREAS

Florida

Relevant sections of Florida code that reset the public/private boundary prior to renourishment are as follows (FL Code §161.191):

“Vesting of title to lands.--

(1) Upon the filing of a copy of the board of trustees' resolution and the recording of the survey showing the location of the erosion control line and the area of beach to be protected as provided in s. 161.181, title to all lands seaward of the erosion control line shall be deemed to be vested in the state by right of its sovereignty, and title to all lands landward of such line shall be vested in the riparian upland owners whose lands either abut the erosion control line or would have abutted the line if it had been located directly on the line of mean high water on the date the board of trustees' survey was recorded.

(2) Once the erosion control line along any segment of the shoreline has been established in accordance with the provisions of ss. 161.141-161.211, the common law shall no longer operate to increase or decrease the proportions of any upland property lying landward of such line, either by accretion or erosion or by any other natural or artificial process, except as provided in s. 161.211(2) and (3). However, the state shall not extend, or permit to be extended through artificial means, that portion of the protected beach lying seaward of the erosion control line beyond the limits set forth in the survey recorded by the board of trustees unless the state first obtains the written consent of all riparian upland owners whose view or access to the water's edge would be altered or impaired.”

Maine

Frontal and back dunes were mapped by the Maine Geological Survey in 1988, and new structures or additions to existing structures are prohibited on frontal dunes. Since 1988, no adjustments have been made to the maps based on either erosion or accretion.

North Carolina

North Carolina's beachfront setback line is based on the first line of stable and natural vegetation. In areas that have received large scale beach fill, a "static" vegetation line is created and used for setback determinations, and is drawn at the location of vegetation line prior to the beach fill project (or, in cases where beach fill occurred prior to the rule, the vegetation line is approximated from aerial photos or surveys). There is a new rule that should become effective in September 2009 that will allow some exceptions for development in cases where the setback from the static vegetation line cannot be met, but the setback from the new vegetation line can (however, new development will be limited to 2500 sq ft and cannot be any further seaward than the landward-most adjacent building AND the town must be granted a static line exemption from the NC Coastal Resources Commission by proving they have a 25 year or greater beach fill project in place, funds to pay for it, and sufficient compatible sand. NC inlet zones use the same vegetation line and static line concepts.

Relevant sections of North Carolina code that reset the public/private boundary prior to renourishment are as follows (NC Code §146-6(f)):

"...the title to land in or immediately along the Atlantic Ocean raised above the mean high water mark by publicly financed projects which involve hydraulic dredging or other deposition of spoil materials or sand vests in the state. Title to such lands raised through projects that received no public funding vests in the adjacent littoral proprietor. All such raised lands shall remain open to the free use and enjoyment of the people of the state, consistent with the public trust rights in ocean beaches..."

Texas

The Plan for Texas Open Beaches was established in 2006 by the Texas General Land Office, and it gives the state or local governments the authority to seek the removal of any encroachment on the public beach. The public beach is a rolling easement from the natural Line of Vegetation (LOV) to the mean high tide line. Beach renourishment is considered artificial manipulation, so it does not move the Line of Vegetation seaward, even if a nourished beach or dune becomes vegetated. The Structure Removal Initiative was announced in July 2006. In the Village of Surfside Beach, 37 structures were located on the public beach, and 25 have been either relocated or demolished. Owners who voluntarily move their houses are reimbursed up to \$50,000 for the cost of relocation, but this money cannot cover the cost of purchasing new land. Many of the owners who relocated are once again earning rental income from their property that they were not earning while the structure was threatened. The cost to relocate each individual property has been around \$150,000-\$160,000, so the Structure Removal Initiative has reimbursed owners about 1/3 of the cost.

K. BARRIERS OR CONCERNS

While the Committee unanimously supports the general recommendation to prevent seaward expansion of beachfront development, some committee members did not agree completely with the condition that the DHEC-OCRM baseline should never move seaward “under any circumstances.” In some situations, adjustments to the baseline accuracy may be warranted. These situations could include the discovery of better scientific evidence to support a correction of baseline, improved shoreline data, and improved standards and methodologies for determining the baseline. In most instances, these potential corrections to the baseline are assumed to be minor and as such, the intent to preclude any further seaward adjustment of the baseline is supported, but some flexibility is suggested in situations where existing baseline positions might be in error or could be made more accurate.

Some committee members also strongly suggest that baseline determinations follow a scientific and consistent methodology similar in practice to the stringent standards applied by FEMA in determining regulatory NFIP flood boundaries and maps. For example, the determination of baselines in unstabilized inlet zones can be based on historic shoreline positions as well as other factors (e.g. historical inlet migration, inlet stability, channel and ebb tidal delta changes, the effects of sediment bypassing, the effects of nearby beach restoration projects, etc.). Committee members suggested that more clear standards be established to reduce the subjectivity in staff decisions related to these line determinations.

Recommendation 2 – Strengthen the Beachfront Setback Area

A. GENERAL RECOMMENDATION

The “setback area” established under the SC Beachfront Management Act can be more accurately described as a jurisdictional area, since the requirements for building setbacks are actually limited. The policy and management recommendations described here are intended to strengthen the beachfront setback area by: a) increasing the minimum setback line distance; b) improving the formula used to delineate setbacks for highly dynamic shorelines; c) tightening certain restrictions within the setback area; and, d) enhancing the protection of beach and dune features that are located outside of the setback area.

B. RATIONALE

Jurisdictional baselines and setback lines were established by the SC Beachfront Management Act in 1988 to regulate the new construction, repair, or reconstruction of buildings and erosion control structures along the state’s ocean shorelines. Building within the state’s beachfront “setback area” is allowed, but any development is subject to specific regulations. The baseline is established at the crest of the primary oceanfront sand dune in standard zones (beaches not influenced by tidal inlets or associated tidal shoals), and at the most landward point of erosion at any time during the past forty years in unstabilized inlet zones (SC Code §48-39-280(A)). The setback line is established landward of the baseline a distance of forty times the average annual erosion rate or not less than twenty feet from the baseline. The baseline and setback line are updated every 8-10 years using the best available scientific and historical data including aerial imagery, LiDAR data, historical shorelines, beach profile data, and long-term erosion rates.

First, the Beachfront Management Act established a minimum setback of 20 feet for beaches experiencing long-term accretion or long-term erosion rates of less than 1/2 foot per year (SC Code §48-39-280 (B)). Based on a recent analysis of long-term erosion rates along the beachfront, this minimum distance has been applied to approximately 59% of the beachfront stations. As a result, there are large stretches of beachfront properties where the state’s jurisdiction is very limited (for example, Figure 2). In the setback area, new buildings are limited to 5,000 square feet of heated space, and no new erosion control structures are allowed. However, just outside of the setback area, new erosion control structures and/or buildings of any size (that meet requirements under local ordinances) are allowed. In some cases, large multi-family units are constructed on and over secondary dunes, right up to the 20 ft DHEC-OCRM setback line; in other cases, new seawalls are constructed just beyond the setback line, and will be “grandfathered in” as the shoreline migrates (until “damaged beyond repair,” or 50% loss of structural integrity, at a later date). The minimum setback area is particularly narrow with respect to projections for accelerated sea level rise, as the historical rate (~1.5 ft/century) may double or even triple in the coming decades (US CCSP, 2009).

Second, the data, methods, and computing power used to calculate and delineate baselines and setback lines can be improved due to advancements over the past 20 years, and there is a need to improve the scientific basis for protection of the beach/dune system. Shoreline change is more predictable in some regions than in others, and the short-term rate of change in some regions is higher than the long-term average change. This is especially true in unstabilized inlet areas, where the long-term erosion rate may be a gradual 1 foot/year, but the shoreline can vary by hundreds of feet over a 10-year period due to a repetitive series of inlet shoal bypassing events. Currently, the Beachfront Management Act requires that the baseline in unstabilized inlet zones be established using the landward most shoreline in the prior 40-year window (SC Code §48-39-280 (A)(2)), and the setback area is calculated based on the shore-perpendicular, long-term erosion rate (based on data going back to the 1800s). There is no justification for “dropping” shorelines that are older than 40 years from consideration, which allows seaward movement of the baseline in unstabilized, highly dynamic inlet zones.

Third, building restrictions in the setback area and seaward of the baseline are limited. For example, there is a disconnect between the state statute and regulation on building size restrictions. If part of a new habitable structure is constructed seaward of the setback line, the owner must certify in writing to the department that the construction meets the following requirements:

“(i) The habitable structure is no larger than five thousand square feet of heated space” (SC Code §48-39-290 (B)(1)(a)).

“(2) That portion(s) of the habitable structure seaward of the setback line is no larger than five thousand square feet of heated space” (R. 30-13(B)(2)).

If DHEC-OCRM staff follow the regulation and not the statute, a much larger building could be allowed as long as the portion within the setback area is limited to 5,000 square feet. Within a 20’ setback area, this is not a substantial limitation. Also, structures within the setback area (and seaward of the baseline) are allowed to be rebuilt to the original size following an event that causes greater than 2/3 loss of assessed value (SC Code §48-39-290 (B)(1)(b)(iv)). Other states, including North Carolina, restrict rebuilding in the beachfront setback area following a determination of “damaged beyond repair.” Finally, over 60 structures have received “special permits” to build seaward of the DHEC-OCRM baseline.

Fourth, valuable beach and dune features are often located outside of the “beach/dune system” as it is defined in the Act (from the Mean High Water line to the landward extent of the 40-year setback line, see SC Code §48-39-270 (5)). While mitigation for dune damage is required under R. 30-11(D)(6), there is no state prohibition on dune destruction other than for the primary dune. Large secondary dunes are vulnerable to development when a new, sometimes temporary primary dune forms at a seaward location (the primary dune is defined as at least 3 feet in height and 500 feet in length (R. 30-1(D)(43)).

C. NEW POLICY RECOMMENDATIONS

- a) **The minimum beachfront setback should be increased to 50 feet from the baseline (for all beach and inlet zones).**

The expanded setback area along beaches with slow rates of erosion or even accretion is desirable given projections of accelerated sea level rise (Figure 1) and the potential for more intense storm events, and because the current restrictions do little to limit the size of buildings or placement of erosion control structures outside of the setback area but in close proximity to the primary dune or active beach. At present, increasing the minimum setback distance from 20 ft to 50 ft would affect approximately 264 additional habitable structures in the state (an additional 7% of the 3,850 habitable beachfront structures).

The minimum setback is currently established in both statute and regulation. The Committee is unclear on whether a regulatory change expanding the minimum setback would be preempted by the statute.

- b) **The setback area regulation (R. 30-13(B)(2)) should be modified to become consistent with the statute that requires that if part of a new habitable structure is constructed seaward of the setback line, the total structure must be no larger than five thousand square feet of heated space (SC Code §48-39-290(B)(1)(a)).**

Consistency between the relevant regulation and statute is needed so that habitable structures that are located completely within the setback area and those that straddle the setback line are limited to 5,000 square feet, as intended by the statute.

- c) **In “unstabilized inlet zones,” evaluate all historical shorelines for determining the baseline, and include some measure of variability (e.g. standard deviation or variance) in erosion rate formulas for determining the setback line distance.**

Unstabilized inlets are extremely dynamic, and are often the locations of erosion “hot spots” where structures are routinely threatened by rapid shoreline erosion. DHEC-OCRM should not limit baseline determinations based on aerial photographs that are available in the prior 40-years, but should reset the baseline in these areas to a composite of the most landward historical shorelines, possibly since the construction of the Atlantic Intracoastal Waterway (AIWW). This approach is followed by coastal managers in North Carolina to determine which historical shoreline positions should be included in jurisdictional line analyses. The baseline should then be fixed unless new information comes forward at a later date that reveals an even farther landward position (*see Recommendation #1*).

A measure of the variability in these zones (in statistical terms, variance or standard deviation) should be included in the formula used to determine the setback area distance in unstabilized inlet zones. This formula would be more appropriate for inlet areas that show little shore-perpendicular migration, but significant variability over short time frames (as well as longitudinal spit formation and migration). In general, DHEC-OCRM should establish improved formulas to better reflect inlet dynamics in setback line formulas.

The Committee felt that the current approach to establishing baselines and setback lines in standard beach zones is appropriate, except that the minimum setback distance should be increased.

d) Limit the building or re-building of structures in the most vulnerable beachfront areas, particularly seaward of the baseline.

To date, about 60 “special permits” have been issued statewide by DHEC-OCRM for habitable structures seaward of the baseline. According to SC Code § 48-39-290(D), special permit houses cannot have a seawall as part of the foundation, and they can never be greater than 5,000 square feet, further seaward than either neighboring house, or located on the primary dune or active beach. Furthermore, if water reaches under the house during high tide over a period of time, removal of the structure is required. The state should reexamine and consider strengthening these criteria. In addition, the state should re-evaluate post-storm reconstruction policies in the setback area.

e) Enhance protection of sensitive dune features that are outside of the state’s “beach/dune system.”

Because secondary dunes, recurved spits, and other sensitive beach/dune features are often outside the beach/dune system as defined in the statute, state and local cooperation is needed to protect secondary dunes and special features.

Any regulatory changes would require approval from the DHEC Board for promulgation pursuant to the SC Admin. Procedures Act (SC Code Ann. § 1-23-10 et seq.), which requires review by the SC General Assembly, and must be authorized under existing statutes.

Any statutory changes would require legislative action by the South Carolina General Assembly.

D. NEW PLANNING AND MANAGEMENT ACTIONS

- 1) DHEC-OCRM should establish and hold all historical shoreline data for the coast of South Carolina, and should work with partner agencies and academic institutions to establish a scientifically defensible formula for setback determinations in unstabilized inlet zones.
- 2) DHEC-OCRM should work with local governments and partner agencies to explore opportunities for relocation of vulnerable structures outside of the setback area. DHEC and the General Assembly should also reconsider building size restrictions and the use of special permits on the beachfront.

- 3) DHEC-OCRM could consider the designation of Geographic Areas of Particular Concern (GAPC's) for some locations. Hilton Head Island provides examples of local ordinances that enhance dune protection that should be considered by other beachfront communities.

E. EXISTING POLICIES AND PROGRAMS

This policy recommendation is directly related to existing authorities and procedures followed by DHEC-OCRM under the South Carolina Coastal Tidelands and Wetlands Act: SC Code §48-39-250 et seq., SCDHEC-OCRM Critical Area Permitting Regulations (R. 30-1 et seq), and the South Carolina Beachfront Management Plan (R. 30-21).

The Critical Area Permitting Regulations define Geographic Areas of Particular Concern (GAPC's) as "areas within South Carolina's coastal zone which have been identified in the state's Coastal Management Program as being of such importance as to merit special consideration during the [DHEC-OCRM] review of permit applications (R. 30-1(D)(24)). GAPC's consist of: 1) areas of unique natural resource value; 2) areas where activities, development, or facilities depend on proximity to coastal waters, in terms of use or access; and 3) areas of special historical, archeological or cultural significance.

F. GENERAL COSTS AND BENEFITS

This policy could lead to decreased beachfront property values in some areas, but the specific reductions are difficult to quantify for the following reasons:

- Beachfront parcels have various dimensions (width and depth), and these dimensions limit the size of habitable structures that can be built under existing or new policies.
- Not all habitable structures are of equal value per square foot. If the setback line moves landward in some areas, it could limit new habitable structures to a certain square footage, but the size and type of structure will depend on parcel dimensions, local zoning, and building codes, among other factors.

This policy would benefit long-term planning in coastal communities by using the best available data and historic trends and by including some measure of variability when calculating erosion rates in "unstabilized inlet zones."

This policy would also promote and preserve the storm protection functions and habitat of secondary dunes and other sensitive beach/dune features.

G. MEASURES OF SUCCESS

- Reduction in occurrence of impacted infrastructure and property damage.
- Reduced demand for renourishment, erosion control, Emergency Orders.
- Long-term health of beach / dune system.

H. FEASIBILITY ISSUES

Beachfront property owners will likely oppose any further restrictions on the use of their property, including size limitations, setbacks, and the use of various erosion control alternatives.

The General Assembly will have to consider the reasonable use of beachfront parcels in contrast to the long-term economic and environmental impacts associated with encroachment of development into the beach/dune system – a problem that was recognized in the state’s original passage of the Beachfront Management Act in 1988.

I. KEY UNCERTAINTIES/ASSUMPTIONS

- Magnitude and influence of sea level rise on shoreline position.
- Magnitude and influence of storm climate on shoreline position.
- Inlet dynamics.
- Costs associated with data collection, compilation, analysis, and product creation.

J. EXAMPLES FROM OTHER STATES OR AREAS

Texas

Proposed setback rules call for new buildings to be located landward of the Line of Vegetation, a distance of 60 times the erosion rate. Nueces County recently established a 350-ft setback requirement.

North Carolina

North Carolina’s Coastal Area Management Act (CAMA) established coastal construction setback rules similar to those found in South Carolina. The Vegetation Line is the “baseline” from which erosion rate-based setback lines are drawn. Under current rules established in 1979, the setback is 30 times the long-term average annual erosion rate for single-family structures regardless of size or for multi-family or commercial structures less than 5,000 sq ft (minimum setback of 60 feet). For multi-family and commercial structures greater than 5,000 sq ft with an erosion rate less than 3.5 ft/yr, the setback is 60 times the long-term average annual erosion rate. If the erosion rate is greater than 3.5 ft/yr, the setback is 30 times the long-term average annual erosion rate plus 105 feet for this type of structure. North Carolina’s Coastal Program has recently changed oceanfront setback rules that are now based on total square footage regardless of whether the structure is single-family, multi-family, or commercial. Under the new policies, the minimum setback factor remains 30 times the erosion rate for all structures less than 5,000 sq ft but, as it does with existing policy, the factor increases to 60 times the erosion rate for structures greater than 5,000 sq ft. The setback factor increases from 60 to 90 times the erosion rate in increments of 5 as total square footage increases, and the maximum setback factor becomes 90 times the erosion rate for structures greater than or equal to 100,000 sq ft.

North Carolina's Coastal Area Management Act (CAMA) also requires that new buildings and development are located as far back from the beach as possible. Relocation, beach renourishment, or temporary sandbags are the only acceptable erosion responses in the state since permanent hard stabilization of the shoreline is not allowed. In February 2009, the NC Coastal Resources Commission and its advisory board unanimously passed a resolution asking the General Assembly to consider creating a state trust fund to help finance coastal infrastructure projects, including the removal of structures encroaching onto public beach areas. In North Carolina, no portion of a building or structure can extend seaward of the ocean hazard setback line.

Rhode Island

Rhode Island requires a minimum setback distance of 50 ft from coastal features, defined as beaches; dunes; barrier islands and spits; coastal wetlands; rocky shores; manmade shorelines; and headlands, bluffs, and cliffs. Where erosion rates are mapped, the setback distance is 30 times the rate for residential development, or 60 times the rate for commercial (or greater than 4 unit) developments.

Maine

Maine's Coastal Sand Dune Rules prohibit new structures or additions to existing structures on frontal dunes. A building cannot exceed 20% of the lot coverage, and buildings larger than 2,500 sq ft are not allowed within the dune system unless the applicant can demonstrate that the site will remain stable after allowing for a two-foot rise in sea level over 100 years. All development except single family residences must be set back 250 feet from the high water line. The Municipal Shoreland Zoning Act mandates a 75-foot setback for residential development.

Hawaii

Hawaii CZM regulations establish statewide shoreline setbacks of not less than twenty feet and not more than forty feet, but County Planning Departments are delegated powers and may establish shoreline setbacks greater than the CZM state requirements. For example, the Kauai County Shoreline Setback and Coastal Protection Ordinance states that no lot shall have a shoreline setback line of less than forty feet, and setback distances increase with increasing lot depth. New lot depths of greater than 160 feet are required, and a proposed building footprint less than 5,000 sq ft has a setback distance of 70 times the erosion rate, plus a forty foot safety buffer. A proposed building footprint greater than 5,000 sq ft has a setback distance of 100 times the erosion rate, plus a forty foot safety buffer. The state is not legally bound to implement the County setback ordinance, and the state recently approved a less restrictive setback distance than would have been required by the County ordinance. However, a condition that no shoreline hardening would be allowed for the life of the development was included in the state authorization. Maui County has adopted shoreline rules that incorporate managed retreat principles as post and pier buildings are relocated inland over time. Through the coastal permitting process, Maui County has been successful in having oceanfront structures removed at several large resorts during their redevelopment.

K. BARRIERS OR CONCERNS

While the Committee unanimously supports the general recommendation to strengthen the DHEC-OCRM Setback Area, the Committee did not reach full agreement on two of the specific sub-recommendations:

- a) Committee members debated whether 50 feet was potentially too great or too little of an increase to the minimum setback distance (currently set at 20 feet). They suggested that if the setback is to be revised, it should be based on a detailed analysis to support the revision. This analysis would include a careful analysis of the implications of the new rule, historic analysis of the success and failure of the existing 20-ft setback, and challenges that coastal communities and the state would face to implement a revision.
- b) Committee members pointed out that the implications of this recommendation depend on actions taken under sub-recommendation (a); that is, if the setback area is increased to 50 feet or more, this recommendation would affect far more habitable structures in applying the 5,000 square foot maximum to all structures that overlap with any part of the setback area.
- c) Some committee members do not support the application of a "measure of variability" or standard deviations in the determination of shoreline positions. They believe this approach is not scientifically justified for policy implementation at this time.
- d) Some committee members strongly suggest that setback determinations follow a scientific and consistent methodology similar in practice to the stringent standards applied by FEMA in determining regulatory NFIP flood boundaries and maps. For example, the determination of long-term erosion rates is based on all available historical shoreline positions, but DHEC-OCRM staff have determined some historical shoreline data to be potentially inaccurate and have therefore not used those data in the calculation of erosion rates. Additional standards are needed to guide staff in the use of various data sources for long-term erosion rates.

Recommendation 3 – Eliminate Inconsistent Public Subsidies

A. GENERAL RECOMMENDATION

Public investments along the state’s shoreline, including development infrastructure, insurance subsidies, and erosion control solutions, should promote public benefits that are consistent with long-range coastal management policies. This recommendation suggests that public subsidies along coastal shorelines be reevaluated to reduce or eliminate those that may promote further development in vulnerable areas or that are inconsistent with the goals, policies, and rules associated with the South Carolina Beachfront Management Act.

B. RATIONALE

In many cases, new development or building in areas known to be highly vulnerable to coastal storms and shoreline dynamics is subject to additional federal, state, and local regulations - but is still possible, desired, and even profitable. There are two general opinions on new development in high hazard areas: 1) that property owners should be able to build as long as it is at their own risk; and/or 2) that the proposed buildings, infrastructure, and the people who occupy those areas place others at risk due to the need for additional emergency assistance, and due to the additional debris created during a storm event. Given that these additional risks to other people and structures are often considered insufficient grounds for prohibiting development in South Carolina, this recommendation seeks to ensure that new development, at the very least, is undertaken at the property owner’s risk rather than through public support.

Much of the state’s shoreline has been developed at various levels of intensity and with varying levels of vulnerability to shoreline migration and intermittent flooding. Failure to address conflicts between development patterns and changing shoreline conditions can result in stranded assets in tenuous locations. New infrastructure should not exacerbate the problem by facilitating additional density in areas of high vulnerability, and state funding to address shoreline change must take a long-range approach with sustainable investment decisions. Addressing shoreline change will be increasingly expensive given the prospect of accelerated sea level rise. To expend public resources that promote inappropriate coastal development patterns or that offer repeated short-term fixes for long-range problems is fiscally irresponsible. The state should not be the bail-out of last resort where inappropriate development decisions have been made.

In 1982, the federal Coastal Barrier Resources Act (P.L. 97-348) established a Coastal Barrier Resources System (CBRS) along the Atlantic, Gulf, and Great Lakes coastline. The U.S. Fish and Wildlife Service was designated the lead agency and designated then-undeveloped coastal barrier islands (or undeveloped portions of islands) as CBRS units. The intent of this program is to encourage the conservation of hurricane prone, biologically rich coastal barriers by restricting federal expenditures that encourage development, such as flood insurance through the National Flood Insurance Program. The law is considered a free-market approach to conservation – properties within CBRS units can be developed, but federal taxpayers do not underwrite any

private investments in these areas. Sixteen CBRS units have been established along the coastal barriers of South Carolina and include over 17,000 acres of upland.

C. NEW POLICY RECOMMENDATIONS

- a) The General Assembly should prepare legislation to clarify state policy with respect to public subsidies of development in “high hazard areas” along beachfront and/or sheltered coastlines.**

“High hazard areas” could include the existing federal CBRS units in South Carolina, DHEC-OCRM’s inlet hazard areas, marsh islands, remaining undeveloped or unsubdivided beachfront parcels, and/or other types of designations (e.g. coastal “V” or Velocity zones under SCDNR’s floodplain management program). Within the designated high hazard areas (which have not yet been identified), state and local governments should limit public subsidies that would contribute to greater density or new development within those high hazard areas. The concept is simply “build at your own risk,” and follows the same model as the Coastal Barrier Resources Act that the federal government uses for the same purpose. Examples of state and local subsidies that should be considered include transportation funds, water/sewer extensions (as well as low interest loans or revolving fund programs), Community Development Block Grants (CDBG), tax incentives, the state wind insurance pool, and future state and local investments in beach renourishment projects or other erosion control solutions.

D. NEW PLANNING AND MANAGEMENT ACTIONS

Public investments to address shoreline change should be based on sound scientific information documenting coastal processes, current and projected shoreline change, and vulnerability assessments including physical, natural system, and socio-economic elements. The framework for documenting conditions and options should be included in the update of the State Beachfront Management Plan and in approved Local Comprehensive Beachfront Management Plans, which should be required to obtain state funding. The state should provide information and technical assistance to help develop and/or update local plans.

E. EXISTING POLICIES AND PROGRAMS

The SC Coastal Program Document (III-69 to III-71) indicates that, for undeveloped beach stretches and estuarine shorelines, new road or bridge projects involving the expenditure of public funds providing access to undeveloped barrier islands will not be approved unless a strong public benefit argument can be made. The program document further states that “the extension of public services, such as sewer and water facilities, to barrier islands should only be proposed in a comprehensive approach which considers the natural “carrying capacity” of the island to support development and which integrates these facilities to parallel the level of access which is available to the island.”

F. GENERAL COSTS AND BENEFITS

In general, significant costs for new development in high hazard areas would shift from the public to the private property owners. This may result in reduced development or building, and therefore reduced local tax revenues from property taxes, accommodation taxes, and hospitality taxes.

However, there will also be reduced taxpayer contributions to emergency management operations, post-storm clean-ups, insurance subsidies, and renourishment projects for these areas.

G. MEASURES OF SUCCESS

- Reduced public expenditures for any new development within designated areas.

H. FEASIBILITY ISSUES

New state-level property designations and restrictions will face resistance from property owners but may gain public support. Designations that restrict additional density in already-developed areas may face stronger opposition than designations for currently-undeveloped or not yet subdivided properties.

I. KEY UNCERTAINTIES/ASSUMPTIONS

The primary uncertainty is in the magnitude and timing of shoreline changes and storm events. There is little doubt that change will come, and it is likely that the rate of change will be greater than has occurred in the historical record given the prospect of accelerated sea level rise. The assumptions on which public investment decisions are based must incorporate sound scientific evidence as well as a range of possible outcomes reflecting uncertainty with respect to natural systems.

J. EXAMPLES FROM OTHER STATES OR AREAS

Maine

Maine Statute Title 38, Chapter 21 states that “certain areas of the Maine coast, because of their fragile nature, valuable habitat and their storm buffering abilities should be protected and conserved in their natural state and that it is inappropriate to use state funds to encourage or support activities incompatible with the ability of these areas to sustain these activities.”

Therefore, no state funds or state financial assistance are expended for development activities within the Coastal Barrier Resource (CoBRA) system including but not limited to structures, roads, airports, boat landings, bridges, causeways, and erosion control structures. However, the Governor may approve state expenditures or financial assistance available within the CoBRA

system “for assistance for emergency actions essential to the saving of lives, the protection of property, and the public health and safety.”

New York

New York’s Coastal Erosion Management Regulations (Chapter V, Part 505.1(d)) state that “public investment in services, facilities, or activities which are likely to encourage new permanent development in erosion hazard areas is restricted.”

K. BARRIERS OR CONCERNS

None identified; however, this will depend on the types and extent of areas designated for reduced state subsidies.

Some committee members suggest that there may be some rare instances where state supported beach nourishment would be justified for areas that were pre-determined for limited state subsidies, for example, to extend nourishment project reaches to protect adjacent state beach and shoreline resources. In addition, some joint sharing of borrow sources may create beneficial timing and reduction of costs for state nourishment efforts in conjunction with private efforts.

Recommendation 4 – Strategically Acquire Beachfront Lands and/or Easements

A. GENERAL RECOMMENDATION

Coastal land acquisition and protection mechanisms must be established as part of long-term retreat strategies, and to ensure that sufficient space is afforded for short-term beach/dune erosion cycles. This policy recommendation focuses on programs for the voluntary acquisition of priority high risk coastal properties.

B. RATIONALE

Coastal land acquisition and protection are mechanisms that can be used to encourage and enable long-term retreat strategies, as well as address the near-term goal of maximizing the space for natural beach dynamics. A voluntary land acquisition program would incorporate both fee-simple purchase and conservation easements for properties deemed at risk from storms and erosion. Acquisition options could include (1) purchase of lands that are not currently developed, (2) acquisition of high risk land prior to or after storms and erosion damage, limiting redevelopment, and (3) acquisition of lands further inland that would be locations for relocation.

Undeveloped Lands: Current levels of build out and protection along South Carolina's oceanfront limit the effectiveness of the first scenario. A 1988 survey of the South Carolina shoreline (Kana, 1988) determined that 76 miles, or 42%, of the state's coastline is undeveloped and held in trust as wildlife preserves, research domains and state parks. An additional 9% was identified as undeveloped, but publicly or privately owned and potentially developable in the future (see Table 2 for 2009 update).

These properties provide opportunity for acquisition and/or planned development that takes into account erosion and sea level rise. Conservation easements would be one opportunity to ensure that development occurs behind the DHEC-OCRM setback line. If opportunities present themselves, efforts should be made to acquire and/or limit development on these properties within the DHEC-OCRM setback area.

Developed Lands: Based on the 1988 report, approximately 50% of the South Carolina coastline is developed. State or local governments have the opportunity to utilize and create voluntary land acquisition programs to acquire or place easements on land that is already developed to enable relocation from the beach/dune system. In most instances, these properties in developed areas are not available for acquisition. Coastal land is highly desirable and their property value makes acquisition an expensive proposition. However, storms and high erosion conditions may provide an opportunity for either acquisition or the placement of easements on properties during the redevelopment process. In order for this to be feasible, coastal acquisition programs and associated funding need to be in place in advance.

Relocation: For active retreat through relocation to be feasible in pre- and post-storm situations, land would need to be available. In this scenario, acquisition programs would prioritize lands further inland that could be used for property relocations. This was not identified as a high priority by the Committee, but should be considered in the development of land acquisition program and funding methods.

Location	Miles of Shoreline	Ownership
Waties Island	1.45	Private
Town of Atlantic Beach	0.20	Public - Town of Atlantic Beach
Between Briarcliffe Acres and Lake Arrowhead	1.20	Private
S. of Arcadian Shores	0.25	Private
MB - between Haskell Cir. and Hampton Cir.	0.60	Private
N. of Springmaid Pier	0.13	Private
S. end of Litchfield Beach (spit)	0.40	Private - Inlet Pt S. Community Association
N. end of Debidue Beach	0.17	Private - USC Development Foundation
Debidue Beach - Arcadia Plantation	0.57	Private
S. end of Debidue Beach	0.73	Private - Belle W. Baruch Foundation
N. end of Dewees Island	0.75	Private - Dewees Island Prop. Owners Assoc.
N. end of Folly Beach	0.40	Public
N. end of Kiawah Island	1.60	Private
Kiawah Island - N. of Sea Forest Dr.	0.20	Private
S. end of Kiawah Island (spit)	0.75	Private
Pritchards Island	1.23	Private - University of South Carolina, Beaufort
Bay Point Island	1.50	Private
Hilton Head Island – N. of the Folly	0.30	Public - Town of Hilton Head Island
N. Daufuskie Island - Easter Beach Ln	0.30	Private
Middle of Daufuskie Island - Beauregard Blvd	0.65	Private
TOTAL:	13.38	

There are several state, federal, and local land protection programs in place that could help support coastal land acquisition programs in all three categories. These include the Coastal and Estuarine Land Conservation Program (CELCP), South Carolina Conservation Bank, Charleston County Greenbelt, and other local programs. However, these programs have limited resources and use restrictions that can limit their value in acquiring smaller high cost barrier island properties. As such, they would provide only a small portion of the funds necessary to implement complete programs.

The Town of Hilton Head Island has a land acquisition process in place that could serve as an example for other counties and municipalities along the coast. The process includes: (1) identification of properties for potential acquisition, (2) criteria for making acquisition recommendations, and (3) funding sources for acquisition, including the Real Estate Transfer Fee, Beach Preservation Fee, general revenue, grants and donations. Since the program was

initiated in 1990, 127 parcels have been acquired, totaling 1,171.70 acres. The total expenditures are \$149.7 million. At least 13 of these properties are located on the oceanfront or along Broad Creek. Other sites have focused on high-density areas along U.S. Route 278. In addition to increasing public access, the Town estimates that this has reduced (a) 4.37 million square feet of commercial development, (b) 1,365 motel rooms, and (c) 4,467 residential and timeshare units.

In addition, several coastal states (e.g. Alabama, Mississippi, and Louisiana) have used hazard mitigation funds available through the Federal Emergency Management Agency (FEMA) to support acquisition and relocation programs. Grant programs are available for pre- and post-disaster mitigation. In South Carolina, these programs are administered through the South Carolina Emergency Management Division (SCEMD) and the Department of Natural Resources. There is opportunity to better link these programs with local government coastal acquisition and relocation efforts.

In the past, South Carolina received Flood Mitigation Assistance funding to support stormwater drainage system upgrades in the Hilton Head Island area. In addition, South Carolina has received over \$6.3 million in Pre-Disaster Mitigation funding for the following: Lake Fairfield acquisition, retrofitting/upgrading the Seabrook Island wastewater treatment facility, preparation of local hazard mitigation plans, seismic and wind retrofitting for the Dock Street Theatre in Charleston, and the Litchfield Beach weir replacement project.

C. NEW POLICY RECOMMENDATIONS

- a) Expand the uses allowed under the current SC Beach Restoration and Improvement Trust Fund (§ 48-40-30 of the SC Beach Restoration and Improvement Act) to include land acquisition, voluntary relocation, and technical/planning assistance.**

Any regulatory changes would require approval from the DHEC Board for promulgation pursuant to the SC Admin. Procedures Act (SC Code Ann. § 1-23-10 et seq.), which requires review by the SC General Assembly, and must be authorized under existing statutes.

Any statutory changes would require legislative action by the South Carolina General Assembly.

D. NEW PLANNING AND MANAGEMENT ACTIONS

- 1) Create and/or refine voluntary land acquisition strategies to support the purchase of and/or placement of conservation easements on high risk property.**
 - i) Evaluate current federal, state, and local acquisition programs for their effectiveness in beachfront acquisition (e.g. FEMA, CELCP, SC Conservation Bank, Greenbelt Programs).
 - ii) Identify undeveloped shoreline properties that could incorporate land protection strategies through acquisition and/or easements. Work with federal, state, and local

agencies, NGOs and property owners to implement acquisition programs when appropriate.

- iii) Incorporate land acquisition, easement and relocation programs into Local Comprehensive Beach Management Plans (*see Recommendation #5*). In particular, local governments should develop voluntary acquisition programs that could go into effect after storm and erosion events, when opportunities for such land protection are greater.
- iv) Identify opportunities to use acquired areas for public access.

There are opportunities for state and/or local implementation of voluntary acquisition programs. In either case, there is a need for a comprehensive plan so that opportunities are readily available. This would be of particular benefit in a post-storm situation where multiple properties may be interested.

2) Identify new (and increase current) funding mechanisms to support coastal land acquisition programs.

- i) Consider the use of Real Estate Transfer fees to support local land acquisition programs. This would be similar to the current Hilton Head Island program. At this time, such programs are not allowed per Section 6.1.70 of the SC Code of Laws, which prohibits local governments from imposing a fee or tax on the transfer of real property. Consideration should be made to changing this law and to ensure that local taxes raised for this purpose stay with the local community for property acquisition. Local governments may also be able to establish Municipal Improvement Districts for these purposes.
- ii) Expand the uses allowed under the current SC Beach Restoration and Improvement Trust Fund (§ 48-40-30 of the SC Beach Restoration and Improvement Act) to include land acquisition, voluntary relocation and technical/planning assistance. A competitive proposal should then be used to distribute funds to local communities.
- iii) Capitalize on federal mitigation grant programs that support acquisition and relocation efforts. This includes pre-storm programs, such as Pre-Disaster Mitigation (PDM) and Severe Repetitive Loss (SRL), and the post-storm Hazard Mitigation Grant Program (HMGP).

E. EXISTING POLICIES AND PROGRAMS

SC Coastal Program Document:

“The Coastal Council (DHEC-OCRM) encourages and supports state, local, and private efforts to acquire coastal barrier islands for inclusion in preservation and protection programs. Public recreational benefit should be one primary motivation for these efforts, and where appropriate, barrier islands should be maintained for recreational use, based on the capacity of individual areas to accommodate human activity” (III-69 to III-71).

SC Conservation Bank:

The mission of the Conservation Bank is “to improve the quality of life in South Carolina through the conservation of significant natural resource lands, wetlands, historical properties and archeological sites.” (Title 48, Chapter 59). To date, the Conservation Bank has not funded projects located on barrier islands. This would need to be evaluated as a possibility.

County Government Programs:

Horry County – Parks and Open Space Board, Horry County Open Space Fund
Georgetown County – no current fund identified for open space, working on a master plan for Recreation and Community Enhancement.
Charleston County - Greenbelt Plan and Fund supported through a sales tax.
Beaufort County - Rural and Critical Lands Preservation Program
Jasper County – no current fund identified for open space

Municipal Programs:

Town of Hilton Head Island – land acquisition program.

FEMA Mitigation Grant Programs:

Multiple grant programs provide funds to states and local communities to reduce the loss of life and property from natural hazard events. There are a wide range of mitigation projects that can be funded. The following programs enable the acquisition, demolition or relocation of structures with the conversion of underlying property to deed-restricted open space:

- Hazard Mitigation Grant Program (HMGP) - Administered by SCEMD, post-disaster
- Pre-Disaster Mitigation (PDM) – Administered by SCEMD, pre-disaster
- Severe Repetitive Loss (SRL) – Administered by SCDNR, pre-disaster, related to National Flood Insurance Program (NFIP)
- Flood Mitigation Assistance Grant Programs – Administered by SCDNR
- Repetitive Flood Claims Grant Program – Administered by SCDNR

Under these programs, properties are acquired at the current or pre-event market value. The preference is for acquisition and demolition over relocation

Coastal and Estuarine Land Conservation Program (CELCP):

Authorizes the acquisition of land and interests in land from willing sellers to improve the conservation of, and to enhance the ecological values and functions of, coastal and estuarine areas to benefit both the environment and the economies of coastal communities. The South Carolina CELCP plan includes coastal counties, watersheds and conservation focus areas.

F. GENERAL COSTS AND BENEFITS

The greatest cost of acquisition is related to the high property values on South Carolina's coast. However, this initial cost should be weighed against the value of the natural system, the public access potential, and the minimized risk/cost of moving development.

The cost of relocation or acquisition is likely to be a one-time expense, whereas hard and soft stabilization approaches will be continual expenditures, including maintenance. There is some expense associated with ongoing stewardship of easements and deed restrictions. Also, local governments may experience a loss of their tax base if property owners relinquish development rights to beachfront parcels for open space conservation.

G. MEASURES OF SUCCESS

- Number of properties acquired or placed under conservation easement.
- Number of acquisition programs modified to incorporate at-risk properties.
- Number of local governments implementing voluntary acquisition programs.

H. FEASIBILITY ISSUES

- High percentage of oceanfront property that is already developed;
- The acceptance of risk in order to live by the beach and the ability to redevelop after storm or erosion events;
- Value of barrier island property and the associated cost of acquisition;
- Small property size, which can limit the overall impact of acquisition in support of relocations when occurring on a lot-by-lot basis;
- Challenge of finding additional funding sources and potentially instituting additional taxes to support programs;
- Competition for acquisition funding with other land conservation sites that may be greater in size and less costly;
- Ability to implement program in a timely fashion when opportunities may arise, e.g. post storm;
- Real Estate Transfer fees, such as that used by the Town of Hilton Head Island to support land acquisition, are now prohibited by the General Assembly for other communities;
- Some funding (e.g. Army Corps of Engineers beach renourishment) is established based on total property value. Undeveloped property has a lower property value, which could impact a local government's decision to acquire property.

I. KEY UNCERTAINTIES/ASSUMPTIONS

- Availability of annual appropriations;

- Willingness of land owners to move from the beach if other alternatives (e.g. nourishment, rebuilding) exist.

J. EXAMPLES FROM OTHER STATES OR AREAS

Florida

From 1990 to 1999, Florida spent more than \$835 million to purchase land that increased public access to the coast.

In 2004, bond measures were approved in eight counties that cost a total of \$300 million to buy and preserve open space. However, in January 2009 an article in the *Miami Herald* reported that the Florida Senate was considering halting the Florida Forever program to stave off more pressing budget cuts. The proposal would stop the state from issuing the remaining \$250 million of \$300 million worth of bonds that are issued each year to buy conservation land across the state.

Virginia

Since 1991, the Virginia Coastal Program has helped to acquire and preserve over 1,800 acres of coastal lands, including wetlands, sand dune systems, lowland and upland riparian buffers, and other wildlife habitat areas.

Massachusetts

The Massachusetts Coastal Hazard Commission released a set of recommendations in 2007 which included recommendations related to voluntary land acquisition: *(1) Conserve coastal land and minimize loss through acquisition of storm-prone properties from willing sellers in fee or through conservation restrictions and easements and (2) Encourage coastal communities to adopt the CPA and use the Community Preservation Fund to acquire storm-prone properties.*

Maine

“Protecting Maine’s Beaches for the Future: A proposal to create an integrated beach management plan.” This 2006 report presented to the Joint Standing Committee on Natural Resources by the Beach Stakeholder’s Group includes a section on “*Voluntary Acquisition of Storm-Damaged Properties or Properties for Dune Enhancement or Public Access.*”

Also, Maine Coast Heritage Trust, a statewide land conservation organization, announced in August 2006 that it had raised more than \$100 million to accelerate land conservation efforts on Maine’s coast.

Mississippi

The Mississippi Emergency Management Agency (MEMA) implements disaster loss reduction measures through the implementation of state and local mitigation plans. The agency administers federally-funded mitigation programs, including the National Flood Insurance Program’s Community Assistance Program, the Flood Mitigation Assistance Program (FMA), Pre-Disaster Mitigation program (PDM) and post-disaster Hazard Mitigation Grants (HMGP). The FMA,

PDM and HMGP allow for the acquisition of structures and the conversion of property to deed-restricted open space.

Alabama

Alabama has established similar Hazard Mitigation Assistance (HMA) grant programs that incorporate the post-disaster HMGP and four annual grant programs for mitigation measures, including acquisition of property. These programs are the PDM, FMA, Repetitive Flood Claims and Severe Repetitive Loss programs.

K. BARRIERS OR CONCERNS

None identified.

Recommendation 5 – Strengthen the Role of Local Governments

A. GENERAL RECOMMENDATION

The South Carolina Beachfront Management Act established incentives for ocean beachfront communities to prepare local comprehensive beach management plans in coordination with DHEC-OCRM. Because the capacities of local governments have evolved significantly since 1988, local comprehensive beach management plans represent an opportunity for strengthened beachfront planning and management at the local level, in cooperation with the state. However, there is a need to clarify, strengthen, and expand the plan elements that are presently required for approval of local beach plans, and to integrate these requirements with other local planning activities.

B. RATIONALE

In recognition of its stewardship responsibilities, it is the policy of South Carolina to “create a comprehensive, long-range beach management plan and require local comprehensive beach management plans for the protection, preservation, restoration and enhancement of the beach/dune system. These plans must promote wise use of the state’s beachfront to include a gradual retreat from the system over a forty-year period” (SC Code §48-39-260(2)).

The South Carolina’s Beachfront Management Plan, first published by the SC Coastal Council in 1992 and codified as regulation (R. 30-18) houses the original building setbacks lines along the entire coast and referenced approved local beachfront management plans (§48-39-320(A)).

Required elements of the state plan include:

1. Development of a database for the state’s coastal areas to provide essential information concerning the management of the beach/dune system;
2. Development of guidelines for the accomplishment of:
 - a. beach/dune restoration and nourishment;
 - b. development of a beach access program;
 - c. maintenance of a ecologically stable, dry, sandy beach;
 - d. protection of all sand dunes seaward of the setback line;
 - e. protection of endangered and threatened species as well as critical habitats;
 - f. regulation of vehicular traffic upon the beaches and beach/dune system;
 - g. Development of a mitigation policy for construction allowed seaward of the setback line;
3. Development of a public education and awareness program on the importance of the beach/dune system; and
4. Assistance to local governments in developing the local comprehensive beach management plans.

In accordance with the State Beachfront Management Act, all beachfront counties and municipalities must then prepare, in coordination with DHEC-OCRM, a local comprehensive beach management plan which must be submitted to DHEC-OCRM for approval. Once approved, local comprehensive beach management plans become a part of the state plan. The local comprehensive beach management plans, *at a minimum*, must contain all of the following:

1. An inventory of beach profile data and historic erosion rate data for each standard erosion zone and inlet erosion zone under the local jurisdiction;
2. An inventory of public beach access along with a plan for enhancing public access and parking;
3. An inventory of all structures located in the area seaward of the setback line;
4. An inventory of nesting and important habitats of the beach/dune system and a protection and restoration plan if necessary;
5. A conventional zoning and land use plan consistent with the purposes of the Act for the area seaward of the setback line;
6. An analysis of erosion control alternatives, including renourishment of the beach under the local government's jurisdiction;
7. A drainage plan for the area seaward of the setback line;
8. A post disaster plan including plans for cleanup, maintaining essential services, protecting public health, emergency building ordinances, and the establishment of priorities, all of which must be consistent with the Act;
9. A detailed strategy for achieving the goals of this chapter by the end of the forty-year retreat period. Consideration must be given to relocating buildings, removal of erosion control structures and relocation of utilities;
10. A detailed strategy for achieving the goals of preservation of existing public access and the enhancement of public access to assure full enjoyment of the beach by all residents of this state.

Many of the local beachfront management plans originally approved by DHEC-OCRM in the early 1990s were of limited scope, did not necessarily address issues in a consistent manner (across communities), and sometimes failed to address the minimum requirements. Local communities may not have benefited from technical assistance that is now available and certainly did not consider factors beyond the minimum (10) requirements. Recognizing these shortcomings, DHEC-OCRM has already taken the initiative to develop *Interim Guidelines for the Development of Local Comprehensive Beach Management Plans* and has been using these interim guidelines to help standardize the format of all local comprehensive beach management plans. These new guidelines are meant to encourage more robust planning and to expand upon current required elements. The new guidelines have already proven to be effective and well received among several beachfront communities that have recently developed updates to their original plans. However, currently, there are no formal requirements for local communities to go beyond the original minimum requirements.

Furthermore, there are a variety of planning requirements for coastal counties and municipalities in South Carolina outside of the local comprehensive beach management plans. Counties and municipalities are required to prepare a Comprehensive Plan which includes, at a minimum seven elements (SC Code §6-29-510(D)). One element is a natural resource component which

must consider coastal resources (SC Code §6-29-510(D)(3)). There is no additional guidance regarding planning for coastal resources, nor is there any requirement for a county or municipality to confer with the state on this or any aspect. Local Comprehensive Plans, due to thoroughness of the information collected and the decadal rewrites, provide a good opportunity to advance certain coastal planning approaches at the local level. The lack of legislative direction as to what should be discussed in the coastal resources section has resulted in little consistency among comprehensive plans.

Considering all eighteen counties and municipalities along the South Carolina coast are required to develop and implement both Local Comprehensive Plans and Local Comprehensive Beach Management Plans, there is an opportunity for coordination and integration. Greater coordination between these two could strengthen implementation of planning efforts by better informing land-use planning, clarifying zoning decisions, providing consistent guidance on variances, and using consistent definitions. For instance, requirements for managing drainage seaward of the setback line are not well defined. The Hazard Mitigation Plan required of communities participating in the National Flood Insurance Program also addresses land use planning, hazard zone delineation, and other topics related to beachfront management. Currently, DHEC-OCRM planning staff looks for overlaps with hazard mitigation and other planning efforts as they review beachfront management plans, however upfront efforts would assist in streamlining the review process.

Many municipalities and counties are currently working to incorporate the state-approved local comprehensive beach management plans into their local comprehensive plans, an approach encouraged by DHEC-OCRM. For example, the Town of Hilton Head Island has integrated several plans with their Comprehensive Plan by making them adopted appendices to their Comprehensive Plan. Goals and strategies are coordinated with eight mandated elements (Natural Resource, Cultural Resources, Population, Housing, Community Facilities, Economic Development, Land Use, and Priority Investment), a Recreation Element, a Transportation Element, Beach Management Plan and a Post-Disaster Recovery Plan appendices (as required by the Beachfront Management Act), and a Hazard Mitigation Plan appendix (as required by the Flood Insurance Reform Act).

The current planning processes will need to give heightened attention to some topics in order to achieve a more effective coordination and to address changing coastal risks. This planning and management recommendation includes suggestions for augmenting post-storm recovery plans and hazard mitigation plans. The regular update of hazard mitigation plans currently does not account for the changing risks associated with climate change and sea level rise. As part of the regular required updating of these plans, counties and municipalities in South Carolina should incorporate changing information on coastal risks.

C. NEW POLICY RECOMMENDATIONS

a) Strengthen the required elements of Local Comprehensive Beach Management Plans.

The Interim Guidelines should be adopted and included in the new State Beachfront Management Plan update, which DHEC-OCRM intends to begin in the coming year. In particular, the required elements need to be strengthened as follows:

Element 1 –Require an analysis of general shoreline change in conjunct with the beach profile and erosion data.

Element 2 –provide an actual plan for enhancing public access and parking (land acquisition . . . etc).

Element 3 - Provide short and long-term strategies for addressing structures that are currently seaward of setback line. Strategies should consider both active and passive mechanisms (i.e. relocation of buildings, land acquisition, incentives/disincentives, post-storm redevelopment plans and policies, abandonment policies; *see also Recommendation #4*).

Element 4 –Discuss any habitat management or protection activities, such as sand fencing, renourishment, etc. that can positively or negatively affect the system. Also discuss significant dune systems located outside of the beachfront setback area.

Element 5 – Provide discussion on land use conditions beginning with entire community and then focusing on beachfront area. Identify and discuss all major developments that are located adjacent to ocean beaches.

Element 6 – Require discussion on beach alterations (past nourishment projects, past Emergency Orders and temporary sandbags, installation of groins, and removal of erosion control devices) (*see Recommendation #9*). Discussion of past as well as anticipated beach nourishment projects should be provided. Indicate the year, approximate volume, borrow site and placement location for each past project. Note success or lessons learned. Identify suitable borrow locations for anticipated beach nourishment projects. Discuss any sediment budget evaluations that have been undertaken in the area.

Element 7 – Discuss any upland drainage issues that affect the beach, as well as how the county or municipality will manage the stormwater under the federal and state stormwater programs.

Element 8 – Detail all preparedness plans as they relate to local emergency operations. Discuss the following: (1) notification system between DHEC-OCRM and local community, (2) policies which govern repairs and rebuilding of vital infrastructure and support services to insure restoration of service that is consistent with forty-year retreat policy (*see Recommendation #9*), (3) the system for post-disaster damage assessment and how building permits for beachfront reconstruction will be reviewed and administered at the local level, (4) policies for the relocation of structures damaged beyond repair and no longer in compliance with provisions of the beach management plan. Require a post storm redevelopment plan. Re-development plan should include damage assessment,

redevelopment, economic restoration and development, repair and restoration of infrastructure, emergency permitting and inspections, environmental concerns, finance and recovery administration.

Element 9 – Include current local regulations that complement the state’s long-term retreat policy and short-term goal of maximizing the space afforded natural beach and dune dynamics. Any further needs (i.e. renourishment) should be identified. Examine long-term erosion-rates, identify problem areas and outline strategies for how the municipality will address beach erosion, sea level rise and problem areas beyond a ten-year planning horizon. Identify past Emergency Orders, when they occurred and what is being done to prevent them from occurring again. Identify conflicts between any existing plans and ordinances with the state’s forty-year retreat policy.

Element 10 – Detail the community’s beach access plan. Discuss DHEC-OCRM’s “full and complete public access” and what is being done to meet, maintain or improve upon these criteria.

b) Integrated local plans should be required for a beachfront community to gain access to a state “beach management fund” (see (D)(2) below, and Recommendation #4 (C)(a)).

Existing legislation includes a schedule for reevaluation and updating of plans, which should be synchronized. This planning and management recommendation suggests that the timing of local beach management and hazard mitigation planning processes be brought into line with the Local Comprehensive Plan process. According to the Planning Enabling Act, comprehensive plans must be reevaluated every five years and updated at least every 10 years. The governing bodies must adopt new comprehensive plans every 10 years. The SC Beachfront Management Act requires updates of the beach management plan every five years. Under the US Disaster Mitigation Act of 2000, interim regulations require that local hazard mitigation plans be updated on a five-year cycle. The timing of updates to the Local Comprehensive Beach Management Plans and Hazard Mitigation Plans should be adjusted to coincide with the next mandated reevaluation, update, or adoption of a Local Comprehensive Plan.

Any statutory changes to requirements for eligibility, including those for state funds for beach maintenance or improvements or mitigation, would involve legislative action by the South Carolina General Assembly. Specifically, establishing additional requirements for local comprehensive plans that would affect only local beachfront governments would require amendment to the State Comprehensive Planning Enabling Act. The requirement of integrated plans to establish community eligibility for any state funds for beach maintenance, mitigation or improvement does not currently exist. Amendments to the State Beachfront Management Act, State Beach Restoration and Improvement Trust Fund, and/or the State Planning Comprehensive Enabling Act may also be required.

Any regulatory changes would require approval from the DHEC Board for promulgation pursuant to the SC Admin. Procedures Act (SC Code Ann. § 1-23-10 et seq.), which requires review by the SC General Assembly, and must be authorized under existing statutes.

Any statutory changes would require legislative action by the South Carolina General Assembly.

D. NEW PLANNING AND MANAGEMENT ACTIONS

- 1) DHEC-OCRM can accomplish the strengthening of Local Comprehensive Beach Management Plans by incorporating new or expanded requirements within the next update of the State Beachfront Management Plan, which is scheduled to be completed within the next few years.

The State Beachfront Management Plan is currently in regulation (R. 30-21), therefore any changes must be promulgated in the same way as any other regulatory amendment. All proposed regulatory changes would require approval from the DHEC Board for promulgation pursuant to the SC Admin. Procedures Act (SC Code Ann. § 1-23-10 et seq.), which requires review by the SC General Assembly, and must be authorized under existing statutes.

- 2) Integrate or streamline local planning activities of beachfront communities.

Local Comprehensive Plans should be integrated with Local Comprehensive Beach Management Plans and Hazard Mitigation Plans. Hazard mitigation plans should address but not be limited to repetitive loss areas, vulnerability assessment, community mitigation capability assessment, protection of critical facilities, public education, and linkages with flood risk maps. They should consider hurricane storm surge, tidal surges in the context of the full range of sea level scenarios current at the time of mitigation plan development and/or revision. Mitigation plans should include information on the hazard, the total amount of property, infrastructure, and economic impact that will be affected by storms, and changes in the general sea level or storm severity. For ease of implementation, local comprehensive beachfront management plans should be specifically referenced in the Local Comprehensive Plan and included as appendices of local comprehensive plans.

E. EXISTING POLICIES AND PROGRAMS

- SC Beach Restoration and Improvement Trust Fund (§48-40)
- State Comprehensive Beach Management Plan (§48-39-320)
- Local Comprehensive Beach Management Plans (§48-39-350)
- Local Government Comprehensive Planning Enabling Act of 1994 SC Code of Laws Title 6, Chapter 29
- Flood Insurance Reform Act of 2000, which requires a hazard mitigation plan to receive federal funding for disaster mitigation grants & Repetitive Loss program monies.
- Disaster Mitigation Act of 2000, Federal Regulations Title 44: Emergency Management and Assistance; § 201.6 Local Mitigation Plans.

F. GENERAL COSTS AND BENEFITS

*****A key incentive for an increased role of local governments in planning and managing beachfront issues, in keeping with the recommendations listed here, will be an enhanced Beach Restoration and Improvement Trust Fund.**

As mentioned in *Recommendation #4(C)(a)*, if the SC General Assembly:

- a) broadens the scope of the trust fund to include other beach management options, including structure relocation and acquisition proposals;
- b) funds the Trust Fund regularly for improved predictability for local governments; and
- c) increases state funding levels for beach management activities;

local governments will have a far stronger incentive to meet the state planning requirements suggested here (as well as meeting the public access requirements under the existing Act). The SC Council on Coastal Futures (2004) recommended that the state “should capitalize and adequately fund the State Beach Renourishment Trust Fund, whose purpose is to provide state matching funds for priority public beach renourishment projects and to provide for emergency response needs to repair beaches after storms.” **We concur and recommend the expansion of this fund to include a broader range of beach management options.**

Strengthened requirements of local comprehensive beach management plans and greater coordination across planning efforts will also require more staff time; however, the results of this planning effort will provide greater utility and efficiency to both local and state governments in managing the beachfront. It will be important to establish a staggered system so that the number of communities pursuing planning will not exceed the capacity of the planning staff. Other benefits may include streamlined permitting of proposed beach nourishment, local infrastructure, or development projects consistent with or discussed in the local approved plans.

G. MEASURES OF SUCCESS

- Completion of local comprehensive plans which integrate beach/dune planning considerations.
- Improved FEMA Community Rating System (CRS) classifications for discounts on flood insurance.
- Lowering of Building Code Effectiveness Grading Schedule.

H. FEASIBILITY ISSUES

Currently, some localities update their local beach management plans after the update of their local comprehensive plans due to time and staffing constraints. The coordination of the planning and review process will be important to the feasibility of this approach. Limitations of staffing levels should be considered in refining the timeline for coordination.

The SC chapter of the American Planning Association's South Carolina Chapter, which has supported legislation to require local governments in the coastal zone to incorporate a specific discussion of coastal zone management in their comprehensive plans, may support this approach. Other groups that may provide support in this effort include Municipal Association of South Carolina, the South Carolina Association of Counties, and SC Emergency Management Division.

I. KEY UNCERTAINTIES/ASSUMPTIONS

None identified.

J. EXAMPLES FROM OTHER STATES OR AREAS

Town of Hilton Head Island, SC Comprehensive Plan and Appendices

K. BARRIERS OR CONCERNS

None identified.



GOAL 2. IMPROVE THE PLANNING OF BEACH RENOURISHMENT PROJECTS

“In recognition of its stewardship responsibilities, the policy of South Carolina is to severely restrict the use of hard erosion control devices to armor the beach/dune system and to encourage the replacement of hard erosion control devices with soft technologies as approved by the department which will provide for the protection of the shoreline without long-term adverse effects” (SC Code § 48-39-260(3)).

“In recognition of its stewardship responsibilities, the policy of South Carolina is to promote carefully planned nourishment as a means of beach preservation and restoration where economically feasible” (SC Code § 48-39-260(5)).

Overview

Beach renourishment and other “soft” solutions are the preferred alternatives to hard stabilization in South Carolina. The SC Beachfront Management Act defines beach nourishment as “the artificial establishment and periodic renourishment of a beach with sand that is compatible with the existing beach in a way so as to create a dry sand beach at all stages of the tide” (SC Code § 48-39-270(4)). A typical renourishment project consists of dredging beach compatible sand from an offshore site, pumping the sand onto the beach, and distributing it on the beach face. Renourishment can also include trucking sand to the beach from an upland source. The current planning process for major beach renourishment projects involves an evaluation of the environmental impact of the project, the public recreational benefit, the expected useful life, the protection benefit, and the extent of support for the project (R. 30-18(B)). The project review can be time-consuming because it requires extensive coordination with local governments and appropriate agencies and consultants to ensure that all factors are considered.

Since renourishment projects add sand to the beach from an external source, they are the only engineered shore protection alternative that addresses the problem of a sand budget deficit (NRC, 1995). However, renourishment may not be technically or economically feasible on all beaches, and it may not be sustainable over longer time scales due to decreasing sand availability, increasing rates of erosion, and/or decreasing funding sources. In the short- or mid-term, unstable funding may be the deciding factor that limits renourishment project feasibility. Federal funding, in particular, has faced recent scrutiny as questions surface about the fairness and equity of significant federal subsidies for temporary shore protection (Beatley et al., 2002; ASBPA, 2009).

In South Carolina, a Beach Restoration and Improvement Trust Fund was established by the General Assembly in 1999 (SC Code §48-40). The General Assembly has appropriated approximately \$5 million annually for the past 3 years for beach renourishment projects in SC. However, these funds have not been routed through the Beach Restoration and Improvement Trust Fund. The Trust Fund is the primary incentive for beachfront communities to adopt and enforce Local Comprehensive Beach Management Plans (*see Recommendation #5*), and to provide “full and complete” public access – both are preconditions for state renourishment funds

when routed through the Trust Fund (SC Code § 48-39-120(D); 48-39-320(A)(3); 48-39-350(B)). In addition, if the Trust Fund is not used to build sufficient funds over time, communities (and state coastal managers) cannot rely on the availability of annual appropriations for specific beach renourishment projects, and therefore cannot appropriately plan for renourishment needs to avoid major erosion problems.

Status and Trends

Based on DHEC-OCRM data, at least 24 renourishment projects have occurred in South Carolina since 1985, with a total of over 27.5 million cubic yards of sand added at a price of nearly \$225 million (not adjusted for inflation). Table 3 lists the beach renourishment projects in the state between 1985 and 2008, along with the length of beach nourished, sand volume applied, and cost breakdown among private, local, state, and federal sources. Figure 4 depicts the spatial extent of these renourished beaches. Hilton Head Island, the Grand Strand, and Folly Beach have had the most sand applied, combining for 21,039,000 cubic yards or 76% of the state's total. The projects in these areas have cost a combined \$175.2 million, which is 78% of the entire amount that has been spent in the state for renourishment. While all three areas received some state funding, the Grand Strand and Folly Beach projects were supported primarily through federal funding, and the Hilton Head Island projects were supported primarily through local funding. Of the \$223.8 million spent on renourishment projects in South Carolina, \$22.7 million came from private funds (10%), \$58.8 million from local funds (26%), \$45.3 million from state funds (20%), and \$97.3 million from federal funds (44%).

Renourishment in Other Coastal States

Of the 34 states, territories, and commonwealths participating in the National Coastal Zone Management Program, twenty-one have beach renourishment policies. Ten states have a continuing funding program for beach renourishment, and nine states fund projects on a project-by-project basis (NOAA, 2000). A recent study by the NOAA Coastal Services Center found that about \$2.5 billion (in current dollars) were spent nationwide on renourishment between 1950 and 2002. Furthermore, about \$95 million (current dollars) was spent on renourishment projects in the 1950s, but about \$835 million was spent in the 1990s (NOAA, 2008). This represents a nine-fold increase in expenditures for beach renourishment over the past 40 years in the United States.

TABLE 3: South Carolina Beach Renourishment Projects, 1985-2008

Area	Year	Length (miles)	Sand Volume (cubic yards)	Private Cost ¹ (millions of \$)	Public Cost (millions of \$)			Total Cost (millions of \$)
					Local	State ²	Federal	
Myrtle Beach	1986-1987	8.6	854,000		4.5			4.5
Seabrook Island	1990	1.1	700,000	1.5				1.5
Debidue Beach	1990	1	200,000	1				1
Hilton Head Island	1990	6.6	2,000,000		2	8		10
Hunting Island	1991	1.5	800,000			2.9		2.9
Folly Beach	1993	5.3	2,500,000			3.5	11.5	15
Edisto Beach	1995	2	150,000		0.5	1		1.5
Grand Strand ³	1996-1998	26	5,000,000		9	9	36	54
Hilton Head Island	1997	7	2,000,000		11			11
Sullivans Island	1998	0.5	35,000			0.2		0.2
Debidue Beach	1998	1.5	250,000	1.5				1.5
Pawleys Island	1998	2.5	250,000			1.3		1.3
Folly Beach	1998					0.1		0.1
Daufuskie Island	1998	3.5	1,400,000	6				6
Hilton Head Island	1999	0.8	200,000		1.2			1.2
Edisto Beach	2000					0.3		0.3
Folly Beach	2005	5.3	2,300,000		1		11.5	12.5
Edisto Beach	2006	3.5	875,000		3	4.7		7.7
Debidue Beach	2006	1.5	600,000	5.6				5.6
Hunting Island ⁴	2006	3	570,000			8.5		8.5
Hilton Head Island	2007	6	2,700,000		19			19
Folly Beach	2007	1.9	485,000				7.5	7.5
MB/Grand Strand ⁵	2008	25.3	3,000,000		4.8	4.8	30.8	40.4
Isle of Palms	2008	1.8	885,000	7.1	2.8	<1		~10.6
TOTALS:		116.2	27,754,000	22.7	58.8	45.3	97.3	223.8

¹ The private cost values are estimates.

² State money allocated to the SC Beach Restoration and Improvement Trust Fund, which was created in 1999, can be used to fund beach renourishment, improved public access, and beach erosion monitoring.

³ The Grand Strand project includes North Myrtle Beach (renourished in 1996), Myrtle Beach (renourished in 1997 and 1998), and Surfside Beach and Garden City Beach (renourished in 1998).

⁴ The Hunting Island 2006 project includes \$4.5 million for sand renourishment and \$4 million for new groin construction.

⁵ The MB/Grand Strand project includes Garden City/Surfside, Myrtle Beach, and North Myrtle Beach.

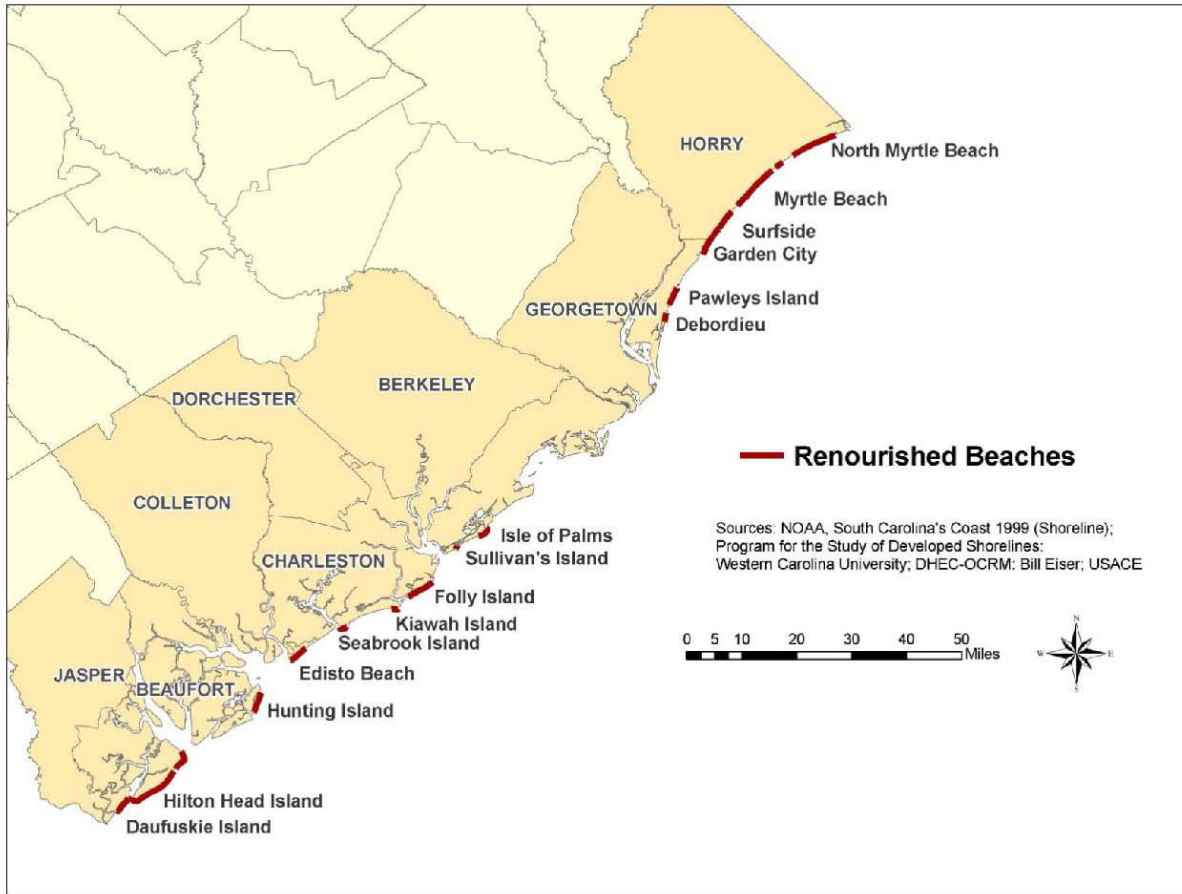


Figure 4: *South Carolina Beach Renourishment Projects (from London et al., 2009).*

Potential for Downdrift Impacts of Dredging and other Nearshore Alterations

Renourishment costs tend to increase with increasing distances from the shore to sand sources. This creates an incentive for local governments to find suitable sand sources as close to shore as possible. However, dredging for renourishment within the “active sand system,” where the majority of sand is in near-constant flux due to waves, longshore currents, storm events, seasonal changes in beach slope, transport from the beach face to nearshore shoals, and rapidly changing inlet dynamics, can deprive sand from downdrift areas or result in unintended impacts to the system. These projects do not add sediment to the beach system and therefore do not address the problem of a sand budget deficit. This can be thought of as “robbing Peter to pay Paul” – that is, any sand removed from the active sand system was likely to be deposited elsewhere in the active system. Downdrift impacts of nearshore dredging and other alterations can be difficult to predict due to uncertainties in the modeling of complex coastal processes. Because of these uncertainties, DHEC-OCRM needs better guidance with respect to permitting any nearshore alteration project. Other “soft” solutions to beach erosion, such as sand scraping, inlet modifications, and inlet relocations, also require careful consideration for downdrift and long-term impacts.

Monitoring

Applications for state funding of renourishment projects must include any engineering studies that have been completed and plans for post-project monitoring, but current regulations do not specify standardized monitoring methodologies (R. 30-18(C)(7)). Without consistent monitoring and reporting, it is difficult to assess relative success or impacts of dredging and renourishment projects. For example, the South Carolina Dept. of Natural Resources-Marine Resources Research Institute (SCDNR-MRRI) recently completed a meta-analysis of all renourishment projects in the state, but the researchers experienced difficulty analyzing the importance of design parameters such as seasonal timing and dredge and fill depth due to inconsistent reporting (Bergquist and Crowe, 2008). Reports with environmental monitoring data were identified for 16 renourishment projects in the state, but useable data for the meta-analysis were limited to only nine projects (Bergquist and Crowe, 2008; Figure 5). Minimum data collection requirements, standardized methodologies, and longer term monitoring are needed to more fully evaluate renourishment projects (Bergquist and Crowe, 2008; NRC, 1995).

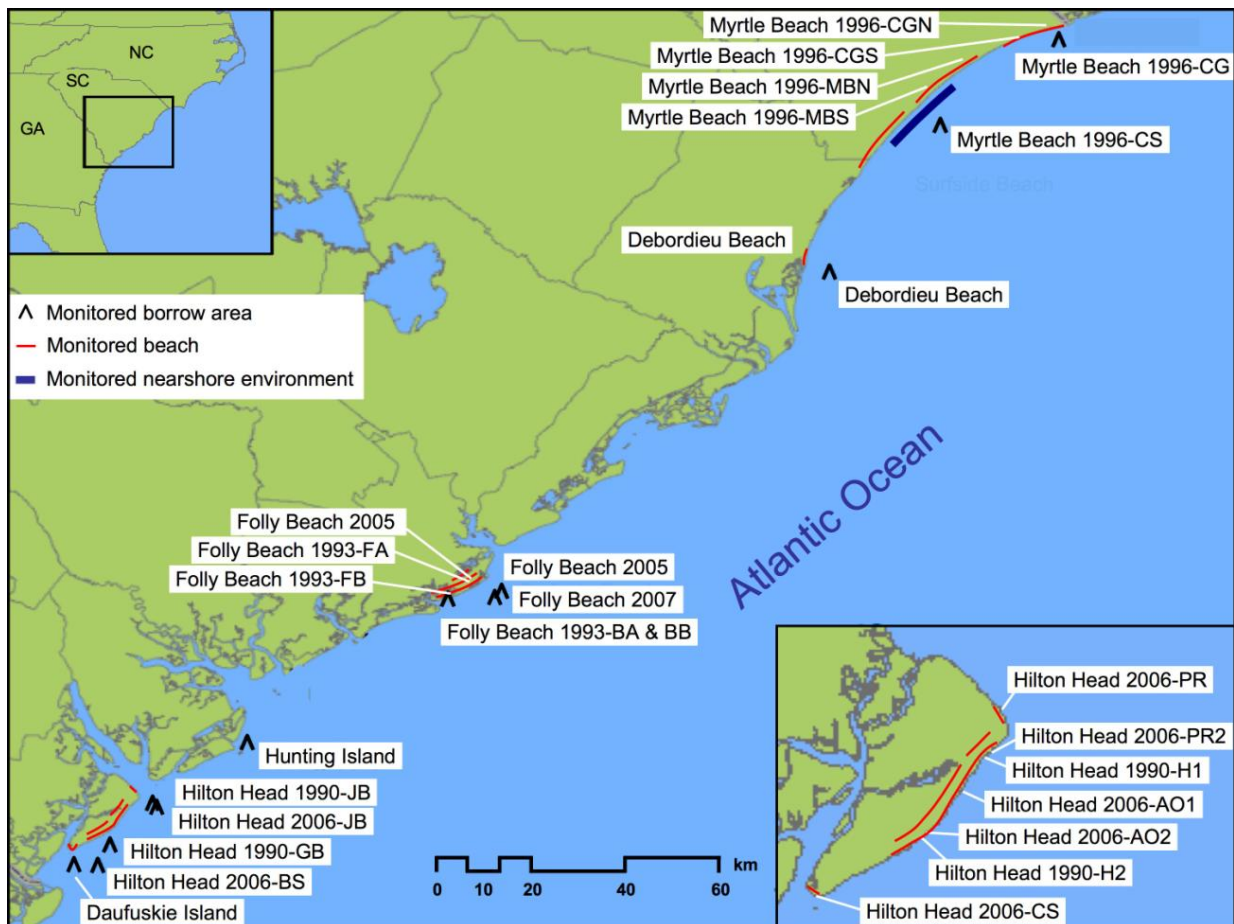


Figure 5: Nourished beach and borrow area projects in South Carolina where appropriate environmental monitoring data are available. Borrow sites are shown over ocean; beach projects are shown over land. Red lines represent approximate areas nourished and multiple lines indicate repeated nourishment. “^” = borrow site. Blue line indicates area where nearshore monitoring has been performed (from Bergquist and Crowe, 2008).

Policy and Management Recommendations

The following policy and management recommendations explore potential improvements to existing federal, state, and local policies and practices. In particular, the following policy recommendations seek to:

- 6) Improve intergovernmental and public/private planning and efficiency in future renourishment projects;
- 7) Improve regulatory decision-making with respect to nearshore alterations that may have “downdrift” impacts; and
- 8) Improve and standardize pre- and post-project monitoring requirements for better assessments of project successes and/or impacts.

Recommendation 6 – Develop and Implement Regional Sediment Management Plans

A. GENERAL RECOMMENDATION

In order to better and more efficiently manage sediment resources in the coastal zone of South Carolina, the state needs a Regional Sediment Management plan with strong involvement of federal, state, and local governments and the private sector. The plan should identify sources of sediment along the South Carolina coast, quantify and characterize those sediment sources for identification of potential material for beach nourishment, and estimate beach nourishment needs for the shoreline based on erosion rates and storm damage reduction templates. The Plan should also provide opportunities for coordination at the project planning stage to avoid future conflicts and identify opportunities for cost savings.

B. RATIONALE

Currently, not enough is known about the quantity, location, and quality of sand and sediments in SC coastal waters, which often leads to differing perceptions about the sustainability of sand resources for long-term beach renourishment strategies. In addition, there has often been a lack of pre-planning for beach renourishment, which has led to multiple challenges for local beach communities including:

- Increased costs for local governments;
- Reacting with last minute / emergency renourishment project proposals; and
- Missed opportunities for beneficial re-uses of dredged materials.

Regulatory agencies and coastal communities also need a better understanding of regional sediment budgets, including sources, gross quantities, and general characteristics of sediment and coastal processes for the entire state in order to assess future needs and impacts of beach nourishment projects.

The quality and quantity of sand material used in nourishing the shoreline is critical in the design and performance of any project to offset erosion. Locating and investigating a potential source of acceptable borrow material for beach renourishment is costly and time consuming. Investigations require geophysical and geotechnical studies that typically include sub-bottom profiling, side-scan sonar, bathymetric mapping, core boring collection, sand testing, and analysis to identify sediment quantities and characteristics. Costs for such investigations range from \$100,000 to more than \$500,000 per investigation.

Coastal communities need to be proactive by planning ahead for specific nourishment projects so as to avoid unnecessary delays during regulatory reviews (*see Recommendation #5*). In the absence of such advanced planning for nourishment projects, erosion can leave beach sections in

“emergency” situations. Pre-planning could remedy situations where property owners and municipalities push for less than ideal solutions to erosion problems. Recent problems associated with the use of sandbags and last minute nourishment proposals illustrate the importance of identifying high risk areas and crafting a nourishment plan to be implemented before ecologically destructive, short term action is necessary. Knowledge of the location of potential sediment sources would help the state manage its resources and enable it to provide beachfront communities with information that could reduce costs for further investigations and transport distances. The location and characteristics of borrow areas will also allow communities to plan for the type of dredge needed and the time of year dredging can be done in response to environmental factors such as turtle nesting. Subregional sediment management plans would also benefit local governments in developing local comprehensive beach management plans (*see Recommendation #5*).

C. NEW POLICY RECOMMENDATIONS

No policy changes were suggested by the Committee.

D. NEW PLANNING AND MANAGEMENT ACTIONS

1) The State of South Carolina should develop and implement a Regional Sediment Management (RSM) plan.

The scope of the RSM plan would have multiple components. The plan would require an estimate for the expected sand needs for the entire coastline for a designated period of time based on erosion rates and sub-regional sediment budgets. Addressing the sand material needs in specific reaches of the South Carolina coast, determining sediment budgets, and identifying potential borrow sites within those reaches would result in sub-regional sediment management plans that would then be part of a larger statewide regional sediment management plan. Once a plan is in place, it will need to be updated on a periodic basis (for example, every ten years).

- The Regional Sediment Management Plan should build on known sediment source information, but would need additional state and federal investigations to identify and characterize additional sediment sources.
- The plan should identify potential sources of acceptable sand material to include offshore deposits and nearshore regenerating bars, as well as dredge material that would otherwise be placed in upland disposal areas following state, federal, or private dredging.
- The plan should define standards of acceptable sand grain size, color, composition, and texture by sub-region based on natural or in-situ material. Standards should be developed that take into account all aspects of the nourishment process, and they need to be flexible enough so that the sand that does exist can be used and the project can be constructed. One outcome would be the identification of potential sources of acceptable sand for

beach nourishment projects along the South Carolina coastline; however, for specific beach renourishment projects, site specific data collection, analysis, and design would still be required.

- These identified sources should be correlated to local community reaches based on reasonable pumping distances, and this information should then be considered and incorporated back into Local Comprehensive Beach Management Plans.
- The Regional Sediment Management Plan will require several years of research and data collection to identify compatible sand sources. The borrow sites and other nearby resources should be monitored and re-evaluated after large nourishment projects that utilized the identified sites (*see Recommendation #8*).

Sub-regional sediment management plans should be used to ensure the continued involvement of local communities in: 1) identifying high risk areas and sources of compatible sand; 2) exploring opportunities for partnerships and leveraging of research, mapping, and operations; and 3) developing proactive renourishment plans (*see Recommendation #5*).

General and site specific erosion rates need to be determined to estimate the future nourishment needs. Native sand characterization of grain size, color, composition, shell content, and texture for specific areas, as well as consideration of turtle nesting season and shorebird migration impacts, are necessary when comparing to potential borrow source sites.

Development of a Plan

DHEC-OCRM should develop and maintain the Regional Sediment Management Plan. In developing the plan, DHEC-OCRM needs to:

- integrate available information from local, state, and federal projects and identify potential data gaps and needs;
- determine the options and alternatives of collecting and storing data;
- divide the coastline into sub-regions of similar sand requirements and needs; and
- help identify potential offshore borrow sources for those sub-regions.

The methods and activities listed above will allow DHEC-OCRM to better identify and manage the sediment resources along the coast. To assist in its planning efforts, DHEC-OCRM should organize sub-regional workshops to engage local governments and stakeholders. A statewide regional plan's success depends on local, regional, and private sector participation.

Funding

Funding is essential to this effort. State and local funding sources could be used to contribute to a consortium of funding sources. Other possible funding sources could be investigated. Various federal agencies have programs that may be able to provide assistance either for data collection or evaluation and analysis. These may include USGS, USACE, FEMA, and NOAA. In order to obtain federal funds for specific projects, research, or mapping, the state would need support from its congressional delegates who must identify designated funds under various authorities for

each year of a multi-year investigation. DHEC-OCRM would oversee the development of the Regional Sediment Management Plan, but could coordinate with other agencies to leverage resources.

Understanding Needs

Expected sand needs would be based on erosion rates and sediment budgets that would begin with compilation of existing information. To estimate sub-regional sediment budgets, the coastline would be broken into sections to capture similar geomorphology and focus on higher risk areas. State and federal experts would decide the standard for acceptable material for the reaches based on collected data. Ongoing investigations by federal agencies and their contractors, as well as universities could be expanded for data collection, evaluation and mapping of sand sources. For all specific beach renourishment and coastal engineering projects, site specific data collection, analysis, and design will still need to be conducted by the private sector (as is currently the case for most, if not all, beachfront communities in South Carolina).

Storing Data

Database structure could utilize the USACE eCoastal framework, which is an enterprise Geographic Information System (GIS) that was developed for coastal engineering business practices. It was developed to concentrate on the specific needs of the coastal engineer, scientist and manager. The architecture was developed by the USACE utilizing spatial data standards (SDS), geodatabase development, and desktop and web applications, and it was designed to provide baseline information for effective planning and prediction of regional and local coastal processes. Coastal Carolina University (CCU) has already begun implementing the web-based eCoastal SDS compliant network which is used to store, analyze, and visualize coastal data on the web as part of an agreement with USACE. DHEC-OCRM, the South Carolina Sea Grant Consortium, USGS, and CCU have provided financial support, expertise, data, and time, to support the hardware infrastructure, software, database development, software development, and staff for the project.

E. EXISTING POLICIES AND PROGRAMS

Regarding the beneficial re-use of dredged material, the South Carolina Beachfront Management Act recognizes that “dredging practices, which include disposal of beach quality sand at sea, also may deprive the beach/dune system of much-needed sand” (SC Code § 48-39-250(7)). The Marine Protection, Research, and Sanctuaries Act (MPRSA) requires investigation of alternative dredge material placement before use of the Ocean Dredged Material Disposal Site (ODMDS).

The South Carolina Beachfront Management Plan implements the South Carolina Beachfront Management Act of 1988 to protect both life and property, protect unique habitats and preserve the beach for future use by all citizens. The act addresses measures to renourish eroding beaches and requires the adoption of Local Comprehensive Beach Management Plans by local governments.

The U. S. Army Corps of Engineers (USACE) defines Regional Sediment Management (RSM) as a “system-based approach” that seeks to solve sediment-related problems by designing solutions that fit within the context of a regional strategy. RSM involves making local project decisions in the context of the sediment system and forecasting the long-range implications of management actions. RSM recognizes that sediment management actions have potential economic and ecological implications beyond a given site, beyond originally intended effects, and over long time scales (decades or more). RSM engages many stakeholders. Many federal and non-federal sediment management activities may potentially have system-wide effects.

USACE Hurricane and Storm Damage Reduction projects require detailed investigations of offshore borrow sites and identification of a sediment source for the 50-year life of the project. Local community beach nourishment investigations via private AE firms are sources of information.

The SC Coastal Erosion Study has developed a geologic framework of the Grand Strand which has implications for sediment volumes, rates of sediment transport, and the distribution and character of near-surface geologic strata at the active coast (Barnhardt, 2009).

F. GENERAL COSTS AND BENEFITS

Identification of borrow sources for a beach nourishment project can be time consuming and costly when approached on a case-by-case basis. Developing a plan to investigate large reaches of the region will result in a time and overall cost savings. The statewide investigation of sediment sources can be done through cost sharing programs with the federal government under the following authorizations:

- General Investigation (South Carolina Shores GI authorized in 1988 under Section 110 of the River and Harbor Act of 1962 includes beach nourishment as well as offshore investigations and is still Open)
- WRDA 2007 Section 2037: Regional Sediment Management (which modified the previous WRDA 1992 Section 204: Beneficial Use of Dredge Material)
- WRDA 1974 Section 22: Planning Assistance to States

At a subregional scale, local communities can work with state or federal cost share programs to develop and expand their plans to include erosion rates, sediment budgets, critical areas, and native sand characterization. Additionally, municipalities can take advantage of current state legislation allowing for the use of the accommodations taxes for nourishment projects. Municipalities should also look to HOAs and local property owners for partial financing.

Federal cost sharing authorizations:

- WRDA 1974 Section 22: Planning Assistance to States
- Section 206, 1960 FCA: Flood plain Management Services

The general public and private property owners will benefit from advanced planning for beach nourishment projects. By avoiding potential legal costs, loss of public and private property, and the potential for environmentally damaging emergency measures, benefits will be widespread.

A Regional Sediment Management approach would not merely be a research activity. The types of benefits that could come from a regional sediment plan would be similar to those resulting from the Coastal Erosion Study funded by USGS and the SC Sea Grant Consortium in the 1990s. The Coastal Erosion Study, a seafloor mapping and study activity that was geographically limited to the northern shoreline of SC, benefitted the USACE and the state and local communities in the Grand Strand Region (Barnhardt, 2009). Benefits included:

- Data gathered by the Beach Erosion Research and Monitoring (BERM), a component of the Coastal Erosion Study, has been used by DHEC-OCRM to generate its annual “State of the Beaches” reports and by Horry County (for Arcadia Shores and Surfside/Garden City) and the City of North Myrtle Beach to help with compliance and monitoring issues regarding nourishment projects.
- Data from the Coastal Erosion Study was used to support local and federal efforts to secure emergency repair funding for nourishment.
- The Coastal Erosion Study has helped provide a baseline for expansion of the regional inventory of sand resources on the inner shelf available for future nourishment projects allowing local communities to focus limited dollars on details of using a reserve rather than on initial searches over large areas.
- Techniques and capability of the Coastal Erosion Study have been used to aid SCDNR with monitoring of the ODMDS for Charleston Harbor and with reefs adjacent to the Grand Strand Beach Nourishment Project.
- The Coastal Erosion Study geologic framework serves as part of the baseline characterization and guidance for locating potentially viable sites for wind power generation on the inner shelf off the Grand Strand.

G. MEASURES OF SUCCESS

- Reduction in future borrow source searches.
- Reduction in long-term and post-emergency nourishment costs.
- Reduction in the frequency of future nourishment projects through best RSM practices.
- Advances in the science and management of SC's regional sediments sources.
- Advances in the knowledge, relationships, and collaborations of key RSM experts and stakeholders.
- Increases in tourism due to high quality beaches developed from RSM sources.
- Improvements in coastal habitats and ecologies due to high quality beaches
- Better, more efficient nourishment designs.

H. FEASIBILITY ISSUES

This framework is dependent on reliable data sets including physical inventories and projected change. The framework also will require an effective institutional framework at both the state and local level to implement the program and the political will to move forward.

I. KEY UNCERTAINTIES/ASSUMPTIONS

The primary uncertainty is in the timing of funding sources. State and federal fiscal years differ. Federal funding for this type of work would have to be by specific line item, which is never guaranteed once let alone on a multi-year basis.

J. EXAMPLES FROM OTHER STATES OR AREAS

Gulf of Mexico Region

The Gulf of Mexico Alliance (GOMA) has been instrumental in establishing collaborative partnerships between the states of Alabama, Florida, Louisiana, Mississippi, and Texas to enhance the ecological and economic health of the Gulf of Mexico. Through these partnerships, the Gulf States have acknowledged that sediment resources are integral to and a critical physical resource necessary in accomplishing many of the GOMA initiatives and objectives.

Subsequently, a need has been recognized for the development of the Gulf Regional Sediment Management Master Plan (GRSMMP) to facilitate and assess the implementation of sediment management to provide for more effective use of dredged material and other sediment resources for habitat conservation and restoration. The intent of the plan is to provide guidelines to the Gulf States for more effective management of sediment resources, recognizing they are a part of a regional system involving natural processes and dredging activities.

North Carolina

The North Carolina Beach and Inlet Management Plan (BIMP) is a joint project by the Division of Water Resources (DWR) and the Division of Coastal Management (DCM). Management of the state's inlets and beaches is presently achieved through multiple programs. DWR maintains a six-year plan for water resource development projects in NC, including historical information, current status, and future cost projections for beach and inlet projects. DCM maintains a digital database of shorelines that is used to establish beachfront erosion rates and inlet processes. A collaborative effort between DWR and DCM will catalog, archive, and make available relevant coastal information (*e.g.*, maps, reports, scientific monitoring data) to create a resource that will facilitate beach and inlet management and the development of a BIMP. In addition, NCAC 7H .0312, Technical Standards for Beach Fill Projects, outlines new sediment criteria rules for beach nourishment projects, and went into effect February 1, 2007.

California

California's Coastal Sediment Management Workgroup's Coastal Regional Sediment Management Plan program implements Sediment Master Plan (SMP) objectives by developing a series of regional plans specific to discrete portions of the California coast. The Coastal RSM Plans are intended to formulate regional consensus-driven sediment management policy and guidance in order to restore, preserve and maintain coastal beaches and other critical areas of sediment deficit; sustain recreation and tourism; enhance public safety and access; and restore coastal sandy habitats.

Lower Columbia River

In January 2008, the Lower Columbia Solutions Group (LCSG) signed a Declaration of Cooperation to initiate work on a Regional Sediment Management Plan (RSMP) for the lower Columbia River to maximize regional benefits (economic, social and environmental) and reduce regional costs associated with dredging activities.

SC Coastal Erosion Study: <http://woodshole.er.usgs.gov/project-pages/scarolina/index.html>

USACE Regional Sediment Management: <http://www.wes.army.mil/rsm/>

K. BARRIERS OR CONCERNS

None identified.

Recommendation 7 – Strengthen Reviews of Nearshore Dredging and Other Alterations

A. GENERAL RECOMMENDATION

The State of South Carolina prefers “soft” solutions to coastal erosion, as opposed to “hard” alternatives such as seawalls, revetments, and groins (SC Code § 48-39-260(3); R.30-11(D)(2)). However, some nearshore alterations associated with nonstructural stabilization options, including inlet modifications, dredging for renourishment projects, and large-scale beach scraping projects, can have unanticipated, negative downdrift impacts; and essentially redistribute sand within the active nearshore system rather than increase the sand available to that system. This recommendation seeks new guidance for the evaluation of proposed projects from the beachfront to 1 mile offshore – an area that generally captures the active “littoral zone” where most beach sand transport occurs.

B. RATIONALE

Finding suitable borrow sources of beach quality sands is often a significant challenge to support long-term beach management plans using beach nourishment strategies. One of the biggest costs for beach nourishment is the transport of sediment dependent on the location of, or distance to, the borrow source (e.g., the closer the borrow source, typically the lower the cost of a beach nourishment project). Consequently, borrow source searches often consider nearshore shoals such as those in many inlet ebb shoal deltas.

Since mining of nearshore sediments can potentially impact the future redistribution of sediments in the active littoral system, science-based evaluation criteria are provided to assure adjacent or “receiving” shorelines are not adversely impacted (e.g., physical and numerical modeling and impacts analysis for potential inlet relocations or dredging operations). Monitoring requirements consistent with other state permitting requirements (e.g., long-term monitoring of downdrift impacts) provide a safeguard to mitigate any adverse impacts discovered during the post-project monitoring period.

Other nonstructural nearshore alterations such as beach scraping and inlet modifications can also negatively impact downdrift beaches by disrupting natural sediment transport pathways without adding new sand to the system. Furthermore, as engineering proposals for soft erosion control solutions grow in complexity, and as increasing numbers of stakeholders engage in the decision-making process, the current situation often leads to competing proposals and differing perceptions of the validity of environmental assessments.

C. NEW POLICY RECOMMENDATIONS

- a) **For nearshore alterations proposed to address beachfront erosion, excluding sand scraping or minor renourishment projects conducted under an approved Emergency Order (see Recommendation #9), DHEC-OCRM should establish a special review process with enhanced scrutiny for any projects affecting the beach, inlet systems, or submerged lands out to 1 (one) mile offshore.**

Permit conditions should include:

- 1) The permittee or project sponsor should demonstrate an inability or hardship in using sand from areas beyond the 1-mile limit, aside from any expected and reasonable increases in associated project costs;
- 2) Project proposals should ensure no negative impacts to the maximum extent practicable by conducting a thorough analysis, peer review process, and/or expanded monitoring in areas where excavation is performed, as well as in areas susceptible to downdrift impacts;
- 3) Contingency plans should be developed in the event that adverse impacts are identified (*see Recommendation #8*).

The Committee was unsure if this recommendation would require a regulation change or could be implemented under existing authorities. Any regulatory changes would require approval from the DHEC Board for promulgation pursuant to the SC Admin. Procedures Act (SC Code § 1-23-10 et seq.), which requires review by the SC General Assembly, and must be authorized under existing statutes.

Any statutory changes would involve legislative action by the South Carolina General Assembly.

D. NEW PLANNING AND MANAGEMENT ACTIONS

- 1) **DHEC-OCRM should establish an ad hoc Technical Committee to establish clear criteria, guidelines, and recommendations for decision-making related to nearshore project proposals (the area that includes inlets and beaches out to the 1-mile offshore limit).**

The results of the Technical Committee should be used to inform and guide future projects, but no changes proposed here should result in delayed permitting.

E. EXISTING POLICIES AND PROGRAMS

Nearshore Alterations

The SC Coastal Tidelands and Wetlands Act sets forth the following policy:

"In recognition of its stewardship responsibilities, the policy of South Carolina is to...severely restrict the use of hard erosion control devices to armor the beach/dune system and to encourage

the replacement of hard erosion control devices with soft technologies as approved by the department which will provide for the protection of the shoreline without long-term adverse effects" (SC Code § 48-39-260(3)).

DHEC-OCRM Critical Area Permitting Regulations state that “the Department shall promote soft-solutions to erosion within the context of a policy of retreat of development from the shore and prevent the strengthening and enlargement of existing erosion control structures” (R.30-11(D)(2)).

Renourishment Projects

R.30-13(N)(2) “Protection of Beaches and Artificial Beach Nourishment: The following requirements apply to the Department’s consideration of projects for the renourishment of beaches:

- (a) Careful study shall be given to the type (grain size and quality) of material most suitable for nourishment of a particular beach area;
- (b) Borrow areas and sand for artificial nourishment shall be carefully selected to minimize adverse effects. Where possible, artificial beach nourishment shall be performed in concert with inlet stabilization or navigation projects;
- (c) Dredging in the borrow areas shall not be in conflict with spawning seasons or migratory movements of significant estuarine or marine species. Nourishment of beach areas shall be scheduled so as not to interfere with nesting and brood-rearing activities of sea birds, sea turtles, or other wildlife species.”

Federal Policies and Regulations

The Coastal Barrier Resources Act (CBRA) designated various “undeveloped” barrier islands to be ineligible for federal assistance or support for development (*see Recommendation #3*). This program is administered by the U.S. Fish and Wildlife Service. Several South Carolina tidal inlet systems are defined and mapped as CBRA zones, restricting federal support for infrastructure and improvements within these zones. These restrictions apply to all terrestrial areas within the CBRA and open coastal waters to the 30’ bathymetric contour. CBRA areas that may be of interest to adjacent communities as potential beach nourishment resources include Waties Island, Long Pond, Huntington Beach, Litchfield Beach, Pawleys Inlet, the Debidue/North Inlet Complex, Dewees/Capers Island, the Morris Island/Bird Key complexes, Captain Sam’s Inlet, the Edisto Inlet complex, Hunting Island, and the Daufuskie Island complex. Nearshore alterations in these areas are not eligible for federal funds, but they may be allowed if funded through other sources.

Borrow sites must comply with the Magnuson-Stevens Fishery Conservation and Management Act, which states that adverse effects to essential fish habitat of managed species must be minimized. This program is administered through the National Marine Fisheries Service.

The Minerals Management Service (MMS) administers access and use of natural resources, including sand, from submerged lands of the United States beyond the three-mile jurisdiction of individual states under authority of: the Outer Continental Shelf Lands Act (OCSLA) and Public Law 103-426.

Section 933 of the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662) specifies that it is U.S. Army Corps of Engineers policy to participate in the additional costs for placing clean sand or other suitable material, dredged by the Corps during construction or maintenance of federal navigation projects, onto adjacent beaches or nearshore waters if specific requirements are met. This beneficial reuse of dredged material typically involves cost sharing with state or local governments.

The U.S. Army Corps of Engineers has direct permit authority to evaluate applications for certain activities in the Nation's water pursuant to three separate laws:

- Section 10 of the Rivers and Harbors Act
- Section 404 of the Clean Water Act
- Section 103 of the Marine Protection, Research, and Sanctuaries Act

Section 10 of the Rivers and Harbors Act regulates the construction, excavation, or deposition of material in, over, or under "navigable waters of the US," or any work which would affect the "course, location, condition, or capacity" of those waters. Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into "waters of the US." Section 103 of the Marine Protection, Research, and Sanctuaries Act regulates the transportation of dredged material to the ocean for the purpose of disposal.

The National Environmental Policy Act (NEPA) of 1969 establishes a national environmental policy and a framework for considering the environment in decision-making for federal actions. NEPA applies to federal government activities, and it requires all federal agencies to:

- Assess the environmental impacts of major federal projects or decisions such as issuing permits, spending federal money, or affecting federal lands;
- Consider the environmental impacts when making decisions; and
- Disclose the environmental impacts to the public.

According to the Endangered Species Act, the U.S. Fish and Wildlife Service must be consulted to determine if a nearshore alteration project may affect endangered species or their habitats.

The National Historic Preservation Act also requires that areas worthy of historic preservation be avoided.

F. GENERAL COSTS AND BENEFITS

It may be argued that restricting use of sediment from the closest possible sources may increase the overall cost of beach nourishment projects. Advancing one section of beach; however, through potentially cheaper options that utilize the common "shared" sand resources to protect one area over another is incompatible with the overall objective of beachfront management: to

maintain a viable, functional, and sustainable beach and dune system for the entire state. Limitation of unintended consequences to adjacent properties from redistribution of sediment within the active beach system can reduce potential litigation as well as state and federal liability to mitigate adjacent impacts.

Incorporation of sediment borrow sites as part of individual community beachfront management plans should allow the state to more effectively evaluate community proposals, move to a regional sediment management approach (*see Recommendation #6*), and proactively address potential resource conflicts and shortfalls. In addition, adhering to the recommendations of an ad hoc Technical Committee would reduce the amount of emergency permitting and associated muting of state regulations, which are designed to wisely manage state physical and biological resources.

Adequate long-term monitoring of areas mined within the active beach system and in areas downdrift of the project will increase project costs to a level that might not offset any savings that were intended by not using a sand resource outside the active beach zone. Monitoring of shoreline and shoal changes would require sufficient (at least one year) pre-impact data to understand local coastal processes prior to such a project.

G. MEASURES OF SUCCESS

- Reduced claims of downdrift adverse impacts following a renourishment project or other nonstructural nearshore alteration project.
- Refilling of nearshore borrow areas with compatible sand, reestablishment of benthic communities, and reduced downdrift impacts from nearshore dredging projects.

H. FEASIBILITY ISSUES

The membership of a future nearshore alterations Technical Committee could be controversial. It will be essential to have representation from diverse groups including state regulatory agencies, federal agencies, local governments, natural resource managers, coastal engineers, geologists, and academic experts. It will be difficult to ensure that any outcomes and recommendations from the Technical Committee do not extend the permitting process or timeframe.

I. KEY UNCERTAINTIES/ASSUMPTIONS

With all nearshore alterations, there are significant uncertainties related to coastal processes and future storms, waves, winds, and currents that make decisions regarding potential downdrift impacts difficult. For the same reason, there will always be uncertainties in attributing any downdrift erosion problems to a specific project.

A littoral cell's offshore extent is variable and differs from site to site. This recommendation is only that projects within one mile offshore receive heightened reviews because this distance generally captures the active littoral zone coast-wide.

J. EXAMPLES FROM OTHER STATES OR AREAS

North Carolina

NCAC 7H .0312, Technical Standards for Beach Fill Projects, which outlines new sediment criteria rules for beach nourishment projects, went into effect February 1, 2007.

Massachusetts

The Massachusetts Department of Environmental Protection's publication, *Beach Nourishment: Guide to Best Management Practices in Massachusetts*, seeks to minimize erosion and potential adverse environmental impacts, to promote the beneficial reuse of clean, compatible dredge material, and to expedite the regulatory review of nourishment projects.

K. BARRIERS OR CONCERNS

None identified.

Recommendation 8 – Improve Beach Nourishment Monitoring

A. GENERAL RECOMMENDATION

The goal of this policy is to require, improve, and standardize physical and biological monitoring of all beach nourishment projects conducted in South Carolina. It should include assessments of both the beach that is nourished and the area where the sand is mined from (“borrow sites”) as well as nearby sensitive habitats such as hard bottoms, islands, and estuarine habitats when deemed appropriate.

B. RATIONALE

While most beach nourishment projects conducted in South Carolina have been monitored for effects related to physical and biological changes, a few have received only cursory monitoring, and most others have not been conducted past the first year of post nourishment recovery. An improved, more standardized monitoring program for all beach nourishment projects is warranted based not only on the strong recommendations provided by the National Research Council’s committee on beach nourishment and protection (NRC 1995), but also based on the highly variable recovery rates observed in the studies that have been completed in the United States (NRC, 1995). A recent re-analysis of monitoring projects conducted in South Carolina found several consistent and significant environmental impacts of dredging and nourishment during the 12-15 months following completion of the activities, although considerable variability was observed among the studies (Bergquist and Crowe, 2008).

At present, there are no mandatory requirements or standards for monitoring beach nourishment projects. Beach nourishment projects that have been permitted by DHEC-OCRM and the U.S. Army Corps of Engineers are usually submitted to the agencies identified in Item C(a) for comment. Additional rationale for the recommendations provided in this subsection C is provided by Bergquist and Crowe (2008).

C. NEW POLICY RECOMMENDATIONS

- a) Require pre- and post-monitoring for all beach nourishment projects, for both offshore (borrow area) and onshore (beach and surf zone) results, including downdrift shoreline changes.**

DHEC-OCRM should be required to ensure that all beach nourishment projects are reviewed by appropriate state and federal agency staff to solicit input on required monitoring objectives for each project, which may vary dependent on the size and location of the project, source and characteristics of the sand to be placed on the beach, timing and duration of the project, and information gained from previous monitoring projects in South Carolina and elsewhere.

- At a minimum, recommendations should be solicited from the SCDNR, USFWS, and NOAA-NMFS, in addition to any recommendations provided by DHEC-OCRM and USACE staff, as appropriate.
- It is also recommended that the firm or agency that is conducting the monitoring be independent of the firm or agency conducting the nourishment project.
- Monitoring results should be tied directly to project contingency plans (*see also Recommendation #7*).

D. NEW PLANNING AND MANAGEMENT ACTIONS

1) To the extent possible, standardize monitoring requirements, including timing, parameters measured, and methodologies, to enable consistent evaluations of project results (and cross-project comparisons).

Primary physical monitoring issues that should be considered include: (1) how well does material placed on the beach match the native sediments? (2) how effective is the project in retaining nourished material (e.g. is it meeting design predictions) and are there selected locations within the project that are not performing as planned?; (3) have post-nourishment beach profiles been modified significantly such that utilization by sea turtles and other biota is impacted?; (4) is the sand borrow area refilling, at what rate, and with what type of material?; (5) what modifications are occurring with respect to current and wave energy effects in the borrow area?

Primary biological monitoring issues that should be considered include: (1) did the nourishment project have potential long-term negative impacts on faunal or floral resources inhabiting or utilizing the beach, and if so, which resources were affected?; (2) are biological impacts anticipated in subtidal habitats adjacent to the shoreline, and if so, which resources are of concern?; (3) what are the extent and duration of impacts to biological resources in the sand borrow areas?; (4) are larger biota, such as turtles, likely to be impacted by the dredging operation? Based on these potential issues, agency review staff should provide recommendations as to what biological monitoring should be required for each nourishment project since all projects may not warrant the same level of monitoring.

For both physical and biological monitoring, detailed surveys of the beach and borrow sites should be conducted before, after, and at appropriate time intervals thereafter to resolve rate of recovery or any long term changes. Ideally, pre-impact studies should be completed as much as one year in advance of the impact and include multiple survey intervals to characterize natural seasonal variation. At a minimum, the post-project evaluation should include surveys immediately after project completion and further monitoring intervals at least yearly until there is sufficient evidence to understand how the project is performing and how physical and biological recovery is occurring in impacted areas (generally at least five to ten years or the life of the project). Since natural seasonal variation in benthic community structure and composition can occur, seasonal sampling is recommended for the first year after project completion, and the timing of subsequent annual assessment should include

seasonal considerations with respect to the pre-impact assessment season. The sampling design for physical and biological impact effects should utilize a BACI (Before, After, Control, Impact) sampling design with sufficient sampling effort (based on power analysis) in all areas to adequately detect and characterize changes that are occurring. This should be accomplished by sampling numerous, randomly-placed locations within the project areas (beach and borrow sites) as well as in un-impacted reference areas. Reference areas should be interspersed with project areas when feasible and be of similar characteristics to the project area prior to project start. Data from previous monitoring projects should provide sufficient information to resolve appropriate sampling efforts and calculate minimum sample sizes through power analyses.

At a minimum, the following physical parameters that should be monitored/calculated in nourished beach areas and their associated control locations: beach width, berm elevation, beach slope, and surficial sediment characteristics. In borrow areas and their associated control locations, the minimum physical parameters that should be monitored/calculated include: bottom topography (borrow only), average depth of dredging below grade, refilling rates (borrow only), and surficial sediment composition.

At a minimum, biological parameters that should be monitored/ calculated in nourished beach areas and their associated control locations include: densities of major beach invertebrate taxa/species. In borrow areas and associated control locations, the minimum biological parameters that should be monitored include: benthic infaunal densities, number of infaunal species, identities and densities of individual species, and densities of major taxonomic groups.

Analysis of the above data should include appropriate summary statistics (mean, median, standard deviations, sample sizes, etc.) shown in tables or figures to illustrate temporal changes in the impact and control locations. Appropriate inferential statistics should be used to determine the significance of any effect of dredging or nourishment on physical and biological characteristics of beach and borrow locations. Biological community data should be analyzed using modern multivariate statistical techniques.

Within one year of the final monitoring event, a report analyzing, presenting and appending all data from the entire monitoring effort should be completed. All reports should include clear interpretation of broad patterns and trends, including discussion of significant statistical results (or lack thereof) and relevant environmental, ecological, and/or geologic consequences.

Reports prepared by those completing the monitoring effort should receive peer review by the appropriate agency staff and disseminated to relevant state and federal agencies as well as the town and county governments funding or affected by the nourishment project.

E. EXISTING POLICIES AND PROGRAMS

Post-nourishment beach monitoring is authorized by the SCDHEC-OCRM Critical Area Permitting Regulations, but it is not required. Therefore, the formulation of standardized monitoring requirements may need new regulation or policy development.

In the Critical Area Permitting Regulations, R.30-13(N)(2), Protection of Beaches and Artificial Beach Nourishment, is the only regulation that addresses the permitting of beach nourishment projects, but it does not mention monitoring. This regulation discusses grain size and quality of fill material, selection of borrow sites, avoidance of spawning, nesting, or brood-rearing seasons of marine species, and dredge and fill policies.

According to R.30-18(C)(7), applications for state funding of beach restoration projects must include "any engineering studies that have been completed concerning the project, and plans for post-project monitoring."

The U.S. Army Corps of Engineers typically requires monitoring as part of beach nourishment projects, but it does not employ a set of standardized requirements for all projects.

F. GENERAL COSTS AND BENEFITS

Most beach nourishment projects conducted within the state have had some monitoring completed based on agency requests. Thus, the costs to ensure that this is completed as a mandatory effort should not be significantly higher. Impacted parties are the entities who are requesting the permit and must bear the cost of the monitoring effort. Costs associated with most past monitoring efforts have generally represented a very small percentage (1-3%) of the overall project costs. The benefits derived from better understanding the impacts and recovery, or lack thereof, are critical for ensuring that future beach nourishment projects are completed in a manner that has the least environmental/ecological consequences. Much has been learned from past monitoring efforts, which has reduced the need for monitoring some components of the habitat/resources, but has highlighted problems with other components/habitats that need to be addressed in completing future projects. The SCDNR and DHEC-OCRM cannot complete their mandates to protect coastal environments and resources in South Carolina without adequate knowledge of project impacts.

G. MEASURES OF SUCCESS

All beach nourishment projects are adequately monitored using strong scientific approaches. Findings from each project are utilized to minimize impacts related to future projects and document the time required for full recovery of impacted areas. Specific measures of success can include:

- Improved beach construction design. If it is realistic to assume design could be changed based on results, this may allow for considerable change in costs and impact structure (nearshore nourishment such as is done in other areas rather than upper beach face with associated additional costs in interruptions)
- Improved borrow site placement to ensure more rapid recovery and reuse of impacted areas. This is a very important consideration given the physical limitation of sand resources in some areas and regulatory limitations in other areas (e.g. CBRA).
- Improved information base on all projects regarding duration of project lifespan using standardized approaches
- Improved technical assessment of beach nourishment projects

H. FEASIBILITY ISSUES

There are sufficient private firms as well as government and academic institutions to be able to conduct these studies. Since most projects completed in South Carolina have been adequately monitored, the proposed policy is very feasible and consistent with current practice. The proposed policy will make implementation of monitoring efforts more consistent among projects and ensure agency mandates to protect affected habitats and resources are addressed. It should also improve the technical approaches used for monitoring efforts, which in a few cases, have been limited. While costs of monitoring projects are always of concern, all projects warrant some level of monitoring to understand impacts and recovery processes.

I. KEY UNCERTAINTIES/ASSUMPTIONS

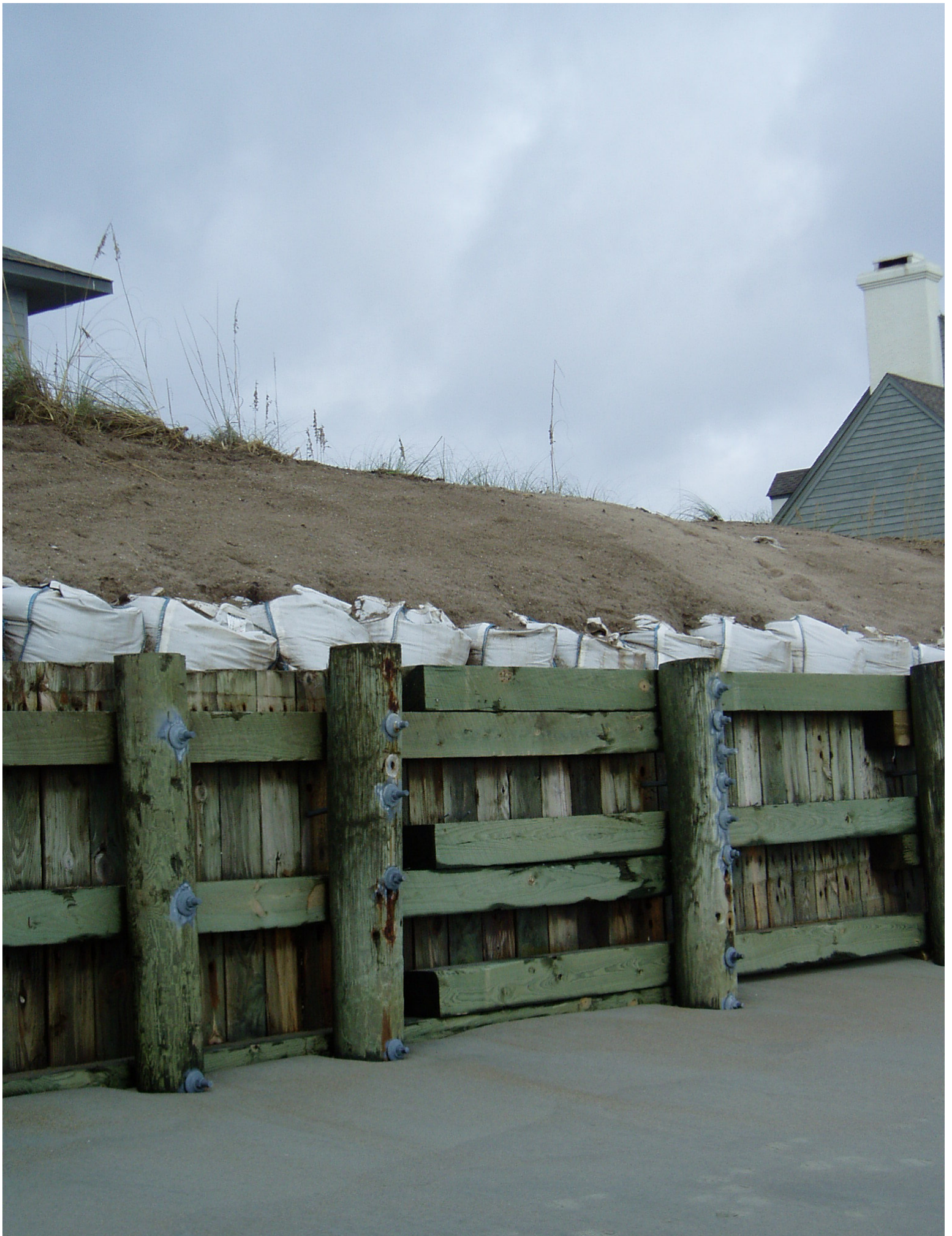
Costs will increase depending on the number of required monitoring parameters, frequency, and duration.

J. EXAMPLES FROM OTHER STATES OR AREAS

Many other states have implemented some level of monitoring of beach nourishment projects. Despite the abundance of studies, it is clear that impacts can be quite varied (NRC, 1995; Greene, 2002); and some of these studies have not been considered to lack sufficient scientific rigor with respect to adequate monitoring effort and data analysis (Peterson and Bishop, 2005).

K. BARRIERS OR CONCERNS

None identified.



GOAL 3: MAINTAIN PROHIBITIONS AND FURTHER RESTRICT THE USE OF HARD STABILIZATION STRUCTURES

“The use of armoring in the form of hard erosion control devices such as seawalls, bulkheads, and rip-rap to protect erosion-threatened structures adjacent to the beach has not proven effective. These armoring devices have given a false sense of security to beachfront property owners. In reality, these hard structures, in many instances, have increased the vulnerability of beachfront property to damage from wind and waves while contributing to the deterioration and loss of the dry sand beach which is so important to the tourism industry” (SC Code § 48-39-250(5)).

“It has been clearly demonstrated that the erosion problems of this state are caused by a persistent rise in sea level, a lack of comprehensive beach management planning, and poorly planned oceanfront development, including construction of hard erosion control structures, which encroach upon the beach/dune system” (R. 30-1(C)(4)).

Overview

Within its beachfront jurisdiction, and in accordance with the SC Beachfront Management Act, DHEC-OCRM does not allow new “erosion control structures,” which are specifically defined in the Act as seawalls, bulkheads, and revetments (see below). While these structures can protect coastal property and infrastructure from erosion, they do so at the expense of the long-term health of the beach/dune system and the public’s access to this shared resource. The structures themselves can intensify erosion problems in their immediate vicinity; and as sea levels rise, eventually the dry sand and intertidal beach will be lost. Other “hard” stabilization structures such as groins, jetties, and offshore breakwaters, as well as temporary sandbag structures, may still be permitted to mitigate erosion, but have other potential environmental and public safety impacts. Well-documented impacts of beachfront erosion control structures include aesthetic and recreational impacts, loss of the dry sand and intertidal beach, reduced public beach access, losses of critical habitat for invertebrates and shorebirds, and interruption of natural sand transport pathways (including sand that would have originated from the eroding shoreline) (e.g. Griggs, 2005; Dugan and Hubbard, 2006, see Figure 6 for example of a beach revetment in SC).

South Carolina is not the first or the only state to prohibit either the new construction or reconstruction of erosion control structures. North Carolina and Rhode Island are two examples of states that also prohibit hard erosion control structures on ocean shorelines. Like South Carolina, existing erosion control structures that are damaged more than 50% in Rhode Island cannot be rebuilt (RI CRMP, 2008).

Hard structure policies must be considered in light of South Carolina’s retreat policy, and potentials for beach renourishment, habitable structure relocation, and land purchase/conservation. Substantial investments in any one of these areas will affect outcomes in the other program areas. With continued coastal development and population growth, and projections of



Figure 6: *Revetment on Fripp Island, SC. Photo taken September 24, 2009.*

accelerated rates of sea level rise, it has become increasingly important to protect the beach/dune system by prohibiting new erosion control structures. The Advisory Committee wished to reinforce this prohibition to ensure the long-term health of the beach/dune system for future generations.

Erosion Control Structures

The SC Beachfront Management Act defines erosion control structures as seawalls, bulkheads, or revetments. A seawall is a retaining wall designed specifically to withstand normal wave forces, a bulkhead is a retaining wall designed to retain fill material but not to withstand wave forces on an exposed shoreline, and a revetment is a sloping structure built along an escarpment or in front of a bulkhead to protect the shoreline or bulkhead from erosion (SC Code § 48-39-270(1)). These structures are built parallel to the shoreline, whereas groins and jetties (not defined as erosion control structures) are built perpendicular to the shoreline. The state applies a strict regulatory position concerning erosion control structures. No new seawalls, bulkheads, or revetments are allowed to be constructed in South Carolina seaward of the DHEC-OCRM beachfront setback line, except, in some cases, to protect a public highway which existed on June 25, 1990 (SC Code § 48-39-290(B)(2)(a)). According to state regulations, an existing functional

erosion control structure may not be enlarged, strengthened, or rebuilt, but may be maintained in its present condition (R. 30-5(D)). Furthermore, an erosion control structure that is damaged more than 50% above grade cannot be repaired or replaced and must be removed from the beach at the owner's expense (SC Code § 48-39-290(B)(2)(b)).

Emergency Orders and Sandbags

The term “emergency” is defined by the SC Coastal Tidelands and Wetlands Act as “any unusual incident resulting from natural or unnatural causes which endanger the health, safety, or resources of the residents of the state, including damages or erosion to any beach or shore resulting from a hurricane, storm, or other such violent disturbance” (SC Code § 48-39-10(U)). Emergency situations before or after a storm event often prompt local governments to issue Emergency Orders, which allow property owners to construct temporary barriers against wave uprush through sandbagging, sand scraping, or minor renourishment (R. 30-15(H)). Although Emergency Orders are issued by local governments, DHEC-OCRM must be notified within 72 hours of any issuance that would normally require a permit. State regulations require that the notification indicates the nature of the emergency, the substance of the order, the time the order will be issued, the name of the local official executing the order and the authority under which that person is acting, the location of the activity, and an estimate of when the order will be withdrawn (R. 30-5(B)). Current regulations specify that sandbags must be biodegradable, a maximum size of five gallons (0.66 cubic feet) each, filled with beach compatible sand, and stacked at an angle not steeper than 45 degrees (R. 30-15(H)(1)). The property owners being protected by sandbags are responsible for the maintenance of the bags to insure that they remain in place and in good repair, and they are also responsible for the complete removal of the bags when so ordered by DHEC-OCRM (R. 30-15(H)(1)(f)).

Groins

Groins are shore-perpendicular structures that are designed to stabilize an eroding beach or extend the life of some renourishment projects by trapping sand that is being transported as littoral drift. Groins are not defined as erosion control structures by the SC Beachfront Management Act (as amended), so they are allowed under certain conditions. New groins may only be allowed on beaches that have high erosion rates with erosion threatening existing development or public parks and only in furtherance of an ongoing beach renourishment effort. The applicant for a groin project must also provide a financially binding commitment to cover the estimated cost of reconstructing or removing the groin if monitoring indicates adverse downdrift impacts attributable to the project (SC Code § 48-39-290(A)(8)).

Jetties and Offshore Breakwaters

Jetties are shore-perpendicular structures (typically much longer than groins) that are constructed on either side of an inlet and designed to keep navigation channels from filling with sediment. Breakwaters are typically shore-parallel structures built offshore and designed to reduce wave

action on an eroding shoreline. Since jetties and offshore breakwaters interfere with the natural transport of sediment, they are only permitted after a thorough analysis of the project demonstrates that there will be no negative effect on adjacent areas. As part of the permitting process, a bond may be required to ensure that remedial steps such as redesign, reconfiguration, or complete removal of a structure will be carried out if it is shown that the structure has caused adverse impacts (R. 30-13(N)(1)).

Status and Trends

Erosion Control Structures

According to a 1988 study, about 88 miles of ocean coast were developed in South Carolina at that time, or 49% of the total ocean coast of 181 miles (Kana, 1988). The South Carolina Sea Grant Consortium further estimated that 27% of the state's developed beachfront is "armored" or fronted with some hard stabilization structure (Tibbetts, 1997). Calculating the exact length of beachfront erosion control structures in the state is difficult because many have been buried by beach nourishment projects or natural accretion, but the number of beachfront habitable structures with an erosion control device can be estimated. DHEC-OCRM maintains an inventory of seawalls on a parcel-by-parcel basis, and data that are typically recorded include dimensions and construction materials of the walls. Groins and jetties are not included in this inventory because these devices are not considered erosion control structures in the SC Beachfront Management Act, as amended. Statewide analyses of aerial photographs were performed in 1998 to identify additional erosion control structures and digitize them with GIS software. Based on the DHEC-OCRM seawall inventory and the aerial photography analyses, about 933 of the 3,850 beachfront habitable structures (24%) in South Carolina are immediately landward of some type of shore parallel erosion control structure (Table 4).

The greatest densities of erosion control structures are found on Fripp Island, where 100% of the parcels are armored and Folly Beach, where 99% of the parcels are armored. The Grand Strand beaches of North Myrtle Beach, Myrtle Beach, Surfside Beach, and Garden City Beach also have a significant number of armored parcels. Since South Carolina no longer allows the construction of new seawalls seaward of the 40-yr setback line, these numbers should not increase in the future.

TABLE 4: Beachfront Erosion Control Structures in South Carolina			
Area	Number of Beachfront Habitable Structures	Number of Beachfront Habitable Structures with Erosion Control Device¹	% of Beachfront Habitable Structures in each Area with Erosion Control Device
North Myrtle Beach	415	192	46%
Myrtle Beach	356	64	18%
Surfside Beach	192	2	1%
Garden City Beach	300	55	18%
Litchfield Beach	181	4	2%
Pawleys Island	228	7	3%
Debidue Island	90	32	36%
Deweese Island	24	0	0%
Isle of Palms	342	17	5%
Sullivans Island	118	20	17%
Folly Beach	288	285	99%
Kiawah Island	150	0	0%
Seabrook Island	73	26	36%
Edisto Island	237	16	7%
Harbor Island	58	1	2%
Hunting Island	19	0	0%
Fripp Island	160	160	100%
Hilton Head Island	570	42	7%
Daufuskie Island	49	10	20%
TOTALS:	3,850	933	24%

¹ Only shore parallel structures such as seawalls, bulkheads, and revetments were counted. Groins were not counted because they are not considered erosion control structures in the SC Beachfront Management Act.

Emergency Orders and Sandbags

Since 1985, 111 Emergency Orders have been issued by local governments along the beachfront of South Carolina (Table 5). The Emergency Orders specified one or a combination of the following temporary erosion mitigation techniques: sandbagging, sand scraping, or minor renourishment from an upland source. Edisto Beach has had 31 Emergency Orders, but many of these were issued for individual parcels, whereas Emergency Orders for other beaches were issued for the entire barrier island or municipality. Nine Emergency Orders were issued in the 1980s, 43 were issued in the 1990s, and 59 have been issued since 2000. It appears that the number of Emergency Orders has been increasing in recent years and may continue to increase if sea level continues to rise, storms become more frequent, and funding for renourishment becomes more intermittent (see recent example of Emergency Order/sandbagging in Figure 7).

TABLE 5: Emergency Orders Issued Along the Beachfront of South Carolina		
Location	Dates Issued	Specified Mitigation Techniques
Statewide	9/89	Sandbags
Statewide	9/99	Sandbags, Sand Scraping, Renourishment
North Myrtle Beach	10/90	Sandbags
North Myrtle Beach	3/93	Sandbags, Renourishment
North Myrtle Beach	9/93, 9/96	Renourishment
Myrtle Beach	5/05, 8/06, 1/07, 7/07	Sand Scraping
Garden City Beach	9/05	Sand Scraping
Garden City Beach	11/08	Sandbags, Sand Scraping, Renourishment
Pawleys Island	2/93, 4/01, 3/03, 2/04, 2/05	Sand Scraping
Pawleys Island	6/07	Renourishment
Debidue Island	2/96, 1/05, 3/05, 9/05	Sand Scraping
Isle of Palms	4/89, 4/96, 5/96, 10/96, 2/97, 4/97, 7/97	Sandbags, Sand Scraping, Renourishment
Isle of Palms	2/96	Sand Scraping
Isle of Palms	8/05, 9/05, 11/05, 1/06, 2/06, 4/06, 8/06, 11/06	Sand Scraping, Renourishment
Isle of Palms	5/06, 11/06	Sandbags
Sullivans Island	10/94, 9/95, 8/96, 11/96	Sandbags, Renourishment
Sullivans Island	6/97, 9/97, 12/97, 8/01	Sandbags, Sand Scraping, Renourishment
Sullivans Island	9/08	Sandbags
Folly Beach	1/97, 5/99	Sand Scraping, Renourishment
Folly Beach	12/02, 3/04	Sandbags, Sand Scraping, Renourishment
Kiawah Island	10/02, 5/05, 6/05, 8/2005, 9/05, 10/05, 12/05, 1/06, 2/06, 5/06	Sand Scraping
Kiawah Island	9/05	Sandbags
Seabrook Island	9/95	Sandbags
Seabrook Island	10/05, 5/06, 6/07	Sand Scraping
Edisto Beach	3/89, 11/91, 1/92, 5/92, 11/92, 2/93, 3/93, 4/93, 5/93, 10/93, 11/93, 2/94, 3/94, 4/94, 10/94, 1/95, 9/95, 2/99, 4/00, 4/01, 11/01, 4/02, 10/02, 2/03, 4/03, 9/03, 6/04, 3/05, 5/05, 9/05, 10/05	Sandbags, Sand Scraping, Renourishment
Harbor Island	10/05	Sand Scraping
Harbor Island	9/08	Sandbags, Sand Scraping
Hunting Island	2/93, 10/05	Sand Scraping
Hunting Island	11/93	Sandbags
Hunting Island	8/08	Sandbags, Sand Scraping
Hilton Head Island	2/85, 5/85, 10/85, 2/86, 11/86	Sandbags, Sand Scraping
Hilton Head Island	6/86	Sandbags



Figure 7: *Five gallon and 1 cubic meter sandbags protecting structures on the Isle of Palms, SC. (2007)*

Groins

Based on analysis of 2006 aerial imagery and information from some local communities, there are presently 165 groins along the oceanfront of South Carolina (Table 6). Of these, 6 are terminal groins constructed at one end of a barrier island and designed to stabilize the dynamic inlet shoreline in that area. Pawleys Island, Folly Beach, Edisto Beach, and Hilton Head Island have the most groins, combining for 125 (76%) of the state's total. The number of groins could potentially increase in the future because they are allowed in conjunction with renourishment projects under certain conditions.

Jetties and Offshore Breakwaters

There are six jetty systems in the state at the following locations: Little River (between NC and SC), Murrells Inlet, the entrance to Winyah Bay, Charleston Harbor, and Savannah River (between SC and GA). There is currently only one offshore breakwater project in the state, and that project consists of six structures along the Hilton Head Island Port Royal Sound shoreline, immediately north of Fish Haul Creek.

TABLE 6: Existing Oceanfront Groins in South Carolina		
General Area	Location	Number of Groins
Garden City Beach	S. of the intersection of Yucca St. and Waccamaw Dr.	6
Garden City Beach	Near intersection of Dolphin St. and Waccamaw Dr.	4
Pawleys Island	Terminal groin at N. end of island	1
Pawleys Island	Along entire island S. of N. Causeway Rd.	23
Debidue Island	N. of the intersection of Middleton Ln. and Beach Bridge Rd.	1
Debidue Island	Derelict timber groins – Hobcaw Tract ~ 3000' S. of Ocean Green	2
Isle of Palms	N. end of the island along Dewees Inlet	1
Sullivans Island	Adjacent to Breach Inlet at N. end of island	7
Sullivans Island	N. of Station 19 St.	1
Sullivans Island	Near Ft. Moultrie (Station 12 St.) along Charleston Harbor	4
Folly Beach	Along entire island - (~10 groins are buried)	42
Edisto Beach	From the State Park S. to Mikell St.	32
Edisto Beach	Louise and Bailey Streets, along the South Edisto River	2
Hunting Island	Terminal groin at N. end of island	1
Hunting Island	Northern half of the island - recent CSE project	6
Fripp Island	Terminal groin at N. end of island	1
Fripp Island	Between 787 and 789 Marlin Dr.	1
Fripp Island	Along southern end of island	4
Hilton Head Island	Port Royal Sound Shoreline	17
Hilton Head Island	Terminal groin on south shore of The Folly Inlet (Atlantic)	1
Hilton Head Island	South Beach shoreline in Sea Pines	6
Hilton Head Island	Terminal groin adjacent to Braddock Cove Creek (Lands End)	1
Daufuskie Island	Terminal groin at Bloody Point	1
	TOTAL:	165

Policy and Management Recommendations

As discussed previously, the Advisory Committee unanimously supports the continued prohibition of new beachfront erosion control structures, defined as seawalls, bulkheads, or revetments. The following policy and management recommendations explore potential improvements to existing federal, state, and local policies and practices regarding those hard structures that are allowed (groins, breakwaters, and temporary sandbag structures). In particular, the following policy recommendations seek to:

- 9) Establish new criteria for defining “emergency” situations and improve regulatory decision-making with regard to new proposals for temporary hard stabilization measures;
- 10) Improve guidelines for groins and breakwaters; and
- 11) Increase public awareness of beach management issues through improved real estate disclosures for beachfront property transactions.

Recommendation 9 – Refine Criteria for Emergency Orders and Sandbags

A. GENERAL RECOMMENDATION

The use of sandbags and other means of erosion control should be subject to state regulations that will offer specific, reasonable, and temporary solutions for emergency situations while minimizing negative impacts on public safety, beach access, and the health of the beach/dune system.

B. RATIONALE

As evidenced by recent Emergency Orders issued for properties on the Isle of Palms (Figure 6), there are serious deficiencies in existing policy, especially related to:

- 1) When it is appropriate to issue an Emergency Order;
- 2) What design criteria should be used for temporary structures; and
- 3) Enforcement procedures when criteria within an Emergency Order are not met (Table 5 provides a list of all prior Emergency Orders issued along SC beaches).

The goal of these recommendations is to ensure appropriate guidelines are in place to determine the circumstances under which the issuance of an Emergency Order is appropriate and what remedies are available to property owners in emergency situations. Current regulations for Emergency Orders can result in negative and severe impacts to coastal ecosystems and neighboring properties.

If sandbag revetments specifically can be used under an Emergency Order until the effects of a short-term, emergency erosion event are reversed, then they are probably a reasonable option to offer. In practice, the use of sand bags may garner time for beach nourishment planning and permitting and delay major costs associated with relocation or loss of land use without significant harm to the beach. However, there are problems with the interpretation of the appropriate use of sandbags and very few specific regulations exist to address the engineering limitations of their use.

There are several reasons for restricting sandbag usage as emergency erosion control structures:

- 1) Increased loss of access, recreational beach, and habitat over time (a well-designed sandbag revetment has the same potential to cause increased erosion at the site and along adjacent beach property as would a rock revetment or wooden bulkhead).
- 2) Debris at the site and along both adjacent and far-off shorelines from structural failure; and

3) A lack of incentives to fully consider and devise long-term erosion control plans due to practically unlimited sandbag usage.

C. NEW POLICY RECOMMENDATIONS

a) **The State of South Carolina should redefine criteria for beachfront “emergency” declarations according to the following considerations:**

1. Emergency Criteria: New regulations should differentiate predictable, typical storm and weather events from true emergency situations. Moreover, regulations should distinguish between weather-related emergencies and property-status emergencies. The most objective, predictable approach for determining if a weather-related state of emergency exists is to rely upon state of emergency declarations issued by the Governor of South Carolina or by Joint Resolution of the South Carolina Legislature.

Sandbags should only be used as a temporary emergency measure and only to protect imminently threatened structures. The intent should be that sandbags would only be allowed in the aftermath of an extreme weather event; the fact that a particular property is under severe erosion threat would not, in the absence of an immediately preceding weather event and emergency declaration, provide justification for an Emergency Order. In other words, long-term erosion problems that property owners and municipalities have failed to address should not be addressed through emergency provisions.

Emergency sandbag provisions should be subject to the following process:

- a. Following an emergency declaration by the Governor or Legislature, DHEC-OCRM may issue Emergency Orders for those communities or petitioners within the area specifically included under the declaration. The Emergency Order should establish allowable emergency measures, including the use of temporary sandbags.
- b. Property owners acting under a DHEC-OCRM Emergency Order should be required to post a bond for the eventual removal of all sandbags.
- c. Within 90 days of the issuance of a DHEC-OCRM Emergency Order, the petitioner must also provide DHEC-OCRM with an acceptable plan (1-2 pages may suffice), in writing, for:
 - i. the removal or relocation of the threatened structure; and/or
 - ii. evidence that their community has a feasible and financially viable renourishment plan for the affected area that is consistent with their approved Local Comprehensive Beachfront Management Plan (*see Recommendation #5*).
- d. If the petitioner has not provided DHEC-OCRM with an acceptable plan for removal, relocation, or renourishment within 90 days of the issuance of an Emergency Order, then the Emergency Order should be deemed to have expired at the end of the 90th day, and the sandbags should be removed at the property owners’ expense.

- e. If the petitioner’s plan is approved and calls for renourishment, then a renourishment permit application should be submitted to DHEC-OCRM within 18 months of the issuance of the original Emergency Order.
 - i. If DHEC-OCRM approves the renourishment permit, then sandbags should be allowed to remain in place for up to 12 months after the permit is issued to allow sufficient time for the project to be completed, but must be removed at the time of renourishment or at the end of the 12 month period.
 - ii. If DHEC-OCRM denies the renourishment permit application, the sandbags should be removed within 90 days of the final agency decision (including all appeals), at the property owners’ expense.
 - f. If the petitioner’s plan is approved and calls for removal or relocation of a threatened structure, this should occur within 18 months of the original Emergency Order issuance and all sandbags should be removed at that time at the property owners’ expense.
2. Repeat Emergency Orders: Local Comprehensive Beach Management Plans should include a list of all past Emergency Orders issued and plans for avoiding future Orders for the same locations (*see Recommendation #5*). In other words, if erosion vulnerabilities have been identified, then local governments should take steps to limit those vulnerabilities in preparation for future events.
 3. Types of Structures Protected: Under DHEC-OCRM Emergency Orders, sandbag use should be limited to protection of habitable structures and critical infrastructure, excluding expendable structures such as decks, steps, walkways, and swimming pools.
- b) DHEC-OCRM, in coordination with stakeholders, should re-evaluate the use of sandbags, according to the following considerations:**
1. Siting: Under DHEC-OCRM Emergency Orders, temporary sandbag revetments should be required to be placed as landward as possible to provide more stable protection for the owner.
 2. Bag Material: Fabrics should be a single layer with a tensile strength of 250-600 pounds, and be treated to resist damage from sunlight. This strength range includes most bags presently in use, but prevents the use of heavier and more permanent protection. Bags untreated for sunlight can have a very short structural life, but last for a long time as beach/ocean debris. Biodegradable bags should not be permitted due to a short structural life.
 3. Bag Size: To avoid unintended movement of bags by waves, and to provide substantial temporary stability, sand bags with dimensions of 3 to 5 feet in width and 7 to 15 feet in length should be used.
 4. Bag Fill Material: Bag fill material should be compatible with the sand or natural beach material located at the specific site where sandbags are used.

5. Structure Design: All sandbags should be placed parallel to the shoreline. To promote removal, revetments built from sandbags should generally be limited to a base width of 20 feet and a height of 6 feet, unless supported by site-specific engineering considerations. Public access should also be strongly considered in the design.
6. Enforcement: Clear and consistent enforcement measures and consequences for violations should be delineated prior to issuance of any order (fines, future eligibility, etc.). DHEC-OCRM should have authority to require the petitioner to remove sandbags, or to use proceeds from the deposited bond to begin removal and clean-up, if specifications are not followed.

Any regulatory changes would require approval from the DHEC Board for promulgation pursuant to the SC Admin. Procedures Act (SC Code Ann. § 1-23-10 et seq.), which requires review by the SC General Assembly, and must be authorized under existing statutes.

Any statutory changes would require legislative action by the South Carolina General Assembly.

D. NEW PLANNING AND MANAGEMENT ACTIONS

- 1) If Emergency Orders issued by the Governor or the Legislature are not incorporated as the necessary pre-condition for issuance of a permit, there should be careful consideration of alternative approaches, such as allowing DHEC-OCRM to declare emergencies. Again, the use of sandbags should not be a regular occurrence, but rather a true emergency measure aimed at addressing once-in-a-decade or less frequent events.
- 2) Preparation for emergency conditions should be addressed through Local Comprehensive Beach Management Plans, including an emergency plan as well as a long term renourishment or relocation plan.
- 3) A technical manual with design standards and options for temporary erosion control solutions should be developed and provided by DHEC-OCRM to communities, contractors, and homeowners.

E. EXISTING POLICIES AND PROGRAMS

Under SC Code § 48-39-130(D), during an emergency, the normal permitting requirements for altering critical coastal areas may be waived. An Emergency Order must first be issued by an “appointed official of a county or municipality or of the state, acting to protect the public health and safety, upon notification to the department.” *Id.* When the Emergency Order pertains to a beach or dune critical area, “only the use of sandbags, sandscraping, or renourishment, or a combination of them, in accordance with guidelines provided by the department is allowed.” *Id.*

SC Code § 48-39-10(U) defines “emergency” as “any unusual incident resulting from natural or unnatural causes which endanger the health, safety or resources of the residents of the state, including damages or erosion to any beach or shore resulting from a hurricane, storm or other such violent disturbance.”

Under SC Administrative Regulation Section 30-5(B)(1), the official declaring the emergency must notify DHEC-OCRM regarding the nature of the emergency, the substance of the order, when the order was or will be issued, the location of the activity, and when the Emergency Order will likely be withdrawn. 30-5(C) imposes penalties if notice is not given or found lacking.

Regulation 30-15(H) describes what types of Emergency Orders are allowed regarding beach/dune critical areas (seaward of baseline).

Sandbags may be used under the following criteria to construct temporary protection for coastal structures if the local official determines a structure to be in imminent danger.

- (a) The bags shall be biodegradable and be commercially manufactured for the purpose of holding sand.
- (b) The bags, when filled, shall be a maximum size of 5 (five) gallons or 0.66 cubic feet and must be filled and installed by hand.
- (c) The bags may be placed no farther seaward than is necessary to protect the structure or to repair an erosion control structure. In no case may sandbags protect a dune or be used to retard normal shoreline movement.
- (d) The bags shall be stacked at an angle not steeper than 45 degrees.
- (e) Only clean sand may be placed in the bags. Beach sand may be used to fill the bags provided the sand is returned to the beach when the bags are removed.
- (f) The property owner is responsible for the day-to-day maintenance of the sandbags to insure that they remain in place and in good repair. The property owner is responsible for the complete removal of the bags when so ordered by the Department (DHEC-OCRM).

Section 10 of the Rivers and Harbors Act regulates the construction, excavation, or deposition of material in, over, or under “navigable waters of the US,” or any work which would affect the “course, location, condition, or capacity” of those waters. Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into “waters of the US.”

F. GENERAL COSTS AND BENEFITS

The cost of Emergency Orders, including the placement of sandbags meeting the proposed criteria (material sources for bags and fill, plus installation, maintenance, and removal) should be

identified. Along with the proposed limitations on the use of sand bags, the high cost of implementation should be incentive to consider pre-planned alternatives like beach nourishment.

G. MEASURES OF SUCCESS

Success will be determined by a reduction in the number of (and frequency of) Emergency Orders.

Success can also be measured by the number of sandbags removed, or a general reduction in time between the placement and removal of bags.

H. FEASIBILITY ISSUES

Revising current regulations to restrict a proliferation of sandbag usage highlights the need for improved real estate disclosures, including information about erosion rates, past Emergency Orders, nearby Emergency Orders, etc. (*see Recommendation #11*).

Potential lawsuits and/or controversies may arise if a property owner loses value as a result of their inability to protect their property in certain situations. The most challenging aspect may be state criteria for “emergency” declarations.

The proposed regulations will be effective only if the public is fully aware of stricter limitations on declaring emergencies, and therefore accepts the risk of owning beachfront property and takes measures to plan for mitigating the risk.

I. KEY UNCERTAINTIES/ASSUMPTIONS

Larger sandbags may be more difficult to remove from the beach. In North Carolina, some vandalism (slicing open large bags) has also been experienced.

The extent of future emergency declarations and demand for temporary erosion control solutions is unknown.

The sustainability (affordability) of renourishment practices to address chronic and sudden erosion resulting from storm events is unknown in the long-term.

J. EXAMPLES FROM OTHER STATES OR AREAS

Florida

Under Florida statute 252.36., the governor may declare coastal erosion emergencies, and so may the Secretary of the Florida Department of Environmental Protection as authorized under 120.569(2)(1).

North Carolina

Sandbags are intended to provide temporary protection to imminently threatened structures (erosion scarp within 20 feet of structure) while their owners seek more permanent solutions, such as beach nourishment or relocation of the structure. Temporary sandbag structures are used to protect only the principal structure and its associated septic system, but not such appurtenances as gazebos, decks or any amenity that is allowed as an exception to the erosion setback requirement. A permitted sandbag structure may remain in place for up to two years after the date of approval if it is protecting a building with a total floor area of 5,000 square feet or less, or, for up to five years if the building has a total floor area of more than 5,000 square feet or if the structure is protecting a bridge or a road. The property owner shall be responsible for removal of the temporary structure within 30 days of the end of the allowable time period. An imminently threatened structure can be protected only once, regardless of ownership. Also, under General Statute § 113A-118, the Secretary of the Department of Environment and Natural Resources must declare an emergency.

K. BARRIERS OR CONCERNS

Committee members agree that some limits on the sand bag systems, dimensions, and applications are warranted. However, some committee members expressed concern that policy recommendations for sand bag system designs should be left to the determination of licensed engineering and science consultants and should be handled on a site-by-site basis versus applying a “one size fits all” approach.

Committee members discussed whether the timeframes proposed here for removal of the temporary bags were appropriate. If less time were allowed, there may be insufficient time to arrange financial resources, permits, coordination, engineering, etc. If longer than the proposed timeframes, then there was concern that the sand bag systems would become in essence permanent structures or erosion control devices.

Based on experiences in both North Carolina and South Carolina that are described in this section, it is the opinion of some committee members that sandbags simply should not be an allowable option as temporary erosion control solutions.

Committee members discussed whether sandscraping should be allowed under locally-declared Emergency Orders or should be subject to the same restrictions proposed here for sand bags. Some Committee members believe that sandscraping and sand bags should only be allowed following a state emergency declaration because they are temporary solutions that should not be substitutes for proactive planning. Other Committee members believe that sandscraping should be authorized under locally-declared Emergency Orders. The Committee generally acknowledges that sandscraping may not have the same long-term negative impacts as sand bags, but can cause short-term impacts to sea turtle nesting, and can prove ineffective in protecting property since it lowers the beach profile in front of the threatened structures (which can intensify erosion).

Recommendation 10 – Improve Guidelines for Groins and Breakwaters

A. GENERAL RECOMMENDATION

DHEC-OCRM policies and regulations provide some limited restrictions on the construction and use of groins and offshore breakwaters. Strengthened siting and design standards should be considered by DHEC-OCRM during reviews of new groin or breakwater proposals. In addition, ownership and responsibility should be determined for all existing groins in order to negotiate removals of any that are no longer needed or are causing adverse downdrift impacts.

B. RATIONALE

The SC Beachfront Management Act currently allows for the permitting of groins as a shore erosion control mechanism, with certain limitations. Groins are defined as “usually perpendicular to the shore...” and “vary in length from less than one hundred feet to several hundred feet” (R.30-1(D)(26)). Groins are usually constructed as a pile-supported wall or using large rock, and are designed and installed to stabilize beachfront areas by trapping sand undergoing littoral drift. Table 6 lists existing groins in South Carolina (165); new groins are only allowed in conjunction with a financial commitment to renourishment and on beaches that have high erosion rates, with erosion threatening existing development or public parks (R.30-15(G)). However, it is anticipated that an increasing number of locations along the coast will eventually qualify for new groins under these criteria. The use of groins may prove ineffective in preventing beach migration over the long term, can induce localized or “downstream” erosion, and can pose a safety hazard to the general public. Groins are not considered erosion control structures in South Carolina, but they are considered as such in many states including Florida and North Carolina.

Offshore breakwaters are shore-parallel structures that are similar to traditional erosion control devices; however, breakwaters are placed beyond the littoral zone in an attempt to reduce wave energy affecting adjacent shores. Jetties are shore-perpendicular structures (typically much longer than groins) that are constructed on either side of an inlet and designed to keep navigation channels from filling with sediment. DHEC-OCRM regulations presently allow jetties and offshore breakwaters under certain conditions (R.30-13(N)(1)):

“Jetties and offshore breakwaters interfere with the natural transport of sediment and therefore require special permits. They shall only be permitted after thorough analysis of the project demonstrates that there will be no negative effect on adjacent areas. The following standards shall apply:

- (a) A bond may be required to ensure that necessary remedial steps are taken to alleviate any adverse effects on adjacent areas caused by the installation of these structures. These remedial steps may include redesign and reconfiguration of the structures or even complete removal.

- (b) A monitoring plan to assess post-project impact on adjacent areas must be approved by the Department prior to the issuance of a permit.
- (c) Construction activities shall be scheduled so as not to interfere with nesting and brood-rearing activities of sea birds, sea turtles, or other wildlife species.
- (d) Where feasible, jetties shall be designed to provide public recreational fishing opportunities.
- (e) The applicant must have written approval from the local government which has jurisdiction in the area where the project is proposed.

While breakwaters do require “special permits,” the above criteria do not contain specific design or siting standards for DHEC-OCRM decision-making.

There is currently only one offshore breakwater project in South Carolina. That project, which includes six structures, is located along the Hilton Head Island/Port Royal shoreline immediately north of Fish Haul Creek.

C. NEW POLICY RECOMMENDATIONS

Specific policy recommendations are pending results of the management activities described under subsection (D).

D. NEW PLANNING AND MANAGEMENT ACTIONS

- 1) **An ad hoc Technical Committee should be established by DHEC-OCRM to recommend specific design and siting standards, as well as review considerations, for future proposals for groins and breakwaters along the South Carolina coast.**

The following aspects should be considered and addressed by the Committee:

- i) **Siting Criteria**
The Technical Committee should determine beachfront locations where groins or breakwaters are considered inappropriate.
- ii) **Design Standards**
The Committee should develop specific standards for the types of materials that may be used in construction such as rock, concrete, steel, or other hard structures. The Committee should also evaluate structural designs with respect to public safety concerns.

The Committee should propose guidance for breakwater design and placement as well as determining the length, spacing, and number of groins for standard beach zones and inlet zones. The Committee should suggest appropriate design approaches, such as “tune-able” groins for sand bypassing around groins in inlet zones. Tune-able groins provide

adjustable design features, such as the crest height and/or permeability, for purposes of augmenting the groin's sand retention performance and managing downdrift sediment transport rates. Adjusting crest elevations of the groins is analogous to the control of lake storage via adjustable weir sections or gates (i.e., one uses crest elevation adjustments to control how much sediment is stored on one side or the other of a groin). Likewise an analogy to controlling permeability is observed in the application of airflow flaps used to control descent by a parachutist (i.e., one uses groin permeability to control sediment flow).

iii) Adverse Impacts

The Committee should evaluate or determine adverse impacts from proposed or existing groins or breakwaters, and under what circumstances removal should be required.

iv) Abandonment / Failure

The Committee should evaluate or determine at what point the abandonment or failure of a structure is met, and under what circumstances removal should be required.

v) Monitoring Parameters

The Committee should identify appropriate monitoring methods, parameters, and timelines to determine project performance.

2) DHEC-OCRM should leverage additional expertise in reviewing all proposals for new groins and breakwaters.

For example, DHEC-OCRM could develop a more robust peer-review process, and should consider the USACE Independent Technical Review (ITR) process (ER 1110-2-1150, "Engineering Regulation for Engineering Design"): "All engineering documents [and products produced by the District] require an Independent Technical Review (ITR). The members of the ITR team may be District personnel, contract personnel, non-federal sponsor's personnel, or engineers from other sources. The District may use the ITR team in the coordination of special and complex problems as long as such action does not compromise the independence of the ITR team." DHEC-OCRM should also consider expanding in-house staff expertise in coastal engineering.

3) DHEC-OCRM staff should undertake a concerted effort to determine ownership of all existing groins.

In many cases, ownership/responsibility may be disputed, and could range from the State Department of Transportation, to local communities, to private resorts. Additionally, bonds to ensure removal should be included with all new groin or breakwater projects in the event that adverse impacts are identified.

DHEC-OCRM staff will be required to perform all necessary administrative and field duties upon policy implementation. Field duties may include a baseline survey to determine the number of existing groins, as well as their ownership, composition, and functional condition.

E. EXISTING POLICIES AND PROGRAMS

This policy and management recommendation is directly related to existing authorities and procedures followed by DHEC-OCRM under the South Carolina Coastal Tidelands and Wetlands Act: SC Code §48-39-250 et seq., SCDHEC-OCRM Critical Area Permitting Regulations (R 30-1 et seq), and the South Carolina Beachfront Management Plan (R 30-21).

The U.S. Army Corps of Engineers has direct permit authority to evaluate applications for certain activities in the Nation's water pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Section 10 of the Rivers and Harbors Act regulates the construction, excavation, or deposition of material in, over, or under "navigable waters of the US," or any work which would affect the "course, location, condition, or capacity" of those waters. Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into "waters of the US." A permit must be issued by the USACE prior to constructing such structures as groins, revetments, and breakwaters.

F. GENERAL COSTS AND BENEFITS

Existing groins that are maintained would not be impacted by these policy recommendations. Problematic groins that require removal would likely involve expensive operations. The "expanded" beach management trust fund called for under Recommendations #4 and #5 of this report could also be used to offset costs of groin removals where consistent with Local Comprehensive Beach Management Plans.

Wherever dysfunctional groins are removed or new groins or breakwaters are not allowed, adjacent property owners will be forced to use alternative methods of erosion control that are both acceptable and affordable (such as more frequent renourishment projects). As with other restrictions on erosion control solutions, eventually sea level rise, storms, and chronic erosion are expected to force the abandonment of some shoreline properties.

On the other hand, groins can pose public safety risks, are often perceived as having negative impacts on aesthetics and recreational opportunities, and can negatively impact the health of the beach and dune system and endangered/threatened species. Over the long-term, these societal values and the tourism revenues that depend on healthy beach/dune systems in our state are expected to outweigh the impacts to individual property owners. In addition, there should be fewer conflicts between downdrift properties that believe, correctly or incorrectly, that nearby groins or breakwaters are accelerating erosion along their shoreline.

G. MEASURES OF SUCCESS

- Successful removal of dysfunctional groins.
- Improved decisionmaking and project designs for groins and breakwaters.

H. FEASIBILITY ISSUES

- Determining groin ownership may be very difficult in many cases.
- Groins are extremely controversial and any new regulations will be politically sensitive.

I. KEY UNCERTAINTIES/ASSUMPTIONS

- Total costs to remove any structure determined to be destroyed may vary substantially depending on type, size and number of structures to be removed. Inflation will certainly cause an increase in costs over time.
- Similar to sand bags, will ‘soft’ groins be allowed as a temporary measure in conjunction with renourishment projects or as an emergency measure after a storm? If so, how long will they be allowed to remain in place?
- To what extent will local governments be held responsible for groin installation or removal? Will they be required to contribute money and or man-power to install or remove groins when destroyed?
- How will this affect ‘terminal groins’ used to stabilize inlets or to preserve navigation?
- Should beneficiaries of successful breakwater projects (i.e. local governments) be required to provide financial or other assistance toward long term maintenance of the structure?

J. EXAMPLES FROM OTHER STATES OR AREAS

Florida

Florida Statute 161.061 (1) states that “any coastal construction, or any structure including groins, jetties, moles, breakwaters, seawalls, revetments, or other structures... which serves no public purpose, which is dangerous to or in any way endangers human life, health, or welfare, or which proves to be undesirable or becomes unnecessary, as determined by the department, shall be adjusted, altered, or removed by the abutting upland property owner after written notice by the division.”

North Carolina

North Carolina Statute 15A NCAC 07H .0308 (a)(1)(B) states that “permanent erosion control structures may cause significant adverse impacts on the value and enjoyment of adjacent properties or public access to and use of the ocean beach, and, therefore, are prohibited. Such structures include bulkheads, seawalls, revetments, jetties, groins and breakwaters.”

New York

New York State Coastal Policy 13 states that “the construction or reconstruction of erosion protection structures shall be undertaken only if they have a reasonable probability of controlling erosion for at least thirty years as demonstrated in design and construction standards and/or assured maintenance or replacement programs.”

Oregon

Oregon Statewide Planning Goal 18 Implementation Requirement 5 states that “permits for beachfront protective structures shall be issued only where development existed on January 1, 1977.” In these cases, the criteria for review of all shore and beachfront protective structures provide that visual impacts are minimized, necessary access to the beach is maintained, negative impacts on adjacent property are minimized, long-term or recurring costs to the public are avoided.

K. BARRIERS OR CONCERNS

None identified.

Recommendation 11 – Expand Beachfront Real Estate Disclosure Requirements

A. GENERAL RECOMMENDATION

South Carolina should establish stronger rules for real estate disclosure to provide coastal property buyers information of the potential perils associated with developing or purchasing property seaward of the DHEC-OCRM oceanfront setback line. The intent is to ensure that buyers receive proper warning if the property under consideration is subject to special regulations concerning beach erosion, and if the property currently or previously used erosion control methods to address chronic erosion or storm-related damage.

B. RATIONALE

Most oceanfront property is vulnerable to natural forces such as storms and beach erosion, which can pose threats to a property and undercut its value. Additionally, sea level has risen about one foot during the last century, causing most beaches to migrate landward. In many cases, beach renourishment projects have kept pace with sea level rise and erosion, but it is not always clear to a prospective oceanfront property buyer whether the beach is natural or artificial. For private investment decisions, better information must be disseminated on coastal processes, reasonable use of property, and personal responsibility. For example, a prospective property buyer needs to know if future commitment to beach renourishment will be required to maintain the beach in its current condition. Prospective buyers also need to understand that flood insurance will cover damages caused by flooding resulting from hurricanes and other catastrophic events, but it will not cover damages due to chronic, long-term erosion. Full disclosure of historical shoreline changes, beachfront management issues, and past erosion problems should be provided to prospective buyers at the time that property is shown, or at least before writing a contract, rather than at the time of closing on property.

Stronger real estate disclosure rules for coastal property are needed to limit the transfer of at-risk properties to unsuspecting buyers. Increased disclosure requirements would also protect sellers and their agents from potential lawsuits over not fully disclosing a property's history. Knowing a property's erosion rates and erosion control history as well as the applicable DHEC-OCRM regulations would educate a prospective buyer about the potential risk of ownership, rules for rebuilding within the jurisdictional setback area, and the erosion control options allowed should erosion threaten the property.

C. NEW POLICY RECOMMENDATIONS

- a) **SC real estate disclosure requirements should be amended to include all known information pertaining to beachfront management and property-specific erosion and erosion control histories, including:**

1. Background information on coastal processes, and beachfront management including state jurisdictional lines and regulations governing those areas;
2. Existing erosion control structures on the property, including location, size, and type;
3. Historical erosion rates for the property and dates of any known past significant erosion events;
4. Dates of any known past Emergency Orders or sandbag placements; and
5. Dates of any known past beach renourishment projects and vulnerability of future funding for additional projects.

As part of the disclosure process, all buyers of any beachfront property should be provided copies and should be strongly encouraged to read, at a minimum, the available “State of the Beaches” reports issued annually by DHEC-OCRM and the pamphlet “Q&A on Purchasing Coastal Real Estate in South Carolina,” published by DHEC-OCRM, SCDNR, and the SC Sea Grant Consortium. This pamphlet is a particularly good resource for potential buyers since it clearly discusses the Beachfront Management Act, DHEC-OCRM regulations, coastal hazards, and flood insurance. Additionally, for properties that are currently seaward of the DHEC-OCRM setback line, the language used in the existing disclosure addendum (as described in subsection E below) should continue to be provided by DHEC-OCRM staff.

Beach Reports: <http://www.scdhec.gov/environment/ocrm/pubs/reports.htm#beaches>

Q&A Pamphlet: http://www.scdhec.gov/environment/ocrm/pubs/docs/qa_realestate.pdf

- b) Buyers and sellers should be required to sign contractual documents or affidavits indicating their knowledge of the potential risks associated with a specific property, and their receipt and review of the information listed above, prior to the time of closing.**

The Beachfront Management Act provides statutory authority that would encompass the above recommendations without necessary changes. However, the Residential Property Condition Disclosure Act (SC Code Ann. § 27-50-10 et. seq.) does not reference beachfront disclosure requirements. Any changes to that statute to complement the Beachfront Management Act would require legislative action by the South Carolina General Assembly.

Disclosure statement language is governed by the South Carolina Real Estate Commission. Any changes to disclosure language would require approval from that agency, and any regulatory change would require promulgation pursuant to the SC Administrative Procedures Act (SC Code Ann. § 1-23-10 et seq.). Support from the South Carolina Association of Realtors would be important to this process.

D. NEW PLANNING AND MANAGEMENT ACTIONS

- 1) DHEC-OCRM would support the South Carolina Association of Realtors by providing the required data on jurisdictional beach line locations and regulations governing activities in those areas; location, size and type of erosion control structures; historical

erosion rates; issuance of any Emergency Orders; past renourishment projects at that location; and other beachfront management and coastal processes information; on a case-by-case basis and within a specified amount of time after the request is received. DHEC-OCRM would potentially need additional staff to work on this effort, reliable and on-demand internet access to data, and periodically updated data.

E. EXISTING POLICIES AND PROGRAMS:

Section 48-39-330 of the SC Beachfront Management Act requires the following:

“Thirty days after the initial adoption by the department of setback lines, a contract of sale or transfer of real property located in whole or in part seaward of the setback line or the jurisdictional line must contain a disclosure statement that the property is or may be affected by the setback line, baseline, and the seaward corners of all habitable structures referenced to the South Carolina State Plane Coordinate System (N.A.D.-1983) and include the local erosion rate most recently made available by the department for that particular standard zone or inlet zone as applicable. Language reasonably calculated to call attention to the existence of baselines, setback lines, jurisdiction lines, and the seaward corners of all habitable structures and the erosion rate complies with this section.”

In an effort to satisfy the requirements of Section 48-39-330 of the Beachfront Management Act, there is currently an addendum to real estate contracts for properties that are seaward of the DHEC-OCRM setback line. The addendum includes the property’s erosion rate, distances from the baseline and setback line, and width of the FEMA flood zone, but this form is often poorly understood.

The addendum currently used to comply with the Beachfront Management Act states the following:

“COASTAL TIDELANDS & WETLANDS ACT: This property is subject to regulation of use by the Coastal Tidelands & Wetlands Act, § 48-39-10, et. seq., 1976 South Carolina Code of Laws, as amended, and part of (all of) this property is seaward of the setback line/and the minimum setback line/ and baseline/ and has an erosion rate of _____ feet per year, all as adopted by [DHEC-OCRM] on July 1, 1988. This property is also (part of this property is) within the velocity zone as determined by Federal Emergency Management Act. More specifically, the setback line is _____ feet (or from _____ feet to _____ feet) from the seaward property line; the baseline is _____ feet (from _____ feet to _____ feet) from the seaward property line. The velocity zone is _____ feet wide (from _____ to _____ feet wide) starting at the seaward property line and moving landward. The seaward corners of the habitable structures on this property are located _____ feet, _____ feet, etc., from the seaward property line. This information is shown with more particularity on that certain plat made by _____, dated _____, filed in Plat Book _____, page _____, Clerk of Court's Office for _____ County, a copy

of which is attached hereto/reference to which is hereby prayed for a more complete disclosure.”

F. GENERAL COSTS AND BENEFITS

Costs to implement this policy would be incurred by current owners of beachfront property and by state agencies. Because risks associated with purchasing beachfront property would be more transparent, there is the potential for the value of the current property to be affected. Additionally, there would be real associated cost for DHEC-OCRM to implement this policy including increased staff time, data acquisition, monitoring efforts and other informational needs.

The main benefit of increased real estate disclosure is the improvement in consumer protection. Prospective beachfront property buyer would assume a greater benefit from education of potential risks associated with erosion problems and knowledge of what steps may be legally taken to address these problems should they be encountered. Since buyers would know the implications and hazards of living on the beachfront at the time of purchase, they could begin planning for potential erosion problems in the future. An additional benefit would include the protection of the seller and realtors from lawsuits claiming that erosion information was knowingly withheld.

G. MEASURES OF SUCCESS

Success of implementing this policy could be interpreted by measuring indicators such as:

- Reduction in lawsuits against sellers or their agents claiming that erosion information was knowingly withheld.
- Fewer permit requests for illegal erosion control devices within the state’s beachfront jurisdiction.
- Faster permit application process and review periods due to increased knowledge of erosion mitigation options allowed on beachfront property.

H. FEASIBILITY ISSUES

The South Carolina Association of Realtors and other groups may be hesitant to support expanded disclosure requirements. Increased disclosure would also require significant coordination between Realtors and DHEC-OCRM to acquire property-specific data as outlined in section C.

Providing property-specific data for each beachfront property also raises concerns about the need for increased DHEC-OCRM staff time, reliable on-demand internet access, and updated and official data. The intent of this recommendation is not to delay real estate transactions, but some additional time may be needed to locate property-specific erosion data in some instances. The state should ensure sufficient staff and data resources are in place before implementation of this recommendation.

I. KEY UNCERTAINTIES/ASSUMPTIONS

Determining the erosion history of a particular property, such as past erosion events or the extent of past renourishment projects, may be complicated. In addition, some erosion control structures have been buried by renourishment projects, making it difficult to verify if there is an erosion control structure on a property.

J. EXAMPLES FROM OTHER STATES OR AREAS

Texas

Disclosure law requires that closing documents include information regarding the risks associated with purchasing coastal property. A disclosure notification entitled “Addendum for Property Located Seaward of the Gulf Intracoastal Waterway”, promulgated by the Texas Real Estate Commission, provides potential buyers notice of legal and economic risks including statements that the purchaser is assuming economic risks over and above the that involved with inland property. Additionally, the addendum states that the coastal property may become located on public beach due to erosion or storm events, and that the purchaser may be ordered to remove any structure that becomes seaward of the vegetation line. Although the addendum notices the potential for property to become located on public beach, many buyers remain unaware that they may lose their land due to the erosion.

The addendum encourages potential buyers to seek additional information and the advice of a legal professional to determine if the value of the property may be affected by Texas statutes. The buyer is also warned not to sign the addendum without fully understanding the assumed risk.

Florida

The Florida Coastal Properties Disclosure Statement, which was amended during the 2006 legislative session, targets all property seaward of the Coastal Construction Control Line (CCCL). The CCCL is the portion of the beach-dune system subject to severe fluctuations based on a 100-year storm surge, storm waves, or other predictable weather conditions. The seller of any property seaward of the CCCL is required to give a written disclosure statement in the following form:

“The property being purchased may be subject to coastal erosion and to federal, state, or local regulations that govern coastal property, including the delineation of the coastal construction control line, rigid coastal protection structures, beach nourishment, and the protection of marine turtles. Additional information can be obtained from the Florida Department of Environmental Protection, including whether there are significant erosion conditions associated with the shoreline of the property being purchased.”

Oregon

The Oregon Coastal Management Program partnered with Oregon Sea Grant to create a DVD entitled Living on the Edge, Building and Buying Property on the Oregon Coast. The video is

intended to influence the behavior of prospective coastal property buyers and builders by educating them on the unique risks that come with developing along the ocean shore.

Alaska

The State of Alaska's Residential Real Property Transfer Disclosure Statement includes a section where sellers must disclose any environmental concerns about their property. Specifically, the seller is required to indicate whether they are "aware of any erosion/erosion zone or accretion affecting the property?"

K. BARRIERS OR CONCERNS

None identified.



GOAL 4. ENHANCE THE MANAGEMENT OF SHELTERED COASTLINES

“These same unique natural resource areas face increasing land development pressure and negative impacts from human activities in and around them. The marshes constitute a fragile ecosystem; consequently, indiscriminate dredging and filling, degradation of water quality or unsound building and development practices can have long-term detrimental effects” (R. 30-1(B)(6)).

Overview

Salt marshes provide numerous ecosystem services, including nursery habitat for fish and crabs, nutrient filtering and cycling, and high rates of primary productivity (NRC, 2007). Many commercially and recreationally important fish and shellfish species depend on marshes and estuaries for all or part of their life cycle, and many other forms of wildlife utilize wetlands as habitat and a source of food (R. 30-1(B)(2)). In addition to these ecosystem services, marshes protect adjacent uplands from erosion and storm damage by absorbing and dissipating wave energy and establishing a root system to stabilize sediments (R. 30-1(B)(3)). However, some marsh environments may be lost in the future as development and armoring of estuarine shorelines continues to increase at a rapid pace.

From a regulatory perspective, South Carolina’s Critical Area includes coastal waters (navigable, saline waters subject to the ebb and flood of the tide shoreward to the mean high water mark) and tidelands (land at or below high tide including coastal wetlands, mudflats and similar areas adjacent to coastal waters and integral to estuarine systems) (R. 30-1(D)). The boundaries of the Critical Area are designated by DHEC-OCRM, and in turn determine when state critical area permits are required. Critical areas are dynamic and subject to change over time, so permits are evaluated on an individual basis. Unlike the state’s oceanfront shorelines, estuarine shorelines do not have similar policies related to “retreat,” setbacks, or prohibitions on erosion control structures. Developments are generally not permitted to encroach into tidal marshes, including the transitional banks of the marshes. The number of permit applications for bulkheads and revetments appears to be somewhat constant over the past few years, but permits are not required for erosion control structures built immediately landward of the “Critical Line” as defined by DHEC-OCRM.

South Carolina’s policies for erosion control in the estuarine environment are intended to prohibit erosion control structures in those areas where it is not advantageous for such a structure (SC Code § 48-39-120(B)). The SC Coastal Tidelands and Wetlands Act does not specifically define those areas that are most advantageous for erosion control structures, but the SCDHEC-OCRM Critical Area Permitting Regulations prohibit erosion control devices (bulkheads and revetments) in areas where marshlands are adequately serving as an erosive buffer or where public access would be adversely affected (R. 30-12(C)). Erosion control structures are allowed when there are no erosive buffers (marshlands) and public access is not affected, provided that a minimal amount of fill (\leq 18 inches per erosion control structure) is needed (R. 30-12(C)).

DHEC-OCRM has the authority to remove all erosion control structures that have an adverse effect on the public interest (SC Code § 48-39-120(C)).

Status and Trends

South Carolina has 187 miles of ocean frontage, approximately 2,875 miles of estuarine shorelines (includes estuaries, bays, and barrier islands), and over 500,000 acres of salt marsh (SCDHEC-OCRM, 1979; SC Sea Grant Consortium, 2007). Estuarine shoreline changes are affected by a number of anthropogenic and natural processes that are not well understood including channel dredging, boat wakes, and sea level rise. New and ongoing research will improve understanding of the drivers and succession sequences of estuarine shoreline changes in the state. For example, the North Inlet-Winyah Bay National Estuarine Research Reserve is studying the spatial dynamics of emergent salt marsh to address long-term changes in the community and inland migration of marsh and forest zones in response to sea level rise. In the short-term, this project will assess marsh vegetation spatial responses to soil changes and flooding (Smith and Buck, 2008). In an urban setting, another study found that estuarine shoreline erosion was caused by steep slopes and high sand content, but oyster beds helped to reduce erosion rates (Chose, 1999). In the Palmetto Bluff Development (Beaufort, SC), the U.S. Geological Survey's Digital Shoreline Analysis System and aerial imagery successfully assessed long-term erosion rates, and short-term erosion rates were measured in field studies. The short-term rates were in agreement with measured long-term rates (~0.4 m/yr) and indicated that the system is in an erosional state but unaffected by human activity in the area (Goodwin, 2007).

To better estimate shoreline erosion rates, at least two digital shorelines over a long period of time are required. Currently, there are no existing digital shorelines suitable for large-scale estuarine shoreline erosion and change analysis in South Carolina. However, in response to initial meetings of the Advisory Committee that identified this research need, DHEC-OCRM is working with the SC Dept. of Natural Resources Geological Survey to investigate existing shoreline data and protocols for estuarine shoreline change analysis in the state. These outcomes will be presented at a future workshop, and a standard protocol for classifying and measuring estuarine shorelines will be discussed.

The percentage of estuarine shoreline that is hardened is presently unknown, and trends are difficult to evaluate because permits were not consistently tracked prior to 2001. Since 2001, DHEC-OCRM has issued 835 permits for bulkheads or seawalls and 188 permits for riprap or revetments along eroding estuarine shorelines (Figure 8). This large number of permits in the last decade indicates that erosion is a common concern along South Carolina's estuarine shorelines.

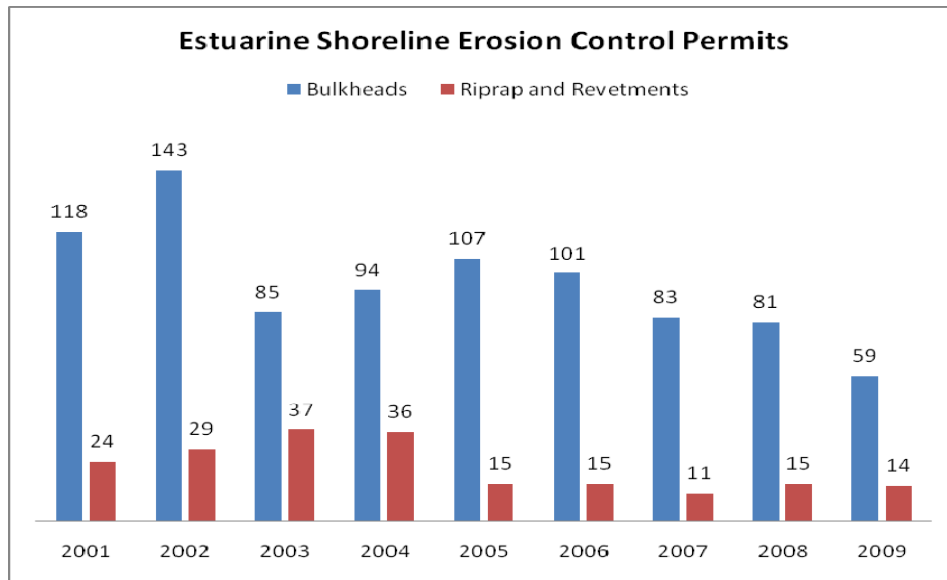


Figure 8: *Permits issued for estuarine shoreline erosion control structures in South Carolina’s Critical Area. From 2001 through 2009, approximately 1,067 permits have been issued. Figure modified and updated from Tibbetts, 2007.*

Alternative Estuarine Shoreline Stabilization

Alternative or “living shoreline” stabilization projects typically use natural materials such as oyster shells or plantings to mitigate estuarine shoreline erosion. The following is a list of past and present alternative estuarine shoreline stabilization projects that have been implemented in South Carolina:

- An alternative shoreline stabilization project at the North Inlet-Winyah Bay National Estuarine Research Reserve (NERR) used a cellular concrete mat system sold under the brand name Armorflex© (by Contech Construction Products) along a 150 ft estuarine shoreline that had a 40 ft highly erosional area. Coastal EcoScapes produced native vegetation that was planted in April 2008. Monitoring for water quality, oyster recruitment, and biomass vegetation surveys will be conducted over three years.
- The SC Oyster Restoration Project established twenty-four sites between 2001 and 2003, and monitoring from seven of these sites indicates that polypropylene mesh bags filled with shell help to stabilize the shoreline. Reef development and success occurred after two years, and the project included extensive public outreach and education (Hadley, 2007). Construction of an expanded oyster reef resulted in 8 m of marsh growth for a previously eroding tidal creek shoreline in Palmetto Islands County Park (Coen and Hadley, 2005).
- In 1996, 1,080 bushels of oyster shells were distributed along 350 ft of Hobcaw Creek in Charleston Harbor to examine shoreline erosion suppression. Three treatment areas (polypropylene netting, reinforcing wire and uncovered) examined shell stability. Initial bi-monthly sampling indicated the uncovered areas were more conducive to propagating

vertical intertidal oyster populations. However, maintenance planting (adding additional shells) is necessary in high wave energy environments (Anderson, 1997; Anderson, pers. comm.).

Local Government Buffer Guidelines

Undeveloped shoreline “buffer” or setback areas are often established through state or local shoreline management policies in order to enhance water quality (by “filtering” surface and groundwater discharges from developed areas), allow for natural marsh migration, preserve views from the water, conserve unique and important habitats, provide for recreational opportunities and public access (e.g. shoreline trails), or protect life and property from erosion, flooding or storm surge. South Carolina does not have statewide estuarine shoreline buffer rules, but the following examples represent a list of local governments that have established riparian buffer guidelines:

- **Beaufort County** requires a 50 ft buffer along tidal waters and wetlands (SC General Assembly LAC, 2007). Beaufort County requires critical river buffers (Zoning Development Standards Ordinance, Sec. 106-1845), and buffers are also part of the stormwater ordinance’s Best Management Practices (BMP) manual (Ahern, pers. comm.)
- **Charleston County** has landscaping buffers (9.5.4), and land use required buffers are determined by guidelines in 9.5.4-B (a-d). Charleston County requires wetland, waterways, and DHEC-OCRM critical line buffers that are 15 or 35 ft as described in 9.7.1 B1 (Charleston County Zoning and Land Development Regulations Ordinance, 2008).
- **Dorchester County**’s Ashley River Historic District Overlay Zone requires a ≥ 200 ft buffer along the Ashley River Corridor’s District 1 and includes natural vegetation and buffer guidance (Dorchester County Zoning and Land Development Standards Ordinance 04-13, Article XI, Section 11.5, Revised 2007).
- **Georgetown County** requires a minimum 15 ft setback from the edge of any salt water marsh wetland line as determined by DHEC-OCRM (Georgetown County Zoning Ordinance, 2008).

Refocusing on the Management of Estuarine Shorelines

As described in the Introduction to this report, many estuarine shorelines face similar pressures as those experienced along the beachfront - in terms of chronic erosion, transgression, and inundation; storm impacts; and development pressures. However, there is not a similar management framework for estuarine shorelines, in terms of the expanded jurisdictional area, setback area, structure limitations, etc. for the beach/dune system. Estuarine shoreline erosion control structures such as bulkheads and revetments prevent natural marsh migration inland as sea level rises, and they often change the hydrodynamics of tidal creek channels by causing currents to increase (NRC, 2007; Tibbetts, 2007). The increased currents in turn can prevent

sediments from “settling out” of the water column and nourishing nearby marshes. A single erosion control structure may not have a dramatic negative impact on the estuarine environment, but the cumulative impacts of hundreds, or even thousands, of structures in the coastal zone must be considered (NRC, 2007; Figure 9).



Figure 9: *Estuarine shoreline erosion control structures near Charleston, SC. Many stretches of tidal creek shorelines in South Carolina have been armored with a variety of structures including wooden bulkheads and rock revetments.*

In light of these impacts, an expert national panel recently recommended that alternative shoreline stabilization structures and buffers should be investigated and used more frequently to combat erosion while providing ecological benefits (NRC, 2007).

Policy and Management Recommendations

The following policy and management recommendations explore potential improvements to existing federal, state, and local policies and practices. In particular, the following policy recommendations seek to:

- 12) Improve regulatory decision-making with regard to estuarine shoreline stabilization;
- 13) Promote natural shoreline migration, wetland transgression, improved water quality, and reduced exposure to erosion and storm damage through the use of shoreline vegetative buffers.

Recommendation 12 – Manage Erosion Control in Estuaries

A. GENERAL RECOMMENDATION

Current regulations and permitting procedures for estuarine shorelines are not adequate to ensure the protection of the state’s salt marsh-tidal creek ecosystems. The placement of erosion control structures (e.g. bulkheads) may result in undesirable cumulative impacts, and in cases where erosion control structures are approved, alternatives to traditional bulkheads may be preferred. This recommendation suggests strengthened regulations related to estuarine bulkheads, and investments in developing guidance and criteria for alternative erosion control approaches.

B. RATIONALE

South Carolina has approximately 2,875 miles of estuarine shoreline. These areas can experience erosion as a result of long-term (e.g. sea level rise) and short-term (e.g. waves, boat wakes) forces. The rate of shoreline erosion is not consistent across the state. Currently, there is limited data on both the rate of erosion and shoreline hardening along South Carolina’s estuarine shorelines. There is also limited understanding of the physical and ecological characteristics and values of various estuarine shorelines throughout the state.

In addition to increasing the understanding of South Carolina’s estuarine shorelines, there is a need to re-evaluate regulations to ensure that the state’s critical areas are conserved. Current state regulations allow owners of non-beachfront shoreline property to construct bulkheads along the upland edge of their property to minimize erosion and to protect against flooding and inundation from boat wakes, coastal storms and, in the long run, sea level rise. There are few requirements that limit bulkhead permitting, which can lead to their placement in areas where they may not be necessary. For example, the governing regulations do not:

- establish maximum lengths or heights for estuarine bulkheads;
- identify methods for evaluating cumulative or secondary impacts;
- clearly define an “adequate marsh buffer” (R. 30-12(C)(1)(c));
- restrict bulkheads just landward of the DHEC-OCRM Critical Line, which defines the boundary between upland and intertidal areas; or
- restrict bulkheads on undeveloped (vacant) properties where no structures are threatened.

Finally, there is a need to consider the type of shore erosion control devices that should be allowed along estuarine shorelines. Current state guidelines do not address types of shoreline stabilization used along the sheltered coast. The likely result will be estuarine shorelines with significant armoring that limits ecosystem connectivity and mobility, increases downstream erosion, and impacts natural hydrology and habitats. In order to establish state guidelines and

regulations for estuarine shoreline permits, the level of local knowledge about the effectiveness of alternative shoreline stabilization technologies must be increased.

C. NEW POLICY RECOMMENDATIONS

a) **Establish a Minimum Setback for Non-Beachfront Erosion Control Structures.**

In the absence of a restricted, undisturbed vegetative shoreline buffer (where bulkheads would already be prohibited - as proposed in Recommendation #13, and as currently exists under some local ordinances), we propose that a minimum setback be established for nonbeachfront shorelines throughout the DHEC-OCRM “Critical Area,” wherein no bulkhead, revetment, or hard erosion control structures should be constructed. The setback distance should be established to be consistent with existing local easements and building setbacks from the shoreline or DHEC-OCRM critical line boundary; and could possibly be tied to erosion rates or slope of the property to adjust for local circumstances.

These setbacks (and subsequent adjustments) will allow for natural shoreline and marsh transgression for some period of time into the future. There should also be consideration given to the state’s long-term policy of retreat from eroding beaches, and whether there is a need for a similar policy for some non-beachfront regions. For example, “retreat” may not be appropriate for downtown Charleston; however, in some areas, long-term retreat policies may be desirable to allow critical estuarine habitats to migrate inland. These policies and decisions should be based on comprehensive cost-benefit analyses that take into account any losses of the nonmarket values associated with natural resources and/or ecosystem services.

This recommendation would have to be implemented in two ways:

- DHEC-OCRM Regulation R.30-12.C would have to be amended to include the estuarine bulkhead setback; and
- The same information should be incorporated in applicable zoning ordinances as a riparian buffer (or setback) requirement, if possible. Implementation at the local level would probably provide better initial site design review and enforcement oversight and provide several collateral benefits, provided buffers included requirements for the preservation of natural vegetation.

b) **Differentiate Shoreline “Transgression” from Shoreline “Erosion.”**

Under existing regulatory language, DHEC-OCRM staff should not allow hard stabilization of nonbeachfront shorelines when the shoreline is “transgressing,” or migrating inland naturally due to sea level rise, as evidenced by emergent vegetation at the upland boundary on lowlying properties. Bulkheads are only to be allowed where erosion of upland is occurring, which is a distinct process that can be caused boat wakes, wave action, stormwater runoff, and other physical forces. No regulatory change is

needed, only a change in DHEC-OCRM staff implementation or interpretation of the rule.

c) Require Evaluation of Alternative Stabilization Approaches on Vacant Properties.

Traditional bulkheads, rip-rap, and revetments should not be allowed for undeveloped properties unless the permittee demonstrates that no practical alternative exists. Given that no structure is imminently threatened by erosion on an undeveloped property, the burden for evaluating alternatives to traditional bulkheads and revetments should be on the property owner. If the state follows recommendations under section (D) below, eventually the state should be able to offer guidance on alternative options that are appropriate for specific shorelines. Alternatives to be considered, in order of preference, should include better site design, vegetation plantings, and hybrid structures.

Any regulatory changes would require approval from the DHEC Board for promulgation pursuant to the SC Admin. Procedures Act (SC Code Ann. § 1-23-10 et seq.), which requires review by the SC General Assembly, and must be authorized under existing statutes.

Any statutory changes would involve legislative action by the South Carolina General Assembly.

D. NEW PLANNING AND MANAGEMENT ACTIONS

1) Develop a knowledge-base for understanding of estuarine shoreline dynamics and processes, including human impacts and implications of sea level rise.

There are a series of steps that the State of South Carolina should take to gain a better understanding of estuarine shoreline dynamics. The state has built a strong baseline of information for beachfront shorelines; similar information is needed for estuarine shorelines which are facing many of the same threats. This information will inform both the process by which existing rules for bulkheads are developed and alternatives to traditional shoreline control methodology are promoted.

(i) **Map and Characterize Estuarine Shorelines** – Multiple priorities identified in the South Carolina Shoreline Change State of Knowledge Report (Nelson et al., 2009) focus on the need to increase knowledge of sheltered shorelines. Completion of these projects would greatly benefit development of revised permit guidelines and regulations for erosion control. In particular, future projects and funding should be directed towards:

- Historic and current digital marsh/estuarine shorelines, monitoring of estuarine shoreline change and marsh migration; and
- A shoreline inventory and classification system.

(ii) **Develop an Erosion Control Response Table** – Not all sites are appropriate for alternative erosion control methods. Information is available in other coastal states (e.g. Maryland and North Carolina) on erosion sites being evaluated for the effectiveness of different shore erosion management techniques, including structural, non-structural and hybrid approaches. Information that should be considered includes erosion rate, fetch, water depth, slope, and ecological values. Developing a table relevant to South Carolina’s sheltered shorelines could help determine when alternative methods should be applied.

(iii) **Education and Training** – Increased information and education should be provided to owners of properties located adjacent to estuarine shorelines. This includes understanding of (a) the link between salt marsh and upland habitats, (b) the difference between erosion threats such as boat wakes and transgression due to sea level rise, (c) permit guidelines, and (d) the impacts of shoreline control devices. With the development of alternative shoreline techniques, outreach should be conducted in cooperation with contractors and engineers who generally design and implement erosion control projects.

(iv) **Development of Estuarine Shoreline Management Plans** – When additional information is available on the status of estuarine shorelines, the state should consider development of broader Estuarine Shoreline Management Plans. Through local and subregional research, mapping, and planning efforts, local governments should partner with DHEC-OCRM to evaluate areas where bulkheads would have unacceptable secondary or cumulative impacts to estuarine ecosystems, public access, recreational opportunities, or other values. The mechanism could be similar to that used for Local Comprehensive Beach Management Plans under the Beachfront Management Act. In this case, an estuarine shoreline management plan could be used to address cumulative impacts, and to designate which shoreline control devices are appropriate and where they should be used.

DHEC-OCRM should serve as lead for most of the background data collection, including erosion rates and shoreline characterization. This should be done in coordination with partners, including federal agencies and universities. Information gathered should be made available to landowners, contractors, local governments and other interested parties.

2) Promote alternatives to traditional erosion control approaches.

Alternatives to traditional bulkheads and rip-rap exist and can help minimize estuarine shoreline erosion while maintaining the natural characteristics of estuarine ecosystems. These include, among others, marsh plantings, intertidal oyster reef restoration, and offshore sills. Promoting these techniques in appropriate situations can limit the impact of shore erosion control on natural systems while enabling protection of upland structures. The following steps should be taken to develop and promote alternatives to traditional shore erosion control:

(i) Implement Pilot Projects - South Carolina’s sheltered shorelines vary from many of the areas across the country that have started to implement non-structural and living shoreline methods. In particular, the state’s greater tidal ranges could make use of some techniques challenging. As such, it is recommended that a series of pilot projects be built

and monitored under different ecological conditions across the state. Information gathered from these pilot projects will help to refine future policy, regulation, and permitting guidelines. Pilot projects should be promoted and supported by DHEC-OCRM and its partners, including permitting requests. Actual on-the-ground projects could be led/coordinated with/by DHEC-OCRM or other partners, including but not limited to DNR, land owners, NGOs, local governments, federal agencies and universities. Mechanisms should be put in place to track and monitor pilot projects in order to develop a set of South Carolina specific principles for alternative shoreline control methodology.

(ii) Evaluate and Revise Regulations and Permit Guidelines - Upon completion of pilot studies and other research and mapping efforts, DHEC-OCRM should consider what modifications to shoreline regulations and permitting guidelines might be necessary to incorporate alternative methodologies into state policy and management. The specifics of the changes will be dependent on pilot project outcomes, but could include requiring that all permit applicants demonstrate that alternative methods are (or are not) feasible or creating incentives to support non-structural shore erosion techniques. There is also the potential that local governments could choose to develop regulations, for instance, through overlay zones.

E. EXISTING POLICIES AND PROGRAMS

Existing policies for estuarine bulkheads are found in section R.30-12.C of DHEC-OCRM's Critical Area Permitting Regulations, as follows:

C. Bulkheads and Revetments (Rip-rap) (Other than ocean front, as covered under R.30-13(N)):

(1) In an attempt to mitigate certain environmental losses that can be caused by these structures, the following standards are adopted:

(a) Structures must be designed to conform to the critical area line (upland boundary), to the maximum extent feasible, and constructed so that reflective wave energy does not destroy stable marine bottoms or constitute a safety hazard;

(b) Structures may be constructed up to 18 inches from the existing escarpment. In situations where this is not feasible, Department staff will determine the location of the bulkhead or revetment on a site by site basis;

(c) Bulkheads and revetments will be prohibited where marshlands are adequately serving as an erosion buffer, where adjacent property could be detrimentally affected by erosion, sedimentation, or where public access is adversely affected unless upland is being lost due to tidally induced erosion.;

(d) Bulkheads and revetments will be prohibited where public access is adversely affected unless no feasible alternative exists.

Additionally, DHEC-OCRM has the authority to remove all erosion control structures which have an adverse effect on the public interest (SC Code § 48-39-120(C)).

South Carolina Water Quality Certification, Section 401

Any applicant for a federal permit or license for an activity which may result in a discharge to a “water of the US” must receive certification from DHEC that applicable state water quality standards will not be violated. The federal permit or license cannot be issued until certification is issued or waived and cannot be issued at all if certification is denied. Certification is required for activities permitted by the USACE for those activities that are subject to Section 404 of the Clean Water Act. Bulkheads are an example of an activity requiring a Corps permit.

Authorizing Statute: Section 401 of the Federal Water Pollution Control Act of 1972 (P.L. 92-500) as amended by the Clean Water Act of 1977 (P.L. 95-217) and the Water Quality Act of 1987 (P.L. 100-4).

Clean Water Act, Section 404

Section 404 of the Clean Water Act regulates proposed discharges into waters of the United States, including jurisdictional wetlands. Any proposed discharge of fill material into “waters of the United States” (including wetlands) requires authorization from the Army Corps of Engineers (USACE) and the State of South Carolina.

Rivers and Harbors Act, Section 10

Section 10 of the Rivers and Harbors Act regulates the construction, excavation, or deposition of material in, over, or under “navigable waters of the US,” or any work which would affect the “course, location, condition, or capacity” of those waters.

F. GENERAL COSTS AND BENEFITS

- a) ***Develop a knowledge-base for understanding of estuarine shoreline dynamics and processes, including human impacts and implications of sea level rise.***
 - Costs to conduct research and surveys
- b) ***Strengthen existing rules governing estuarine bulkheads.***
 - One benefit would be the enabled landward migration of estuarine marshes beyond the critical area line.
- c) ***Promote alternatives to traditional erosion control approaches.***
 - Erosion control costs per foot Maryland – nonstructural (\$50-100), hybrid (\$150-500), structural (\$500-1200).
 - Costs to the property owner would be dependent on the nature of the regulations to be added.
 - It is currently easier/quicker to obtain a permit for a traditional bulkhead rather since an alternative may require additional or unfamiliar review.

- Ecosystem services provided by techniques that enable habitat connectivity and migration?
- Alternatives to traditional bulkheads are likely to be of long-term benefit to both the state and the property owners, as maintenance and repairs of bulkheads are expected to be greater than costs associated with the alternatives.

G. MEASURES OF SUCCESS

- Regulations modified to include bulkhead setback with additional criteria for construction.
- Database completed for estuarine erosion rates and current hardened shorelines.
- Permit guidelines changed to promote alternative techniques
- Percent of critical area permits that use nonstructural shoreline control techniques
- Number of marine contractors trained in nonstructural and living shoreline techniques

H. FEASIBILITY ISSUES

Enacting these recommendations in an effective manner is dependent on state and local government interest and commitment.

Requires good scientific information on both the status of estuarine shorelines and the suitability of nonstructural and hybrid techniques in a variety of environments. Gaining this information could be costly.

Desire to maintain private property may challenge implementation of newer techniques.

Varying costs of techniques – if structural methods are less expensive and have been proven effective in minimizing erosion, how do you promote or incentivize alternatives?

Review of regulations to see if current permits make living shorelines harder to permit. It is a challenge to permit living shorelines in GA, but this analysis has not been completed for SC.

I. KEY UNCERTAINTIES/ASSUMPTIONS

These recommendations are subject to the nature of the jurisdiction of DHEC-OCRM, and may be unattainable if they are applied to lands that lie outside of DHEC-OCRM's critical line jurisdiction.

Estuarine shoreline change analysis must take place to justify the 50' or other value assigned to standard bulkhead setbacks to account for future sea level rise given local differences in geomorphology.

Feasibility and likely success of implementing nonstructural and/or living shorelines along SC estuarine shoreline is unknown.

J. EXAMPLES FROM OTHER STATES OR AREAS

Alternative Estuarine Shoreline Stabilization in South Carolina

The following is a list of past and present alternative estuarine shoreline stabilization projects that have been implemented in South Carolina:

- An alternative shoreline stabilization project at the North Inlet-Winyah Bay National Estuarine Research Reserve (NERR) used a cellular concrete mat system sold under the brand name Armorflex© (by Contech Construction Products) along a 150 ft estuarine shoreline that had 40 ft of highly erosional area. Coastal EcoScapes produced native vegetation that was planted in April 2008. Monitoring for water quality, oyster recruitment, and biomass vegetation surveys will be conducted over three years.
- The SC Oyster Restoration Project established twenty-four field sites between 2001 and 2003, and monitoring from seven of these sites indicates that polypropylene mesh bags filled with shell help to stabilize the shoreline. Reef development and success occurred after two years, and the project included extensive public outreach and education (Hadley, 2007). Construction of an expanded oyster reef resulted in 8 m of marsh growth for a previously eroding tidal creek shoreline in Palmetto Islands County Park (Coen and Hadley, 2005).
- In 1996, 1,080 bushels of oyster shells were distributed along 350 ft of Hobcaw Creek in Charleston Harbor to examine shoreline erosion suppression. Three treatment areas (polypropylene netting, reinforcing wire and uncovered) examined shell stability. Initial bi-monthly sampling indicated the uncovered areas were more conducive to propagating vertical intertidal oyster populations. However, maintenance planting (adding additional shells) is necessary in high wave energy environments (Anderson, 1997; Anderson, pers. comm.).
- In 2007, an eroding tidal marsh in Hilton Head Island, SC, was the site of marsh restoration efforts that included installing stabilizing structures, planting about 1.5 acres of *Spartina spp.*, and using the fill material. The project also includes a physical monitoring program and potential project related effects.

Maryland – Shorelines Online, Erosion Rates and Categorization

Virginia – Living Shoreline Program, Shore Erosion Advisory Service

North Carolina – CZM program and demonstration projects

Washington – Shoreline Management Act/Shoreline Masters Program (local governments develop shoreline plans)

K. BARRIERS OR CONCERNS

None identified.

Recommendation 13 – Establish Non-Beachfront Shoreline Buffer Areas

A. GENERAL RECOMMENDATION

Shoreline “buffers” offer a number of significant benefits, including water quality improvements, erosion control, wildlife habitat, improved aesthetics, recreational opportunities (e.g. low-impact trail systems), and possibly storm damage reduction. This policy recommendation suggests that a 25-foot minimum vegetated buffer requirement should be established for all new non-beachfront shoreline developments in the South Carolina coastal zone. The Committee recognizes that a number of coastal communities have already taken the lead in establishing shoreline buffer requirements, and encourages other local governments to consider adopting similar ordinances.

B. RATIONALE

Development within the coastal counties along the shorelines of estuaries is growing at a rapid pace. The demand for water-front property is high and shoreline property commands premium prices. Rising sea levels, coastal storms accompanied by high tides and waves, and recreational activities (vessel wake) can cause increased erosion along these shorelines. Combined with the clearing of natural vegetation for lawns to extend to the water, there is no protection for the banks against wave action and other sources of shoreline erosion. Natural vegetation buffer zones provide a root system to hold the bank in place, absorb nutrients and other pollutants, slow stormwater runoff to less erosive velocities, and mitigate increased sediment loading.

There are adverse impacts to the estuaries due to increased development. Increased stormwater runoff from impervious land use, combined with enriched or polluted waters draining pervious surfaces, such as treated lawns and golf courses, is discharging into our estuaries. This runoff contains nitrogen and phosphorus, which are acceptable in moderate concentrations but turn into pollutants when they become overabundant in the environment. Stormwater runoff also contains sediment from erosion of soils as water flows across disturbed and unvegetated areas. This sediment is affecting fish, shrimp and oyster habitat.

Estuarine and lagoon shores account for the longest stretches of eroding shoreline in the Southeast Atlantic region (National Assessment of Shoreline Change, USGS Open File Report 2005-1401). Much of South Carolina’s marsh system may be lost to sea level rise unless it can migrate landward, and one group of researchers found that “a three-foot rise in sea level would result in a net loss of about 50 percent of the marsh in the Charleston area;” Morris et al., 2002). The primary impediment to managed retreat or landward migration of wetlands under sea level rise is not just the construction of buildings, but the holding back of the sea through seawalls or bulkheads and their associated fill. Providing a buffer zone along the marsh will allow space for this migration. A report from the National Academy of Sciences (NRC, 2002) recently identified protection and restoration of riparian areas as a national priority.

C. NEW POLICY RECOMMENDATIONS

- a) **Establish a minimum vegetated buffer zone, extending 25 feet inland from the DHEC-OCRM Critical Line boundary, for all new developments along non-beachfront shorelines within the coastal zone.**

All new development, including single family homes, would be required to include a vegetated buffer zone. The area within the buffer should not be cleared or altered from its natural vegetated state, unless low-impact recreational uses (low-impact trails) and minimal limb clearing to expand viewsheds are determined to be acceptable by DHEC-OCRM. No shore protection structures, such as bulkheads or riprap, should be allowed within the buffer zone (and seaward of the buffer) for new developments; and all existing development should also be prohibited from placing new hard structures within the 25-foot buffer zone, even if it has been cleared of all natural vegetation (this would preclude the need for the bulkhead setback area described in Recommendation #12).

A law requiring a statewide buffer zone in the coastal zone and designating DHEC-OCRM as the implementing agency would be needed. This would require a legislative action possibly amending the Coastal Tidelands and Wetlands Act (SC Code Ann. § 48-39-10 et seq.) to expand DHEC-OCRM's jurisdiction to include a 25' buffer area inland and adjacent to the Critical Area. Statutory changes would require legislative action by the South Carolina General Assembly.

New buffer regulations would be required and would need approval from the DHEC Board for promulgation pursuant to the SC Admin. Procedures Act (SC Code Ann. § 1-23-10 et seq.), which requires review by the SC General Assembly, and must be authorized under existing or new statutes.

- b) **For previously developed properties, state tax incentives or credits should be considered for property owners who re-establish, certify, and deed restrict riparian/estuarine buffers on their property, and/or record "rolling easements" that allow unimpeded, natural shoreline migration.**

D. NEW PLANNING AND MANAGEMENT ACTIONS

- 1) **Coastal communities should be encouraged to adopt shoreline buffer ordinances that are more stringent than the state buffer zone requirement.**

DHEC-OCRM should guide local governments' development of buffer ordinances, based on lessons learned by coastal communities with existing buffer ordinances.

E. EXISTING POLICIES AND PROGRAMS

The Ashley River Special Area Management Plan (SAMP) includes a shoreline buffer policy of 100 ft to preserve historic shoreline views while allowing 30% selective clearing.

SCDHEC-OCRM stormwater guidelines require a 20 ft buffer between golf courses and water, and recommends 35 to 50 ft buffers to protect water quality and quantity.

DHEC published a pamphlet entitled “Vegetated Riparian Buffers and Buffer Ordinances”. The purpose of this pamphlet is to provide basic information on riparian buffers. It is also intended as a general resource for local policy makers who are considering the creation of buffers or greenways in their communities.

See examples of existing local buffer ordinances in the Goal 4 Overview section.

F. GENERAL COSTS AND BENEFITS

Benefits would be hard to quantify but would include: improved water quality, ecosystem diversity, habitat protection and restoration, erosion reduction, prevention of sediment loading in waters, recreational benefits, aesthetic appeal, increased property values, and storm surge protection.

Buffers could provide a credit for meeting stormwater requirements related to site design under the DHEC Standards for Stormwater Management and Sediment Reduction.

G. MEASURES OF SUCCESS

- Improvements in coastal water quality.
- Increase in fisheries, shellfish, and other commercial revenue sources.
- A decreased rate of shoreline hardening of non-beachfront shorelines in the coastal zone.

H. FEASIBILITY ISSUES

South Carolina has been trying for almost 10 years to get a statewide buffer zone law passed. Private property rights advocates will fight restrictions on the use of property. However, this buffer recommendation focuses on the coastal zone and the Committee believes is feasible given that several coastal communities have already adopted more stringent buffer ordinances.

I. KEY UNCERTAINTIES/ASSUMPTIONS

The optimum buffer zone width is uncertain due to site-specific characteristics such as adjacent land use and shoreline stability.

J. EXAMPLES FROM OTHER STATES OR AREAS

North Carolina

The North Carolina Coastal Shoreline Buffer Rules (15A NCAC 07H .0209) require a 30-foot buffer for new coastal shoreline development, and a 50-foot buffer for select waterways.

The Neuse Riparian Area Rule (15A NCAC 2B .0233) requires a 50-foot buffer along all perennial and intermittent streams, lakes, ponds, and estuaries (but not wetlands) in the Neuse River Basin. 50-foot stream buffers are measured horizontally along lines perpendicular to the sides of surface waters, which typically begin at the top of the stream banks. The 50-foot Neuse buffer is divided into two zones: Zone 1 (the inner 30 feet, closest to the surface water) is to remain undisturbed in its natural state; Zone 2 (the outer 20 feet) must be vegetated. Minor grading is allowed in Zone 2, provided that diffuse flow and the health of the existing vegetation in Zone 1 is not compromised. No fertilizer may be used in either zone, other than a one-time application to establish replanted areas after minor grading and when additional plantings are installed to enhance the buffer's functionality.

Georgia

Georgia requires 50-foot buffers under the Coastal Marshlands Protection Act. The rule allows exceptions and hardships, requires stormwater management plan submittals, and attempts to have only 15% effective impervious cover within the buffer zone when possible.

K. BARRIERS OR CONCERNS

While the Committee unanimously supports the general recommendation to establish a non-beachfront shoreline buffer zone for new developments in the coastal zone, the Committee did not reach full agreement on one of the specific sub-recommendations:

- a) Committee members debated whether the zone should be based on an average of 25 feet in width, or based on a 25-foot line that parallels nonlinear shorelines. For example, where small channels or creeks intrude into shoreline parcels, parallel buffer lines would be drawn inland a significant distance to account for those intrusions. Alternatively, in using an "averaging" method, a property owner could clear significant portions of a lot right up to the waterline in exchange for deeper buffers in other parts of the lot, which would be inconsistent with the purposes of a 25-foot minimum buffer.

Some committee members suggested that the final buffer distances should be based on scientific studies, ecological impact analyses, development projections, private property rights, and best practices for preserving a rationale buffer distance.

Appendix 1. South Carolina Beachfront Management Act (as amended)

TITLE 48 – ENVIRONMENTAL PROTECTION AND CONSERVATION

CHAPTER 39

COASTAL TIDELANDS AND WETLANDS

SECTION 48-39-250. Legislative findings regarding the coastal beach/dune system.

The General Assembly finds that:

(1) The beach/dune system along the coast of South Carolina is extremely important to the people of this state and serves the following functions:

(a) protects life and property by serving as a storm barrier which dissipates wave energy and contributes to shoreline stability in an economical and effective manner;

(b) provides the basis for a tourism industry that generates approximately two-thirds of South Carolina's annual tourism industry revenue which constitutes a significant portion of the state's economy. The tourists who come to the South Carolina coast to enjoy the ocean and dry sand beach contribute significantly to state and local tax revenues;

(c) provides habitat for numerous species of plants and animals, several of which are threatened or endangered. Waters adjacent to the beach/dune system also provide habitat for many other marine species;

(d) provides a natural healthy environment for the citizens of South Carolina to spend leisure time which serves their physical and mental well-being.

(2) Beach/dune system vegetation is unique and extremely important to the vitality and preservation of the system.

(3) Many miles of South Carolina's beaches have been identified as critically eroding.

(4) Chapter 39 of Title 48, Coastal Tidelands and Wetlands, prior to 1988, did not provide adequate jurisdiction to the South Carolina Coastal Council to enable it to effectively protect the integrity of the beach/dune system.

Consequently, without adequate controls, development unwisely has been sited too close to the system. This type of development has jeopardized the stability of the beach/dune system, accelerated erosion, and endangered adjacent property. It is in both the public and private interests to protect the system from this unwise development.

(5) The use of armoring in the form of hard erosion control devices such as seawalls, bulkheads, and rip-rap to protect erosion-threatened structures adjacent to the beach has not proven effective. These armoring devices have given a false sense of security to beachfront property owners. In reality, these hard structures, in many instances, have increased the vulnerability of beachfront property to damage from wind and waves while contributing to the deterioration and loss of the dry sand beach which is so important to the tourism industry.

(6) Erosion is a natural process which becomes a significant problem for man only when structures are erected in close proximity to the beach/dune system. It is in both the public and private interests to afford the beach/dune system space to accrete and erode in its natural cycle. This space can be provided only by discouraging new construction in close proximity to the beach/dune system and encouraging those who have erected structures too close to the system to retreat from it.

(7) Inlet and harbor management practices, including the construction of jetties which have not been designed to accommodate the longshore transport of sand, may deprive downdrift beach/dune systems of their natural sand supply. Dredging practices which include disposal of beach quality sand at sea also may deprive the beach/dune system of much-needed sand.

(8) It is in the state's best interest to protect and to promote increased public access to South Carolina's beaches for out-of-state tourists and South Carolina residents alike.

(9) Present funding for the protection, management, and enhancement of the beach/dune system is inadequate.

(10) There is no coordinated state policy for post-storm emergency management of the beach/dune system.

(11) A long-range comprehensive beach management plan is needed for the entire coast of South Carolina to protect and manage effectively the beach/dune system, thus preventing unwise development and minimizing man's adverse impact on the system.

SECTION 48-39-260. Policy statement.

In recognition of its stewardship responsibilities, the policy of South Carolina is to:

(1) protect, preserve, restore, and enhance the beach/dune system, the highest and best uses of which are declared to provide:

(a) protection of life and property by acting as a buffer from high tides, storm surge, hurricanes, and normal erosion;

(b) a source for the preservation of dry sand beaches which provide recreation and a major source of state and local business revenue;

(c) an environment which harbors natural beauty and enhances the well-being of the citizens of this State and its visitors;

(d) natural habitat for indigenous flora and fauna including endangered species;

(2) create a comprehensive, long-range beach management plan and require local comprehensive beach management plans for the protection, preservation, restoration, and enhancement of the beach/dune system. These plans must promote wise use of the state's beachfront to include a gradual retreat from the system over a forty-year period;

(3) severely restrict the use of hard erosion control devices to armor the beach/dune system and to encourage the replacement of hard erosion control devices with soft technologies as approved by the department which will provide for the protection of the shoreline without long-term adverse effects;

(4) encourage the use of erosion-inhibiting techniques which do not adversely impact the long-term well-being of the beach/dune system;

(5) promote carefully planned nourishment as a means of beach preservation and restoration where economically feasible;

(6) preserve existing public access and promote the enhancement of public access to assure full enjoyment of the beach by all our citizens including the handicapped and encourage the purchase of lands adjacent to the Atlantic Ocean to enhance public access;

(7) involve local governments in long-range comprehensive planning and management of the beach/dune system in which they have a vested interest;

(8) establish procedures and guidelines for the emergency management of the beach/dune system following a significant storm event.

SECTION 48-39-270. Definitions.

As used in this chapter:

(1) Erosion control structures or devices include:

(a) seawall: a special type of retaining wall that is designed specifically to withstand normal wave forces;

(b) bulkhead: a retaining wall designed to retain fill material but not to withstand wave forces on an exposed shoreline;

(c) revetment: a sloping structure built along an escarpment or in front of a bulkhead to protect the shoreline or bulkhead from erosion.

(2) Habitable structure means a structure suitable for human habitation including, but not limited to, single or multifamily residences, hotels, condominium buildings, and buildings for commercial purposes. Each building of a condominium regime is considered a separate habitable structure but, if a building is divided into apartments, then the entire building, not the individual apartment, is considered a single habitable structure. Additionally, a habitable structure includes porches, gazebos, and other attached improvements.

(3) Department means the Department of Health and Environmental Control.

(4) Beach nourishment means the artificial establishment and periodic renourishment of a beach with sand that is compatible with the existing beach in a way so as to create a dry sand beach at all stages of the tide.

(5) The beach/dune system includes all land from the mean highwater mark of the Atlantic Ocean landward to the setback line described in Section 48-39-280.

(6) A standard erosion zone is a segment of shoreline which is subject to essentially the same set of coastal processes, has a fairly constant range of profiles and sediment characteristics, and is not influenced directly by tidal inlets or associated inlet shoals.

(7) An inlet erosion zone is a segment of shoreline along or adjacent to tidal inlets which is influenced directly by the inlet and its associated shoals.

(8) Master plan means a document or a map prepared by a developer or a city as a policy guide to decisions about the physical development of the project or community.

(9) Planned development means a development plan which has received local approval for a specified number of dwelling and other units. The siting and size of structures and amenities are specified or restricted within the approval. This term specifically references multifamily or commercial projects not otherwise referenced by the terms, master plan, or planned unit development.

(10) Planned unit development means a residential, commercial, or industrial development, or all three, designed as a unit and approved by local government.

(11) Destroyed beyond repair means that more than sixty-six and two-thirds percent of the replacement value of the habitable structure or pool has been destroyed. If the owner disagrees with the appraisal of the department, he may obtain an appraisal to evaluate the damage to the building or pool. If the appraisals differ, then the two appraisers must select a third appraiser. If the two appraisers are unable to select a third appraiser, the clerk of court of the county where the structure lies must make the selection. Nothing in this section prevents a court of competent jurisdiction from reviewing, de novo, the appraisal upon the petition of the property owner.

(12) Pool is a structure designed and used for swimming and wading.

(13) Active beach is that area seaward of the escarpment or the first line of stable natural vegetation, whichever first occurs, measured from the ocean.

SECTION 48-39-280. Forty-year retreat policy.

(A) A forty-year policy of retreat from the shoreline is established. The department must implement this policy and must utilize the best available scientific and historical data in the implementation. The department must establish a baseline which parallels the shoreline for each standard erosion zone and each inlet erosion zone.

(1) The baseline for each standard erosion zone is established at the location of the crest of the primary oceanfront sand dune in that zone. In standard erosion zones in which the shoreline has been altered naturally or artificially by the construction of erosion control devices, groins, or other manmade alterations, the baseline must be established by the department using the best scientific and historical data, as where the crest of the primary oceanfront sand dunes for that zone would be located if the shoreline had not been altered.

(2) The baseline for inlet erosion zones that are not stabilized by jetties, terminal groins, or other structures must be determined by the department as the most landward point of erosion at any time during the past forty years, unless the best available scientific and historical data of the inlet and adjacent beaches indicate that the shoreline is unlikely to return to its former position. In collecting and utilizing the best scientific and historical data available for the implementation of the retreat policy, the department, as part of the State Comprehensive Beach Management Plan provided for in this chapter, among other factors, must consider: historical inlet migration, inlet stability, channel and ebb tidal delta changes, the effects of sediment bypassing on shorelines adjacent to the inlets, and the effects of nearby beach restoration projects on inlet sediment budgets.

(3) The baseline within inlet erosion zones that are stabilized by jetties, terminal groins, or other structures must be determined in the same manner as provided for in item (1). However, the actual location of the crest of the primary oceanfront sand dunes of that erosion zone is the baseline of that zone, not the location if the inlet had remained unstabilized.

(4) Notwithstanding any other provision of this section, where a department-approved beach nourishment project has been completed, the local government or the landowners, with notice to the local government, may petition an administrative law judge to move the baseline as far seaward as the landward edge of the erosion control structure or device or, if there is no existing erosion control structure or device, then as far seaward as the post project baseline as determined by the department in accordance with Section 48-39-280(A)(1) by showing that the beach has been stabilized by department-approved beach nourishment. If the petitioner is asking that the baseline be moved seaward pursuant to this section, he must show an ongoing commitment to renourishment which will stabilize and maintain the dry sand beach at all stages of the tide for the foreseeable future. If the administrative law judge grants the petition to move the baseline seaward pursuant to this section, no new construction may occur in the area between the former baseline and the new baseline for three years after the initial beach nourishment project has been completed as determined by the department. If the beach nourishment fails to stabilize the beach

after a reasonable period of time, the department must move the baseline landward to the primary oceanfront sand dune as determined pursuant to items (1), (2), and (3) for that section of the beach. Any appeal of an administrative law judge's decision under this section may be made pursuant to Title 23 of Chapter 1.

(B) To implement the retreat policy provided for in subsection (A), a setback line must be established landward of the baseline a distance which is forty times the average annual erosion rate or not less than twenty feet from the baseline for each erosion zone based upon the best historical and scientific data adopted by the department as a part of the State Comprehensive Beach Management Plan.

(C) The department, before July 3, 1991, must establish a final baseline and setback line for each erosion zone based on the best available scientific and historical data as provided in subsection (B) and with consideration of public input. The baseline and setback line must not be revised before July 1, 1998, nor later than July 1, 2000. After that revision, the baseline and setback line must be revised not less than every eight years but not more than every ten years after each preceding revision. In the establishment and revision of the baseline and setback line, the department must transmit and otherwise make readily available to the public all information upon which its decisions are based for the establishment of the final baseline and setback line. The department must hold one public hearing before establishing the final baseline and setback lines. Until the department establishes new baselines and setback lines, the existing baselines and setback lines must be used. The department may stagger the revision of the baselines and setback lines of the erosion zones so long as every zone is revised in accordance with the time guidelines established in this section.

(D) In order to locate the baseline and the setback line, the department must establish monumented and controlled survey points in each county fronting the Atlantic Ocean. The department must acquire sufficient surveyed topographical information on which to locate the baseline. Surveyed topographical data typically must be gathered at two thousand foot intervals. However, in areas subject to significant near-term development and in areas currently developed, the interval, at the discretion of the department, may be more frequent. The resulting surveys must locate the crest of the primary oceanfront sand dunes to be used as the baseline for computing the forty-year erosion rate. In cases where no primary oceanfront sand dunes exist, a study conducted by the department is required to determine where the upland location of the crest of the primary oceanfront sand dune would be located if the shoreline had not been altered. The department, by regulation, may exempt specifically described portions of the coastline from the survey requirements of this section when, in its judgment, the portions of coastline are not subject to erosion or are not likely to be developed by virtue of local, state, or federal programs in effect on the coastline which would preclude significant development, or both.

(E) A landowner claiming ownership of property affected who feels that the final or revised setback line, baseline, or erosion rate as adopted is in error, upon submittal of substantiating evidence, must be granted a review of the setback line, baseline, or erosion rate, or a review of all three. The requests must be forwarded to the department board in accordance with Section 44-1-60 and the final decision of the board may be appealed to the Administrative Law Court as provided in Chapter 23 of Title 1.

SECTION 48-39-290. Restrictions on construction or reconstruction seaward of the baseline or between the baseline and the setback line; exceptions; special permits.

(A) No new construction or reconstruction is allowed seaward of the baseline except:

(1) wooden walkways no larger in width than six feet;

(2) small wooden decks no larger than one hundred forty-four square feet;

(3) fishing piers which are open to the public. Those fishing piers with their associated structures including, but not limited to, baitshops, restrooms, restaurants, and arcades which existed September 21, 1989, may be rebuilt if they are constructed to the same dimensions and utilized for the same purposes and remain open to the public. In addition, those fishing piers with their associated structures which existed on September 21, 1989, that were privately owned, privately maintained, and not open to the public on this date also may be rebuilt and used for the same purposes if they are constructed to the same dimensions;

(4) golf courses;

(5) normal landscaping;

(6) structures specifically permitted by special permit as provided in subsection (D);

(7) pools may be reconstructed if they are landward of an existing, functional erosion control structure or device;

(8) existing groins may be reconstructed, repaired, and maintained. New groins may only be allowed on beaches that have high erosion rates with erosion threatening existing development or public parks. In addition to these requirements, new groins may be constructed and existing groins may be reconstructed only in furtherance of an on-going beach renourishment effort which meets the criteria set forth in regulations promulgated by the department and in accordance with the following:

(a) The applicant shall institute a monitoring program for the life of the project to measure beach profiles along the groin area and adjacent and downdrift beach areas sufficient to determine erosion/accretion rates. For the first five years of the project, the monitoring program must include, but is not necessarily limited to:

(i) establishment of new monuments;

(ii) determination of the annual volume and transport of sand; and

(iii) annual aerial photographs.

Subsequent monitoring requirements must be based on results from the first five-year report.

(b) Groins may only be permitted after thorough analysis demonstrates that the groin will not cause a detrimental effect on adjacent or downdrift areas. The applicant shall provide a financially binding commitment, such as a performance bond or letter of credit that is reasonably estimated to cover the cost of reconstructing or removing the groin and/or restoring the affected beach through renourishment pursuant to subsection (c).

(c) If the monitoring program established pursuant to subsection (a) shows an increased erosion rate along adjacent or downdrift beaches that is attributable to a groin, the department must require either that the groin be reconfigured so that the erosion rate on the affected beach does not exceed the pre-construction rate, that the groin be removed, and/or that the beach adversely affected by the groin be restored through renourishment.

(d) Adjacent and downdrift communities and municipalities must be notified by the department of all applications for a groin project.

(e) Nothing in the section shall be construed to create a private cause of action, but nothing in this section shall be construed to limit a cause of action under recognized common law or other statutory theories. The sole remedies, pursuant to this section, are:

(i) the reconstruction or removal of a groin; and/or

(ii) restoration of the adversely affected beach and adjacent real estate through renourishment pursuant to subsection (c).

An adjacent or downdrift property owner that claims a groin has caused or is causing an adverse impact shall notify the department of such impact. The department shall render an initial determination within sixty (60) days of such notification. Final agency action shall be rendered within twelve months of notification. An aggrieved party may appeal the decision pursuant to the Administrative Procedures Act.

A permit must be obtained from the department for items (2) through (8).

(B) Construction, reconstruction, or alterations between the baseline and the setback line are governed as follows:

(1) Habitable structures:

(a) New habitable structures: If part of a new habitable structure is constructed seaward of the setback line, the owner must certify in writing to the department that the construction meets the following requirements:

(i) The habitable structure is no larger than five thousand square feet of heated space. The structure must be located as far landward on the property as practicable. A drawing must be submitted to the department showing a footprint of the structure on the property, a cross section of the structure, and the structure's relation to property lines and setback lines which may be in

effect. No erosion control structure or device may be incorporated as an integral part of a habitable structure constructed pursuant to this section.

(ii) No part of the building is being constructed on the primary oceanfront sand dune or seaward of the baseline.

(b) Habitable structures which existed on the effective date of Act 634 of 1988 or constructed pursuant to this section:

(i) Normal maintenance and repair of habitable structures is allowed without notice to the department.

(ii) Additions to habitable structures are allowed if the additions together with the existing structure do not exceed five thousand square feet of heated space. Additions to habitable structures must comply with the conditions of new habitable structures as set forth in subitem (a).

(iii) Repair or renovation of habitable structures damaged, but not destroyed beyond repair, due to natural or manmade causes is allowed.

(iv) Replacement of habitable structures destroyed beyond repair due to natural causes is allowed after notification is provided by the owner to the department that all of the following requirements are met:

a. The total square footage of the replaced structure seaward of the setback line does not exceed the total square footage of the original structure seaward of the setback line. The linear footage of the replaced structure parallel to the coast does not exceed the original linear footage parallel to the coast.

b. The replaced structure is no farther seaward than the original structure.

c. Where possible, the replaced structure is moved landward of the setback line or, if not possible, then as far landward as is practicable, considering local zoning and parking regulations.

d. The reconstruction is not seaward of the baseline unless permitted elsewhere in Sections 48-39-250 through 48-39-360.

(v) Replacement of habitable structures destroyed beyond repair due to manmade causes is allowed provided the rebuilt structure is no larger than the original structure it replaces and is constructed as far landward as possible, but the new structure must not be farther seaward than the original structure.

(2) Erosion control devices:

(a) No new erosion control structures or devices are allowed seaward of the setback line except to protect a public highway which existed on the effective date of this act.

(b) Erosion control structures or devices which existed on the effective date of this act must not be repaired or replaced if destroyed:

(i) more than eighty percent above grade through June 30, 1995;

(ii) more than sixty-six and two-thirds percent above grade from July 1, 1995, through June 30, 2005;

(iii) more than fifty percent above grade after June 30, 2005.

(iv) Damage to seawalls and bulkheads must be judged on the percent of the structure remaining intact at the time of damage assessment. The portion of the structure or device above grade parallel to the shoreline must be evaluated. The length of the structure or device parallel to the shoreline still intact must be compared to the length of the structure or device parallel to the shoreline which has been destroyed. The length of the structure or device parallel to the shoreline determined to be destroyed divided by the total length of the original structure or device parallel to the shoreline yields the percent destroyed. Those portions of the structure or device standing, cracked or broken piles, whalers, and panels must be assessed on an individual basis to ascertain if these components are repairable or if replacement is required. Revetments must be judged on the extent of displacement of stone, effort required to return these stones to the prestorm event configuration of the structure or device, and ability of the revetment to retain backfill material at the time of damage assessment. If the property owner disagrees with the assessment of a registered professional engineer acting on behalf of the department, he may obtain an assessment by a registered professional engineer to evaluate, as set forth in this item, the damage to the structure or device. If the two assessments differ, then the two engineers who performed the assessments must select a registered professional engineer to perform the third assessment. If the first two engineers are unable to select an engineer to perform the third assessment, the clerk of court of the county where the structure or device lies must make the selection of a registered professional engineer. The determination of percentage of damage by the third engineer is conclusive.

(v) The determination of the degree of destruction must be made on a lot by lot basis by reference to county tax maps.

(vi) Erosion control structures or devices must not be enlarged, strengthened, or rebuilt but may be maintained in their present condition if not destroyed more than the percentage allowed in Section 48-39-290(B)(2)(b)(i), (ii), and (iii). Repairs must be made with materials similar to those of the structure or device being repaired.

(c) Erosion control structures or devices determined to be destroyed more than the percentage allowed in Section 48-39-290(B)(2)(b)(i), (ii), and (iii) must be removed at the owner's expense. Nothing in this section requires the removal of an erosion control structure or a device protecting a public highway which existed on the effective date of Act 634 of 1988.

(d) The provisions of this section do not affect or modify the provisions of Section 48-39-120(C).

(e) Subitem (a) does not apply to a private island with an Atlantic Ocean shoreline of twenty thousand, two hundred ten feet of which twenty thousand, ninety feet of shoreline is revetted with existing erosion control devices and one hundred twenty feet of shoreline is not revetted with existing erosion control devices. Nothing contained in this subitem makes this island eligible for beach renourishment funds.

(3) Pools, as defined in Section 48-39-270(12):

(a) No new pools may be constructed seaward of the setback line unless the pool is built landward of an erosion control structure or device which was in existence or permitted on the effective date of this act and is built as far landward as practical.

(b) Normal maintenance and repair is allowed without notice to the department.

(c) If a pool, existing on July 1, 1988, is destroyed beyond repair, as determined by the department pursuant to Section 48-39-270(11), it may be replaced if the owner certifies in writing to the department that:

(i) It is moved as far landward as practical. This determination of practicality must include the consideration of local zoning requirements.

(ii) It is rebuilt no larger than the destroyed pool.

(iii) It is constructed according to acceptable standards of pool construction and cannot be reinforced in a manner so as to act as an erosion control structure or device.

(d) If a pool is not destroyed beyond repair as determined by the department pursuant to Section 48-39-270(11) but the owner wishes to replace it, the owner may do so if:

(i) The dimensions of the pool are not enlarged.

(ii) The construction conforms to sub-subitem (iii) of subitem (c).

(4) All other construction or alteration between the baseline and the setback line requires a department permit. However, the department, in its discretion, may issue general permits for construction or alterations where issuance of the general permits would advance the implementation and accomplishment of the goals and purposes of Sections 48-39-250 through 48-39-360.

(C)(1) Notwithstanding the provisions relating to new construction, a person, partnership, or corporation owning real property that is affected by the setback line as established in Section 48-39-280 may proceed with construction pursuant to a valid building permit issued as of the effective date of this section. The person, partnership, or corporation may proceed with the construction of buildings and other elements of a master plan, planned development, or planned unit development notwithstanding the setback line established in this chapter if the person, partnership, or corporation legally has begun a use as evidenced by at least one of the following:

(a) All building permits have been applied for or issued by a local government before July 1, 1988.

(b) There is a master plan, planned development, or planned unit development:

(i) that has been approved in writing by a local government before July 1, 1988; or

(ii) where work has begun pursuant to approval as evidenced by the completion of the utility and infrastructure installation designed to service the real property that is subject to the setback line and included in the approved master plan, planned development, or planned unit development.

(2) However, repairs performed on a habitable structure built pursuant to this section are subject to the guidelines for repairs as set forth in this section.

(3) Nothing in this section prohibits the construction of fishing piers or structures which enhance beach access seaward of the baseline, if permitted by the department.

(D) Special permits:

(1) If an applicant requests a permit to build or rebuild a structure other than an erosion control structure or device seaward of the baseline that is not allowed otherwise pursuant to Sections 48-39-250 through 48-39-360, the department may issue a special permit to the applicant authorizing the construction or reconstruction if the structure is not constructed or reconstructed on a primary oceanfront sand dune or on the active beach and, if the beach erodes to the extent the permitted structure becomes situated on the active beach, the permittee agrees to remove the structure from the active beach if the department orders the removal. However, the use of the property authorized under this provision, in the determination of the department, must not be detrimental to the public health, safety, or welfare.

(2) The department's Permitting Committee is the committee to consider applications for special permits.

(3) In granting a special permit, the committee may impose reasonable additional conditions and safeguards as, in its judgment, will fulfill the purposes of Sections 48-39-250 through 48-39-360.

(4) A party aggrieved by the decision to grant or deny a special permit application may appeal pursuant to Section 48-39-150(D).

(E) The provisions of this section and Section 48-39-280 do not apply to an area in which the erosion of the beaches located in its jurisdiction is attributed to a federally authorized navigation project as documented by the findings of a Section 111 Study conducted under the authority of the federal Rivers and Harbors Act of 1968, as amended by the federal Water Resources Development Act of 1986, and approved by the United States Army Corps of Engineers. Nothing contained in this subsection makes this area ineligible for beach renourishment funds. The baseline determined by the local governing body and the department is the line of erosion control

devices and structures and the department retains its jurisdiction seaward of the baseline. In addition, upon completion of a department approved beach renourishment project, including the completion of a sand transfer system if necessary for long-term stabilization, an area under a Section 111 Study becomes subject to all the provisions of this chapter. For the purposes of this section, a beach nourishment project stabilizing the beach exists if a successful restoration project is completed consisting of at least one hundred fifty cubic yards a foot over a length of five and one-half miles, with a project design capable of withstanding a one-in-ten-year storm, as determined by department, and renourishment is conducted annually at a rate, agreed upon by the department and local governing body, equivalent to that which would occur naturally if the navigation project causing the erosion did not exist. If the two parties cannot agree, then the department must obtain the opinion of an independent third party. Any habitable structure located in an area in which the erosion of the beaches located in its jurisdiction is attributed to a federally authorized navigation project as documented by the findings of a Section 111 Study, which was in existence on September 21, 1989, and was over forty years old on that date and is designated by the local governing body as an historical landmark may be rebuilt seaward of the baseline if it is rebuilt to the exact specifications, dimensions, and exterior appearance of the structure as it existed on that date.

SECTION 48-39-300. Local governments given authority to exempt certain erosion control structures from restrictions.

A local governing body, if it notifies the department before July 1, 1990, may exempt from the provisions of Section 48-39-290, relating to reconstruction and removal of erosion control devices, the shorelines fronting the Atlantic Ocean under its jurisdiction where coastal erosion has been shown to be attributed to a federally authorized navigation project as documented by the findings of a Section 111 Study conducted under the authority of the Rivers and Harbors Act of 1968, as amended by the Water Resources Development Act of 1986 and approved by the United States Army Corps of Engineers. Erosion control devices exempt under this section must not be constructed seaward of their existing location, increased in dimension, or rebuilt out of materials different from that of the original structure.

SECTION 48-39-305. Judicial determination of ownership and whether construction prohibition applies or requires compensation; burden of proof.

(A) A person having a recorded interest or interest by operation of law in or having registered claim to land seaward of the baseline or setback line which is affected by the prohibition of construction or reconstruction may petition the circuit court to determine whether the petitioner is the owner of the land or has an interest in it. If he is adjudged the owner of the land or to have an interest in it, the court shall determine whether the prohibition so restricts the use of the property as to deprive the owner of the practical uses of it and is an unreasonable exercise of police power and constitutes a taking without compensation. The burden of proof is on the petitioner as to ownership, and the burden of proof is on the State to prove that the prohibition is not an unreasonable exercise of police power.

(B) The method provided in this section for the determination of the issue of whether the prohibition constitutes a taking without compensation is the exclusive judicial determination of

the issue, and it must not be determined in another judicial proceeding. The court shall enter a judgment in accordance with the issues. If the judgment is in favor of the petitioner, the order must require the State either to issue the necessary permits for construction or reconstruction of a structure, order that the prohibition does not apply to the property, or provide reasonable compensation for the loss of the use of the land or the payment of costs and reasonable attorney's fees, or both. Either party may appeal the court's decision.

SECTION 48-39-310. Prohibition of destruction of any beach or dune vegetation seaward of setback line.

The destruction of beach or dune vegetation seaward of the setback line is prohibited unless there is no feasible alternative. When there is destruction of vegetation permitted seaward of the setback line, mitigation, in the form of planting of new vegetation where possible, for the destruction is required as part of the permit conditions.

SECTION 48-39-320. Comprehensive beach management plan.

(A) The department's responsibilities include the creation of a long-range and comprehensive beach management plan for the Atlantic Ocean shoreline in South Carolina. The plan must include all of the following:

(1) development of the data base for the state's coastal areas to provide essential information necessary to make informed and scientifically based decisions concerning the maintenance or enhancement of the beach/dune system;

(2) development of guidelines and their coordination with appropriate agencies and local governments for the accomplishment of:

(a) beach/dune restoration and nourishment, including the projected impact on coastal erosion rates, cost/benefit of the project, impact on flora and fauna, and funding alternatives;

(b) development of a beach access program to preserve the existing public access and enhance public access to assure full enjoyment of the beach by all residents of this State;

(c) maintenance of a dry sand and ecologically stable beach;

(d) protection of all sand dunes seaward of the setback line;

(e) protection of endangered species, threatened species, and important habitats such as nesting grounds;

(f) regulation of vehicular traffic upon the beaches and the beach/dune system which includes the prohibition of vehicles upon public beaches for nonessential uses;

(g) development of a mitigation policy for construction allowed seaward of the setback line, which must include public access ways, nourishment, vegetation, and other appropriate means;

(3) formulation of recommendations for funding programs which may achieve the goals set forth in the State Comprehensive Beach Management Plan;

(4) development of a program on public education and awareness of the importance of the beach/dune system, the project to be coordinated with the South Carolina Educational Television Network and Department of Parks, Recreation and Tourism;

(5) assistance to local governments in developing the local comprehensive beach management plans.

(B) The plan provided for in this section is to be used for planning purposes only and must not be used by the department to exercise regulatory authority not otherwise granted in this chapter, unless the plan is created and adopted pursuant to Chapter 23 of Title 1.

SECTION 48-39-330. Disclosure statement.

Thirty days after the initial adoption by the department of setback lines, a contract of sale or transfer of real property located in whole or in part seaward of the setback line or the jurisdictional line must contain a disclosure statement that the property is or may be affected by the setback line, baseline, and the seaward corners of all habitable structures referenced to the South Carolina State Plane Coordinate System (N.A.D.-1983) and include the local erosion rate most recently made available by the department for that particular standard zone or inlet zone as applicable. Language reasonably calculated to call attention to the existence of baselines, setback lines, jurisdiction lines, and the seaward corners of all habitable structures and the erosion rate complies with this section.

The provisions of this section are regulatory in nature and do not affect the legality of an instrument violating the provisions.

SECTION 48-39-340. Distribution of funding.

Funding for local governments to provide for beachfront management must be distributed in a fair and equitable manner. Consideration must be given to the size of the locality, the need for beach management in the area, the cost/benefits of expenditures in that area, and the best interest of the beach/dune system of the State as established by priority by the department.

SECTION 48-39-345. Coastal Division of DHEC to administer funds reimbursed to nonfederal project sponsors under local cooperative agreement with Army Corps of Engineers for cost-shared beach renourishment project.

Any funds reimbursed to nonfederal project sponsors under the terms of a Local Cooperative Agreement (LCA) with the Army Corps of Engineers for a federally cost-shared beach renourishment project, where the reimbursement is for credit to the nonfederal sponsor for federally approved effort and expenditures toward the nonfederal project sponsor obligations detailed in the LCA and where the State has provided funding to the nonfederal sponsor to meet the financial cost-sharing responsibilities under the LCA, must be refunded by the nonfederal

sponsor to the State with the State and the nonfederal sponsor sharing in this reimbursement in the same ratio as each contributed to the total nonfederal match specified in the LCA. The Coastal Division of the South Carolina Department of Health and Environmental Control shall administer these funds and make these funds available to other beach renourishment projects.

SECTION 48-39-350. Local comprehensive beach management plan.

(A) The local governments must prepare by July 1, 1991, in coordination with the department, a local comprehensive beach management plan which must be submitted for approval to the department. The local comprehensive beach management plan, at a minimum, must contain all of the following:

- (1) an inventory of beach profile data and historic erosion rate data provided by the department for each standard erosion zone and inlet erosion zone under the local jurisdiction;
- (2) an inventory of public beach access and attendant parking along with a plan for enhancing public access and parking;
- (3) an inventory of all structures located in the area seaward of the setback line;
- (4) an inventory of turtle nesting and important habitats of the beach/dune system and a protection and restoration plan if necessary;
- (5) a conventional zoning and land use plan consistent with the purposes of this chapter for the area seaward of the setback line;
- (6) an analysis of beach erosion control alternatives, including renourishment for the beach under the local government's jurisdiction;
- (7) a drainage plan for the area seaward of the setback zone;
- (8) a post disaster plan including plans for cleanup, maintaining essential services, protecting public health, emergency building ordinances, and the establishment of priorities, all of which must be consistent with this chapter;
- (9) a detailed strategy for achieving the goals of this chapter by the end of the forty-year retreat period. Consideration must be given to relocating buildings, removal of erosion control structures, and relocation of utilities;
- (10) a detailed strategy for achieving the goals of preservation of existing public access and the enhancement of public access to assure full enjoyment of the beach by all residents of this State. The plan must be updated at least every five years in coordination with the department following its approval. The local governments and the department must implement the plan by July 1, 1992.

(B) Notwithstanding the provisions of Section 48-39-340, if a local government fails to act in a timely manner to establish and enforce a local coastal beach management plan, the department

must impose and implement the plan or the State Comprehensive Beach Management Plan for the local government. If a local government fails to establish and enforce a local coastal beach management plan, the government automatically loses its eligibility to receive available state-generated or shared revenues designated for beach/dune system protection, preservation, restoration, or enhancement, except as directly applied by the department in its administrative capacities.

SECTION 48-39-355. Documentation of authorized activity.

A permit is not required for an activity specifically authorized in this chapter. However, the department may require documentation before the activity begins from a person wishing to undertake an authorized construction or reconstruction activity. The documentation must provide that the construction or reconstruction is in compliance with the terms of the exemptions or exceptions provided in Sections 48-39-280 through 48-39-360.

SECTION 48-39-360. Application of chapter.

The provisions of Sections 48-39-250 through 48-39-355 do not apply to an area which is at least one-half mile inland from the mouth of an inlet.

Appendix 2. Policy and Management Recommendations Matrix

MINIMIZING RISKS		Sub-Policy	BMA	REG	OCRM	State	Local
1) Prevent the Seaward Expansion of Beachfront Development	Disallow seaward movement of the DHEC-OCRM Baseline	X	X				
	Local governments should establish a beachfront building line			X			X
	Re-survey public/private boundary prior to renourishment	X		X			
2) Strengthen the Beachfront Setback Area	Increase the minimum setback distance	X	X				
	Align setback regulations with statutes regarding size limitations		X				
	Evaluate all historical shorelines and short-term variability in unstabilized inlet zones	X	X	X			
	Limit building in the most vulnerable beachfront areas, particularly seaward of the DHEC-OCRM Baseline	X	X	X			X
	Enhance protection of dunes outside of “beach/dune system”	X	X/PD	X			X
3) Eliminate Inconsistent Public Subsidies	State should designate “no subsidy” zones in hazardous areas	X				X	
4) Strategically Acquire Beachfront Lands and/or Easements	Establish state and local voluntary acquisition strategies			X		X	X
	Explore and expand funding mechanisms for voluntary acquisitions, including a state “beach management” trust fund	X		X		X	X
5) Strengthen the Role of Local Gov’ts	Develop stronger guidance, new elements, and OCRM assistance for Local Comprehensive Beach Management Plans	X	X	X			
	Integrate planning requirements for beachfront communities			X		X	X
RENOURISHMENT							
6) Develop and Implement Regional Sediment Management Plans	State should develop and implement a regional sediment mgmt. plan in cooperation with U.S. Army Corps of Engineers			X			X
7) Strengthen Reviews of Nearshore Dredging and Other Alterations	Heightened reviews and monitoring of any projects within 1 mile		X	X			
	Establish Technical Committee to recommend new criteria		X	X			
8) Improve Beach Nourishment Monitoring	Require pre- and post-monitoring for all nourishment projects			X			
	Standardize, to the extent possible, data collected and methods			X			

HARD STABILIZATION STRUCTURES		Sub-Policy	BMA	REG	OCRM	State	Local
9) Refine Criteria for Emergency Orders and Sandbags	Establish new criteria for “emergency” – e.g. disaster declarations	X	X				
	Establish new design criteria for temporary structures (sandbags)		X	X			
10) Improve Guidelines for Groins and Breakwaters	Establish Technical Committee to recommend siting/design criteria		X	X			
	Leverage additional expertise in review of groin/BW proposals			X			
	Identify ownership / responsibility for all existing groins			X			
11) Expand Beachfront Real Estate Disclosure Requirements	Expand R/E disclosure requirements for approval by SC REC			X		X	
“SHELTERED” COASTLINES							
12) Manage Erosion Control in Estuaries	Map and characterize estuarine shorelines			X		X	
	Develop “erosion control options table” for different shorelines			X			
	Expand education, training for property owners, consultants			X		X	
	Develop Estuarine Shoreline Mgmt. Plans at state and local levels	X		X		X	X
	Promote alternatives to traditional bulkheads/revetments			X			
	Establish minimum setback for bulkheads		X				X
	Differentiate “transgression” from erosion in OCRM decisions			X			
	Require analysis of alt. stabilization for undeveloped properties		X				
13) Establish Non-Beachfront Shoreline Buffer Areas	Establish 25-ft min. buffer for nonbeachfront shorelines in CZ	X	X				
	State tax incentives or credits could be considered for buffers					X	
	Encourage local gov’ts to establish / expand shoreline buffers			X			X

BMA = may require amendment to Beachfront Mgmt Act; REG = requires new or change to OCRM regulations; PD = requires amendment to SC Coastal Program Document; OCRM = requires implementation by DHEC-OCRM staff; STATE = implementation through other state agency or statute; LOCAL = requires implementation by local government.

Appendix 3. Summary of Public Comments and Committee Responses / Clarifications

The Draft Report of the Shoreline Change Advisory Committee was made available for public comments during a period from November 6, 2009 through February 5, 2010. The Draft Report was downloaded a total of 31,625 times, and a total of 35 comment letters were received. The full and complete record of public comments on the Draft Report is available in a Supplement to this final report, upon request, from the SCDHEC Office of Ocean and Coastal Resource Management, and available for download (at the time of publication) from the following website: <http://www.scdhec.gov/environment/ocrm/>. The comments were categorized, summarized, and counted in this Appendix. The Committee chose to respond to some comments where it saw the opportunity to clarify the intent of the original text or address items that may have been misinterpreted.

TOPIC	COMMENT	COMMITTEE RESPONSES / CLARIFICATIONS
<i>General Support</i>	Letters indicating support for all 13 General Recommendations (15 received).	
<i>General Dissatisfaction</i>	Letters indicating general dissatisfaction (4 received). The Beachfront Management Act has been a success and the recommendations in the report represent a significant shift from the original legislative findings and intent (1 comment).	
<i>Committee Composition and Process</i>	The work of the Committee in discussing these complex issues is relevant, timely, and appreciated (25 comments). The composition of the Committee was heavily weighted toward government and academic members (2 comments). Changes in beachfront management policy should be dictated by elected officials, not by agency personnel	Response from DHEC-OCRM: This was intended to be an expert Committee that leaned heavily on our state’s university and agency scientists. Other coastal stakeholders, with a broad range of backgrounds and expertise, were included on the Committee to ensure that the practicalities and implications of any recommendations were discussed and considered. Response from DHEC-OCRM: DHEC routinely uses advisory committees to engage outside experts

	<p>and a volunteer committee for which there was no legislative oversight (1 comment).</p> <p>The relevancy of the expertise of some committee members was questioned (specifically related to coastal geology) (1 comment).</p> <p>The “stealth roll-out” of the draft report and short response time window demonstrated the intent to limit public input (1 comment).</p> <p>Beachfront property owners were excluded from the process (2 comments).</p>	<p>and stakeholders on contemporary research and policy issues. It has been over 20 years since the SC Beachfront Management Act called for the establishment of a statewide beach management program, and given the rapid coastal population growth and development during that period and continuing beachfront challenges and conflicts, it was the right time to reflect on state and local policies to improve upon the agency’s required state and local beach management plans.</p> <p>As acknowledged on pg. 30 and throughout the report: “Any regulatory changes would require approval from the DHEC Board for promulgation pursuant to the SC Admin. Procedures Act (SC Code Ann. § 1-23-10 et seq.), which requires review by the SC General Assembly, and must be authorized under existing statutes. Any statutory changes would require legislative action by the South Carolina General Assembly.”</p> <p>Response from DHEC-OCRM: DHEC-OCRM staff acknowledge that the original one month window for public review was insufficient for a report of this magnitude, and immediately extended to a 90-day comment period upon request. Email notices and press releases were distributed statewide, and the draft report was downloaded over 30,000 times during the comment period.</p> <p>Response from DHEC-OCRM: Please see text under the “Opportunities for Public Input” subheading on pp. 10-11, which includes a description of regional discussion forums where 27 people attended on behalf of 13 different beachfront Homeowners/Property Owners Associations.</p> <p><u>All responses and clarifications from this point forward are from the Shoreline Change Advisory Committee.</u></p>
<p><i>Content / Analysis under General Recommendations</i></p>	<p>The “Measures of Success” and “Key Uncertainties/Assumptions” sections of each</p>	

	<p>recommendation should be reconsidered, revised, and elaborated upon (1 comment).</p> <p>Pertinent text from local ordinances or other documents should be included directly in the report (1 comment).</p>	
<i>Planning Timeframes</i>	<p>The descriptors “short-term,” “mid-term,” and “long-term” need to be clarified throughout the report (1 comment).</p> <p>Coastal erosion is time- and space-specific, so a realistic frame of reference for planning purposes needs to be established (1 comment).</p> <p>Accelerated sea-level rise is of less importance to coastal erosion at decadal to century time scales than the effects of inlet sediment bypassing, storms, sand-trapping structures, and shoals (1 comment).</p>	
<i>Coordination</i>	<p>Coordination between all levels of government is needed to avoid conflicts between potential new state regulations and existing local and/or federal regulations (1 comment).</p> <p>The draft report fails to fully recognize the role that local governments can and must play in policy development and implementation (1 comment).</p>	<p>The Committee fully agrees that local governments can and should play a stronger role in shoreline management, as described in Recommendation #5 and throughout the report.</p>
<i>Education and Outreach</i>	<p>Public education activities are noticeably absent from this report (2 comments).</p>	
<i>Cost-Benefit Analysis</i>	<p>For many proposed recommendations, the report did not use cost-benefit analysis to quantify or analyze potential negative economic impacts (2 comments).</p>	<p>The Committee attempted to identify and broadly describe the potential economic costs and benefits associated with each recommendation. However, it was beyond the scope of the Committee to provide specific and detailed cost-benefit analysis. For</p>

	<p>Coastal stakeholders want to know how the recommendations in the report will affect properties and the coastal economy; not just the environment (3 comments).</p>	<p>many of the recommendations, any future study should further quantify nonmarket values, indirect economic benefits, and ecosystem services (for example, storm surge protection, water quality improvement, recreational uses, and enhanced public health and welfare) as well as direct impacts such as decreased property values of oceanfront lots.</p>
<p><i>Inlet Management</i></p>	<p>Changes associated with tidal inlets account for the majority of erosion problems in South Carolina (2 comments).</p> <p>Inlet Management Zones should be established (1 comment).</p> <p>The lack of discussion surrounding inlet shoal attachment, management, and erosion mitigation is a major deficiency in the report (1 comment).</p>	<p>The Committee agrees that tidal inlets play a key role in beachfront management in South Carolina and understands that, for example, inlet shoals are attractive sources of sand given cost benefits and the fact that some shoals can be reliably predicted to attach to downdrift beaches. However, given concerns about the potential for unintended consequences of some inlet management approaches, the Committee suggests that an ad hoc technical committee (see Recommendation #7) provide additional guidance to DHEC-OCRM on criteria, guidelines, and recommendations for such projects.</p>
<p><i>Goal 1: Minimizing Risks</i></p>	<p>The original intent and current implementation of the Beachfront Management Act’s “retreat policy” needs to be clarified (3 comments).</p> <p>The term “retreat policy” should be replaced with “stabilization policy” and renourishment should be the preferred response to erosion (1 comment).</p>	<p>From pg. 25 of the report: “As currently constructed, the state’s retreat policy does not provide for the immediate, active relocation of structures from the beach/dune system; however, by gradually eliminating erosion control structures, it ensures abandonment of property to allow the natural, inland migration of a healthy beach/dune system, if or when renourishment becomes unsustainable for a specific area or community... In the meantime, the Committee urges state and local governments to enact policies to ensure that sufficient space is provided for the natural migration of the beach/dune system and that the related risks to private and public resources are minimized.”</p>

	<p>The proposed retreat policy would be detrimental to the SC economy, would hinder tourism, and would diminish property values (2 comments).</p> <p>Retreat is a viable option only in select instances (2 comments).</p>	
<p><i>Recommendation 1: Prevent the Seaward Expansion of Beachfront Development</i></p>	<p>Specific support expressed for Rec. #1 (5 letters).</p> <p>SC Code §48-39-120(B) should be clarified to include renourishment, in addition to natural accretion, as areas that cannot be developed if they extend beyond the original property line or boundary (1 comment).</p> <p>This recommendation appears to be more punitive than sensible (1 comment).</p> <p>Seaward movement of the DHEC-OCRM beachfront jurisdictional lines should continue to be allowed (2 comments).</p> <p>“Holding the line of existing development” should be a state regulation rather than a local ordinance to ensure coast-wide uniformity (2 comments).</p> <p>Many of the planning actions (on pages 30 and 31) are suited to vacant lands, but not to developed areas (2 comments).</p> <p>If the state’s desire is to prohibit any future seaward movement of the baseline, then it must adopt a different basis for establishing the baseline than the dune crest (1 comment).</p> <p>The current definition of a new primary sand dune (3 feet high, 500 feet long) is woefully deficient and should not serve as the basis for seaward baseline movement as dunes of this size offer little storm protection or</p>	

	<p>sediment supply to the beach (1 comment).</p> <p>It is generally difficult to receive enough points to change the FEMA Community Rating System class and reduce flood insurance premiums for a community (1 comment).</p> <p>The state should establish criteria for the evaluation of shoreline location accuracy (1 comment).</p>	
<p><i>Recommendation 2: Strengthen the Beachfront Setback Area</i></p>	<p>Specific support expressed for Rec. #2 (4 letters).</p> <p>Increasing the minimum setback line distance will cause more houses to enter into DHEC-OCRM’s beachfront permitting jurisdiction and render them valueless (3 comments).</p> <p>A phased implementation of this minimum setback distance should be considered (1 comment).</p> <p>Erosion rate variability should be incorporated into the calculation of the setback distance for all beaches; not just unstabilized inlet zones (1 comment).</p> <p>Implementing standard deviation or variance in inlet areas could result in impractically wide setbacks (1 comment).</p> <p>There are inconsistencies that need to be addressed between local flood ordinances and state post-storm reconstruction laws (1 comment).</p> <p>This recommendation could lead to difficulty in obtaining insurance, increased insurance cost, difficulty in obtaining mortgages, and the potential loss of property value (1 comment).</p>	<p>Development and redevelopment are allowed within the setback area. From pg. 36 of the report: “Building within the state’s beachfront ‘setback area’ is allowed, but any development is subject to specific regulations.”</p> <p>The Committee is not aware of any private insurance companies that have used state-designated erosion hazard areas to determine insurance premiums or coverage eligibility. The National Flood Insurance Program, implemented by the Federal Emergency Management Agency and the SC DNR Floodplain Management Program, can actually discount flood insurance premiums if sufficient setbacks are enacted at the state and local levels through the</p>

	<p>The OCRM jurisdictional setback line should become the building control line, which was the original intent of the 1987 Blue Ribbon Committee’s recommendations (1 comment).</p> <p>If natural accretion or renourishment cannot be sustained in the future, the existing methodology for establishing baselines and setback lines will allow jurisdictional lines to migrate landward (1 comment).</p> <p>The state can further restrict the size of new / replacement habitable structures seaward of the baseline, but eliminating all such structures seaward of the baseline is not practical (1 comment).</p> <p>Provision 44 CFR sec. 60.3(e)(7) of the NFIP V zone regulations may be useful in protecting dune areas beyond those protected by the state (1 comment).</p> <p>I agree that the setback area should be expanded, but the basis for a minimum setback distance of 50 feet needs to be explained (1 comment).</p> <p>The allowable size of 5,000 sq ft of heated space seaward of the setback line should be reduced, and buildings seaward of the baseline should be restricted to an even smaller size (1 comment).</p>	<p>Community Rating System (see pages 30, 32, and 62).</p> <p>From pg. 39 of the report: The recommendation is to “<u>Limit</u> the building or re-building of structures in the most vulnerable beachfront areas, particularly seaward of the baseline.”</p>
<p><i>Recommendation 3: Inconsistent Public Subsidies</i></p>	<p>Specific support expressed for Rec. #3 (1 letter).</p> <p>The recommendation to eliminate inconsistent public subsidies of private property is unclear (7 comments).</p>	<p>Pg. 45 of the report has been clarified with the following: “Within the designated high hazard areas (which have not yet been identified), state and local governments should limit public subsidies that would contribute to <u>greater density or new development within those high hazard areas</u>. The concept is simply ‘build at your own risk,’ and follows the same model as the Coastal Barrier Resources Act that the federal government uses for the same purpose.”</p>

	<p>The elimination of public subsidies would jeopardize eligibility for FEMA and state post-disaster funding (for designated areas). Clarification of the report’s proposal is warranted (1 comment).</p> <p>This recommendation will do irreparable harm to homeowners in the state wind insurance pool (1 comment).</p> <p>This recommendation should apply to sheltered shorelines in addition to ocean shorelines (2 comments).</p> <p>This recommendation is potentially one of the most important issues presented in the report, but it needs to be expanded (1 comment).</p>	<p>The Committee felt that, if a shoreline property were developed AFTER designation as a special high hazard area by the General Assembly, it should be developed at the property owner’s risk and should not qualify for public post-disaster funds for reconstruction or erosion control (see pg. 45).</p> <p>The Committee felt that, if a shoreline property were developed AFTER designation as a special high hazard area by the General Assembly, it should be developed at the property owner’s risk and should not qualify for the state wind insurance pool.</p>
<p><i>Recommendation 4: Strategically Acquire Beachfront Lands and/or Easements</i></p>	<p>Specific support expressed for Rec. #4 (2 letters).</p> <p>Any available funding should be used for beach renourishment; not for land acquisition or other uses (2 comments).</p> <p>It is unlikely that voluntary acquisition will be a viable option except after a hurricane or sever storm destroys a building and leaves the land unbuildable (2 comments).</p> <p>Not all beachfront communities can follow the Town of Hilton Head Island’s example of using accommodations taxes and real estate transfer fees for beach management and land acquisition (1 comment).</p> <p>Efforts should be directed into strengthening post-storm redevelopment regulations; not into developing voluntary relocation programs (1 comment).</p>	<p>As noted on pg. 53 of the report: “The cost of relocation or acquisition is likely to be a one-time expense, whereas hard and soft stabilization approaches will be continual expenditures, including maintenance.”</p>

	<p>The Bolivar Peninsula post-Ike buyout program could provide some “lessons learned” regarding voluntary acquisition (1 comment).</p>	
<p><i>Recommendation 5: Strengthen the Role of Local Governments</i></p>	<p>Specific support expressed for Rec. #5 (2 letters).</p> <p>The recommendation for additional elements in Local Comprehensive Beach Management Plans will be very difficult for smaller communities and counties to implement due to staff limitations (3 comments).</p> <p>Where the state owns beachfront areas, such as in Myrtle Beach, Edisto Island, and Hunting Island, it should work with the local community to ensure that clear lines of responsibility are established for all potential issues (1 comment).</p> <p>The timing of comprehensive plans and beachfront management plans needs to be consistent with federal hazard mitigation plan timing to avoid risking eligibility for federal disaster assistance and loss of flood insurance premium discounts (1 comment).</p> <p>Eligibility for state beach management funds should not be contingent upon integrated local plans (1 comment).</p> <p>The state should specify the sea level rise values and other future conditions scenarios that should be considered by local governments in their hazard mitigation plans (1 comment).</p>	<p>The Committee believes that stronger guidelines and requirements for local beachfront communities are needed and should be accompanied by state support for communities in the form of technical planning assistance and enhanced funding under a state “beach management trust fund” (pg. 62).</p> <p>As acknowledged on pg. 62 of the report: “Strengthened requirements of local comprehensive beach management plans and greater coordination across planning efforts will also require more staff time; however, the results of this planning effort will provide greater utility and efficiency to both local and state governments in managing the beachfront.”</p>
<p><i>Goal 2: Renourishment</i></p>	<p>The report suggests that beach renourishment is expensive to the point of being cost prohibitive, but it does not provide legitimate cost-benefit analysis to support this argument (3 comments).</p>	<p>From pg. 25 of the report: “The Committee agreed that beach renourishment appears to be viable for at least the “mid-term” for many beach communities, but that renourishment could fail as a <u>statewide solution</u> under several</p>

	<p>The costly expense of renourishment should not be continued – barrier islands and coastlines should be allowed to erode and accrete naturally (1 comment).</p> <p>By not funding continued beach nourishment, tourism in the region will suffer (1 comment).</p> <p>A presumption in the Draft Report is that most of the developed coast is eroding or going to erode in the future. Yet as the report mentions in passing, most developed beaches in the state are in better condition today than in 1988. There are fewer exposed seawalls, more protective dunes, and wider beaches in many localities – whether due to normal accretion or renourishment (1 comment).</p> <p>Better permit transparency and timelines are needed for renourishment projects (2 comments).</p>	<p>related scenarios - all of which seem plausible at some point, however distant:</p> <ol style="list-style-type: none"> 1) decreasing sand availability (leading to higher costs per project); 2) increasing rates of erosion (or frequency of storms); and/or 3) decreasing federal, state, and local revenues supporting renourishment (or increasing reliance on local and private funding sources).” <p>The combined influence of these factors will be different for each beach community – i.e. some communities will be able to sustain renourishment over longer time horizons.</p> <p>From pg. 62 of the report: “The SC Council on Coastal Futures (2004) recommended that the state ‘should capitalize and adequately fund the State Beach Renourishment Trust Fund, whose purpose is to provide state matching funds for priority public beach renourishment projects and to provide for emergency response needs to repair beaches after storms.’ <u>We concur and recommend the expansion of this fund to include a broader range of beach management options.</u>”</p>
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	<p>The artificial enlargement of protective dunes should be promoted and added to this section of the report (1 comment).</p> <p>DHEC-OCRM should not require full-scale permits for sand fencing for dune protection/restoration (1 comment).</p> <p>Recommendations for improved sand fencing policies (with regard to nesting sea turtles) should be added to this section of the report (1 comment).</p>	
<p><i>Recommendation 6: Develop and Implement Regional Sediment Management Plans</i></p>	<p>Specific support expressed for Rec. #6 (3 letters).</p> <p>Erosion zone mapping would need to be consistent with the erosion zone determinations of the National Flood Insurance Program (1 comment).</p> <p>RSM can be a long and expensive process that may not greatly expand knowledge in South Carolina. Inlet management plans would result in more comprehensive solutions than RSM (1 comment).</p>	
<p><i>Recommendation 7: Strengthen Reviews of Nearshore Dredging and Other Alterations</i></p>	<p>Specific support expressed for Rec. #7 (1 letter).</p> <p>Sand for renourishment should be allowed to be removed within the existing already narrow parameters for permitting (4 comments).</p> <p>For consistency, the proposed ad hoc Technical Committee should include local government representatives with expertise in the enforcement of floodplain management regulations (1 comment).</p>	<p>From pg. 80 of the report: “DHEC-OCRM should establish a special review process with enhanced scrutiny for any projects affecting the beach, inlet systems, or submerged lands out to 1 (one) mile offshore.” This recommendation does not call for prohibiting the use of nearshore sand resources.</p>

	<p>Management of attaching shoals (via scraping and redistribution of sediment) should be considered by the proposed ad hoc Technical Committee (4 comments).</p> <p>Wave refraction studies should also be performed prior to the issuance of any renourishment or groin permits (1 comment).</p> <p>The basis for the 1-mile criterion needs to be further explained, and the three proposed permit conditions for projects within this distance seem excessive and unnecessary (1 comment).</p>	
<p><i>Recommendation 8: Improve Beach Nourishment Monitoring</i></p>	<p>Specific support expressed for Rec. #8 (2 letters).</p> <p>Small scale sand fence installation and dune building projects should be exempt from additional monitoring requirements (1 comment).</p> <p>Excessive monitoring should be avoided so it doesn't become overly burdensome and expensive (2 comments).</p> <p>Firms that design beach renourishment projects should not be precluded from monitoring their own projects (1 comment).</p>	
<p><i>Goal 3: Hard Stabilization Structures</i></p>	<p>There are statements that mislead the reader into believing that there may be imminent danger or that support current beach erosion theory suggesting beach armament results in damage to adjoining properties or loss of the dry sand beach (1 comment).</p>	<p>The text referred to on pg. 91 was not drafted by the Committee but rather is a legislative finding from the Beachfront Management Act (SC Code § 48-39-250(5)).</p>
<p><i>Recommendation 9: Refine Criteria for Emergency Orders and Sandbags</i></p>	<p>The current regulations regarding the size of allowable sandbags need to be reevaluated (3 comments).</p>	

	<p>Acute erosion events that are not caused by storms or disaster events also need to be covered by Emergency Orders (3 comments).</p> <p>Emergency Orders should be differentiated between sand scraping and sand bagging emergency orders (2 comments).</p> <p>Local government officials should have input into whether or not an erosion situation justifies emergency measures (1 comment).</p> <p>Properties that are not “habitable” (i.e. public golf courses or other public access uses) should be considered as potential candidates for emergency measures (1 comment).</p> <p>It would not be possible to obtain the necessary permits and funding for a beach renourishment project in 90 days following an erosion emergency (1 comment).</p>	<p>The following text has been added to pg. 105 of the report: “Committee members discussed whether sandscraping should be allowed under locally-declared Emergency Orders or should be subject to the same restrictions proposed here for sand bags. Some Committee members believe that sandscraping and sand bags should only be allowed following a state emergency declaration because they are temporary solutions that should not be substitutes for proactive planning. Other Committee members believe that sandscraping should be authorized under locally-declared Emergency Orders. The Committee generally acknowledges that sandscraping may not have the same long-term negative impacts as sand bags, but can cause short-term impacts to sea turtle nesting, and can prove ineffective in protecting property since it lowers the beach profile in front of the threatened structures (which can intensify erosion).”</p> <p>From pp. 100-101 of the report:</p> <ul style="list-style-type: none"> e. “If the petitioner’s plan is approved and calls for renourishment, then a renourishment permit application should be submitted to DHEC-OCRM <u>within 18 months</u> of the issuance of the original Emergency Order. <ul style="list-style-type: none"> i. If DHEC-OCRM approves the renourishment permit, then sandbags should be allowed to remain in place for <u>up to 12 months</u> after the permit is issued to allow sufficient time for the project to be completed, but must be removed
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	<p>This Committee should not try to distinguish between or tie allowable responses to various causes of emergencies (1 comment).</p> <p>The option requiring all sandbags to be placed beneath a pile-supported building is not practical (1 comment).</p>	<p>at the time of renourishment or at the end of the 12 month period.”</p> <p>The Committee agreed with this comment and made changes to the relevant text on pg. 101.</p>
<p><i>Recommendation 10: Improve Guidelines for Groins and Breakwaters</i></p>	<p>Specific support expressed for Rec. #10 (1 letter).</p> <p>There are concerns about the true need for, as well as the transparency and composition of, ad hoc Technical Committees assembled to review applications for the construction of groins and breakwaters (3 comments).</p> <p>Soft, fabric tube-type, removable groins should be considered (1 comment).</p> <p>Groin regulations need enforcement “teeth” to ensure removal of dysfunctional groins and/or those that cause downdrift impacts (1 comment).</p> <p>Restrictions on groins and their upkeep would be a detriment to the economy in some areas (2 comments).</p> <p>Current guidelines are sufficiently clear and should remain in place (3 comments).</p> <p>Groins should be redefined as hard erosion control structures and should be treated similarly as policies for seawalls (1 comment).</p>	<p>From pg. 107 of the report: “An ad hoc Technical Committee should be established by DHEC-OCRM to recommend specific design and siting standards, as well as review considerations, for future proposals.” As envisioned, this group (and the ad hoc technical committee described under Recommendation # 7) would not be a decision-making entity, but would suggest appropriate review standards and potentially comment on specific project proposals during the open public comment period.</p>

	Adjustable groins have generally not worked well in previous installations in other states (1 comment).	
<i>Recommendation 11: Expand Beachfront Real Estate Disclosure Requirements</i>	<p>Specific support expressed for Rec. #11 (2 letters).</p> <p>Expanded real estate disclosure should include background information on regulations in place to protect sea turtles (1 comment).</p> <p>Should verify with FEMA as to whether or not the National Flood Insurance Program would pay for flood losses associated with chronic erosion in low-lying areas (1 comment).</p> <p>An educational program regarding issues related to beachfront construction and hazards would be more effective than affidavits (1 comment).</p> <p>Disclosure needs to occur early in the property buying process (1 comment).</p>	
<i>Goal 4: “Sheltered” Coastlines</i>	It appears that less effort was put forth on sheltered shorelines, which are arguably more critical to the future health and welfare of our coastal ecosystems and economies than are our beaches (1 comment).	
<i>Recommendation 12: Manage Erosion Control in Estuaries</i>	<p>Specific support expressed for Rec. #12 (2 letters).</p> <p>An estuarine shoreline retreat policy is needed since these shorelines are as much a part of the state’s public trust responsibilities as the beachfront (2 comments).</p> <p>Interim measures should be proposed since pilot studies and other research and mapping efforts may take some time to complete (1 comment).</p>	

	<p>Pilot projects would enhance the knowledge of beneficial alternative erosion control approaches (1 comment).</p> <p>OCRM can't require an owner of an oceanfront lot to perform an alternatives analysis before being allowed to develop the lot (2 comments).</p> <p>Very objective criteria would need to be established to implement set-backs for erosion control structures (1 comment).</p> <p>Since most erosion control structures in marsh areas are designed to protect real estate rather than public resources, perhaps similar policies as oceanfront erosion control structures should be applied (1 comment).</p>	<p>From pg. 126 of the report: The recommendation is to "Require Evaluation of <u>Alternative Stabilization Approaches</u> on Vacant Properties." This recommendation applies to <u>non-oceanfront shorelines</u> only and states that "traditional bulkheads, rip-rap, and revetments should not be allowed for <u>undeveloped properties</u> unless the permittee demonstrates that no practical alternative exists," which could include other forms of stabilization.</p>
<p><i>Recommendation 13: Establish Non-Beachfront Shoreline Buffer Areas</i></p>	<p>Specific support expressed for Rec. #13 (3 letters).</p> <p>A minimum 25 foot buffer is a good starting policy, but wider buffers should be considered that can accommodate a three foot rise in relative sea level (2 comments).</p> <p>Tax incentives or credits should apply to buffers beyond the minimum 25 feet up to a distance that can accommodate marsh migration for a three foot rise in relative sea level (1 comment).</p> <p>Strategic acquisition of marshfront lands / easements should be pursued (1 comment).</p>	

Appendix 4. Presentations to the Committee

Presenter	Title of Presentation
Braxton Davis, Ph.D., SCDHEC-OCRM	South Carolina Shoreline Change Initiative Overview
Barbara Neale, SCDHEC-OCRM	Shoreline Management in South Carolina
Braxton Davis, Ph.D., SCDHEC-OCRM	Shoreline Management in Other Coastal States
Angela Sunley, Texas General Lands Office	Texas Shoreline Management: History, Challenges, and Current Status
John Mark Dean, Ph.D. and Dr. Richard Beck, 1987 Blue Ribbon Committee	A Look Back at the 1987 Blue Ribbon Committee on Beachfront Management
Paul Gayes, Ph.D., Coastal Carolina University	Beach Monitoring and Coastal Erosion Studies
Scott Harris, Ph.D., College of Charleston	Shoreline Inventories and Applications
Jim Morris, Ph.D., University of South Carolina	Responses of South Carolina's Coastal Wetlands to Rising Sea Level

Chris Mack, P.E.,
AECOM

Engineering Perspectives on Research & Information Needs

Doug Marcy,
NOAA Coastal Services Center

NOAA Shoreline Information Resources and Perspectives

Bill Eiser,
DHEC-OCRM

Beachfront Management Act – Overview of Retreat Policy

Jim London, Ph.D.,
Jeff Allen, Ph.D.,
Caitlin Dyckman, Ph.D., and
Courtney St. John,
Clemson University

Overview of Clemson Research on Beachfront Policies

Kirstin Dow, Ph.D.,
University of South Carolina

Adaptation to Sea Level Rise and Associated Hazards

Tina Hadden
U.S. Army Corps of Engineers

USACE Regulatory Program Overview

Sara Brown, P.E.,
U.S. Army Corps of Engineers

USACE Hurricane and Storm Damage Reduction

Tim Kana, Ph.D, P.G.,
Coastal Science & Engineering

Experiences with Beach Nourishment in South Carolina

Bob Van Dolah, Ph.D. and
Derk Bergquist, Ph.D.,
S.C. Dept. of Natural Resources

Environmental Impacts of Beach Nourishment

Mark Caldwell,
U.S. Fish & Wildlife Service

The Roles of the USFWS in Beach Nourishment

Jim Gregson,
Ted Tyndall,
Guy Stefanski, and
Doug Huggett,
N.C. Division of Coastal Mgmt.

Ocean Shoreline Management in North Carolina

Barbara Neale,
SCDHEC-OCRM

South Carolina Beachfront Erosion Control Regulations

Rob Young, Ph.D.,
Western Carolina University

Perspectives on Coastal Science and Management

Elizabeth Von Kolnitz,
SCDHEC-OCRM

Overview of State and Local Beach Management Planning

Jill Foster and
Scott Liggett, P.E.,
Town of Hilton Head Island

Beachfront Management on Hilton Head Island

Barbara Neale,
SCDHEC-OCRM

Overview of OCRM Authorities for Estuarine Shorelines

Debra Hernandez,
Hernandez and Company

Mitigating Erosion along Sheltered Coasts

Lisa Jones,
S.C. Dept. of Natural Resources

South Carolina's Floodplain Management Program

Steve Underwood,
N.C. Division of Coastal Mgmt.

North Carolina's Estuarine Shoreline Policies and Initiatives

Guy Stefanski,
N.C. Division of Coastal Mgmt.

North Carolina's Estuarine Shoreline Mapping Project

Sadie Drescher,
SCDHEC-OCRM

Estuarine Shoreline Vegetative Buffers

Ross Nelson,
Tidewater Environmental
Services, Inc.

Shoreline Change State of Knowledge Report

Braxton Davis, Ph.D.,
SCDHEC-OCRM

Overview of Shoreline Change Committee and Preliminary
Findings – Grand Strand, Beaufort, and Charleston
Regional Community Leaders Forums

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