

***FINAL REPORT***

**STATE COASTAL MANAGEMENT  
EFFECTIVENESS IN PROTECTING  
BEACHES, DUNES, BLUFFS, ROCKY SHORES:  
A NATIONAL OVERVIEW**



**Prepared by Tina Bernd-Cohen and Melissa Gordon  
As Part of the Sea Grant National CZM Effectiveness Study  
for the Office of Ocean and Coastal Resource Management  
National Ocean Service, NOAA, DOC**

**March 1998**

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# STATE COASTAL ZONE EFFECTIVENESS IN PROTECTING BEACHES, DUNES, BLUFFS AND ROCKY SHORES: A NATIONAL OVERVIEW

## EXECUTIVE SUMMARY

### **The Importance of the Coastal Zone Management Act for Protecting Beaches, Dunes, Bluffs and Rocky Shores**

Prior to enactment of the federal CZMA, state efforts to address protection of natural shoreline features such as beaches, dunes, bluffs and rocky shores were highly variable. State coastal management programs (CMPs) developed since passage of the CZMA were designed specifically to balance resource protection and development. State coastal programs have resulted in more attention to issues such as erosion, sea level rise, and cumulative adverse impacts resulting from development on receding beach and bluff shorelines and sensitive natural habitat areas. State CMPs have been at the forefront in addressing shoreline use conflicts such as the demand for shoreline armoring to protect existing upland structures to the detriment and loss of natural beach systems. Beach nourishment has been promoted by some coastal states as an alternative to continued loss of developed recreational beaches through shoreline hardening. Likewise, some coastal states have funded research into sand loss from inlet dredging and have demanded that beach quality sand from inlet dredging be placed on down-drift beaches. Whereas excavation of sand for coastal development was a common practice in the past, state CMPs prohibit such practices today and wage educational campaigns on the importance of protecting stabilized dune systems.

State CMPs serve as the institutional focus for addressing ongoing competing public and private demands for the use of our limited and sometimes fragile coastline resources. Our understanding of natural shoreline processes and the impacts of human development on these processes has grown. Today, we are no longer building as close to the shoreline. The development that does occur is better built to withstand coastal storm events. Efforts are made to guide access across fragile vegetated dunes. We are becoming better stewards of our natural coastal heritage through state CMP efforts. Balancing private property rights with natural resource protection goals remains a challenge.

### **Summary of Research Findings**

**The national objective of protecting coastal resources is being achieved** through implementation of federally-approved state coastal management programs (CMPs). State CMP efforts are effective overall in addressing protection of beaches, dunes, bluffs, and rocky shores, given that the CZMA requires states to balance competing needs and demands such as protection of properties from hazard risks and promotion of recreational use of the shoreline. Determination of CMP effectiveness has been based on process indicators and case examples. Process indicators such as state regulatory setbacks to keep development away from the immediate shoreline were used to determine program effectiveness. Throughout this report and in the appendices are 31 case examples which illustrate and document ways state CMPs are effectively protecting natural shoreline resources.

**Coastal states are utilizing a wide variety of tools to achieve resource protection** including regulatory setbacks and controls over shoreline development in combination with planning, stewardship of state lands, coastal land acquisition, and research and public education about shoreline processes and

human interaction. All but three coastal states identified protection of natural resources and/or minimization of loss of life and property from coastal hazards as a high priority management issue. Although all coastal states own coastal properties, only three use state ownership and land management as the primary tool. Of the twenty-five tools identified with beach and dune protection, the fewest tools used by a state is eleven and the most is twenty-three. Of the thirteen tools related to bluff and rocky shore protection, the fewest tools used by any state is five and the most is eleven.

**Regulatory controls are the most significant tools employed nationwide to protect shoreline resources,** since the majority of the oceanfront shoreline is in private ownership, migrating and subject to development pressures. Protection is achieved through setbacks; regulation of shoreline development and shoreline stabilizations; restrictions on pedestrian and vehicular access; habitat protection; and permit compliance/permit tracking systems. Setbacks are particularly effective-- acting as natural buffer areas and reducing hazard risks. Planning tools, when combined with regulatory, improve natural resource protection by offering either long-range vision or site-specific goals for the protection and development of selected coastal areas. Stewardship of coastal lands, through state land management and acquisition, is also an important component of all state coastal programs. All coastal states own state parks along the shoreline, and most have natural protection areas and guided accessways. Many states have also acquired additional coastal land holdings.

**States are upgrading their CZM programs.** CZM is a growing and changing process meeting changing needs. As state CMPs recognize problems or management gaps, they take corrective action. States have made hundreds of significant changes to their programs. This study has documented over 60 significant changes in the way coastal states protect their natural shoreline resources. Most of these program changes involve alteration of the state CMP regulatory or planning tools. States are giving greater consideration to natural shoreline processes, even when addressing other concerns such as the need to protect developed eroding shoreline using structural measures.

**More systematic resource protection is occurring through regulatory reviews.** State CMPs are providing more systematic, extensive and intensive planning and regulatory review of projects along the shoreline. This regulatory review is minimizing adverse impacts of improper development and erosion on natural systems and adjacent properties and structures. Greater attention is being given to cumulative effects of individual permit decisions. More states are measuring erosion rates and establishing construction setbacks. Concerns about the adverse long-term effects of shoreline armoring on natural beach sand transport are being addressed and opportunities are being taken to employ nonstructural solutions to coastal erosion. As a result, less inappropriate development is occurring in hazardous areas such as migrating beaches and eroding bluffs.

**There is insufficient nationally compatible outcome data to determine on-the-ground effectiveness.** Due to the scarcity of outcome data, it is not possible to determine the on-the-ground effectiveness of state CZM regulatory, planning, land management and acquisition programs. Regarding regulatory data, most coastal states have computerized permit tracking systems. However, no state maintains a statewide database on the miles affected, the area affected, or the resources affected by state or local coastal permits; or the results of pedestrian access and vehicular access restrictions and protected habitat areas. States with local plans tend to have information on the number of plans approved. However, the data stops there. Only some states have inventories of their coastal land holdings-- such as number of shoreline miles in state parks or percent of shoreline in public ownership. Even states that are active stewards of their public coastal land holdings, do not routinely document accessways installed, dunes restored, beaches restored, and other protection results. Coastal states which utilize acquisition have some data on the number of parcels acquired or acres of coastal lands acquired. However, for most states, these data are not categorized by type of resource area acquired, and very few states have data on amount of money spent or acquisition priorities. Therefore, determining "effectiveness" of state coastal programs in protecting natural coastline resources based on *on-the-ground outcome indicators* is elusive. Determining the "effectiveness" of state coastal programs in protecting natural coastline resources based on *process indicators* and case examples is more possible, but still difficult. Case examples can be effective in illustrating how a management tool has been implemented in a certain geographic area and the results of such implementation.

**Competing demands for the use of the shoreline and competing government policies continue to require balance, so the dilemma remains.** State CMPs continue to face decisions regarding competing demands for recreation and tourist development, protection of existing threatened properties and the rights of private property owners versus public health and safety. Shrinking federal and state dollars for state CMP administration, coupled with increased demand and expectations for CMP services, are long-term concerns for coastal programs. Several federal agencies, state CMPs, local coastal governments, and other non-profit organizations play a role in managing our nation's coastline resources. Inconsistencies between certain federal agency programs and state CMP objectives are ongoing concerns. For example, the FEMA flood insurance program and the federally-funded shoreline protection projects of the USACE achieve objectives which undermine some state CMP natural resource protection objectives. The unique role of state coastal zone management programs has been and continues to be to focus attention and resources on improving the state and local land use controls and other tools to minimize the adverse impacts on natural resources.

## **Recommendations**

**Develop a computerized CZM database** - NOAA should seek funding from Congress to establish a computerized monitoring and tracking program for state and federal agency CZM activities, the results of which should be published in a biennial state-of-the-coast report to Congress. This should include a computerized coding system and an information tracking and recovery system for all information submitted by coastal states. NOAA should prepare up-datable state CZM program summary files for each coastal state with information about the state program, periodic changes to the program, program activities, CZM projects undertaken, results and reports produced.

**Share Information Through the Internet** - NOAA should create a home page on the Internet and a CD-ROM of the National CZM Effectiveness Study and other CZM databases.

**Incentives for Coastal States to Refine and Expand their Process and Outcome Data Collection and Record Keeping** - NOAA should seek funding from Congress to form a coastal states task force with the objective to change the coastal states reporting requirements under 306, 309, and 312 to better address results of state CZM activities and their effectiveness in meeting state and national CZM objectives. This should include accepted methods for organizing, collecting, storing, and reporting accurate and precise data on program activities and results which include trend data usable in future assessments of CZM effectiveness.

NOAA/OCRM should also encourage coastal states to: a) improve their daily record keeping and yearly reporting to NOAA/OCRM on program implementation and results; b) develop and refine computerized permit tracking systems regarding permitted activities and refine the individual permit entries to include data on type of project, area and resources affected, length of shoreline affected, size of project, permit restrictions/conditions and other data which, when analyzed yearly, could assess the individual and cumulative impacts of projects permitted along the coast; c) monitor, collect and report on local implementation and results for states that delegate implementation to local governments; d) explore the use of in-depth case studies as a way to provide more meaningful explanations of how CZM works and the on-the-ground results, rather than relying on case examples and success stories; and e) explore the use of aerial photo interpretation for measuring long-term changes in develop and resources along the coast.

**Utilize 309 Assessment Process to address issues associated with shoreline change.** OCRM and the Coastal States should continue to utilize the section 309 Assessment process to address substantive issues associated with protection of natural coastal systems. Significant changes to state coastal programs such changes in activities exempt, shoreline armoring allowed and the landward extent of regulatory jurisdiction should be carefully scrutinized for their long-term effects on natural coastal systems.

**Federal agencies should monitor changes to the coastal environment and report on changes every 5 years.** Congress should fund activities to monitor changes along our nation's coastlines including: 1) federal level aerial surveillance and photo interpretations of shoreline development and changes in development patterns; 2) USACE to conduct follow-up national shoreline studies at least every ten years on erosion, shoreline armoring, beach nourishment, and public ownership of the coast; 3) USDO to

compile data on coastal endangered species and habitat loss/protection changes and role of federal and state agencies in this effort; 4) NOAA to compile data from U.S. Bureau of the Census on population changes in coastal counties; 5) USDOJ to compile data on private development occurring on designated CBRA and federal/state agency actions affecting CBRA designations and implementation success.

**Indicators of effectiveness.** To evaluate state CZM program effectiveness in protecting beaches, dunes, bluffs and rocky shores, the following "*indicators of effectiveness*" and "survey methods" should be used:

*Regulatory Program Outcomes:*

1. No further or reduced rate of encroachment into coastal resource areas.
2. No further or reduced rate of hardening of undeveloped beachfronts through shoreline stabilizations.
3. Controlled shoreline accessways.
4. Healthy and maintained intact natural habitat areas along the coast

*Adopted Plan Outcomes:*

1. Achievement of Plan Objectives through implementation and monitoring

*State Coastal Land Management and Acquisition Outcomes:*

1. Extent of state land holdings in parks/preserves containing beach, dune, bluff or rocky shores.
2. Active public natural resources stewardship of coastal land holdings
3. Coastal lands acquired

*Survey Methods-* for collecting data and measuring outcomes starting with a baseline followed by time series or periodic updates:

- (a) aerial photography interpretation;
- (b) computerized permit data collection and analysis -- showing trends in permitted shoreline structures or shoreline stabilizations on the beach and dune system, eroding bluff, coastal hazard areas, coastal floodplain, or immediate shoreline.
- (c) periodic physical surveys of the condition of coastal resources protection areas;
- (d) shoreline mapping of controlled accessways; delineating shoreline acres and miles where pedestrian and/or vehicular access is restricted; delineating habitat protection areas.
- (e) state and local permit data on activities permitted within approved plan areas, area and linear miles affected, and consistency with plan objectives -- such as protection of designated "coastal resource areas" or "natural habitat areas", dune restoration; inlet management to place dredged sand on downdrift beaches, and designated coastal hazard areas where development is prohibited.
- (f) documentation of direct state or local actions undertaken-- such as miles/acres of dunes revegetation; cubic yards of sand transferred due to installation of inlet sand transfer plant; coastline acres and linear shoreline miles in state ownership with resources present; number of accessways, marked trails, boardwalks, dune crossovers and demonstrated public use; acres or shoreline miles in state coastal lands designated as conservation, preservation or protection areas; miles and acres and type coastal shoreline resource areas acquired by the state.

## Study Approach

This research project involved three stages. *Stage I* included data collection and creation of 29 state profiles. Five states were selected as pilot states to test our survey instrument, followed by surveys of all remaining coastal states. The state profiles documented state tools and available outcome data on protection of natural beaches, dunes, bluffs and rocky shores. Case examples were compiled as part of the state profiles. Data collection also included a search of evaluation literature, national context factors, and national data sources on resource protection. *Stage II* involved evaluation of state CZM program effectiveness in protecting beaches, dunes, bluffs and rocky shores, drawing from the state profiles and national summary tables. *Stage III* involved creation of the national CZM effectiveness evaluation synthesis report. The national overview report contains background and context information; a summary of the regulatory, planning, state land management and acquisition tools used by coastal states to protect natural beaches, dunes, bluffs and rocky shores; the importance of resource protection to coastal states; and the key role, process indicators and outcome indicators of state CZM program effectiveness in protecting natural shoreline resources. The report also contains recommended improvements related to tracking and document state CZM program effectiveness in meeting CZM objectives.

# 1 INTRODUCTION

The purpose of the National Coastal Zone Management (CZM) Effectiveness Study has been to assess the overall effectiveness of the state CZM programs in addressing five core objectives of the Federal CZM Act. This section of the report investigates the effectiveness of coastal resource protection at the state level. In particular, this section looks at the coastal management tools state CZM programs employ to *protect natural beaches, dunes, bluffs and rocky shores* and the effectiveness of these management tools in achieving national policy objectives. Both process and on-the-ground outcome measures are used to assess CZM program effectiveness. This section also contains recommendations for improving federal and state accounting of the results of coastal management programs in achieving national policy objectives.

The Congressional declaration of national policy related to protection of beaches, dunes, bluffs and rocky shores includes:

"(A) the protection of natural resources, including ...beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat, within the coastal zone.

(B) the management of coastal development to minimize loss of life and property caused by improper development in flood-prone areas and in areas likely to be affected by or vulnerable to sea level rise, land subsidence, and saltwater intrusion, and by the destruction of natural protective features such as beaches, dunes, wetlands and barrier islands."

(Section 303 of the Federal Coastal Zone Management Act of 1972)

All coastal states with federally-approved coastal programs have adopted policies which interpret and implement the national policy objectives and call for the protection of natural resources and minimization of loss of life and property along the coast.

State coastal programs were designed to balance resource protection and development. The economic development pressures along the oceanfront and shoreline are tremendous. Shorefront property is scarce and highly valued. As a result, policies to protect natural resources are tempered by policies which meet other objectives. The most obvious conflicts involve balancing protection of the natural beachfront and bluff-front shoreline resources and processes (erosion and accretion) against protection of (a) existing development built too close to the water's edge and threatened by coastal erosion; (b) private property owners' rights to develop on their coastal lands; and (c) public access and recreational use of beach and dune areas.

This report covers the *background and context* for resource protection; the *research methodology*; *research findings and conclusions*; and *recommendations*.

## 2 BACKGROUND AND CONTEXT

State CZM programs which protect beaches, dunes, bluffs and rocky shores are each influenced by a variety of physical, social and economic context factors including: (a) the type and extent of the natural resources in a given state; (b) coastline erosion processes and storm events; (c) coastline ownership and development; (d) human interference with natural processes; (e) competing demands placed on natural coastal resources and state priorities for balancing these demands; (f) shared coastal management responsibilities between states, federal agencies and non-governmental organizations; and (g) the unique role of the CZM program in the state. Historic and cultural factors are also important in some states. See **Table 1**, for selected national context data by state. Also see **Appendix A** for data related to these national and state context factors.

### Beach and Dune, Bluff and Rocky Shore Resources

Beach resources are present along portions of all coastal state shorelines, though the length and character of such beaches vary considerably. Sandy beaches can be categorized into three distinct types: barrier beaches, mainland beaches, and pocket beaches. The Gulf of Mexico and Atlantic Coast is characterized by a system of *barrier beaches* and a relatively wide continental shelf, as is much of Alaska. Barrier beaches are part of a complex integrated system of beaches, marshes, bays, tidal flats, and inlets. These beaches are constantly migrating, eroding and building in response to natural processes and human activities. *Mainland* beaches stretch unbroken for many miles, some low standing and prone to flooding, others backed by steep headlands. They received sediment from nearby rivers and eroding bluffs. Examples include Long Island, northern New Jersey and southern California. *Pocket beaches* form in small bays surrounded by rocky cliffs or headlands. The headlands protect the sandy alcoves from erosion by winter storms and strong currents. Pocket beaches are common in Maine and the Pacific Northwest. Other coastline variations are based on plate tectonics or type of wave forces. Difference and variations in beach and dune coastline systems within a state, between states and within regions are factors affecting states enactment and implementation of certain beachfront management tools.<sup>1</sup>

Headland/rocky shorelines and bluffs/cliffs are present along the West Coast, the North East Coast, the Great Lakes Coast, and Territorial shores. These features are absent along the low elevation Southern and South Atlantic coastlines. The underlying geology of active tectonics, faulting and earthquakes or glaciers, ice gouging and rafting, or ice and strong wind determine shore stability and erosion factors which effect state management responses.<sup>2</sup> Eroding bluffs and cliffs of the Great Lakes states, creating beaches and dunes, are subject to highwater levels which, when driven by storm winds and waves cause flooding and lakefront deterioration.<sup>3</sup>

**Table 1** provides the length of the US coastline, using NOAA, U.S. Department of Commerce data, that includes two measures, one of direct oceanfront miles where they cross bays and sounds and the other tidal shoreline miles which extend inland to the head of tidewaters or to a point where tidal waters narrow to a width of 100 feet. The national shoreline, as measured by the US Army Corps of Engineers, to the head of tidewaters, or to the point where tidal waters narrow to 100 feet is also shown. Percent of direct ocean coastline in beaches, rocky shores and bluffs is also indicated from state CZM program estimates. For 8 of the 29 coastal states, their entire ocean coastlines are sandy beaches with no rocky shores or bluffs. All other 21 coastal states have beaches and rocky shores, backed by bluffs or sand dunes.

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<sup>1</sup>Beatley, Timothy, David J. Brower, and Anna k. Schwab. 1994. An Introduction to Coastal Zone Management

<sup>2</sup>Ibid.

<sup>3</sup>National Committee on Property Insurance. 1998. America's Vanishing Coastlines: A New Concern for the Voluntary and Residual Property Insurance Markets. p,23

Table 1: National Context Factors Affecting State Protection of Beaches, Dunes, Bluffs, and Rocky Shores

State	Resource Protection-Importance of Issue: High- H Medium-M Low-L (1)	Open Ocean Coastline Miles (1)	Tidal Shoreline Miles (2)	National Shoreline Miles and % Critically Eroding (3)		% State Land Area % State Population in Coastal Zone (4)		Coast Pop. Density 1990 (4) person per sq. mile	% Coast Pop Chg 1970-90 (5)	Presence of Natural Coastal Resources and Beach and Rocky Shore a Percent of the State's Open Ocean Coastline Beach, Bluff and Rocky Shore as Percent of Non-Open Ocean (CT & Great Lakes States) Shoreline (6)				Major Barrier Islands Number/ Miles (7)	USACE Major Shoreline Protect. Projects 1950-93 (8)
				Miles	% CE	Area	Pop.			Beaches	Dunes	Bluffs	Rocky Shores		
AL	H	46*	607	352	9	6	12	171	27%	y-100%	n	n	n	--	-
AK	H	6640	33904	47300	>1	67	85	1	89%	y-nd	?	y	y	nd	-
AS	H	126	126	nd	nd	100	100	607	72%	y-nd	n	y	y-nd	nd	-
CA	H	840	3427	1827	4	24	73	605	39%	y-nd	y	y	y-nd	--	13
CT	M	0	618	270	9	47	62	887	8%	y-31%	Y-rare	y-25%	y-14%	--	8
DE	H	25*	381	226	12	100	100	338	22%	y-100%	y	n	n	1- 6 mi	4
FL	H	1266*	8426	6266	5	100	100	228	90%	y-65%	y	n	n	49-560m	33
GU	H	108*	110	nd	3	100	100	637	57%	y-37%	n	y	y-63%	nd	-
HI	H	750	1052	nd	2	100	100	174	44%	y-25%	y	y-nd	y-nd	nd	-
LA	L	149*	7721	1943	2	37	49	171	16%	y-50%	y	n	n	--	4
ME	H	228	3478	2500	>1	39	72	72	29%	y-10%	y	y	y-90%	--	-
MD	H	32*	3190	1939	9	66	70	507	12%	y-100%	y	n	n	2- 31 mi	4
MA	H	192	1519	1200	11	45	75	1272	5%	y-??	y	y	y-nd	2- 18 mi	7
MI	H	0	3224	nd	nd	55	50	154	-5%	y-nd	y	y-nd	y-nd	--	-
MS	H	44*	359	247	15	4	12	192	30%	y-41%	n	n	n	--	3
NH	H	18*	131	40	5	12	32	331	67%	y-70%	y	n	y-30%	--	5
NJ	H	125*	1792	469	26	76	90	1219	6%	y-100%	y	n	n	10-100m	12
NY	H	125*	1850	638	47	37	84	858	-3%	y-100%*	y	y	y	4- 93 mi	13
NC	H	320*	2625	3661	15	19	11	75	39%	y-100%	y	n	n	20-285m	10
NM	H	184*	206	nd	nd	100	100	236	255%	y-nd	n	y	y-nd	nd	-
OR	H	362*	1410	500	13	20	38	82	46%	y-72%	y	y	y-28%	--	-
PA	H	0	140	nd	nd	4	25	1701	-9%	y-19%	n	y-81%	n	--	3
PR	H	311	700	nd	nd	12	100	856	30%	y-50%	y	y	y-nd	nd	-
RI	H	40	384	340	7	100	100	950	6%	y-68%	y	y	y	--	1
SC	H	181*	2876	3063	2	26	24	114	57%	y-100%	y	n	n	18- 96 m	2
VI	H	Nd	175	nd	nd	100	100	771	63%	y-nd	?	y	y-nd	nd	-
VA	H	200*	3315	993	26	22	62	423	40%	y-100%	y	n	n	9- 67 mi	2
WA	H	171	3026	2337	>1	31	70	172	46%	y-35%	y	y	y-65%	--	-
WI	M	0	820	nd	nd	19	39	177	0%	y-10%	y	y-72%	y-8%	--	-
Total	26H 2M 1L	Nd	85770	31513***	nd	nd	44	nd	nd	y-29	y21 n8	y18 n11	y17 n12	nd	124

KEY: : y=yes n=no ?- unknown nd- no data H- high M-medium L-low

\* denotes where state coastline miles data differs from General Coastline miles data in US DOC, NOAA 1975. The Coastline of the United States

\*\* New York- Atlantic Ocean only covered under this study. \*\*\* Does not include the Great Lakes States or the Island Territories and Commonwealths.

(1) Individual State CZM Profiles.

(2) US DOC, NOAA. 1975. *The Coastline of the United States*.

(3) USACE. 1970. *National Shoreline Study*.

(4) Coastal Ocean Policy Roundtable, The 1992 Coastal Status report: A Pilot Study of the US Coastal Zone and its Resources, Tables 2 and 3.

(5) US DOC, NOAA, OCRM. *Table 2: Coastal County Percent Population Per Decade and Percent Change Per Decade*. (unpublished in-house data)

(6) Individual State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores

(7) Ringold, Paul and John Clark. 1980. *The Coastal Almanac*, Table 8.

(8) USACE, *Shoreline Protection and Beach Erosion Control Study: Phase 1*.

## Human Interactions

### Coastline Ownership

State jurisdictional ownership of beaches usually begins at mean high water and extends seaward. This leaves extensive dry sanding beach and dune systems in private ownership, except where governments have acquired beachfronts for recreation or preservation. Seventy percent of our nation's shoreline is in private ownership (excluding Alaska where 99% is publicly owned). As of 1970, three-fifths of the shoreline was undeveloped (excluding Alaska).<sup>4</sup> Development pressures vary depending on geography and climate issues. Inaccessible and hard to develop shorelines, such as rocky shores, are less prone to

development than accessible sandy beach areas. A state's beach and dune management varies depending on the extent of public ownership. For the 20 coastal states (not including the islands or the Great Lake States), public ownership ranges from a high of 99% for Alaska to a low of 3% for Maine. For 11 of the 20 states, over 1/4 of the shoreline is in public ownership. (See **Table 1**)

### Coastline Development and Economic Pressures on Shoreline Properties

As early as the late 1800s, recreational tourism began along our nation's beaches. With the advent of the automobile, seasonal seaside resorts evolved. The summer homes and fishing villages of the 1940s and 1950s were transformed by the 1970s into "cities on the beach."<sup>5</sup> Today, due to population and economic pressures, over half of our nation's population lives within 50 miles of the coast and our nation's coastal zone is over four times more densely populated than the national average.<sup>6</sup> In addition to the retirees who migrated to the coast and other year round residents, tourists and conventioners are demanding beachfront coastal resorts. This is most pronounced along our coastal barriers at high risk due to coastal flooding, hurricanes and erosion. Billions of dollars in private development and public recreation and infrastructure is invested on these unstable coastal barriers.<sup>7</sup> The demand for coastal waterfront property has led to increased residential development pressures along our nation's coastal bluffs and rocky shores.

The cost of purchasing oceanfront and waterfront properties along our nation's shorelines are considerably higher than for non-waterfront properties. The seasonal beachfront cottages of yesterday have given way to much larger and more expensive developments, often high-rise multi-family condominiums. The result is intensive, extensive and expensive investments in known coastal high hazard areas. Barrier islands have become a magnet for retirees and vacation homes.<sup>8</sup> About half of all residential and non-residential construction in the U.S. between 1970 and 1989 occurred in coastal areas. The most dramatic growth has occurred in the Florida and California.<sup>9</sup> Despite the environmental degradation associated with population growth, these shoreline areas remain in strong demand for commercial, residential, tourism and recreation.

The persistent development along our nation's coastline had led to destruction of coastal dunes systems and placement of structures in jeopardy from both short and long-term erosion. Shoreline development prior to the 1970s were frequently armored with seawalls, revetments, bulkheads or other shoreline stabilization structure to protect upland private and public investments from erosion. Such stabilization structures accelerated the loss of sandy beaches.<sup>10</sup> **Table 1** shows coastal county population change

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<sup>4</sup>Ibid.

<sup>5</sup>Platt, Rutherford H. et al. 1987. Cities on the Beaches; Management Issues of Developed Coastal Islands.

<sup>6</sup>U.S. Department of Commerce, NOAA. 1990. 50 Years of Population Change along the Nation's Coasts: 1960-2010.

<sup>7</sup>Platt, Rutherford, et al. 1992. Coastal Erosion: Has Retreat Sounded?, p.12.

<sup>8</sup>U.S. Department of Commerce, NOAA, NOS. 1992. Building Along America's Coasts: 20 Years of Building Permits, 1970-1989. p.5

<sup>9</sup>Ibid

<sup>10</sup>Ibid., p.8

between 1970 and 1990. For 16 of the 29 CZM states, population growth was 30% or greater (major impact); for 5 population growth was between 10% and 29% (moderate impact); and for 8 population declined or growth was 0% to 9% (minimal impact).

### **Coastline Erosion**

Coastal erosion, the landward displacement of the shoreline, is a normal process that has been going on for many years along most of our nation's sandy beaches. Gradual long-term erosion from normal wave action (of 1-3 feet per year) is accelerated by severe storm events during hurricanes and winter storms, sea level rise, the greenhouse effect; and man-made shoreline stabilizations.<sup>11</sup>

The only nationwide survey of shoreline erosion, published by the U.S. Army Corps of Engineers in 1971, estimates that at least 7% of our nation's coastline is critically eroding where properties are in imminent danger of collapse and 25% is experiencing significant erosion.<sup>12</sup> In addition to long-term erosion, many coastal states have experienced shoreline loss and property destruction through periodic storm events. Bluff recession is a particular problem along the Great Lakes States and portions of the west coast.

The average rate of erosion is determined locally through historical shoreline records or shoreline modeling. A few examples of documented shoreline retreat dramatize the management urgency of coastal erosion. Cape Shoalwater, Washington has been eroding at the rate of more than 100 feet a year since the turn of the century. It's sparsely settled sand dunes have retreated an outstanding 12,000 feet, or more than 2 miles since 1910.<sup>13</sup> Most of the barrier islands along the east and gulf coasts are retreating landward by 1 to 10 feet per year--rates of up to 20 feet are not uncommon for specific locations.<sup>14</sup> Every coastal state is affected by shoreline change and erosion.<sup>15</sup> **Table 1** shows, by state, the amount of coastal shoreline threatened by critical erosion.

Sea level rise and land subsidence, as a contributor to shoreline erosion, are recognized problems along portions of our nation's coastline. If accurate, the long-term costs to protect existing development, shoreline stabilizations, and infrastructure would be staggering<sup>16</sup>

### **Coastal Storm Events**

Coastal storms and hurricanes exacerbate long-term erosion, shifting the position of beaches and sand dunes and splintering and collapsing erodible bluffs. Rapid shoreline erosion caused by high storm surge and wave heights overtop dunes and damage beachfront buildings in harms way. Wave attack at the base of steep slopes, undercut and collapse overhanging banks and topple properties perched on such bluffs. Large tsunamis waves with speed and height have inflicted great damage to California and Hawaii coastal areas. Between 1980 and 1995, 11 separate billion-dollar weather disasters struck coastal areas of the US: 9 hurricanes, 1 Nor'easter and 1 tropical storm resulted in over \$46 billion in damages.<sup>17</sup>

### **Human-Interference with Natural Processes**

Beach systems, and sandy beaches in particular, are dynamic. They advance and retreat, but over several cycles maintain state of equilibrium. Beginning as early as the 1890s, a variety of human modifications to the physical shoreline have been undertaken to achieve objectives that run counter to the protection and dynamic equilibrium of natural beach/dune systems. This host of human interferences have adversely affected the natural sand transport system, destroyed or caused dune instability, and increased erosion.

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<sup>11</sup>Kaufman, W., and O.H. Pilkey, Jr. 1983. The Beaches are Moving.

<sup>12</sup>U.S. Army Corps of Engineers. 1971. National Shoreline Study.

<sup>13</sup>National Committee on Property Insurance. 1988.

<sup>14</sup>Ibid

<sup>15</sup>U.S. Army Corps of Engineers. 1971.

<sup>16</sup>S.D. Lyles, L.E. Hickman., and H.A. Debaugh.1988. Sea Level Variations for the United States. 1855-1986: US Department of Commerce, National Oceanic and Atmospheric Administration, Rockville, Maryland.

<sup>17</sup>U.S. Department of Commerce, NOAA, NCEM. Home Page  
<http://ncem.noaa.gov/publications/billionz.html>

These include the damming of coastal rivers; dredged navigational channels with jetties for shipping and dredged tidal inlets for commercial fishing and recreational boating; the placement of dredged spoil and beach quality sand offshore beyond the littoral sand transfer system; shoreline armoring; sand-trapping structures such as groins and breakwaters; sand mining for development; and sand scraping practices. Efforts to recreate natural beach/dune systems include sand fencing and dune revegetation, beach nourishment, and inlet sand transfer.<sup>18</sup>

The *damming of coastal rivers*, to protect urban areas downstream from flooding and provide hydro-electric power, has trapped sediment that would normally feed coastal beaches. Sediment starved beaches occur most on the west coast, but some east coast beaches are also affected by river diversions. *Inlet dredging* to maintain established boating and shipping access through coastal barrier passes that open and close with storm events has, until recently involved disposal of dredge material offshore beyond the littoral sand transfer system. The loss of this sand to the nearby beaches has increased erosion. For major navigational channels, the installation of *jetties* to stabilize the such inlets results in trapping sand on the updrift side of the inlet and starving the downdrift beaches. *Offshore breakwaters* used primarily to stop wave action and create a quiet water area for safe boat moorings obstruct the free flow of sand along the coast and starve downstream beaches.

*Shoreline armoring* through placement of seawalls, revetments, bulkheads, or riprap to protect private oceanfront structures and public infrastructure from erosion has occurred at the expense of lost recreational beaches. These wave-resistant walls may withstand wave action and protect upland properties but rapidly remove sand from the beach and eventually fail or require more substantial armoring.<sup>19</sup> *Groins*, structures extending into the water to interrupt and accumulate sand on the updrift shore, also starves downdrift adjacent beaches. Most of our nation's urban oceanfronts have been armored, although the percent of our nation's beachfront/oceanfronts that has been armored is unknown.

*Sand mining*, the removal of sand from beaches, dunes, adjacent areas, or riverbeds near was common practice in many states for road construction and development fill. This resulted in a loss of sand and protective dune areas, making such areas vulnerable to coastal flooding from storm events and accelerating erosion. *Sand scraping*, the practice of moving sand accumulated at one portion of the beach to another to build back a dune or the practice of leveling sand in front of a beachfront development to provide visual access to the water, has been allowed in many states. The negative effects include unstable dunes and low-lying dune areas vulnerable to breaching in storms.

Three activities have been used to try to recreate the natural beach/dune system. Dune restoration through *Sand fences and dune revegetation* has been used to stabilize and re-build dune areas. This helps limit breaching and creation of new inlets during major storms. *Beach renourishment and period nourishment* has become a popular alternative to armoring, in attempting to artificially create or recreate a beach area through the importing of compatible sand and pumping/placing it on the eroded beach area. The flattened beach profile and wider beach width mitigates erosion losses and storm-induced inundation. In certain high erosion areas, however, sand is rapidly washed away. Finding suitable sand source borrow areas also poses challenges. *Sand transfer facilities* which pump sand from updrift accumulation areas to downdrift beaches has ameliorated this problem. In Florida, for example, over 80% of the beach erosion on the state's Atlantic coast is estimated to be caused by 19 maintained inlets, most stabilized with jetties.

### **Balancing Competing Demands for Protection of Natural Resources with the Use of Hard Structures to Protect Private Oceanfront Properties and Public Infrastructure**

Sandy beaches backed by dunes or bluffs, rocky shores and wetlands constitute the three types of natural shoreline features along our nation's coastline. The natural resource protection values of these features are often in conflict with social and economic values as reflected in shoreline use and development. State CZM programs were created, in part, to provide institutional mechanisms and management tools to balance the competing demands placed on these shoreline features.

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<sup>18</sup> US Army Corps of Engineers. 1971 and Platt. 1992.

<sup>19</sup>U.S. Army Corps of Engineers. 1971. Shore Protection Guidelines. pp32-33

The natural resource protection values of beaches and dunes commonly identified by state coastal programs include the first line of defense and protection of upland properties from storms and high tides; and wildlife habitat for marine life such as sea turtle nesting areas, bird nesting and staging areas, and endangered species habitat. Key use values of beaches and dunes are recreation, tourism and access to coastal waters. On the flip side of the coin, social and economic demands have also made oceanfront properties highly desired places for second-homes, resorts and year-round residences. Beachfront and bluff-front development built too close to the edge and now in jeopardy has led to shoreline armoring which has destroyed the natural beach/dune systems which attracted people to the coast in the first place. In addition, cutting and maintaining of inlets for recreational and commercial navigation has permanently disrupted the natural transport of sand along the beachfront, accelerating the loss of recreational beaches.

Coastal bluffs, sitting behind extensive or minimal beaches, have been thought of as excellent features for providing coastline vistas. In a few states, select bluff areas have been acquired and managed as natural resource protection areas or scenic vista areas. Most are managed as high erosion areas where development and other activities are regulated to minimize erosion risks rather than protect valuable natural resource features. The social and economic pressures for ocean vista developments have resulted in the siting of development along bluff recession areas in harms way.

Rocky shores, located within the inter-tidal zone, are recognized as high energy environments and valuable marine habitat. The inter-tidal areas are under state ownership and management. Although public access and recreational enjoyment of these areas has not been restricted, states are beginning to limit public access to avoid over-utilization and destruction of tide pool areas. Rocky shoreland areas have for the most part been resistant to erosion and therefore not managed as high hazard areas. Likewise, they have not been considered developable, though development often occurs immediately landward of these features.

Balancing such competing demands has become a key role of state CZM programs (see below). As our understanding of the impact (both individual and cumulative) of human activities on natural systems grows, coastal managers are looking for alternative management approaches to allow activities but minimize their negative impacts on resources of known public benefit. The U.S. is based on strong private property rights laws. The private property takings issue in the regulation of coastal land and water uses is of paramount importance in the development and implementation of coastal management tools. Over the years, states priorities in balancing resource protection and development have varied and altered. Today, coastal programs are required to justify their management decisions basing complex technical data sets. Refinements to shoreline setbacks, based on historical erosion rates, demands sophisticated and complex computer modeling programs.

Government has invested billions in public infrastructure along our nation's coastlines from highways and bridges to water and sewer systems to support mainly private development and some public facilities including military facilities, coast guard stations, hospitals schools and recreation facilities. Beginning in the 1980s, in recognition of the hazardous nature of barrier islands, federal and state agencies have begun to limit their public investments in such areas.

## **Shared Coastal Management**

Several federal agencies have a long history of involvement with our nation's coastlines, all pre-dating the Federal CZM Act of 1972. Key federal players involved in activities affecting beaches, dunes, bluffs and rocky shores include the U.S Army Corps of Engineers, the Federal Emergency Management Agency, the U.S. Department of Interior/National Park Service/US Fish and Wildlife Service. Starting in 1972, the U.S. Department of Commerce/Office of Ocean and Coastal Resource Management became responsible for administering the Federal CZM Act.

**The Army Corps of Engineers (COE)** administers the 1) federal shoreline protection program through research, planning, design, construction management, federal cost-sharing; 2) authorized navigation channel dredging; and 3) federal permits for dredge and fill involving any construction or other activity which affects navigable waters including federal guidelines for beach nourishment and shoreline

stabilizations. The COE Published the National Shoreline Study in 1971, and is working on analysis of Federal shore protection program for Congress.

The COE shoreline protection program covers construction projects for hurricane and storm damage reduction, beach erosion control, navigation, mitigation and recreation. Since 1930, Congress has authorized 137 projects or studies involving 19 of the 29 CZMA states plus 4 coastal states not in the CZM program. A total of 82 Federally-sponsored shore protection projects were constructed between 1950 and 1993 in areas of concentrated development experiencing severe erosion and/or property damage from storms. The projects protect 226 miles or less than 0.3 % of the 84,240 mile of tidal shoreline of the U.S. and only 8% of the 2,700 miles of COE identified "critical-erosion" coastline.<sup>20</sup> Of the 82 projects, 56 were large projects costing \$1,177.3 million in 1993 dollars. The cost-sharing was 60% federal and 40% non-federal (state, locals, and private) sponsors.<sup>21</sup> These projects involve one or more of the following: 1) initial beach restoration, sometimes with dune filling; 2) periodic beach nourishment; 3) shoreline structures-groins, seawalls, revetments, breakwaters, bulkheads, or sand transfer plants; 4) emergency measures to repairs storm damaged projects. The significant shift from reliance on fixed structures in the 1950s to beach restoration and periodic nourishment in the 1970s by the COE, is based on a realization that fixed structures protect upland property but destroy recreational beaches. Artificial beaches as a primary means of shore protection has become a major component of the COE program. the concept of replicating the protective characteristics of natural beach and dune systems. However, beach renourishment is not without its critics. In 1983, 1 million square yards of sand placed on the beaches of Ocean City, New Jersey at a cost of \$5.5 million. Within a few years, storms removed and redistributed much of the sand. <sup>22</sup> In 1993, the COE initiated an investigation and analysis of the benefits, environmental effects, and the existence of induced development resulting from Federal shore protection program. <sup>23</sup>The small percent of our nation's coastal erosion problem covered by the COE, leaves state CZM program with major responsibilities to cope with and address appropriate erosion responses. See Table 3 in Appendix A for shoreline protection projects by state between 1950-1993.

The COE navigation channel dredging program began with the Harbors Act of 1890. Since then Congress has authorized 830 navigation projects for channels for shipping, commerical fishing and recreational boating involving every coastal state, territory and commonwealth.<sup>24</sup>

The COE permit program for dredge and fill projects in navigable waters is subject to federal consistency provisions. Only one coastal state, Alaska, relies on the minimum standards contained in the COE regulations for placement of shoreline stabilizations. All other coastal states have their own state regulatory programs covering shoreline stabilizations and other activities over coastal waters.

**The Federal Emergency Management Agency (FEMA)** administers the Federal Flood Insurance Program that produces rate insurance maps and insures properties within the 100-year flood zone for local community participating in the program. Insured coastal structures, when damaged or destroyed, receive insurance claim payments to repair or rebuild. Critics have argued that, despite local code requirements, the NFIP promotes subsidized inappropriate development in coastal high hazard areas, impeding state management efforts to restrict new development and redevelopment in these areas.

In 1994, Congress required FEMA to conduct an evaluation of the economic impact of mapping coastal erosion areas and then denying flood insurance for existing and new structures in such areas, establishing actuarial rates, and changes in the tax base of communities.<sup>25</sup> As of 1992, there were over 66,000 NFIP policies in effect covering structures in the hazard zone (V-Zone) .

Under the Upton/Jones Program 1988-1995, FEMA allowed for payment of flood insurance claims to demolish or relocate buildings imminently threatened by erosion. A total of 434 claims have been

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<sup>20</sup> U.S. Army Corps of Engineers. 1971.

<sup>21</sup> U.S. Army Corps of Engineers. 1994. Shoreline Protection and Beach Erosion Control Study: Phase I: Cost Comparison of Shoreline Protection Projects of the U.S. Army Corps of Engineers.

<sup>22</sup> Nordstrom, Pilkey et al. 1986. Living with the New Jersey Shore. Durham, N.C. Duke University Press.

<sup>23</sup> U.S. Army Corps of Engineers. 1995. Shore Protection and Beach Erosion Control Study: Economic Effects of Induced Development in Corps-Protected Beachfront Communities.

<sup>24</sup> U.S. Army Corps of Engineers, Institute of Water Resources, Table D, Unpublished Report.

<sup>25</sup> FEMA. Undated. "Section 577 of the National Flood Insurance Reform Act of 1994--"Evaluation of Erosion Hazards": Overview of Study Plan." (provided by Mark Crowell, FEMA)

approved under this program. 73% for demolition. (See Table 4 in Appendix A for claims by state). FEMA is currently conducting an evaluation of economic impact of mapping erosion hazard areas for Congress.

**U.S. Department of Interior (DOI), National Parks Service (NPS)** created and manages 10 National Seashores covering 592,627 acres and 4 National Lakeshores covering 228,716 acres. **The DOI U.S. Fish and Wildlife Service (USFWS)** enforces federal wildlife and endangered species laws and maintains system of national wildlife refuges. In cooperation with states and local communities, USFWS identifies and protects beach and dune areas which provide nesting sites for endangered sea turtles and birds through limitations on sand fencing and beach nourishment during nesting season. Rocky shores, habitat for the Stella Sea Lion and other endangered mammals. There are several National Wildlife Refuges along our nation's coastline. These national wildlife refuges are managed by USFWS to preserve the natural beach/dune systems.

DOI/USFWS also administers the Coastal Barrier Resources Act of 1982 and Coastal Barrier Improvement Act of 1990. The purpose of the Act is to minimize loss of human life, wasteful Federal expenditures, and damage to fish, wildlife and associated natural resources. The Act restricts federal expenditures and financial assistance that have the effect of encouraging development on designated coastal barriers along the Atlantic, Gulf and Great Lakes shorelines. This includes prohibitions on National Flood Insurance, HUD assistance, public infrastructure, and other financial assistance. The system includes 582 units, comprising over 1.3 million acres and 1,276 miles of shoreline that are not publicly owned or otherwise protected. An addition 173 units of otherwise protected areas are covered under the 1990 Act which includes public barrier holdings in federal, state and local ownership. These areas include national wildlife refuges, national parks and seashores, state and local parks and conservation lands. (See Table 5 in Appendix A)

**The U.S. Department of Defense** owns coastal properties within military bases, some significant tracts along the eroding coastline. The closing of certain bases and disposal of coastal properties will pose choices between sale for development or transfer for public preservation.<sup>26</sup>

Nonprofit conservation organizations have played a significant role in preserving certain coastal barrier lands. **The Nature Conservancy, the National Audubon Society and the Trust for Public Lands** and their partners have selectively acquired parcels for protection. Just over half of the shoreline of coastal barriers on the Atlantic and gulf of Mexico are protected through public or quasi-public ownership.<sup>27</sup>

### **Unique Role of States CZM Programs**

All coastal states are involved with the protection of their natural resources through a variety of state and local management controls. 29 of the 35 coastal states, territories and commonwealths have federally-approved CZM programs. The management tools these states utilize to protect beaches, dunes, bluffs and rocky shore include regulatory, planning, direct land management, acquisition and other techniques. These tools are discussed in detail in this study. In most states, local governments participate through local land use controls. The unique role of state CZM programs has been the creation of unified state programs which articulates the conflicts among competing uses, the policies of the state and the balance or method used to resolve conflicts; and utilizes land use controls, both state and local, to manage shoreline uses.

State CZM programs have become increasingly involved in identifying the problems of eroding beach/dune systems and developing coordinated responses through statewide beach management and erosion control plans. States concern about adverse affects on downdrift beaches from federal dredging of navigation channels, offshore disposal of dredged materials, and loss of recreational beaches from shoreline armoring, has lead states CZM programs to take a proactive role in shaping state and federal policies and programs. In recognition of the adverse effects on recreational beaches from shoreline armoring. For example, the South Carolina CZM Program pushed for Congressional recognition that COE dredging of Charleston Harbor was causing severe beach erosion on the sand-starved downdrift beaches

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<sup>26</sup>Platt. 1992.

<sup>27</sup>Ibid.

and led to the Folly Beach renourishment mitigation project.<sup>28</sup> The State of Florida passed legislation requiring that suitable beach quality sand from be inlet and navigational channel dredging be placed on the down-drift beaches and used federal consistency and state-funds to negotiate with the COE to place 1.4 million cubic yards of sand from St. Mary's inlet dredging on the down-drift beaches rather than losing the sand to the offshore system.<sup>29</sup> Several states have passed legislation limiting the use of new shoreline stabilizations, in an effort to protect beach and dune systems at the expense of private upland properties.

The inappropriate siting of structures on coastal barriers, in coastal flood zones and on erodible bluffs is a problem which state CZM programs inherited. Thus when the state CZM programs began in the 1970s, certain portions of our nation's coastline were already committed to intense development and other areas already zoned and platted for development. Shoreline erosion was a recognized problem, but land use controls were not well developed. State CZM programs would provide the testing grounds for land and water management to balance competing demands along our shoreline and minimize adverse impacts on valued natural coastal resources. State CZM programs would be at the forefront of the "quiet revolution in land use controls" and "integrated coastal management."

**State Profiles**, developed as part of this study, capture some of the complexity and diversity of geographic, geologic, and social context factors which are unique to each coastal state and its CZM program. The authors found no significant correlation between these factors and management tools employed by a group of states. These context factors have proven helpful, however, in understanding the unique set of conditions in states that influence coastal management program actions. For example, the Connecticut, New Jersey and portions of the New York coastlines were *already intensely developed* at time of program approval, so population growth between 1970 and 1990 was not a major concern. In Connecticut, management attention has therefore focused on coastal erosion-based permits for improvements and additions to existing structures and development on the few remaining lots within the coastal erosion zone. In New York and New Jersey, attention has been given urban waterfront redevelopment and erosion response to protect existing structures. The islands of Guam, Northern Mariana Islands, Virgin Islands, and American Samoa have each experienced *significant population growth* (>50%) between 1970 and 1990. Tourism development on these islands has placed pressures on the natural resources and infrastructure. Continued development along the narrow low-lying coastal plains has exacerbated coastal hazard risks on these already storm-vulnerable islands. Agricultural use and some new develop on steep slope areas is causing landslides and soil erosion. At least eight states are experiencing *critical erosion* along more than 10% of their shoreline. All but a few states have areas where existing coastline development is falling into the water or in imminent danger of collapse as a result of being constructed too close to an eroding beach or receding coastal bluff. The management responses to shoreline erosion, both on beaches and bluffs, vary by state --from setbacks to requiring moveable structures, to prohibiting shoreline stabilization structures-- but each state with such erosion has sought management solutions. Although all states have beach resources, the demand and utilization varies. Alaska and Florida have extensive *barrier beach resources*. The *warm sub-tropical climate* places Florida's beaches in high demand for recreation and development, while the *bleak Arctic climate* of Alaska along with extensive public holdings makes beachfront development a non-issue. Oregon and Maine have *rocky shore resources* of high scenic value. *Easy linear access* along the Oregon coast has made protection of rocky intertidal areas from over-use a significant issue. In contrast, the *irregular and inaccessible* nature of the Maine coastline reduces the need for protection measures. Several states have coastal bluff resources, but *bluff erosion and bluff development pressures* vary. Where new development along unstable bluffs is occurring-- such as PA, OR, CA, MI-- a variety of management responses are being developed. American Samoa, Guam, Hawaii, and Northern Mariana Islands have *historic and traditional cultural values* which affect coastal management. In American Samoa, most properties are owned by the aigas (communal villages) with tribal chieftains making decisions about communal use of the land consistent with traditional cultural values.

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<sup>28</sup>U.S. Army Corps of Engineers. Water Resources Development in South Carolina. 1993. p.44

<sup>29</sup>State of Florida. Florida Coastal Management Program. Best Projects Report. 1988. p.19

### **National Perspective**

Context factors are helpful when evaluating the overall national effectiveness of state CZM Programs. For example, the length of coastline and type and extent of natural coastline features highlight the relevant areas needing coastal management attention; the extent and change in coastal erosion along our nation's shoreline help define the magnitude of erosion as a national coastal management problem; the extent of public versus private ownership of the coastline puts the relevancy of various management tools (direct land management, regulatory controls and land acquisition) into perspective; and the population and economic pressures along the coastline bring into focus the competition between resource protection and development interests.

### **Issue Identification**

All but three of the twenty-nine coastal states identified issues associated with protection of natural coastal resources and/or minimization of loss of life and property from coastal hazards as a high priority management issue for their program. Two states ranked the issue of moderate importance: Connecticut has no open-ocean coastline and was already intensely developed at time of program approval; Wisconsin considers wetlands protection a higher priority. Louisiana ranked the issue as low, since only a small portion of the coastline is sandy beach and wetlands are the highest priority issue. (See **Table 1**)

### **Diversity of State Policy Objectives**

The tools states employ reflect each state's policy priorities to address competing uses along our nation's beachfront and shoreline areas. This study focuses on a cross-state analysis of the key tools, selected provisions, and on-the-ground outcomes of tools employed. It should be noted that the policy intent behind the tools employed vary, even among similar types of tools employed. **Table 2** illustrates the diversity of policies behind state setback regulations.

## **Overview of State CZM Programs**

This study covers the twenty-nine coastal states, territories and commonwealths with federally-approved coastal zone management programs as of 1995. For the purpose of simplicity, all twenty-nine programs are hereinafter referred to as "coastal states," which term is intended to include states, territories and commonwealths. The state coastal programs were approved between 1976 and 1988. (See **Appendix C**) Each of the twenty-nine coastal states was required to develop and describe its program in a CZM Plan and a draft and final Environmental Impact Statement (EIS), prior to program approval. These documents contain some baseline data on resources. They also describe the key tools to be employed in the program to address resource protection and other issues.

Under the CZMA (Section 306(d)(11); 15 CRF, Section 923.42-.44), states were required to develop coastal programs with means for controlling coastal land and water uses in one or more of three ways: Technique A- state establishment of criteria and standards for local implementation; Technique B- direct state land and water use planning and regulation; or Technique C- state review on a case-by-case basis of actions affecting land and water uses subject to the management program. Ten of the states developed programs based on direct state land and water use planning and regulatory programs (Technique B). Nineteen of the states used a combination of state controls and local controls based on state standards. (See **Appendix C**)

Looking at primary authorities and tools employed by state CZM Programs to protect beaches, dunes, bluffs and rocky shore resources, twelve states employ state-level regulatory programs; seventeen states employ a combination of direct state and local planning and regulatory programs. Although all states own coastal properties, for three states ownership and direct land management is a primary tool. (See **Appendix C**)

Most coastal states are finding ways to provide for local participation in coastal management decisions. Even states that do not rely on local controls as part of their approved programs are providing for voluntary or mandatory local participation. For example, in 1995 New Hampshire began requiring local shoreland ordinances and setbacks. In 1994, Florida added local comprehensive planning to its tool box. In 1990,

South Carolina began requiring local beach management plans tied to access and beach nourishment funding.

Table 2: Diversity of policies behind state coastal setback regulations

Commonwealth of Northern Marianas	Preserve visual open space.
Virgin Islands, Guam	Retain public access.
Puerto Rico	Retain public access and prevent shadows on the beach.
Hawaii	Protect shoreline resources vital to the economy and environment, protect natural shoreline processes, provide public access.
Maine	Conserve wildlife habitats and other vital resources, protect natural functions of frontal dunes.
Michigan and Pennsylvania	Keep development away from bluff-recession hazard areas. Both address reasonable use of parcels subdivided prior to setback laws. Michigan allows moveable structures. PA uses a variances process.
Oregon	Protect public access, protect life and property from hazards including ocean flooding, to prohibit development on beaches, active foredunes, and other conditionally stable foredunes and intertidal dunes.
Rhode Island	Multiple setbacks: to protect foredunes, coastal features - beaches, dunes, bluffs, rocky shores; to reduce loss of life and property in designated coastal hazard areas; to reduce public expenditures for infrastructure and flood disaster relief on barrier islands.
South Carolina	Preserve beaches and keep development off the active beach and dune. However, as a result of taking cases, the state allows certain development along the oceanfront if not located on primary dune.
American Samoa, Florida, New Jersey Carolina, other states	Consider the type and/or size of development (single North family, commercial and/or square footage/number of units) in setting development back from the shoreline.
several states	Erosion-rate based setbacks to respond to beach dynamics and to keep development out of coastal erosion areas.
most states	Variance provisions to avoid "taking" issues associated with private property rights.
Source: State CZM Profiles.	

## 3 METHODOLOGY

A detailed description of the methodology is provided in **Appendix B-1**. The following is a summary containing the research question, research design, and approach to determining effectiveness.

### Research Question and What is Covered

The basic research question utilized is "how effective overall have the individual and collective state CZM program efforts been in addressing protection of beaches, dunes, bluffs and rocky shores?"

### Research Design

The overall research framework is described in the introduction to the entire study. A specific survey instrument was developed for collecting process and outcome data on protection of beaches, dunes, bluffs and rocky shores. This survey instrument was sent to all twenty-nine CZM states. In addition, the instrument was used in completing follow-up phone interviews with state contacts. The survey results served as the basis for completion of individual state CZM profiles. (See **Appendix B-2** for a copy of the Survey Instrument)

In addition, the authors reviewed information from state CZM documents including Final Environmental Impact Statements (FEIS); 309 Assessment and Strategy Reports and state laws and regulations pertaining to resource protection. Where provided by OCRM or the coastal state, the authors reviewed documents on beach and dune protection, state coastal parks, land acquisitions, and selected state CZM progress reports, annual reports, and 312 evaluation reports.

Follow-up phone interviews and data requests were made to each coastal state, usually to multiple state agency or bureau staff. It was typical to contact more than one staff in the state CZM program office, the state land management agency, a state environmental regulatory agency, the state land acquisition agency, and the state wildlife protection agencies.

### Determination of Effectiveness

"Coastal Management Tools" are the processes, tools, and techniques a state coastal management program employs or utilizes to address a coastal management issue and to implement its program.

"Process Indicators" are the specific management programs, tools or techniques that states have developed to address coastal problems. Examples include key provisions of regulatory programs such as coastal setbacks from primary dunes or control zones which protect natural functions of resources; plans with enforceable policies that address beach renourishment, inlet management, dune restoration or special area resource protection; state land management of coastal parks which guide access or protect unique habitat areas; and acquisition programs to purchase beaches, dunes, bluffs or rocky shore areas.

"Outcome Indicators" are the specific on-the-ground measurable effects that result from implementation of CZM programs, tools, and techniques. Examples include linear and/or area data on permits issued reflected in miles of beachfront shoreline developed or armored through permitting; area restricted from vehicular access through access plan and regulations; miles and/or acres of coastal shoreline in state land management or protection status; miles and cubic yards of beaches restored or dunes revegetated; miles and/or acres of coastal shoreline acquired for resource protection.

"CZM Program Effectiveness" means the special role of CZM in using process tools to affect outcomes sought under the CZMA, namely the protection of natural beaches, dunes, bluffs and rocky shores. Effectiveness is measured by: 1) process indicators (tools) and outcome indicators (results) and their

linkage within each of the 29 state programs; 2) state CZM program implementation through case examples where no statewide data is available; and 3) the unique role of CZM as only one of many government and non-government agencies involved in coastal management.

## **Research Limitations**

There are several limitations to this research project. The greatest limitation involves a lack of historical information and databases on state CZM management tools and outcomes. The following is a list of some of the problems and weaknesses which limit meaningful cross-state comparisons of CZM tools and results, and the assessment of CZM effectiveness:

- (1) diversity among state CZM programs with regard to natural resources, size, region, coastal population, development, priorities for balancing resource protection and development, organizational and management framework, and application of similar management tools;
- (2) multiple state agencies involved in the coastal area with separate management mandates, and a lack of coordination among agency programs to achieve common objectives;
- (3) lack of database at OCRM on state CZM program tools, activities, outcomes including a lack of standardized and consolidated reporting in performance evaluations, grants, annual reports which is reflected in an inadequate reporting process between the coastal states and OCRM; inadequate computerized permit tracking data regarding miles, acres, resources, areas affected, length of projects permitted, and assessment of cumulative impacts of multiple permits; and lack of federal standards for measuring state CZM performance coupled with a lack of measurable data provided by OCRM and the coastal states;
- (4) lack of documentation, bibliographies and dissemination of CZM technical reports and program results;
- (5) reliance on case examples and success stories, in the absence of statewide data on CZM outcomes, as indicated in biennial reports to Congress and state submissions to OCRM;
- (6) significant changes to state CZM programs over the years which are not documented by OCRM;
- (7) turn-over among state CZM staff and the lack of institutional memory about CZM activities and results;
- (8) compounding factors which influence and shape state coastal policies and programs and affect CZM results including economic development, environmental pressures, political and social factors.

## 4 RESULTS

### NATIONAL OBJECTIVES BEING ACHIEVED

**The national objective of protecting coastal resources is being achieved** through implementation of federally-approved state coastal management programs. State CZM programs efforts are effective overall in addressing protection of beaches, dunes, bluffs and rocky shores, given that CZM requires states to balance competing needs and demands such as protection of properties from hazard risks and promotion of recreational use of the shoreline. Determination of CMP effectiveness has been based on process indicators and case examples.

### TOOLS EMPLOYED BY COASTAL STATES TO PROTECT RESOURCES

**Coastal states are utilizing 26 widely varying processes to achieve resource protection** including regulatory setbacks and controls over shoreline development in combination with planning, stewardship of state lands, coastal land acquisition, as well as research and public education about shoreline processes and human interactions. A summary *list of the tools* each of the twenty-nine coastal states employ to protect beaches and dunes is shown in **Table 4**. Tools used to protect bluffs and rocky shores are shown in **Table 5**. Coastal management tools are continually evolving. The summary represent management tools in place as of the summer of 1995. All but three state coastal programs identified issues associated with protection of natural resources and/or minimization of loss of life and property from coastal hazards as a high priority management issue. Although all coastal states own coastal properties, only three use state ownership and land management as the primary tool. Of the twenty-five tools identified with beach and dune protection, the fewest tools used by a state is eleven and the most is twenty-three. Of the thirteen tools related to bluff and rocky shore protection, the fewest tools used by any state is five and the most is eleven.

**Regulatory tools are the most significant tools employed nationwide to protect shoreline resources.** Protection is achieved through setbacks; regulation of shoreline development and shoreline stabilizations; restrictions on pedestrian and vehicular access; habitat protection; and permit compliance/permit tracking systems. Setbacks are particularly effective--acting as natural buffer areas and reducing hazard risks. Regulatory controls are needed because the majority of the oceanfront shoreline is in private ownership and is subject to significant shoreline change and development pressures. The scope, policies, and provisions of state coastal regulatory programs afford greater natural resource protection. In addition to construction setbacks, almost all coastal states regulate activities within defined coastal construction control areas in ways that minimize adverse impacts on the natural shoreline resources and protect critical habitat areas. Most coastal states regulate the use of shoreline stabilization structures to minimize adverse impacts on beach systems. Many coastal states restrict pedestrian and vehicular access along portions of the shoreline. Pedestrian access restrictions channel human encroachment along boardwalks or dune crossovers, minimizing dune destabilization and limiting adverse impacts on fragile shoreline resources. Vehicular access restrictions keep vehicles off sensitive coastal habitat areas or limit vehicular use to government vehicles or off-road vehicles in areas planned for their use. Almost all coastal state have permit compliance programs to enforce their regulations and permit tracking systems. Only a few coastal states prohibit shoreline stabilization structures, thereby placing protection of beach systems as a policy priority over protection of upland structures.

**Planning tools, when combined with regulatory, improve natural resource protection.** Most coastal states with beach or bluff resources employ some type of planning tool. Locally-delegated permitting combined with mandatory local planning in eight coastal states provides the key management tool in protecting beaches, dunes, bluffs and rocky shore resources. Planning programs are more effective when combined with implementation through state regulation or local land use regulations, zoning and subdivision ordinances and other actions. Adopted plans offer long-range vision or site-specific goals for the protection and development of selected coastal areas and resources.

**Stewardship of coastal lands, through direct land management and acquisition, is an important component of all state coastal programs.** All coastal states own state parks along the shoreline that encompass one or more beach, dune, bluff or rocky shore. Most coastal states have natural protection areas and guided accessways and many have acquired additional coastal land holdings. Almost half of the coastal states use boardwalks or dune crossovers to protect dune vegetation and minimize adverse impacts on natural resources and employ sand fencing and dune creation to restore the natural function of damaged dune systems. Over half of the coastal states use beach nourishment to recreate recreational beaches which are eroding away. Eleven coastal states have chosen to armor or repair existing shoreline stabilization structures in high erosion areas, primarily to protect coastal highways or other public infrastructure investments.

**Nonregulatory and research tools support regulatory, planning, acquisition and direct land management activities.** All coastal states employ some types of nonregulatory and research tools. For example, education and technical assistance to local governments function to improve local coastal planning and regulation. Likewise, research and technical reports on shoreline erosion rates function to improve state regulatory controls over development in erosion prone areas. **Table 2** identifies the key nonregulatory and research tools that states use in shoreline management. No attempt was made to collect outcome data for these tools. Any further analysis of these tools was beyond the scope of this study.

## **UPGRADING CZM PROCESSES**

Coastal states use a wide variety of management tools to protect beaches, dunes, bluffs and rocky shores.

CZM is a growing and changing process meeting changing needs. As state CZM programs recognize problems or management gaps, they take corrective action. **All but two coastal states have made significant changes to their programs in the way they protect resources.** (See **Table 3** and **Appendix C**)

When looking from the time of original federal program approval in 1972 to the present, a more than 20 year time span, coastal states have made *hundreds* of changes and refinements to their programs. Some changes involved program amendments, others were just routine program improvements. **This study has documented over 60 significant changes made by state coastal programs solely to protect natural shoreline resources.** Most of these program changes involved alteration of the state CZM regulatory and planning tools. Significant changes have commonly included expansion of the geographic area or types of activities covered by shoreline setbacks or regulations and changes to limitations on shoreline stabilizations. Most states are giving greater consideration to natural shoreline processes, even when addressing other concerns such as the need to protect developed eroding shoreline using structural measures. Examples of significant program changes to state CZM program tools are provided in **Table 3**.

With few exceptions, most of these program changes have occurred in the 1980 and 1990, after several years of program implementation. The fact that state coastal programs are changing complicates efforts to assess program effectiveness based on measurable results of program implementation. Although not the methodological approach taken in this study, a review of changes which strengthen or weaken resource protection programs could be used as a way to assess CZM program effectiveness.

Table 3: Examples of **significant changes** to State CZM program tools which affect protection of beaches, dunes, bluffs, and rocky shores:

- \* California adopted coastal hazard landform alteration policy guidance in 1993 to address geologic stability of bluff top development.
- \* Connecticut amended its regulatory program in 1987 to include permits for seawalls which had previously been exempt from review.
- \* Florida amended its beachfront regulatory program in 1985 to establish a 30-year erosion zone and prohibit major development seaward of that zone line.
- \* Hawaii amended its setback provisions in 1989 to limit variances and improve enforcement of setbacks and variances.
- \* Maine amended its sand dune rule in 1989 and 1993 to broaden and clarify permit requirements for development on sand dunes. In 1995, Maine amended its natural resource protection act to allow existing seawalls and other shoreline stabilizations to be fortified and built bigger/stronger to protect existing threatened oceanfront development. This was contrary to the sand dune rule which promotes retreat from erosion-prone areas.
- \* Massachusetts passed a state endangered species act in 1990 which expanded beach management from flood control and storm damage protection to include protection of wildlife habitat and endangered species.
- \* Michigan amended its shorelands protection and management act in 1992 to expand the definition of bluff-line to cover non-bluff shoreline and extended the inland setback requirements to address severe short-term erosion events.
- \* New Hampshire revised the definition of the high water mark in 1995 extending more landward state permit jurisdiction.
- \* New Jersey amended its oceanfront permits program in 1988 and 1990 to expand its jurisdiction landward and include single family, commercial development and shoreline stabilizations previously excluded. Amendments also created erosion hazard areas and erosion-rate setbacks within these areas.
- \* North Carolina amended its program in 1985 to prohibit hard erosion control devices designed to harden or stabilize beaches, and modified its law in 1989 to allow stabilizations to protect historic structures.
- \* Oregon adopted a Territorial Sea Plan in 1994 which includes a Rocky Shores Strategy. Areas are inventoried, classified and designated under one of four classifications. Within these areas access/use is restricted.
- \* South Carolina amended its beach management act in 1988 and 1990. Since 1988, the state prohibits new shoreline stabilization structures; since 1990, reconstruction of shoreline stabilizations & rebuilding of certain damaged structures is restricted.
- \* The Virgin Islands adopted 18 Areas of Particular Concern in 1994 which include sea turtle nesting beaches for special protection.

Source: State CZM Profiles

**Table 4: Summary of State CZM Tools Employed to Protect Beaches and Dunes**

TOOLS	A L	A K	A S	C A	C T	D E	F L	G A	H I	L A	M E	M D	M A	M I	M S	N H	N J	N Y	N C	N M	O R	P A	P R	R I	S C	V I	V A	W A	W I	Total Yes	
<b>REGULATORY &amp; PLANNING TOOLS</b>																													<b>29</b>		
Restrict Construction	y	y	y	y	y	y	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	27
Setbacks	y	n	y	y	n	y	y	y	y	n	y	y	n	y	*	y	y	y	y	y	y	*	y	y	y	y	y	y	y	y	23
Control Areas	y	y	y	y	y	y	y	y	y	y	y	y	y	y	*	y	y	y	y	y	y	*	y	y	y	y	y	y	y	y	27
Restrict Shoreline Stabilizations	y	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	28
Restrict Pedestrian or Vehicular Access	y	y	n	y	y	y	y	y	n	y	y	y	y	y	n	y	y	y	y	y	n	n	y	y	n	y	y	y	y	23	
Protect Habitat, Other Restrictions	n	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	y	n	y	n	y	y	y	y	y	y	y	y	y	25
Permit Compliance Program	y	y	y	y	y	y	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	28
Local Plan and/or Regulate	y	y	n	y	y	n	y	y	y	y	y	y	y	y	y	y	y	y	n	y	n	n	n	y	n	y	y	y	y	22	
Special Area Management Plans	n	y	n	y	n	n	n	y	y	n	y	n	y	n	n	n	n	n	n	y	n	n	y	y	n	y	y	n	y	12	
Other Adopted Plans	n	n	y	y	n	n	y	n	n	y	n	y	y	y	n	y	n	y	y	y	y	y	n	n	y	n	y	n	y	16	
<b>DIRECT LAND MGT, RESTORATION AND ACQUISITION TOOLS</b>																													<b>29</b>		
Shoreline in State Parks Management	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	29
Natural Areas Protected	y	y	n	y	y	y	y	y	n	y	y	y	y	n	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	y	25
Dunes Revegetated	y	n	n	y	y	y	y	n	n	y	y	y	n	n	y	n	n	y	n	n	n	n	n	n	n	n	y	n	n	n	13
Beaches Nourished or Renourished	n	n	n	y	y	y	y	n	n	y	y	y	n	y	y	y	y	y	n	y	y	n	n	y	n	n	y	n	n	n	17
Shoreline Armoring & Repairs	n	n	n	y	y	n	y	n	y	y	n	y	n	n	y	y	n	n	n	n	y	n	n	y	n	n	n	n	n	n	11
Coastal Lands Acquired	n	n	n	y	y	y	y	y	n	y	y	y	y	n	y	n	y	y	n	y	y	y	y	y	y	n	y	y	y	y	21
<b>NON-REGULATORY TOOLS</b>																													<b>29</b>		
Public Investment Restrictions	n	n	n	y	y	y	y	n	n	n	y	y	y	y	n	n	n	y	y	n	n	n	y	y	n	y	n	n	n	n	13
Public Investment Incentives	n	n	n	n	n	y	y	n	n	n	n	y	y	n	n	n	n	n	n	n	n	n	n	n	n	y	n	n	n	n	4
Coastal Property Disclosure	n	n	n	n	n	n	y	n	n	y	n	y	n	n	y	n	n	n	n	n	y	n	n	n	y	n	n	n	n	n	6
Education/Outreach/Technical Assist.	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	28
Financial Assistance	y	y	y	n	y	n	y	y	y	y	y	n	n	y	y	y	y	y	y	n	y	y	n	n	y	n	y	y	n	y	20
<b>RESEARCH TOOLS</b>																													<b>29</b>		
Methodologies for Shore Setbacks/Zones	y	n	n	y	y	y	y	y	n	y	y	n	y	y	y	y	y	y	y	n	y	n	y	n	y	n	n	n	n	y	19
Beach Profiles	y	n	n	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	n	y	y	y	n	y	n	y	y	23	
Natural Areas Inventory	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	y	27
Technical Reports	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	29
Aerial Photos	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	29
Sea Level Rise Considerations	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	25
<b>Total Tools Employed – 25</b>																													<b>25</b>		

**KEY:** Y- Yes, Management Tool employed by state N- No, Management Tool not employed by state  
 \* For MS, all beaches are artificial and open to the public. There is no regulation above MHW.  
 \* For PA, the only major beach is in public ownership and under state land management. All bluffs are regulated by setbacks and control zones.  
 Total Tools Employed out of 25: AI-15, AK-13, AS-12, CA-22, CT-21, DE-19, FL-24, GM-17, HI-19, LA-16, ME-21, MD-23, MA-20, MI-18, MS-15, NH-20, NJ-18, NY-20, NC-21, NM-14, OR-20, PA-11, PR-16, RI-16, SC-23, VI-13-, VA-20, WA-15, WI-18.  
 Source: Individual CZM Profiles

**Table 5: Summary of State CZM Tools Employed to Protect Bluffs and Rocky Shores**

STATES	AK	AS	CA	CT	GU	HI	ME	MA	MI	NH	NM	OR	PA	PR	RI	VI	WA	WI	Total YES	
<b>RESOURCE PRESENT</b>																				
Bluffs/ Rocky Shores	y y	y y	y y	y y	y y	y y	y y	y y	y y	n y	y y	y y	y n	y y	y y	y y	y y	y y	17	17
<b>REGULATORY TOOLS</b>																				
Restrict Construction Bluffs/ Rocky Shores	y y	y y	y y	y y	y y	y y	y y	y y	y n	- y	y y	y y	y -	y y	y y	y y	y ?	y y	17	15
Other Regulatory Controls Bluffs/ Rocky Shores	n n	y y	y y	y y	n n	y y	y y	y y	y n	- y	? ?	y y	y -	n n	y y	y y	y ?	y y	13	11
<b>PLANNING TOOLS</b>																				
Local, state, or special area	y y	y y	y y	y y	y y	y y	y y	n n	n n	- y	n n	y y	y -	y y	y y	y y	y y	n n	13	13
<b>DIRECT LAND MGT</b>																				
State Owns and Manages Bluffs/ Rocky Shores	y y	n n	y y	y ?	y y	y y	y y	? y	y ?	- y	? ?	y y	y -	y y	y y	? y	y y	y y	13	13
Natural Areas Protection Bluffs/ Rocky Shores	y y	n n	y y	y ?	y n	y y	y y	? y	y ?	- y	? ?	y y	n -	y y	y y	? y	y y	y y	11	12
<b>ACQUISITION TOOL</b>																				
Lands Acquired Bluffs/Rocky Shores	n n	n n	y y	? ?	n n	y y	y y	? ?	y ?	- y	n n	n y	y -	n n	? ?	n n	y y	y y	7	7
<b>NON-REGULATORY TOOLS</b>																				
Public Investment Restriction	n n	n n	y n	y n	n n	n n	n n	? ?	y ?	- n	n n	n n	n -	y y	n n	y y	n n	n n	5	2
Coastal Property Disclosure	n n	n n	n n	n n	n n	n n	n n	n n	n n	- n	n n	y y	n -	n n	n n	n n	n n	n n	1	1
Education/Outreach/ TA	y n	y y	n n	y y	n n	y y	n n	y y	y ?	- y	n n	y y	y -	n n	y y	y y	y n	y y	12	9
Financial Assistance	y y	y y	n n	y y	n n	y y	n n	n n	y ?	- y	n n	n y	y -	n n	n n	n n	y y	n n	7	7
<b>RESEARCH TOOLS</b>																				
Inventories/ Designate protection area	y y	y y	n n	y y	y y	y y	y y	y y	y ?	- y	n n	y y	y -	? y	n y	y y	y n	y y	13	13
Technical Reports	y y	y y	y y	y y	n n	y y	y y	y y	y ?	- y	n n	y y	y -	y y	y y	? ?	y n	y y	14	12
<b>Total Tools Employed—13</b>	9 8	8 8	9 8	11 8	6 5	11 11	9 9	6 8	11 ?	- 11	2 2	10 12	10 -	7 8	8 8	7 8	11 6	9 9		

**Key :**  
y- YES, Management Tool employed by state  
n- NO, Management Tool not employed by state  
- not applicable  
? unknown, not state data or insufficient data to determine answer

Resource Presence Summary:  
17 States with Bluffs: AK, AS, CA, CT, GU, HI, ME, MA, MI, PA, NM, OR, PR, RI, VI, WA, WI  
17 States with Rocky Shores: AK, AS, CA, CT, GU, HI, ME, MA, MI, NH, NM, OR, PR, RI, VI, WA, WI  
13 States with No Coastal Bluffs: AL, DE, FL, LA, MD, MA, MS, NH, NJ, NY ocean coast only, NC, SC, VA  
12 States with No Coastal Rocky Shores: AL, DE, FL, LA, MD, MS, NJ, NY ocean coast only, NC, PA, SC, VA  
Source: CZM profiles Version 12/1/96

## 5 PROCESS INDICATORS OF EFFECTIVENESS

Coastal states are utilizing twenty-six (26) widely varying processes to achieve resource protection including regulatory, planning, state land management, acquisition, non-regulatory and research tools. A summary list of the tools each of the 29 coastal states employ to protect beaches and dunes as of 1995 is shown in **Table 4**.<sup>30</sup> From these twenty-six (26) tools, a subset of ten (10) were selected as process indicators of effectiveness. These ten indicators are summarized in **Table 6**.

The ten process indicators are: six regulatory categories (representing each of the six regulatory tools), one adopted plan category (representing the combination of the three original planning tools), and three state land management categories (representing a combination of the five original state land management and acquisition tools). Non-regulatory and research tools were deleted as process indicators. The rationale for deleting these two categories is that nonregulatory and research tools support the four other management categories (regulatory, planning, state land management and coastal acquisition) and that, with limited resources, attention should be placed on the tools which might show on-the-ground results.

Key provisions of selected management tools are used as **process indicators** of effective state CZM programs in protecting **beaches, dunes, bluffs and rocky shores**. States with the suite of regulatory, planning, direct land management and acquisition provisions listed in **Table 6** are presumed to have effective programs.

**Appendix C** contains summary tables which describe the **key provisions** of regulatory and planning tools each of the twenty-nine coastal states utilizes to protect **beaches, dunes, bluffs, and rocky shores**, including setback requirements, regulations within construction zones, restrictions on shoreline stabilizations, access restrictions, and protection of critical habitat areas. Appendix C also contains summary tables on direct land management and acquisition tools associated with state ownership and management and land acquisitions, including coastline miles, miles of beachfront, state oceanfront park (miles, acres, number, and beach parks as subset), number of boardwalks or dunes crossovers installed, dunes revegetated, beaches renourished, shoreline armored, natural areas protected and lands acquired in beach/dune, bluff or rocky shore. Findings regarding state CZM process indicators of effectiveness in protecting **beaches, dunes, bluffs and rocky shores** are presented on the following pages.

### KEY ROLE OF STATE CZM IN COASTAL REGULATORY PROGRAMS

The inappropriate siting of structures on coastal barriers, in coastal flood zones, and on erodable bluffs is a problem which state CZM programs inherited. Thus when the state CZM programs began in the 1970s, certain portions of our nation's coastline were already committed to intense development and other areas were already zoned and platted for development. Shoreline erosion was a recognized problem, but land use controls were not well developed. State CZM regulatory programs have provided institutional mechanisms to balance competing demands along our shoreline and to minimize adverse impacts on valued natural coastal resources. State CZM programs have created new or implemented and refined existing coastline regulatory controls such as setbacks from beaches/bluffs, and controls over shoreline development and stabilizations. CZM programs have played a leadership role in the policy shift towards beach nourishment and shoreline retreat.

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<sup>30</sup> This study also covered protection of bluffs and rocky shores and data on management tools employed. Indicators of effectiveness in protecting these resources are contained in the technical report only.

**Table 6: Process Indicators of Effectiveness**

<p><i>Regulatory Programs:</i></p> <p>(a) <b>Coastal Setbacks</b> for development and redevelopment from beach, dune, bluffs, or rocky shores: the farther inland the setback, the more effective; the fewer exceptions allowed within the setback, the more effective.</p> <p>(b) <b>Coastal Construction Controls Areas</b> along the shoreline with regulations governing activities affecting beach, dune, steep slope bluffs, erodable bluffs, and rocky shores and limits on size, type, design or location of permitted construction to minimize adverse impacts on beach/dune/bluff systems; controls over new significant activities with few exceptions, controls over additions/repairs/rebuilding; the more restrictive, the more effective.</p> <p>(c) <b>Shoreline Stabilization Regulations</b> which place limitations on the use of shoreline stabilization structures in favor of nonstructural solutions.</p> <p>(d) <b>Access Restrictions</b> with requirements for boardwalks or dune crossovers to minimize adverse impacts on dunes; and areas designated where pedestrian and/or vehicular access is restricted to protect resources.</p> <p>(e) <b>Habitat Protection and Other Controls</b> over critical habitat areas where uses are restricted to protect habitat protection values.</p> <p>(f) <b>Permit Tracking and Enforcement Provisions</b> which are used to monitor permits and violations.</p> <p><i>Planning:</i></p> <p>(a) <b>Adopted Plans</b> for areas containing enforceable policies that address resource protection, beach nourishment, inlet management, dunes restoration, or special area resource protection or conservation; the larger the resource area covered, the more of the shoreline included, and the more restrictive the enforceable policies, the more effective.</p> <p><i>State Coastal Land Management and Acquisition:</i></p> <p>(a) <b>State Coastal Land Holdings</b> including inventory of the number, acres and shoreline miles of state lands in state oceanfront parks and preserves.</p> <p>(b) <b>State Coastal Land Management and Stewardship</b> including park management plans; boardwalks, dune cross-crossovers or other guided pedestrian access; dune restoration and beach nourishment where appropriate; enforceable policies restricting the use of shoreline stabilization structures; and designated natural resource habitat protection areas.</p> <p>(c) <b>State Coastal Land Acquisition Program</b> with coastal land acquisition as a priority.</p>
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**COASTAL SETBACKS**

\* All 29 coastal states with federally-approved CZM programs have controls over certain land and water activities along portions of their coastlines. All coastal states with developable beach/dune systems or bluffs have some form of state-mandated regulatory mechanism by which they prohibit or restrict certain types of *new development* in designated portions of their shoreline. The strength of the individual state setback or coastal construction control laws vary considerably depending on the setback distance, activities permitted, exceptions allowed, reconstruction provisions, level of government regulating development, and permit compliance and monitoring.

\* 22 of the twenty-nine coastal states have adopted land use regulations in the form of **setback requirements for new structures** that can be built on the shoreline. Another 2 states use locally-created setbacks.

\* Setback laws have a dual purpose: protecting the natural beach and dune or bluff systems as storm buffers and reducing the loss of life and property from hurricanes and winter storm events. Implementation of these laws has reduced the number and size of new structures that can be built on the

shoreline and, for those built, located these structures as far landward from the water's edge as possible to prevent erosion from reaching the structures during their expected useful life. However, naturally migrating beaches have over time resulted in houses sitting on open beaches and then collapsing into the water. Setbacks have been of limited success in protecting natural beach and dune or bluff systems, since development is often allowed on portions of the dune systems usually behind the crest of the foredunes where restricting private property rights is more difficult.

\* 10 of the 22 states **measure their setback lines** based on an arbitrary distance inland from the shoreline; 4 use erosion rates; 4 use resource features; and 5 use a combination of feet, erosion rates, and/or features. Determining which states have the most extensive landward setback boundaries is not practical, since the ways setback lines are measured vary considerably, as do the state geography and resources. For example, states vary in the shoreline location inland from which they measure their setbacks (mean high water, mean low tide, normal high water, crest of dune, elevation, or contour line.) The landward boundary also varies (feet, erosion rates, feet landward of coastal features.)

\* 16 of the 22 state setback laws contain provisions for **exceptions** which tend to weaken the effectiveness of the setback requirements. Examples include single-family dwellings within the setback if the land was platted before the effective date of the statute, or small parcels where there is not enough land to build behind the setback line. In some states, exception provisions have been added to state laws to avoid private property taking claims. Other types of exceptions include in-filling in developed areas, water-dependent uses, public interest activities, recreational activities, swimming pools, fences, boardwalks.

\* Coastal setback provisions for each state are shown in **Table 7**, including setback distance and exceptions allowed seaward of the setback. Data was not collected on the methodology for setting the baselines and other technical information. There was insufficient data to determine the number of shoreline miles covered by state setback laws.

Table 7: State coastal setback distance provisions and exceptions and type of setback

States	Setback distanced measured in <b>feet or meters</b> :
AL	40 feet landward of crestline (120-450 feet landward of MHWL). Exceptions- SF
AS	25 feet for residential; 50 ft for commercial from OHWL
DE	100 feet landward of seawardmost 7-ft elevation above NGVD. Exceptions-yes, if not sufficient land.
GU	Public access zone MHW and 25 feet inland from 2 foot contour line of Geodetic Survey. 35 feet from MHW bounding beach. No higher than 25 feet. w/in 75 feet of MHW. Exceptions- shoreline w/cliff/bluff higher than 25 feet, village lots >100 square meters in residential areas before WWI. Variances- recreation, commercial.
HI	40 feet. along most shorelines to upper reaches of wash of waves, usually evidenced by edge of vegetation growth, debris. Variances- 20 feet for small lots, shoreline stabilizations in public interest or hardship.
MD	75 feet from Normal High Water (NHW). Exceptions- fences, boardwalks.
NH	100 feet from High Ordinary Tide Line (HOTL) bordering tidal waters. Exceptions- public good, rebuilding. 5 feet from Mean High Water (MHW) for primary structures; 75 feet for septic tanks.
NM	In shoreline Area of Particular Concern (APC), 0-35 feet no construction from MHW; between 35-75 feet, no construction that obstructs visual openness; Between 75-100 feet, only SF allowed.
PR	6 meter public right of way w/no structures. 50 meter setback from TM. 2.5 time height setback
w/in	400 meters of Territorial Maritime Zone (TMZ). Exceptions- urban zone lot, adjacent structures setback less, water-dependency.
WI	75 feet from Ordinary Mean High Water (OMHW). Exceptions- piers, boat hoists, boathouses.

Table 7: State coastal setback distance provisions and exceptions and type of setback (continued)

States	<u>Setback distance measured by erosion rate, landward extent of resource feature or combination of measures</u>
FL	30-year erosion line for major structures from SHWL. Exceptions- SF (Erosion Rate)
MI	Sand dune setback 100 feet landward from crest of first landward ridge not a foredune. Bluff high risk area setback 30-year erosion projection plus 15 feet. Exceptions- substandard lots approved prior to law. (Erosion Rate)
PA	Bluff setback of 50 times annual rate of recession from the bluff-face for residential; 75 times for commercial, at least 50 feet. Exceptions- parcels subdivided prior to law if structure moveable. (Erosion Rate)
VA	30-year erosion rate or 20 times local recession rate from MHW for barrier islands Exception- public interest activities. (Erosion Rate)
NY	No moveable structures or major additions within "environmental hazard areas." (Features)
OR	No building within "beach zone." No building on beaches, active foredunes, other conditionally stable foredunes subject to ocean undercutting and wave overtopping, and intertidal plains subject to ocean flooding. Exceptions- in-filling where protection provided, on older-stabilized dunes. (Features)
SC	From MHW to crest of primary oceanfront sand dune. Exceptions- swimming pools. (Features)
ME	No structures on frontal dunes seaward of 100 year floodplain and sea level rise area. Shoreline setback 75 feet for residential; 25 feet for general development/commercial; 250 feet from Normal High Water Line (NHWL) in Resource Protection Areas. (feet & resource)
NJ	V-zone setback for residential. Exceptions- beach related commercial. 30-year erosion for 1-4 DU.; 60-year erosion setback for larger in erosion hazard areas. Baseline for setback varies by site (crest of coastal bluff, dune crest, first line of vegetation, landward edge of 8-foot. elevation). Exceptions- SF and duplex in-fill, shore protection. 25 feet setback from shore protection structures for all permanent structures. (erosion rate and feet)
NC	Structures less than 5,000 sq. feet, setback landward of 30-yr erosion rate, crest of primary dune, toe of frontal dune, 60 feet from 1st line of stable vegetation. Exceptions- lots platted before law. Structures greater than 5,000 sq. feet, 60-yr. erosion rate or 120 feet from mean vegetation line. (erosion, feet, features)
RI	50 ft from coastal features or 25 feet from coastal buffer zone. Exception- water-dependent activity; 30-year erosion rate up to 4 units, 60-yr erosion rate larger structures in critical erosion areas. Dune construction setback on 3 barrier beaches seaward of utilities/wall of existing development. No development on beach face, sand dune, undeveloped barrier beaches. Exception-stabilizations, access, public utilities, public welfare.
VI	50 feet from MLT or inland boundary of natural barrier. (feet & resource)
Key: MHLW- mean high water line OHWL- ordinary high water line SF single family DU dwelling unit	
Note: 22 states with state setbacks. 2 states with local setbacks- CA, WA.	
5 states with no setbacks: AK, CT, LA, MA, MS.	
Source: State CZM profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.	

***The North Carolina's strong oceanfront setback law uses erosion rates to determine setbacks and keep development out of ocean hazard areas.*** Within the "Ocean hazard Areas of Environmental Concern"-- sand dunes, ocean beaches, and other areas exhibiting substantial possibility of excessive erosion-- setback are based on average annual erosion rates, natural site features, and the nature of the proposed development. The setback is measured from the first line of stable natural vegetation or aerial photos/ground survey where no stable vegetation. New structures smaller than 5,000 square feet and fewer than 5 residential units must be set back the farthest landward of the following: 1) a distance equal to 30 times the long-term annual erosion rate; 2) the crest of the primary dune; 3) the landward toe of the frontal dune, or; 4) 60 feet landward of the vegetation line. Larger structures must be set back 60 times the average annual erosion rate or 120 feet landward of the vegetation line. Where erosion rates exceed 3.5 feet per year, the setback line for larger structures is set at 30 times the erosion rate plus 105 feet. The law was passed in 1974, made part of the coastal program in 1978, and amended in 1981 to allow single-

family residences on pre-existing lots not deep enough to meet the erosion setback requirements, as long as they are set back at least 60 feet. The coastal program has focus attention on studying erosion rates used in determining setbacks.

**The Pennsylvania Bluff Recession and Setback Act provides a long-term regulatory approach to reducing property losses from bluff recession along Lake Erie.** The act requires municipalities in bluff recession hazard areas to administer bluff setback ordinances which restrict new development from bluff areas and limit improvements to existing structures within the minimum bluff setback. Setback distance is based on the rate of erosion (feet per year) multiplied by the life span of the structure. Life span for residential development is 50 years; commercial is 75 years; and industrial is 100 years; or at least 50 feet from the crest of the bluff. The major effect of this program has been to keep new development a safe distance from bluff recession hazard areas. CZM provides technical assistance to Lake Erie property owners affected by bluff recession, consisting of on-site inspections and recommendations on surface and groundwater control, bluff stabilization and the role of vegetation to stabilize loose soil conditions. In the first seven years of the service (1981-1988), approximately 3/4 of the surveyed property owners followed CZM's recommendations, resulting in an estimated property damage savings and property value enhancement of \$5.2 million. Pennsylvania is the only Great Lakes state to offer this service.

## **COASTAL CONSTRUCTION CONTROL AREAS**

\* The coastal construction control areas are smaller geographic areas or subsets of the states' coastal zones, focusing regulatory permit controls over activities along the *immediate shoreline*. In most cases, a state's coastal zone extends more landward to cover watersheds and other inland features. Regulatory controls along the immediate shoreline, such as setbacks and construction regulations, may not apply to more landward areas within the state's coastal zone.

\* 27 coastal states have established land use regulations using a **coastal construction control area or zone** within which they regulate the location, size, and other conditions of development. Provisions used to protect natural beaches and dunes include siting and design guidelines to locate structure as landward as possible, minimizing disruption of dune vegetation, dune revegetation and landscaping requirements to recreate dunes and vegetation destroyed during construction, and limitations on development square footage and density. 23 coastal states use both a **setback and construction control area** approach.

\* The purpose of coastal control areas is to allow activities along the shoreline but to minimize their negative impacts on natural shoreline resources and adjacent properties. Control area regulations presume that some adverse effects will occur in balancing coastal development and resource protection. Some coastal states have strengthened their regulatory program by eliminating exemptions, extending regulatory jurisdiction, and placing limitations on additions, repairs and rebuilding. As a result, less harmful and inappropriate development is occurring along out nation's shorelines, and the development that is permitted is taking into account the resultant negative and cumulative impacts.

\* 19 of the 27 coastal states with regulatory control areas **exempt** certain activities from the permit program. Examples of exempted activities include single-family, water-dependent uses, public purpose uses, recreation, agriculture, decks, walkways, in-filling, and small lots platted before law took effect. Such exempted activities tend to weaken the effectiveness of the control zones in protecting resources. In addition, only 10 of the 27 states with regulatory control areas contain **limitations on additions** to structures built within the setback area or within the construction zone. Limitations include maximum square footage, moveable structures, and location landward of setback.

\* 12 of the 27 coastal states with regulatory control areas place **restrictions on the repair or rebuilding of a structure damaged** during a coastal storm event. For example, structures that are damaged in excess of a specified threshold (e.g., 50% of assessed value) may not be repaired or rebuilt. 16 states participated in the relocation or demolition benefits under the Upton-Jones Act, prior to its termination in 1995. State requirements often differ from NFIP standards. (See Appendix A, Table 4)

\* Each of the 27 states with coastal construction control area programs has **unique regulatory features** which reflect their particular physical, social, economic or political priorities. **Table 8** shows the diversity of regulatory jurisdictions, activities exempted, and restrictions on additions and repairs.

**The Maine Coastal Program illustrates the complexity of regulating diverse resources** such as beaches, bluffs and rocky shores. Maine uses three coastal construction regulatory program. Under the Natural Resources Protection Act, coastal frontal sand dunes and back sand dunes are mapped and protected. There is a de facto setback from frontal dunes. In back dunes, there is a size limit of 2,500 square feet, the structure must be moveable, and elevated above 3" sea level rise, with multifamily elevated higher. Reconstruction of structures damaged >50% is prohibited unless all new building standards are met, including minimal damage to dunes, lot restrictions, bird habitat protection, and revegetation of disturbed areas. Additions may not expand floor area or volume by more than 30% of existing structure. Exceptions include maintenance and repair of existing structures, temporary structures, walkways, open decks smaller than 200 square feet, and underground storage tanks outside the V-zone. State permits are also required for activities within "protected natural resource areas" which include the 100-year flood zone, moderate/high value wetlands, and steep slopes greater than 20%. Development in "protected areas," with the exception of single family residential, must be set back 250 feet from normal high water line. The Municipal Shoreland Zoning Act mandates local zoning with a 75-foot setback for residential and 25 ft for general development/commercial.

**The Rhode Island Coastal Program is an example of a strong regulatory program with defined criteria addressing identified resources, activities, and management issue areas.** Activities are regulated within and 200 feet landward of defined coastal features---coastal beaches and dunes, barrier beaches, bluffs, cliffs and banks, rocky shores, and manmade shoreline. Complex coastal zoning designates what types of activities are permissible on shoreline features, tied to 6 state water classifications. About 75% of the shoreline is adjacent to Type 1 Waters (Conservation) or Type 2 Waters (Low Intensity Use Areas) where alteration or construction or shoreline features and undeveloped barrier beaches is prohibited. In addition, activities are regulated by different setbacks from beaches and dunes, critical erosion areas, and coastal buffer zones. There are also regulations for specific types of activities (such as dredging, filling, new residential structures) as well as 17 designated coastal hazard areas and 18 identified erosion-prone areas. On barrier beaches, all residential and non-water dependent structures on dunes destroyed >50% may not be reconstructed regardless of insurance carrier coverage. Additions are allowed only to structures designated priority permissible uses.

Table 8: State coastal construction control area jurisdictions and provisions

State	Regulatory Jurisdiction--Distance Inland	Activities Exempt	Restricts Additions	Restricts Repairs.....
AL	40 ft inland from crestline to 10-ft. elevation line	SF	no	y--if damaged<50%
AK	District Control Zones- flood/hazard/erosion areas	uk	no	no
AS	1) 200 feet from MHW 2) coastal hazard areas 3) territory-wide grading,excav.,fill,steep slopes	PP, R, WD, SF no no	no no no	no no no
CA	MHT to 1st public road or 300 ft. from beach/bluff or MHT if no beach	SF	yes-except SF	yes-except SF
CT	MHW inland to 1000 feet or 100 feet from state regulated areas	SF, A, O	yes-except minor	yes-except minor
DE	landward of 100 foot setback inland 100 yards North of Wilmington to ~12 miles in SE.	no	no	y-damaged >75% y-foundation >59%
FL	SHW to landward extent of 100-year floodplain.	no	no	no
GU	1) Seashore Reserve seaward to 10 fathom contour, all islands, inland from MHW to 10 meters or edge of public right of way. 2) flood hazard area	Maintenance Dredging no	yes-except SF no	y-if damaged >50% no-SF >\$7500 no
HI	1) SMAs: 100 yds inland, cover resource areas or to inland coastal road. 2) Island-wide land use boundary changes 3) Nat.Resource Conserv. District use permit	SF, uses<\$25,000 no no	no na no	no na no
LA	Inland to intracoastal waterway, highways, natural ridges, parish boundaries.	SF	no	no
ME	1)On mapped coastal dunes. Frontal dune inland 125-175 feet. 2) protected natural resource areas, 100-year floodplain	O SF	y- floor area>30% no	yes- new standards no
MD	On coastal sand dunes 250 feet from NHW.	SF outside dunes	no	no
MA	Tide-flowed tidelands, filled tidal flats between waterway and 1st public way or 250 ft. from water	no	no	no
MI	1) designated critical dune areas w/in 250 ft.dune>3 acres,>4 units 2) high risk bluff erosion areas inland 1000 ft + 15 ft. 3) 500 feet of stream for earth change permit	no no no	no no na	yes-exceptions yes-moveable na
NH	1) HOTL inland 100 feet bordering tidal waters. 2) OHTL inland 250 feet	public good, in-fill A, O	no no	no no
NJ	1) MHW inland 500 feet 2) erosion hazard areas 3) dunes, overwash areas, beaches, bluffs	no SF, duplex in-fill no alternative	no no no	no no no

Table 8: State coastal construction control area jurisdictions and provisions (continued)

State	Regulatory Jurisdiction--Distance Inland	Activities Exempt	Restricts Additions	Restricts Repairs.....
NY	Designated erosion hazard areas- a) beach dune, shoal, bar, spit, barrier island, bluff, wetland, assoc. natural vegetation; b) 40-year erosion area.	no	yes-except moveable structures	no
NC	AECs-Ocean Hazard Areas 1) ocean erodible areas MLW inland to 145- 700 feet.; 2) high-hazard flood areas; 3) inlet hazard areas 4) unvegetated beach areas.	Lots platted before law, minor permits <60,000 sq ft. get local permits	y-setbacks apply	y-setbacks apply
NM	4 APCs: a) shoreline APC MHW inland 150 feet.	no	no	no
OR	1) extreme low tide and line of vegetation 2) coastal town boundaries	no	na	na
PA	landward of crest of bluff 50 to 200 feet. depending on erosion rate and type of development.	yes-parcels subdivided before law if moveable, utilities, 3 miles non-erosion bluff area	yes	yes if >50% market value
PR	1) 1000 meters inland from shoreline 2) flood areas 3) maritime zone-territorial waters, submerged lands	yes-depends on Zone no	no yes no	no yes-must protect no
RI	Inland 200 ft. from coastal feature- beach, dune, beach, coastal bluff, rocky shore, etc.	yes*	yes-if not priority use	yes- on barrier bch
SC >662/3%	40-year erosion zone	no feasible alt., swimming pools, O	>5000 sq ft.	y-damaged
VI	Mapped are based on roads, landmarks, property lines.	minor activity <\$17,000	no	no
VA	Coastal primary dunes and beach	uk	uk	uk
WA	200 feet inland from shore	uk	no	no
WI	OHWM inland 100 feet.	piers, O	no	no

Key: SF- single family, PP-public purpose, WD- water dependent, R- recreation, A-agriculture, O- other such as temporary structures, decks, walkways. uk- unknown Activities Exempt- covers activities not subject to regulations

\* RI has complex regulations with exceptions tied to water type and priority uses.

NOTE: 28 States with control zones along beach, bluff, or rocky shoreline. 2 States with no control zone along beach- MS, PA.

Source: State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.

**The Michigan Coastal Program is a multi-faceted program which has specialized regulatory controls for different types of areas.** Under the Shorelands Protection and Management Act (SPMA), three types of areas are regulated: 1) high risk areas--subject to bluffline recession; 2) environmental areas--fish and wildlife habitat ; and 3) flood risk areas--flood-prone areas due to changes in Great Lakes water level. The "high risks erosion areas" have been surveyed and designated. Included are all areas with erosion > 1 foot per year over 15 or more years. This area can extend inland from MHW as far as 1,000 feet from the bluffline. Setbacks are required and based on 30-year bluffline erosion projections. Within the setback area, new permanent structures are prohibited, and lakeward relocation of existing structures is prohibited. Existing structures in front of the setback line cannot be moved lakeward and any addition must be located landward of the setback line. Repairs to deteriorated or damaged structures >60% of building's replacement value must meet new setback standards. If less than 60%, structures can be restored to previous condition. Exceptions to the setback for small lots granted if waste handling system is landward of the structure, the structure is moveable and located as far landward as possible, and the building meets engineering standards. For structures in danger from erosion with access routes too narrow or steep to relocate the structure, shoreline stabilization permits may be granted, but only after all other options are exhausted and sewer and engineering standards are met.

Major regulatory amendments in 1992 expand the definition of bluffline to include non-bluff areas subject to erosion. All "zone of imminent danger"-- area landward of bluffline where erosion anticipated in the next 10 years-- must be designated. An additional 15 feet was added to the setback to address severe short-term erosion or landslides or high water. Construction requirements were eased. Additions are allowed if existing building and addition are moveable, the addition and the foot-print does not exceed 25% of the building's foundation, and located landward of zone of imminent danger. Reconstruction of substantially damaged structures (60-100% of replacement value) is allowed if damage not caused by erosion and if structure is not reconstructed in zone of imminent danger and is readily moveable. Small structures (.3,500 square feet foundation and >5 units) must be moveable if built between setback and 2 times setback distance. For larger structures, the setback is doubled.

The Sand Dunes Protection Act of 1976, strengthened in 1989, protects critical dune areas within 2 miles of the Great Lakes, much farther inland than the 1,000 feet SMPA high risk erosion area jurisdiction. Regulations may extend inland 250 feet from a critical dune area. A 100-foot setback from the crest of the dune is required unless dune stability standards are met. Development, silviculture and recreation affecting dunes and contour changes is regulated. Building is not allowed on slopes 25-33% without registered plan or slopes >33% without a special exception. Special use projects are regulated including industrial, commercial, multi-family >3 acres or >4 units per acre. Variances can be granted for rebuilding of nonconforming structures within critical dune areas if built prior to act and destroyed by fire or non-erosion forces or made nonconforming due to erosion.

**The Puerto Rico Coastal Program is characteristic of state CZM programs adopted by the island states, territories and commonwealths where regulations are island-wide.** Puerto Rico regulates development through island-wide land use policies and zoning districts. In addition to three shoreline setback areas, permits are required for activities within 1000 meters of the shoreline or farther inland to include important natural resources, as well as all offshore islands. There are 14 zoning districts within which specific activities are allowed. For example, no subdivisions are allowed in the following three Districts: Conservation of Resources District (CR); Conservation and Restoration of Resources District (CRR); and Resource Preservation District (PR). Exceptions granted in CR District for tourist-related recreation if the public interest and natural environment not adversely affected. In the Public Beaches District (PP), subdivisions and development allowed for hotel/vacation facilities, tourist villas, restaurants, recreation, wharves, docks and other water-dependent or water-related activities. Puerto Rico also required Flood Areas permits for activities in Floodprone zones. In Zone 1 (floodways) development and major renovations are prohibited. Exception-existing structures cannot be expanded unless protected. Zone 1M(v-Zone) and Zone 2 (low areas) allows new development and modifications to existing subject to design/building requirements. There is also a relocation program in coastal high hazard flood areas. Effective beginning in 1992, there is a Maritime Control Zone and required state Authorizations and Concessions for nonconforming uses in the maritime zone- mapped territorial waters, submerged lands, inland to reaches of low lands beneath by ebb/flow of tides.

## **SHORELINE STABILIZATION REGULATIONS**

\* The primary purpose of shoreline stabilization structures is to protect upland structures affected by coastal erosion, by stabilizing the shoreline. Most types of shoreline armoring impede natural sand migration, thereby causing erosion and resulting in the loss of natural beach. States which prohibit the use of shoreline stabilizations give priority to the protection of natural beach processes. As a result of inappropriate development along migrating shorelines, the accepted practice prior to CZM was to allow seawalls, bulkheads and groins in an effort to protect structures threatened by coastal erosion. Greater awareness of the negative impacts of shoreline stabilization structures on adjacent properties and coastal resources has caused CZM programs to more carefully scrutinize such activities and weigh the private and public benefits.

\* 28 coastal states **regulate the use of shoreline stabilizations structures**. All 28 require permits for *new* shoreline stabilizations and place conditions on *new* activities to minimize adverse impacts on adjacent land, natural resources, sand supply, erosion, and drainage. Protection of existing upland structures is a common reason for granting permits.

\* 22 coastal states generally **allow new** shoreline stabilizations if impacts are minimized. Most approval must meet criteria such as water-dependency, public benefit, erosion present, nonstructural alternatives not feasible, etc. A few states require structures to be designed to meet 30-50 storm/erosion events.

\* 6 coastal states **prohibit new** shoreline stabilization structures along all or portions of their coastline. Exceptions are granted by some states if structures or infrastructure are in imminent danger of collapse from erosion. (AL, ME, NE, SC, VA, RI)

\* 7 coastal states do not require permits for the **repairs or reconstruction** of shoreline stabilizations. 4 states set 50% damage thresholds and 2 require a rebuilding permit while 2 do not require a rebuilding permit. South Carolina prohibits repair or rebuilding of stabilizations if structures are damaged over a certain percent. Oregon prohibits erosion repairs on oceanfront lots platted before 1977 where no infrastructure improvements exist.

\* Most coastal states have regulatory language which **promotes nonstructural solutions**. Some states require applicants to exhaust nonstructural alternatives before granting structural permits.

\* Each of the 28 states regulating shoreline stabilization structures has **adopted unique provisions** which reflect their level of shoreline development, erosion pressures, and political priorities. **Table 9** summarizes the restrictions associated with shoreline stabilizations.

Table 9: State coastal shoreline stabilization structure restriction provisions

<u>State</u>	<u>Restriction provisions</u>
AL	No SSS allowed on Gulf-front. Exceptions, case-by-case, if structure built prior to law and threatened by erosion. Allowed by permit on Bay, a permit required for repair/reconstruction.
AS	Allowed by permits only in developed areas to protect property from erosion and if public safety/health risk; no feasible alternatives, habitat affected evaluated; adverse affects on nearby areas and habitat, drainage and shoreline alternations minimized.
CA	Allowed by permit for coastal-dependent uses, to protect existing structures or public beaches in danger of erosion if designed to eliminate/mitigate adverse impacts on local shore sand supply. Can replace SSS damaged >50% without permit. Along cliffs, allowed to stabilize slope or check marine erosion where no less damaging alternative.

Table 9: State coastal shoreline stabilization structure restriction provisions (Continued)

State	Restriction provisions
CT	Allowed by permit to protect infrastructure, for water-dependent uses, existing inhabited structures, if bluff slope not greater than 3:1. Groins/jetties allowed where non-structural alternatives infeasible.
DE	Allows by permit new and repair to existing SSS.
FL	Allows by permit new and repairs to existing SSS.
GU	Permit required, but none since 1970s issued. Relies on USACE standards.
HI	Allows but requires variance to demonstrate public interest or hardship. No SSS which interferes with beach processes. State regulates from shoreline seaward. Counties regulate above shoreline.
LA	Allows new but regulates to minimize downstream land loss. No restrictions or permit for repairs/rebuilding if damaged >50%.
ME	Prohibits new rip-rap, seawalls, groins, other SSS on sand dune system, except existing seawalls may be maintained and repaired unless building behind SSS damaged more than 50%. Effective 1995, existing seawalls can be fortified, build bigger and deeper if undermined. Within 32 designated natural coastal barriers, no state funds for new SSS if incompatible with protection values.
MD	Allows new and repair of existing. Nonstructural stabilization encouraged.
MA	Allowed to stabilize shore, rehabilitate existing structures, if minimize encroachment in waterway. Seawalls, bulkheads, revetments must be located landward of MHW, except for proper tieback placement, obtain slope stability, or be compatible with abutting SSS below MHW. Encourages Nonstructural alternatives where feasible. No restrictions on reconstruction. If adverse impacts occur, state may require modifications/removal.
MI	Allowed but must be designed to meet/exceed 20-year storm event for small structures; 50 year storm event for large structures. Must be 30 feet from erosion zone and landward of zone of imminent danger.
MS	Allows new and repairs to existing SSS.
NH	Allows new. No restrictions on reconstruction. SSS considered in public interest and generally allowed for protection of upland structures. Considered a major project if in dune, tidal wetland or within 100 feet of HOTL. Minor projects include beach nourishment <10 cu yd or removal of sand, rock, gravel <20 cu yd. Minimal impact projects- repair retaining wall.
NJ	Allowed based on 7 conditions- to protect water-dependent uses, heavily used public recreation areas or existing structures and infrastructure in developed shorefront areas. Although nonstructural solutions preferred, SSS deemed essential given NJ's urbanized shoreline.
NY	Allows new by permit. Repair/reconstruction allowed without permit. SSS must be designed to control erosion for 30 years, be unlikely to increase erosion, minimize adverse effects on natural protective features, other erosion structures and natural resources. Must include long-term maintenance program. Variances from regulations for hardship and not alternative site, mitigation measures, safe from flood/erosion damage, public benefit if public funds used.

Table 9: State coastal shoreline stabilization structure restriction provisions (Continued)

State	Restriction provisions
NC	Effective 1985, no new SSS. Temporary sand bags and beach nourishment allowed. Repairs to existing do not require permit, but replacements require permits. Exceptions to SSS prohibition- emergency DOT SSS to protect historic sites, groin at north end of Pea Island to protect bridge foundation across Oregon Inlet- only road access to barrier island. Policy preference for beach nourishment and relocation of structures.
NM	Allows new and repairs. Must not interfere with coastal processes or inhibit access to shoreline.
OR	Allows new, but must be built as far landward as possible above MSL to prevent encroachment. Allows repairs/replacement if within 3 years of damage. Prohibits erosion repair on lots where no physical improvements (i.e., building, road, water lines, sewer lines) on existing oceanfront lots platted before 1977. Promotes nonstructural solutions, SSS must be designed to minimize adverse impacts. Allows emergency new and repair SSS if property in imminent peril from erosion.
PA	Allowed from MHW lakeward. Groins allowed 50 feet from water's edge. No regulation of SSS above MHW. No permit required for repair/reconstruction. Priority is bluff-erosion prevention.
PR	Allowed for new and repairs. Relies on USACE standards.
RI	Allowed but must exhaust nonstructural alternatives. Prohibits new SSS on barriers in type 1 waters. Limits use of riprap to protect septic systems/ancillary structures. Permitted SSS must demonstrate that erosion exists, SSS will control erosion, nonstructural SSS does not work, no reasonable alternatives, will not increase erosion, long-term solution and maintenance program and financial commitment. Repair/reconstruction SSS damaged >50% requires a new permit.
SC	Since 1988, no new SSS along beach except to protect public highways in existence in 1990. Since 1990, restricts reconstruction of SSS based on degree damaged in certain years. After 2005, structures damaged >66 2/3% above grade cannot be repaired or rebuilt. Sand bags, sand scraping and beach nourishment allowed as exceptions.
VI	Allows new by permit and environmental assessment. Repairs/reconstruction do not require permits. Prohibited within 50 feet of open shore setback and siting policies to minimize adverse impacts.
VA	Effective 1990, new SSS prohibited under any circumstances. Prior to 1990, preference for nonstructural measures. Exception-SSS allowed on portions of Virginia Beach where private upland structures in imminent danger from erosion.
WA	Allowed, except no new groins or jetties since 1985.
WI	Allows new and repair.
Total	28 states regulate SSS through state permits; 1 state (AK) relies on USACE permit.
Key: SSS- Shoreline Stabilization Structures- refers to erosion control devices designed to harden the beach or shoreline. Includes seawalls, rip-rap, revetments, groins and jetties.	
Source: State CZM profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.	

**South Carolina Developments Erosion Retreat Policy.** The 1988 Beachfront Management Act and the 1990 Amendments established an erosion retreat program which requires the SCCC to develop setback lines derived from expected beach erosion over 40 years. Beachfront development prior to 1977, the year that the State CZM statute was enacted, and from 1977 to 1988 resulted in a steadily increasing loss of the State's public beach resources. No better example of this trend exists than the development of the Garden City areas in Horry County. This unincorporated beachfront community in Horry County developed from 1977 till 1985 from single family beach cottages to high rise hotels and condominiums at the water's edge. In each case, the buildings and swimming pools occupy virtually the entire square footage of the beachfront lots behind seawalls and revetments that leave little or no dry sand beach for much of the day. This development has taken place since the State CZM program was enacted in 1977. This law provided little consideration for the protection and conservation of the public beach or for the dynamics of the changing beachface from erosion and storms. The proliferation of hard erosion control structures in this area has significantly narrowed the beach and flattened the beach profile resulting in a much less appealing tourist destination when compared to other areas with healthier beaches. The storm hazard potential has also been greatly heightened. The policy of retreat established in the 1988 legislation will require decades to correct this problem, while repeated, expensive attempts at beach renourishment will be required in the short run to rebuild public beach. State-of-the art scientific and technical expertise has been and continues to be used to refine the methodologies on which the state bases its shoreline construction retreat policy. This includes methodologies to protect structures from shoreline erosion and damage from storms. (Source: Chris Brooks, South Carolina Coastal Program)

**California allows by permit new stabilization construction and repair to existing shoreline stabilization structures.** In 1992, the California Coastal Commission (CCC) undertook a pilot Regional Cumulative Impact Project (ReCAP) to study development impacts along an 83 mile-long coastal stretch covering the two central California coastal counties of Santa Cruz and Monterey. This study looks at policies governing shoreline armoring activities; resource conditions measured by changes in amount of armoring, and permitted activity related to shoreline armoring. A major finding of the study is that the current coastal policies support the use of public shoreline and public resources to protect private property, and if the current situation continues, more and more of the public shoreline will be lost as a public resource. On-the-ground outcome data indicates that, between 1978 and 1993, the percent of the shoreline armored in the ReCAP pilot area increased from 9.6 miles to 12.0 miles. Approximately 1/8th of the shoreline is now armored. This estimate does not include lengths of beaches protected by breakwaters, jetties, or groins, nor do the figures for length reflect maintenance and additions of rock to existing walls. Much of the increase in armoring between 1978 and 1986 is thought to have been constructed in response to storms in the late 1970s and early 1980s. Future demand for shoreline protection will depend on trends in development along the shoreline, erosion potential and storm frequency. Based on private property ownership, land use and physical characteristics, development patterns, and continued implementation of existing policies, it is estimated that 1/3 of the ReCAP coastline, or 27 miles, could be armored in the future.

Armoring has led to cumulative impacts to beach areas and access opportunities, affecting sand supply and landward retreat of the beach. Along the ReCAP shoreline, data indicate that protective structures cover ~25 acres of beach. Permits granted since 1978 represent about 5 acres, or 20% of this total. Although shoreline armoring data indicates that armoring and encroachment has slowed under CZM, the impact from such encroachment may still be significant. Many of the armoring projects were approved in the popular recreational areas of Santa Cruz County. Armoring is often put in place following emergency storm events. However, permits are approved with little or no technical analysis, review of alternatives, or review of mitigation for adverse impacts on resources, and no followup permit. Therefore, such projects do not receive full regulatory review or monitoring, and are usually in areas of significant long-term or storm related erosion. As a result, impacts from these projects have not been fully assessed or mitigated.

The policies governing shoreline development and building setbacks for much of the shoreline development in urban portions of the ReCAP pilot are often inadequate. CC Act policies are inconsistent. One requires that new development be stable without construction of protective devices to minimize hazards. Another policy allows shoreline armoring to protect existing structures. There is no cutoff date for when a structure can be considered existing. Storm damaged structures are exempt from permits if reconstructed in same footprint, thereby, precluding more landward redevelopment, risk avoidance, and reduction of dependence on protective devices. Setbacks are a common LCP management approach to

avoid armoring. However, most are based on long-term average erosion and do not incorporate episodic events which may exceed setbacks. This leads to structures in harms' way and future need for armoring. In the ReCAP region, LCPs generally develop setbacks based on 50-year economic lifetime for new development. Those structures exceeding that lifetime will ultimately require armoring for long-term protection. Development on infill lots is allowed to be as seaward as adjacent existing development, exacerbating erosion risks and the need for armoring. Current policy does not restrict development in areas of high hazard. Future development is likely to continue with adverse impacts on coastal resources and public costs involved in protecting private development. Regional Plans are recommended to address adverse impacts of shoreline armoring.

Source: ReCAP Pilot Project; Executive Summary and Findings and Recommendations.

## **ACCESS RESTRICTIONS, HABITAT PROTECTION AND OTHER CONTROLS**

\* The purpose for regulating beach access is to two-fold. One reason is protect the stability of the vegetation within the beach, dune and bluff system and retaining their storm buffer benefits. The other is to protect critical natural habitat areas from human encroachment. Coastal beaches, dunes, bluffs and rocky shore areas provide critical habitat for certain animals and plant species that are endangered or threatened with extinction such as bird nesting sites, sea turtle nesting sites or other state-designated essential wildlife habitat set-aside and regulated as part of the state CZM programs. Coastal endangered bird species include shorebirds and seabird such as the bald eagle, piping plover, northern harrier, osprey, upland sand piper, and common tern.

\* 22 coastal states **restrict pedestrian access** by requiring the use of boardwalks, trails, dune cross-crossovers, beachfront stairs, and other structural accessways. Prior to the 1970s, public access cutting through and breaching dunes was a common practice. With CZM, guided access on both private and public dunes has become accepted practice.

\* 22 coastal states **restrict vehicular access** along portions of the beachfront or shoreline. Types of restrictions include only allowing beach clean-up, emergency or law enforcement vehicles, prohibiting driving on public beach areas or designated habitat areas, allowing only certain types of vehicles, and creating physical barrier to the shoreline. Certain beachfronts historically were public transportation routes or beaches used as race-ways. Today, driving and parking on hard sandy beaches with access through vehicular access ramps is considered locally acceptable ways to provide public beach access.

\* 28 coastal states **protect coastal shoreline habitat** through regulation. The most common areas protected are bird staging and nesting areas along the coast. Other areas include turtle nesting sites, endangered species habitat, natural areas, and natural heritage areas. Regulation of turtle and bird nesting sites is seasonal and tend to cover only a small portion of the coastline.

\* 25 coastal states **regulate other activities** which affect natural coastal resources. This primarily includes sand mining, dune reshaping, sand scraping, and dune creation. Both on-shore and offshore sand extraction can have long-term adverse impacts on beach and dune systems. Historically, dunes and beach areas were used commercially as a source of sand for construction, resulting in the loss of many beachfront dune areas. Commercial use of sand remains an issue in a few states, but most now restrict or prohibit the taking of beachfront sand. Sand dune grading and dune reshaping are issues affecting accreting coastlines where too great accumulations of sand obstruct views and access. Dune creation and sand scraping are issues along storm-event and long-term erosion affected coastlines.

***The Florida Coastal Program requires state permits for boardwalks and dune crossovers to the beach. Thousands of permits are issued for these accessways. The South Carolina Coastal Program allows construction of walkways over sand dunes as an exception if the accessways are no greater than 6 feet wide and other criteria are met. Wider accessways and handicap access requires state permit approval. In both states, the goal is to minimize the adverse effects of vertical access through fragile dune areas to the sandy beaches. Whereas dune breaching was common practice prior to state regulations, guided accessway over dunes to avoid damage to the natural and protective functions of dunes is the accepted practice.***

***The Oregon Coastal Program restricts vehicular traffic by Parks Department administrative rule.***

*Along certain beach/dune areas, vehicular access is restricted to protect endangered snowy plover habitat, recreation, and avoid use conflicts. Beach vehicular accessibility is shown on the Official State Map of Oregon 1995-1996. Vehicles are prohibited year-round or from May to September along an estimated 70% of the coast.*

***The Maine Coastal Program protects shore bird nesting or breeding areas.*** *Bald eagles, roseate tern, least tern, piping plover are coastal endangered species and their habitat are mapped and protected under Maine Endangered Species Act as "essential wildlife habitat" by Inland Fisheries and Wildlife. Designated areas include: seabird nesting islands; shorebird nesting, feeding and staging areas; atlantic salmon spawning areas; and critical waterfowl and waterbird areas. The Department of Inland Fisheries and Wildlife reviews state and local permits to ensure these habitat are protected. Prior to issuance of a local or state permit, the applicant is required go through a consultation process with the Department staff. Construction of new fences and reconstruction of closed fences are prohibited; open fences are allowed only to protect dune vegetation or bird nesting areas.*

Table 10: Coastal restrictions on pedestrian and vehicular access, habitat protection and other activities

State	Pedestrian Access		Vehicular Access		Habitat Protected		Other Activities	
AL	y-boardwalks n-dune crossovers		y- only clean up, law vehicles allowed on bch		y- turtle & tern nesting, beach mouse habitat		no	
AK	y-trails regulated		y-transportation routes		y-bald eagles		y-sand mining	
AS	no		no		y-case-by case habitat		no	
CA	y-boardwalks/walkways		y		y- env. sensitive areas		y-sand mining	
CT	y-pedestrian corridors		no		y- bird nesting habitat		y-dune reshape	
DE	y-dune cross-crossovers		y-only 4 wheel drive veh.		y-bird nesting sites		y-sand mining	
FL	y-boardwalks & dune cross-crossovers		y- 5 counties allow driving on the beach		y- sea turtle nesting sites		no	
GU	y-boardwalks		y-no vehicles public bch		y-public conservation areas		y-sand mining, corals	
HI	y-natural resource areas		y-only gov't vehicles		y-natural areas/sanctuaries		y-sand mining, corals	
LA	no		no		y-bird nesting sites		y-sand scraping, dune	
ME	y-boardwalks		y-no new roads, drives		y-shorebird nesting		y-sand fencing, bn, ss,	
MD	y-boardwalks		y-no vehicles on beach		y- bird nesting sites		y- sm, erosion control, bn	
MA	y-boardwalks		y-local plan for ORVs allowed on beach		y-natural heritage endangered species habitat		y-sand scraping, mining	
MI	y-bchfront stairs, bdwalks, trails		y-restricted along 23% coast		y-natural preserves, critical coastal dunes, high erosion areas		y- ss,ds, sand mining	
MS	y-boardwalks		y-no vehicles on beach		y-bird nesting sites		y- ss, sm, bn	
NH	y-boardwalks		no		y-natural sites		y-mining	
NJ	y-boardwalks		y-local restrictions		y-bird nesting sites		y-ss, mining, dune creation	
NY	y-boardwalks		y-no driving on vegetation		y-bird nesting fish WL sites		y- ss, sn, dune creation	
NC	y-structural accessways		y-local restrictions		y-100 mi. undisturbed area		y-dune creation, ss, dr	
NM	no		no		y-beaches, pristine areas		y-sand mining	
OR	y-boardwalks, walkways sidewalks		y-vehicles restricted near habitat areas		y-bird & endangered species habitat areas		y-sand grading, sand dune mgt.	
PA	no		no		y-public beach/bluff		no	
PR	y-public access restricted in extraction		y-no cross-country vehicles		y-natural area reserves, SPA endangered species habitat		y-sand, gravel, stone	
RI	y-dunewalk-crossover, decks		y-vehicles prohibited on barrier beach, foredunes		y-APRs, CMAs, habitat areas		y-sand mining, dune alteration	
SC	y-boardwalks		y-only emergency vehicles		y-sea turtle nesting		y-sm, ss, sr, dune creation	
VI	no		no		y-rec.beaches, turtle nesting		y-dredging, sand mining	
VA	y-dune cross-crossovers, trials creation/veg, sm		y-no vehicles in park areas		y-sea turtle nesting sites		y-dune	
WA	no		y-no driving on beaches		no		y-dune grading, sand mining	
WI	no		y-no vehicles in navig. waters		y- 300 areas statewide		y-sand mining	
<b>Total</b>	<b>yes</b>	<b>no</b>	<b>yes</b>	<b>no</b>	<b>yes</b>	<b>no</b>	<b>yes</b>	<b>no</b>
<b>29</b>	<b>22</b>	<b>7</b>	<b>22</b>	<b>7</b>	<b>28</b>	<b>1</b>	<b>25</b>	<b>4</b>

Key: y- yes n-no sm- sand mining, ss-sand scraping, dr- dune reshaping, bn-beach nourishment, ORV- offroad vehicles, WL- wildlife, SPA- special planning areas., APR- areas of particular concern, CMAs- conservation and Management Areas  
Source: State CZM Profiles

**PERMIT TRACKING AND ENFORCEMENT**

\* 26 coastal states have permit tracking systems. Only 19 have computerized permit tracking systems for habitable structure permits, 20 for shoreline stabilization permits. These permit tracking systems primarily serve as a tool for tracking individual permit status through the permit system and do not contain detailed information on the type or size of project, location and impact on natural resources, or other relevant data for determining individual or cumulative impacts of permit decisions. However, a few states have begun to explore ways to add such data to their permit tracking systems.

\* 28 coastal states have permit compliance programs usually with field inspections, some with aerial surveillance.

\* **Table 11** identifies which states have computerized or paper permit tracking systems and summarizes each CMP's coastal permit compliance mechanisms.

Table 11: State Coastal Permit Tracking Systems and Permit Compliance Tools

<b>STATE</b>	<b>Permit Tracking System Permit Compliance Tools</b>
AL	y-computer listing of permit number, subdivision lot, and party name y-post-permit monitoring
AK	y-agency review, inspection, monitoring y- pre-issuance field inspections, post-issuance field inspections, agency project reviews
AS	y- permit database for Land Use Permits since 1984. Covers all permits island-wide, not coded by geographic area (shoreline, steep slope) or resource area (beach, cliff). Same with Building Permit data.
CA	y-paper files. For CCC permits, developing statewide electronic logging system. y-cease and desist order for activity without permit or inconsistent with permit conditions. Penalties. Reported violations inspected by district office field staff and public records.
CT	y- DEP monitoring of municipal Site Plan Review decisions through quarterly reports y-periodic aerial photo surveys at 5 year intervals, MSPR permits monitored through third party complaints, DER field enforcement staff investigations, clipping service, hearing notices at local level.
DE	y- computer tracking system y- small permit compliance staff make phone calls and inspections
FL	y- computerized database, DEP sends area inspectors to monitor areas y- violations reported, inspector informed, inspector surveys and files report with DEP Bureau of beaches and Coastal Systems, Bureau reviews reports and set penalties/fines.
GU	y- no on-going computer tracking system. Database developed for actions from 1987-1993 only. y- no Territory-wide permit data base dating back to 1979. All permit data is island-wide since Guam's upland jurisdiction is the entire island. This makes it impossible to identify and separate out shoreline development permits from inland development. A database was developed for TLUC actions 1987-1993.

Table 11: State Coastal Permit Tracking Systems and Permit Compliance Tools continued

STATE	Permit Tracking System Permit Compliance Tools
HI	<p>y- 1994 CZM Program computer system and software training for county staff. Database for Kauai County Planning to track permits and violations. City and County of Honolulu utility program that downloads for CZM data analysis, permit tracking.</p> <p>y- monitoring notices of state and county permit actions for compliance with HCZMP.</p>
LA	<p>n- no computer tracking system</p> <p>y- violations monitored through coordination between Enforcement Section and field investigators</p>
ME	<p>y- NRPA computerized permit file.</p> <p>y- Under NRPA, DER staff, &amp; DMR marine patrol officers jointly enforce and monitor for permit violations. Under MSZA, Code Enforcement Officers notify in writing violations and investigate complaints, submit Biennial reports to DEP on applications, permits approved, variances, violations, etc.</p>
MD	<p>y- joint state and USACE permit tracking system used. Permit and compliance database maintained.</p> <p>y- MDNR, Inspections and Compliance Program monitors authorized projects. Regional inspections. Significant violations corrected through restoration and/or fines after referral to the state AG office.</p>
MA	<p>y- computerized tracking system</p> <p>y- certificates of compliance required for all permitted projects and it must be registered with the deed. DEP takes enforcement actions against state-issued permits. Local conservation commissions are generally responsible for enforcement of locally-issued permits.</p>
MI	<p>y- Coastal and Inland Waters Permit tracking System</p> <p>y- inspection, enforcement, and handling of public complaints.</p>
NH	<p>y-new GIS system in 1995. Prior to that old GIS system very limited, mostly paper files</p> <p>y- 2 wetland Board inspectors serve 17 coastal communities, field inspections, public education. Periodic aerial surveillance to monitor waterfront properties, dunes restoration projects, harbor dredging.</p>
NJ	<p>y- computer database, inspectors, monitoring</p> <p>y- Coastal Enforcement Unit/monthly meetings on enforcement, violations, pending decisions, bulletins, press releases of enforcement actions, monthly reports of over flight inspections, responses to complaints of violations, field inspections, etc.</p>
NY	<p>y- computerized data</p> <p>y- specific application requirements</p>
NC	<p>y- permit application tracking system and separate GPS/GIS base system</p> <p>y- inspection, monitoring, tracking, mego database within permit and enforcement section.</p>
NM	<p>y- paper files, computer database being developed</p> <p>y- field staff inspections, monitoring permit compliance, cease and desist orders, civil fines.</p>
OR	<p>y- no statewide database on local permits; separate computer permit tracking for OPI-PRD and R/F-DSL permits, but no information on length of shoreline stabilizations (in paper files)</p>

Table 11: State Coastal Permit Tracking Systems and Permit Compliance Tools continued

<b>STATE</b>	<b>Permit Tracking System Permit Compliance Tools</b>
PA	y- permit tracking system for shoreline stabilizations but only since 1994. no surveillance system. permit data for bluff setback permits in written reports only. y- Shoreline stabilizations -site inspections, violations taken to court, complaint response, penalties. bluff permits- Township Code enforcement officers monitor for violations.
PR	n- no permit tracking system, but developing a GIS based computer system y- each regulatory agency has authority to issue compliance, cease/desist orders, impose fines.
RI	y-computerized permit database begun in 1987, upgraded and input permit data back to 1971. y- violation fines/fees, newspapers publish CRMC list of violators, follow-up on every cease/desist order and notice of violation, field staff, condition on CRMC Assent permits.
SC	y- computer tracking system begun in 1980s on D-base. Permit name and #, category of activity, when issued, appeal date. y- routine inspections, aerial surveillance, Creek and Bay Watch citizens reporting program with 800-number, enforcement manual.
VI	y- all paper files, no computerized data base. y- Bureau of Enforcement monitors enforcement. CCA Commissioner may issue cease and desist orders and initiate judicial proceedings with AG office.
VA	y- computerized tracking system. y- certificates of compliance, must be registered with deed. DEP enforces state-issued permits. Local conservation commissioner responsible for local permits.
WA	y- In process of refining and expanding permit tracking database system. y- State DOE review authority over local shoreline substantial development permits; enforcement authority over local government actions.
WI	y- computerized permit tracking system links DNR offices throughout the state. Non-computerized tracking system for federal consistency. y- monitoring is a goal of DNR, no specific permit compliance tools.
Total:	26 States with Permit Tracking Systems 28 States with Permit Compliance Tools 1 State with no Permit Tracking and Permit Compliance Tools: MS
Key: y- yes n-no	
Source: State CZM profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores	

## KEY ROLE OF STATE CZM IN PLANNING

Since passage of the 1972 CZMA, several states have adopted legislation mandating state and local comprehensive planning and/or growth management programs. Some mandatory local planning programs have been incorporated into state CZM Programs, others have not. In addition, state coastal programs have funded numerous planning studies which look at resource protection issues. These eventually lead to adoption of enforceable policies and regulatory programs addressing a wide array of state-wide and area-specific issues such as erosion hazard management and habitat protection.

Planning programs, when combined with implementation through local land use regulations, zoning and subdivision ordinances and other actions, can provide protection of shoreline resources. The level of protection provided varies depending on: the extent of the resource covered by the plan, the type of protection policies, standards and provisions; and the specified exemptions and variances. There was insufficient resources, as part of this project, to conduct an analysis of the key provisions of each local and state CZM plan affecting resource protection. Attention was given instead to reviewing key provisions of regulatory programs resulting from CMP planning and collecting on-the-ground outcome data for which there proved to be very little.

\* State CMPs employ various types of plans including general land use planning or comprehensive planning as well as special area planning such as beach, inlet, bluff, rocky shore, natural reserves, habitat conservation, erosion or hazard area management planning. All but one of the 29 coastal states employ some type of planning affecting their beachfront; 21 rely on local permit delegation in combination with local planning; 23 utilize special area management plans or a variety of other plans; 10 coastal states use more than one planning tool. (**See Table 12**)

Table 12: Planning Tools- local permit delegation, local planning, other plans affecting protection of beaches, dunes, bluffs, rocky shores

<b>State</b>	<b>Local Permit Delegation</b>	<b>Local Planning</b>	<b>Other Plans (SAMPS, etc)</b>
AL	no	voluntary	no
AK	yes	mandatory	Areas of Special Merit
AS	no	no	Territory-Wide Zoning serves as land use plan
CA	yes	mandatory	Coastal resource/environmentally sensitive areas; Local blufftop management plan
CT	yes	voluntary	no
DE	no	no	no
FL	yes	mandatory	Beach Erosion Control Program; Inlet Management Plans
GU	yes	no	Seashore Reserve Plan; Flood Hazard APC; Erosion Control Plan; Recreation & Water Use Management Plan
HI	yes	mandatory	Natural Area Reserves; Marine Life Conservation Districts; Wildlife Sanctuaries.
LA	yes	voluntary	Mash Management Plan & Beneficial Use of Dredged Material Policy
ME	yes	mandatory	Resource Protection Zones

Table 12: Planning Tools- local permit delegation, local planning, other plans affecting protection of beaches, dunes, bluffs, rocky shores continued

State	Local Permit		Other Plans (SAMPS, etc)
	Delegation	Local Planning	
MD	yes	mandatory	Beach Erosion Control District Plan
MA	yes	voluntary	Areas of Critical Environ. Concern; Local Beach Mgt. Plans for ORV
MI	yes	no	Sand Dune Protection Act & Shorelands Protection/Mgt. require designation of critical dunes & high erosion areas through local zoning; Soil Erosion & Sediment Control Act
MS	no	voluntary	no
NH	yes	voluntary	Hampton Harbor Inlet Mgt.Plan; Seabrook Beach/Dune Plan
NJ	yes	voluntary	no
NY	yes	no	Local Waterfront Revitalization Plans; Local Coastal Erosion Plan
NC	yes	mandatory	Sate Beach Mgt; Shore Erosion Response; Inlet Mgt.Plans
NM	no	no	Siapan Lagoon Management Plan; Coastal Hazard APC
OR	yes	mandatory	Territorial Sea Management Plan
PA	y-bluff only	bluff only(v)	Presque Isle Peninsula State Park
PR	yes	no	Natural Reserves; Special Planning Areas; Island of Culebra
RI	no	no	Salt Pond Regions; Pawcatuck River Estuary & Little Narragansetts Bay
SC	no	no	State Beachfront Management Plan
VI	no	no	APC Management Plans
VA	yes	voluntary	Northhampton County Sustainable Development Initiative; Erosion & Sediment Control Plan
WA	yes	mandatory	no
WI	yes	no	Carol Beach Plan; 3-year Harbor Plans
<b>Total</b>	<b>21- yes 8- no</b>	<b>9- mandatory 10- voluntary 11- no plans</b>	<b>23- yes 6-no</b>
Key: SAMP- Special Area Management Plan			Source: State CZM profiles

## **ROCKY SHORES PLAN**

\* Oregon is the only coastal state to have developed and implemented, through regulations, a rocky shore plan for its entire coastline. This plan serves as a model for other states with rocky shore resources.

***The Oregon Ocean Plan was adopted in 1992, followed in 1994 by the Territorial Sea Management Plan*** which covers rocky shores, intertidal areas and ocean resources in an ecosystem management process. The Plan provides an ocean policy framework with management standards to be used in managing the marine resources in Oregon's territorial seas. The Plan includes a Rocky Shores Strategy to protect Oregon's rocky marine habitats while providing people the opportunity to use them. Under the strategy, four classifications of rocky shores are designated to guide agency programs on the ground: They include: 10 "habitat refuges" along 4% of the rocky shore where access is limited; 7 "research reserves" along 7% of the rocky shore where access is discouraged and harvest is limited; 8 "marine gardens" along 10% of the rocky shore which encourage visitors to highly popular areas; and 29 "marine shores" along 79% of the rocky shore which are small areas open to public but not heavily used. In addition, 9 areas have been identified but not yet designated and 7 priority offshore rocks/reefs identified for future study.

A key aspect is "local site management plans" for rocky shore sites with mandatory policies to address complex site conditions, biological resources, human uses, and agency management concerns. The strategy provides clear policies for all agencies to follow and a process for intergovernmental coordination. Education and public awareness through communications and interpretive programs are crucial parts of the strategy to manage growing usage and impacts on rocky-shore areas.

On-the-ground results of site management plans indicate that four Marine Gardens have been closed to taking of marine invertebrates, clams (except razor clams at Cape Perpetua), and mussel (except single mussels for bait). Pyramid Rock in Rogue Reef, a critical habitat site for Steller sea lions and under increased fishery use, under the plan is closed within 1,000 feet to all fishing activity from May-August. Permit or management conditions have been placed on all rocky shore sites to protect the natural resource values of these areas.

## **BEACH MANAGEMENT PLANS**

\* State CZM programs have become increasingly involved in identifying the problems of eroding beach/dune systems and developing coordinated responses through statewide beach management and erosion control plans. States' concerns about adverse affects on downdrift beaches from federal dredging of navigation channels, offshore disposal of dredged materials, and loss of recreational beaches from shoreline armoring, have led state CMPs to take a proactive role in shaping state and federal policies and programs.

\* Florida, North Carolina, South Carolina, Maryland and several other states have state-level beach management or erosion control planning. The key purpose of these planning efforts is to address erosion hazard issues. The plans usually identify areas of high erosion, properties affected, and erosion responses that have historically been undertaken. For most, plan implementation is tied to the coastal regulatory programs and state land management and beach restoration or armoring programs.

***Coastal States Address Causes of Beach Erosion.*** The South Carolina CMP pushed for Congressional recognition that USACE dredging of Charleston Harbor was causing severe beach erosion on the sand-starved downdrift beaches; this led to the Folly Beach renourishment mitigation project. The State of Florida passed legislation requiring that suitable beach quality sand from inlet and navigational channel dredging be placed on the down-drift beaches; the state then used federal consistency and state-funds to negotiate with the USACE to place 1.4 million cubic yards of sand from St. Mary's inlet dredging on the down-drift beaches rather than losing the sand to the offshore system. After planning and debating the issue, certain states have passed legislation limiting the use of new shoreline stabilizations, in an effort to protect beach and dune systems at the expense of private upland properties.

## **BLUFF PLANS**

\* California, Oregon and Washington states require local plans that address development along eroding coastal bluffs. These programs are all implemented through state and local regulatory programs. Pennsylvania requires local governments to implement state established bluff setbacks, but this is not considered a planning program.

## **LOCAL COASTAL PLANS**

\* 19 coastal states employ local planning, 10 with mandatory local planning and 9 with voluntary local planning; 10 states do not use local planning. Locally-delegated permitting responsibility combined with mandatory local planning are key management tools employed by Alaska, California, Hawaii, Maine, Maryland, North Carolina, Oregon, and Washington in protecting beaches, dunes, bluffs and rocky shores. Several of the regulatory setback and control zone provisions described earlier are administered by local governments. In states that set the enforceable regulatory guidelines, local implementation is strictly administration of the regulation rather than local planning.

***The California Coastal Program requires Local Coastal Programs (LCPs) with CCC certification and oversight. LCP Regulations require that each local coastal program identify specific coastal resources, hazard areas, coastal access, use priorities and significant cumulative impacts on coastal resources and access of development; and adopt a land use plan, zoning ordinances and zoning district maps to reflect the level and pattern of development consistent with Policies in Chapter 3 of CC Act. Land use plans are required to incorporate resource protection policies. Zoning ordinance are required to their implement land use policy plan. CCC Certification of a LCP results in delegation of coastal development permit authority.***

*There are a total of 73 LCP jurisdictions which have been divided into 126 LCP segments for planning purposes, of which 88 have CCC-certified Programs (Plans and Implementation) and local permit delegation responsibilities. Certified LCPs regarding oceanfront property and its development vary widely. Some encourage purchase of remaining undeveloped properties and impose rigorous guidelines for any new development. Others encourage shoreline development adjacent to coastal erosion areas. 24 coastal jurisdictions recognize coastal geologic hazards through designation of special zones, geologic hazard ordinances, or comparable techniques. 18 jurisdictions use liability releases for projects proposed in hazardous areas. Regarding bluff-top development, some local jurisdictions use predetermined, fixed setbacks that vary from 10 to 320 feet. Others employ a cliff retreat rate, most commonly over a 50-year period. Most communities compromise safe setback considerations in "infilling" areas. The lack of state guidelines for safe beach-level development has led to continued development and reconstruction in hazardous locations. San Mateo has a combined Open Space and Conservation Elements which is implemented by a Resources Management District Ordinance that covers the Coastal Policy requirements.*

*The CCC Interpretive Guidelines (adopted May 3, 1997) address "Geologic Stability of Blufftop Development." These guidelines specify that alternation of cliffs and blufftops, faces, or bases by excavation or other means should be minimized and that cliff retaining walls should be allowed only to stabilize slopes, or seawalls at the toe of the seacliffs or to check marine erosion where no less environmentally-damaging alternative exists and where necessary to: 1) to maintain public recreational areas or public services such as highways, energy facilities, port areas; 2) protect principal structures in existing developments that are in danger of erosion; or 3) in LA, Orange and San Diego Counties, infilling small section of wall in subdivisions where wall already in place and infilling have no substantial adverse effect. The guidelines call for a geologic investigation and report when a development is proposed in an unstable "area of demonstration of stability". In areas of geologic hazard, the Commission may require that a development permit not be issued without a waiver of all claims against the public for future liability or damage resulting from permission to build. All such waivers should be recorded with the County recorder's office.*

## **SAMP PLANS**

\* The 23 states that use SAMPs and other specialized plans employ them to address a variety of issues. Most are used for natural resource area protection. Other uses include flood hazard management, erosion control, resolving recreation use conflicts, economic development, state land management, and multi-issue management. These plans are used to supplement or supersede state coastal regulatory provisions for selected planning areas.

***The Guam Coastal Management Program developed and adopted the Recreational Water Use Management Plan in 1990-1991.*** *The plan covers a 6 miles stretch along the coast and in the water. It addresses user conflicts along this stretch of beach and water. Bird nesting areas are identified and protected, and Manahac fish-runs protected. The plan prohibits jet skis except in management plan areas. The plan provides for "use zones" for certain water activities in planned areas, and requires buoyed areas for jet-ski-type vehicles and mechanized vehicular closure during predictable Manahac runs. Minimum operating age is 16 years for all mechanized water vehicles. Jet skis can only be operated in planned areas-- two such areas have been adopted, and a third area being finalized. The first area planned, Agana Bay to Piti, encompasses 6 linear miles of coast to a distance varying from two hundred yards to half a mile. The second area, Cocos Lagoon, is a triangular shaped lagoon 3 miles long on the land side, extending 2 miles seaward. The third area is Apra Harbor, which is Guam's commercial port, the Navy port and Guam's Harbor of Refuge.*

***The Rhode Island Coastal Program adopted four SAMPS,*** *as a supplement to the regulatory program for specific areas: Two SAMPS cover oceanfront areas. The main focus of SAMP planning in Rhode Island has been on cumulative and secondary impacts of development in, and adjacent to, poorly flushed estuaries, nonpoint source pollution, groundwater contamination, and on-site sewage disposal systems. The Salt Pond Regions SAMP: Ninigret to Point Judith Ponds covers 32 square miles. Just over 11% was in public ownership and 50% undeveloped as of 1984. The shoreline miles and miles in beaches and rocky shores are unknown, but the Rhode Island Coastal Resources Management Program is developing a GIS data base and will be able to provide this data in future. The SAMP expands the inland boundary to include a watershed; establishes coordinated permit review procedure; amends policies for dredging in Ninigret and Green Hill Ponds to allow dredging in Type 2 waters; and changes water use designations for Port of Galilee to allow port expansion. It also specifies dredging of navigational channels and restoration of overwash channels, and requires disposal of sand dredged materials to replenish the following adjacent beaches: Sand Hill Cove, East Mantunuck; Charlestown Beach; Quonochontaug barrier beach. It prohibits, for beach restoration, mechanical removal or redistribution of sand from the intertidal zone of the beach to increase the profile of the beach scarp or to construct artificial dune since they destabilize beaches, increase erosion along beaches and sedimentation in ponds. It specifies how beach sand shall be placed on beach. It identifies priority areas for acquisition. The SAMP plan sets density limitations for "self-sustaining lands" and "lands of critical concern." Subdivisions in these areas cannot exceed more than 1 residential unit per two acres and sewers are prohibited. The goal is to keep residential development low. The percent of area and shoreline miles covered under these two classifications is not available, but RICRMP is developing a GIS system that should be able to provide this information in the future. Also, the plan is under revision. (Source: RI Salt Pond Region SAMP. 1984, and 1993 Addendum and phone interview with Jeff Willis, RI Coastal Program Manager)*

## **KEY ROLE OF STATE CZM IN PUBLIC LAND MANAGEMENT AND ACQUISITION**

Regarding public land management, most of the state beachfront and oceanfront parks had been acquired and placed under state park management prior to enactment of state CZM program. The unique role of the state coastal program has included funding or promotion of detailed resource inventories and specialized management plans to balance resource protection and public use of these sensitive lands; installation of boardwalks over dunes and other sensitive habitat; sand fencing to avoid dune destruction; walking trails to limit damage to park resources; beach profiles, sand transport and erosion studies, and beach management planning; beach and dune restoration; and policies limiting state infrastructure investments on state beachfront park shorelines. Beach renourishment has been promoted by some coastal states as an alternative to continued loss of developed recreational beach through shoreline hardening. Likewise, some states have funded research into sand loss from inlet dredging and have demanded that beach quality sand be placed on down-drift beaches. Whereas excavation of sand for coastal development was a common practice in the past, state CZM programs prohibit such practices today and wage educational campaigns on the importance of protecting stabilized dune systems.

Although many state land acquisition programs were in existence prior to enactment of state CZM programs, some state CZM programs have played a major role in creating new land acquisition programs and in helping their state set priorities for coastal land acquisitions. State CZM programs have funded land inventories, land appraisals, negotiated purchases and land swaps. Land inventories have included both high value natural resource properties and vacant coastal lands suitable for recreation. State CZM programs have served as advocates for state acquisition of oceanfront and shoreline properties.

States that are effective stewards of their shoreline parks and preserve lands use park inventories and management plans; install boardwalks, dune crossovers or other guided pedestrian access; use dune restoration and beach nourishment where appropriate; enforce policies restricting the use of shoreline stabilization structures; designate natural resource habitat protection areas; and acquire additional holdings.

### **ACTIVE MANAGEMENT OF STATE COASTAL LANDS**

\* State ownership and management of state-held lands along the coast can afford a high level of natural resource protection, subject to competing use demands placed on such lands. State lands developed for recreational use, such as beachfront parks, can also protect natural resources if management plans are adopted and implemented which restrict pedestrian and vehicular access, set aside fragile habitat from human use, and employ other methods to maintain the natural landforms. Protection also varies depending on priority uses given to such state holdings. Those lands with wildlife preserves or conservation areas generally afford more restrictions on uses than state parks and recreation areas.

\* The installation of boardwalks and dune crossovers serves to protect natural dunes through stabilization of dune vegetation and avoidance of dune breaching. Dune creation and restoration through sand fencing and dune revegetation serve to stabilize and rebuild dune areas, limit breaching during coastal storms, and recreate natural dune systems.

\* The identification, designation and protection of natural resource areas within beach/dune systems function to sustain the natural habitat conditions and values present and provide long-term protection. However, to the extent that such protection is only seasonal, such as temporary turtle or bird nesting site fencing, pedestrian access over such areas at other times of year may destroy the habitat values long-term.

\* All 29 coastal states own state parks along the shoreline that encompass one or more beach, dune, bluff or rocky shore; 26 have natural resource protection areas and guided accessways, and 21 states have acquired additional coastal lands.

\* Only 17 states have inventory data on their state coastal land holdings such as number of shoreline miles in state parks. The data gaps regarding state coastal parks and state beachfront parklands is

discussed under the outcome data section that follows. 5 states do not have information on the total number of beach miles. 5 do not know the number of state coastal parks. 10 do not know the number of beachfront coastal parks they own. 12 do not have information on the miles of state coastal parklands they own. 11 do not know the number of miles in state coastal lands. See **Table 13**.

\* 14 states use boardwalks or dune crossovers within their state coastal parks to guide pedestrian traffic over fragile beach and dune resources. Sand fences have been installed to keep pedestrians off the beach. Prior to CZM, unguided access resulted in the trampling of many public beachfront dune areas.

\* 13 coastal states employ dune creation on state beachfront parks to repair and enhance the natural functions of their state-owned beach and dune systems.

### **BEACH NOURISHMENT**

\* Beach renourishment has become popular as a tool to artificially create or recreate a beach area through the importing of compatible sand. The position of NOAA is that "...while beach nourishment may indeed, under certain circumstances, be a technically viable alternative, there are many other considerations that must be deliberated prior to supporting this approach to erosion management... include(ing) the role of beach nourishment in inducing development in high hazard areas, ...other erosion management approaches, whether beach nourishment is economically justified, appropriate cost-sharing, and the environmental issues..." ( MEMO March 19, 1996. NOAA Position on the National Academy of Sciences' Report "Beach Nourishment and Protection.") For this study, if a state employs beach nourishment in lieu of armoring with sufficient documentation of benefits and tradeoffs, it is generally considered a positive impact on protecting natural beach/dune systems. However, the author agrees that unconditioned use of beach nourishment may indeed adversely affect natural systems and may not be the most suitable management approach to protect natural beach/dune areas.

\* 17 coastal states have used beach nourishment or renourishment as a management tool, 15 in conjunction with the USACE. See **Table 14**. Historically, the lead agency in beach renourishment has been the USACE with local governments participating as project sponsoring. With increased state regulatory oversight and the federal consistency provisions of the CZMA, beginning in the 1970s, coastal states have taken a more active role in setting policies and priorities for beach nourishment.

\* With the increased use and cost of beach nourishment, states in addition to local government have been called upon to provide matching funds for projects. The state and local share is usually 20% of the total cost of a project. There is insufficient data to determine the number of miles of beachfront or cubic yards of sand placed in state-funded beach renourishment projects. Table 3 in Appendix A provides data on USACE major shore protection projects in CZM states between 1950 and 1993. Most states appropriate money from the legislature as needed to match USACE beach nourishment projects. Only a few states, like Florida and South Carolina, have begun to take a proactive role in setting state priorities for beach nourishment projects and seeking dedicated funding for beach nourishment.

\* There were insufficient resources to conduct an in-depth study of state-sponsored beach nourishment projects. Furthermore, state data was sparse on projects funded, success or failure of such projects, and tradeoffs made in selecting beach nourishment as the appropriate management response.

### **SHORELINE ARMORING**

\* Most of our nation's urban waterfronts have been armored. Shoreline armoring is a practice which began prior to CZM programs, in an effort to protect private oceanfront structures and public infrastructure from erosion. Greater awareness of the negative impacts of shoreline stabilization structures on adjacent properties and coastal resources has caused CMPs to more closely scrutinize such activities and weigh the private and public benefits. This is particularly the case, along public recreational beaches, where armoring to protect roads and public access to the shoreline results in the loss of natural beach. Armoring and armoring repair through construction of shoreline stabilization structures acts to accelerate the loss of sandy beaches. For this study, if a state employs armoring on state beaches, it is considered a negative impact on natural beach/dune systems.

\* 10 coastal states have funded armoring or repair existing armoring structures in high erosion areas along their coastline. 15 states have had federal USACE shoreline protection projects built along their coastlines. In all cases, these armoring project were built to protect existing upland infrastructure such as roads, public accessways or public buildings inappropriately sited along the eroding coastline. The cost of relocation such existing uses, particularly coastal highways, was weighed against the loss of natural recreational beaches and armoring was selected as the management option of choice.

### **STATE COASTAL LAND ACQUISITION**

\* Acquisition programs place private lands into public holdings. Along the coast, these acquisitions tend to serve both recreational use demands and some resource protection goals. Acquisition of large resource systems, or acquisition of lands adjacent to existing holdings can afford improved natural resource protection opportunities.

\* 21 coastal states are utilizing acquisition to purchase additional valuable coastal resources. Data is not generally available on all state land acquisitions, so it was not possible to determine whether coastal land acquisition was a priority over inland acquisitions. Although some states do not have formal land acquisition programs, they have utilized CZM funds and other funds to acquire significant parcels.

***A full range of state coastal land management activities occur along New Hampshire's 18 miles of highly developed oceanfront where the immediate shoreline is mainly (78%) in public ownership. State coastal park management plans have been completed for several of the 9 beachfront parks and 7 rocky shore parks in state ownership including studies of archeological, historical, recreational, and natural resources. Twenty (20) natural resource inventories funded by CZM provide baseline data on habitat areas and are used in permitting by Wetlands Board and in public education programs. The Seabrook Back Dunes, the only major undeveloped back dunes remaining along the New Hampshire coast, was acquired by the Town of Seabrook with partial funding (\$100,000) from the CZM Program. This 53 acre parcel is managed as a conservation and passive recreation area. CZM funded an Education Brochure Trail Guide to the Seabrook Dunes Area (1985), Coastal Endangered Plant Inventory on Seabrook Dunes (1983), Seabrook Dune Management Plan (1985), Dunes Valuation Analysis and Acquisition Report 1984, and Final Appraisal (1986). The state also acquired other parcels to expand their coastal land holdings for recreation and conservation. New Hampshire has completed a multi-year Seabrook Foredunes Restoration Project on a 15 acre town-owned Seabrook Beach. The project involved restoring badly eroded dunes, the planting of American beach grass to stabilize the dunes, and the construction of walkways from the street to the beach to control access and minimize adverse impacts on dunes. Signs along walkways inform the public about dunes restoration work and the importance of using walkways. Route 1-A borders the ocean along most of the coastline. The state periodically repairs and maintains protective seawalls running between the beach and the road, as well as seawalls protecting state beachfront parking lots.. Two USACE-built harbor jetties are maintained and as is the state-built jetty at Hampton Harbor Inlet. New Hampshire periodically dredges its harbor channels and beach-quality sand has been placed on adjacent beaches. The USACE also periodically dredges the Hampton Harbor entrance channel, but the sand is not always used for beach nourishment***

***Nearly half (47%) of California's 1100 mile long coastline is in public ownership and active public management. The State Department of Parks and Recreation (DPR) is one of the largest landowners along the California coast, with over 375 miles or 34% of the ocean shoreline in the state parks system. There are ~ 87 bluff-front state parks and ~32 rocky shore state parks. Management of these parks is a major activity, some of which are located in coastal hazard areas. About 10% of state-owned park units are administered by local governments. The state parks include reserves, beaches, historic parks, and unclassified units. They cover beaches, dunes, bluffs, rocky shores and some underwater state reserves. The state has installed ~20 boardwalks to guide pedestrian traffic. The DPR acquisition program for beaches and dunes, through special site-specific legislation and some bond-funds, has acquired 26,838 acres of state beaches, ~6,000 acres of unclassified beach areas, 27.3 miles of land in five state parks and one state reserve, and 2.8 miles of dunes. California has also acquired bluff and rocky shore areas***

*through special legislation and surplus property bills, but the amount of shore acquired above mean high tide is unknown.*

*The Coastal Conservancy awards grants to local governments and non-profit organizations for coastal restoration and coastal resources enhancement projects. Funds are also used for Resource Protection Zones, buffer areas surrounding public beaches, parks, natural areas and fish and wildlife preserves in the coastal zone. Between 1978-1995, 600 projects were initiated and 400 projects were completed involving access, wetlands protection, trail, recreational pier restoration, conflict resolution and farm lands protection. Between 1978-1992, \$175 million general obligation bonds acquired 29,000 acres.*

*The California Department of Parks and Recreation (DPR) administers a statewide resource management, stewardship, and donor program which includes dune creation/ restoration. Through this program 9 dune areas were revegetated on state lands.*

*The California Department of Boating and Waterways (DBW) administers a "shoreline erosion fund" which provides funds to state agencies and local governments for construction of shoreline protective devices and beach nourishment on public beaches and park lands with 75% state funding and 25% local match funding. Nineteen (19) beach erosion control projects were funded between 1980-1996. Since 1980, there has been approximately 20 miles of beachfront replenished, restored, or renourished with 15 million yards with joint federal/state/local funding. Several properties have seawalls with a well-documented history of repeated destruction and reconstruction. In 1984, the DPR adopted a coastal erosion policy to discourage armoring in state beachfront parks and to avoid construction of new permanent facilities in areas subject to coastal erosion and to promote use of expendable or movable facilities in areas subject to erosion. However, the DPR rebuilt a timber seawall for seventh time with little design modifications. This armoring to protect a parking lot and access is not typical.*

**Table 13: STATE COASTAL LAND HOLDINGS AND ACQUISITIONS**

State	Beach Miles	State Coastal Parks # Parks # Beach Parks	State Coastal Parks Mi Parks Mi Bch P	State C. Parks Acres Park Acres Beach	Coastal Lands Acquired (acres/miles)
AL	46	1 all beach	3 all beach	6,000 all beach	N
AK	nd	63 nd	Nd Nd	990,335 nd	N
AS	nd	nd nd	Nd Nd	nd nd	N
CA	nd	119 71	377 280	145,540 26,838	B/D: 26,838 acre; BL: yes-nd; RS: yes-nd
CT	85	nd 6	Nd 6.75	nd 3003	B/D: 1,439 acre
DE	24.5	3 all beach	18	nd nd	B/D: yes, but nd
FL	825 343 Public 42% Public	24	~500	~11,500	B/D: parcels: 980 acres: 294,968 miles: nd
GU	40	14 (only beach)	5.1 13%	nd nd	yes through trades -nd
HI	185	24 16	16%	14,814 322	62 acres-B, BL, RS combined
LA	>4 mi does not include barrier island shore	2	Nd >1 mi.	Nd 345	N
ME	23 B/D 20%-S 205 RS	25 10	Nd 4.6	11090 2380	B/D & BL & RS properties: 8 acrs: 4828 miles: ~20
MD	32	3	17	nd all beach	parels:2 acres: nd miles: 2
MA	222	18 nd	64 nd	nd nd	State Acres:2250 miles: nd Local Grants Projects: 17 Acres: 273 miles: nd
MI	270 50% state	29 nd	114 nd	nd nd	136,000 statewide coastal: nd
MS	18	1	Nd	nd	N
NH	10 B/D 7.8 RS	16 9	12.5 10	~580 101	B/D & RS acres: 131 Miles: nd
NJ	125 9% state	2	12	3192	N
NY	125 30% state	10 all beach	46.5 all beach	11,600 all beach	CA: 2000 acres
NY-Great Lks	No Data Collected				
NC	320 3.4% state	3	11	nd	7,000 acres beachfront 27,439 beach access sites

**Table 13: STATE COASTAL LAND HOLDINGS AND ACQUISITIONS Continued**

State	Beach Miles	State Coastal Parks # Parks # Beach Parks	State Coastal Parks Mi Parks Mi.BchP	State C. Parks Acres Park Acres Beach	Coastal Lands Acquired (acres/miles)
NM	nd	nd nd	Nd Nd	nd nd	N
OR	262 B/D 56% Public 30% state 100 RS 65% public 53% state	64 nd	129.5 76.3-B/D 53.2-RS	27,107 nd	B/D & RS acres: 94.3 miles: .75 B/D only
PA	Lake Erie 10-B 99% state 53-BL 11% public 10% state	Lake Erie 2 1	Lake Erie 13.4 9.9 B 3.5 BL	Lake Erie 3110 10 B 3100 BL	B/D: Spoil Island mile: .25 acres: 10 BL: mile: 3.5 acres:3,100
PR	154	nd 15	Nd Nd	nd nd	N
RI	27.3 64% state	14 nd	Nd Nd	1501 nd	y-nd
SC	181	4	68	nd	y-nd
VI	nd	nd nd	Nd Nd	nd nd	N
VA	200 10% state	1	6	4700	y-nd
WA	60 B 111 RS	120 nd	Nd Nd	27,000 nd	75,000 acres statewide coastal: >10,748 acres
WI	820 10%-B 72%-BL 8%-RS	30 nd	Nd Nd	nd nd	637 acres: 77 beach/560 dunes
Total	y-29 nd-5	nd-5 nd-10	nd-12 nd-11	nd-15 nd-16	y-20 n-9

Key:

B/D Beach/Dune

BL Bluff

RS Rocky Shore

CA Coastal Area

y yes

n no

nd no data provided or unknown

Source: State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.

**Table 14: Active State Coastal Land Management**

State	Board- Walks- # Dune Cross- Overs- #	Dunes Revegetated # projects feet & mile	Beaches Renourished # Projects Federal * State (# & Mi)	Armoring Projects Federal * State	Natural Protection Areas
AL	y-7	y-1 500ft	N N	n n	40 acres for Perdido beach mouse; ~3 mi. sea turtles nesting season; 25 acres for terns.
AK	n	n	N N	n n	49,000 acres protected for Bald Eagles
AS	n	n	N N	n n	N
CA	y--20	y->19 nd	y-7 y-nd	y-5 y-12	Resource Mgt. Plans designate trails, roads, parking, zone units for reserves, preserves, habitat protection and public use. Endangered species habitat protected bird nesting sites.
CT	nd	9 nd	y-6 y-1 .25 mi	y-2 y-3	408 acres Natural Area Preserve; 806 acres Coastal Reserve; Nature trail
DE	y-2-bdwk y-3-cross	y-nd 18 mi	y-2 y-nd 6 mi.	y-1 n	Endangered species habitat-such as piping plover- case by-case and during nesting season.
FL	y-many nd	y-100 mi	y-26 y-nd ~94 mi.	y-6 y-nd	Sea turtle nesting sites during season.
GU	n	n	N N	n n	28,197 acres (20.73% Guam total land area) 15,600 acres submerged lands.
HI	n	n	N N	n n	7 coastal Natural Area Reserves 48,102 acres, 83,200 miles of Wildlife Sanctuaries, 9 Marine Life Conservation District 1346 acres
LA	y-1	y-6 ~20 mi barrier Is.	y-2 y-nd ~20 mi.	y-1 y-20	N
ME	y-1%	y-5 4 mi.	N y-6 USACE Habor Proj. >1 mi	n n	3 state beachfront parks, dunes protection, pedestrian accessways; sea bird nesting sites fenced off during nesting season. 1 Rocky Island Sanctuary-access restricted
MD	y-1	y-1 2 mi	y-2 y-2 10 mi.	y-1 y-nd	Seasonal restrinctions for nesting birds along entire beachfront.
MA	nd	y-nd	y-5 y-nd 3 mi.	y-2 y-nd	5 coastal pk. mgt. plans for 4,673 acres 14 ACECs covering 75,000 acres.
MI	nd	n	N N	N N	- 860 mi.total: ~250 mi. natural preserv; ~300 mi. critical dunes areas; ~310 mi.high risk erosion areas.
MS	y-1	n	y-2 y-1 18 mi.	y-1 n	N
NH	1	y-2 nd	y-3 y-5 2 mi.	y-2 y-3	Pedestrain access restricted area; 5 acres. piping plover nesting site.
NJ	n	n	yes-8 y 27 mi	y-4 y	B/D acres: 2,500 miles: 11.57 Included 100 acre bird sanctuary; 1200 acres beach research/wildlife sanctuary; 1,000 acre beach nature area; 3 other nature areas 1201 acres.
NY	3	n	y-8 y-1	y-4 n	7 protection areas covering 566 acres in state parks. >50 miles beachfront bird nesting areas. 200 fish/wildlife habitat areas.
NC	2	y-nd	y-6 y-12 5 mi	y-2 n	314 miles of beach, plus spoil islands. 100 miles undisturbed areas/Reserves; 50 acre nesting colonial birds; 11 miles sea turtle nesting.

**Table 14: Active State Coastal Land Management Continued**

State	Board-Walks-# Dune Cross- Overs-#	Dunes Reveg. # projects feet & mile	Beach Nourishment # Projects Federal * State # & Mi	Armoring Projects Federal * State	Natural Protection Areas
NM	n	n	N Nd	n n	Offshore islands as bird sanctuaries, beaches as turtle nesting sites
OR	n	n	N y-1 >1 mi.	n n	Vehicles prohibited on 70% of coastline. State park mgt. trails, restricted access.
PA	n	n	y-2 y- 1 area 6 mi	y-1 y-1	Lake Erie only n- beach y- D. Roderick Wildlife Refuge
PR	n	n	N N	n n	19 Nature Reserves and 8 Special Planning Areas
RI	y-1	n	N N	y-1 n	All undeveloped barrier beaches
SC	4	y-3 58 mi	y-1 y-4 45 mi.	y-1 y-nd groins repair	68 miles in parks/wildlife preserves.
VI	n	n	N N	n n	Salt River Bay
VA	n	y	y-1 y-5 nd	n n	6 miles sea turtle nesting at False Cape.
WA	nd	n	N N	n n	Many- 7 areas with >6336 acres harbor seals, falcons, eagles and other bird nesting areas.
WI	y-several nd	n	N N	n n	~300 natural areas statewide coastal: nd
Total	y-14 n-11 nd-4	y-13 n-16	federal y-15 state y-17	federal y15 state y 10	y-26 n-3

Key:

y- yes

n- no

nd- no data provided or unknown, no data provided.

Source: State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.

\*US Army Corps of Engineers, *Shoreline Protection and Beach Erosion Control Study: Phase 1: Cost Comparison of Shoreline Protection Projects of the U.S. Army Corps of Engineers.*

## 6 OUTCOME INDICATORS OF EFFECTIVENESS

Outcome indicators are used to measure the on-the-ground effects that result from implementation of CZM tools. Outcome indicators of CZM effectiveness in implementing regulatory, planning, direct land management and acquisition tools associated with the protection of *beaches, dunes, bluffs and rocky shores* are shown in **Table 15**. The "coastal resource areas" referred to in Table 15 include the landward extent of beach and dune systems, eroding bluffs, coastal hazard areas, coastal floodplains, and the immediate shoreline. The "natural habitat areas" referred to in Table 15 include coastline areas with unique or fragile natural flora or fauna. States' definition, identification, designation, and protection of such areas vary.

The outcome indicators mirror the key tools states employ in resource management: 1) regulatory; 2) planning; and 3) land use management and acquisition. Under *regulatory programs*, four desired results are identified followed by one or more standard survey methods for measuring outcomes. For *adopted plans*, methods were identified for measuring results against plan objectives. Under *state coastal land management and acquisition*, there are suggestions for documenting results of state ownership and acquisition and active state natural resource stewardship.

An example of regulatory outcome indicator data was linear and/or area data on permits issued which would reflect the desired outcome of either few or no permits for activities seaward of a setback line or within identified natural resource areas, such as active beach and dune systems or eroding bluff areas. Counter-indicators would be miles of beachfront shoreline developed or armored through permitting. With this and other kinds of data, such as aerial photos, changes in develop patterns along our nation's coastline and in specific natural coast resource areas could be documented. If baseline and time series data existed, an attempt to trace the rate of reduced impact or reduced rate of encroachment into fragile coastal areas as a result of CZM regulatory controls could be achieved.

What our research documented was that coastal states and federal agencies are not routinely collecting the types of outcome data we identified as valuable in measuring on-the-ground results of CZM programs in achieving the national objectives such as coastal resource protection.

### **OUTCOME INDICATOR DATA AVAILABILITY**

It is not possible to determine on-the-ground outcomes or effectiveness of implementing state CZM regulatory programs, planning programs, state land management, and state acquisition programs to protect beaches, dunes, bluffs and rocky shores, based on data and information provided by OCRM and the coastal states. For the most part, there was insufficient data to assess the on-the-ground effectiveness of state CZM programs. Monitoring and reporting of on-the-ground outcomes of CZM program activities have not been required, as part of OCRM's annual reporting on grants and activities and the periodic 312 program evaluations. Although most states have developed permit tracking systems, these are primarily administrative efforts to track individual permits through the regulatory process and not designed to contain program evaluation data. State reporting on plan implementation, where available, is descriptive rather than analytical. Data on shoreline ownership and inventories of shoreline resources have not been updated since program approval and outcome data on results of active state coastal lands stewardship is scarce.

**Table 15: Outcome Indicators of Effectiveness**

*Regulatory Program Outcomes:*

- 1. No further or reduced rate of encroachment into coastal resource areas** indicated by no new or fewer new shoreline structures or shoreline stabilizations on the beach and dune system, eroding bluff, coastal hazard areas, coastal floodplain, or immediate shoreline.
- 2. No further or reduced rate of hardening of the undeveloped beachfront through shoreline stabilizations.**
- 3. Controlled shoreline accessways.**
- 4. Healthy and maintained intact natural habitat areas along the coast.**

Survey methods for measuring outcomes starting with a baseline followed by time series:

- (a) aerial photography interpretation;
- (b) permit data for: 1) setbacks, control line areas, shoreline permit programs; 2) linear miles of shoreline stabilizations permitted by type of stabilization; 3) area and linear miles of permitted activities by type of activity (new residence, seawall, etc.) located in specific resource areas (beaches, dunes, etc.) within the state's coastal control zones and restrictive conditions attached which show minimization of adverse impacts (size, location, design other conditions); 4) demolitions or landward relocation of beachfront/bluff-front structures; 5) shoreline boardwalks, dune crossover, and other structural accessways permitted with specific resource areas (beach, dune, bluff, rocky shore); and/or 6) for habitat areas showing no activities permitted in designated areas which would adversely affect the natural values being protected;
- (c) periodic physical surveys of the condition of selected/designated coastal resources protection areas;
- (d) shoreline maps of controlled accessways; maps delineating shoreline acres and miles where pedestrian and/or vehicular access is restricted; maps delineating habitat protection areas.

*Adopted Plan Outcomes:*

- 1. Achievement of Plan Objectives through implementation and monitoring--** such as protection of designated "coastal resource areas" or "natural habitat areas", dune restoration; inlet management to place dredged sand on downdrift beaches; keeping development away from designated coastal hazard areas; etc.

Survey methods for measuring outcomes starting with a baseline followed by time series:

- (a) aerial photography interpretation;
- (b) periodic physical surveys of areas protected or managed under enforceable plans;
- (c) state and local permit data on activities permitted within approved plan areas, area and linear miles affected, and consistency with plan objectives;
- (d) direct state or local actions undertaken-- such as miles/acres of dunes revegetation, cubic yards of sand transferred due to installation of inlet sand transfer plant, etc.

*State Coastal Land Management and Acquisition Outcomes:*

- 1. Extent of state coastal land holdings in parks and preserves** containing beaches, dunes, bluffs or rocky shores.
- 2. Active public natural resources stewardship of coastal land holdings**
- 3. Coastal lands acquired**

Survey methods for measuring outcomes starting with a baseline and periodic updates:

- (a) coastline acres and linear shoreline miles in public/ state ownership with resources present;
- (b) number of accessways, marked trails, boardwalks, dune crossovers and demonstrated public use;
- (c) dune restoration projects, acres, miles of shoreline involved, state funds;
- (d) acres or shoreline miles in state coastal lands designated as conservation, preservation or protection areas;
- (e) aerial photography interpretation or periodic physical surveys to verify condition of resources;
- (f) miles and acres and type coastal shoreline resource areas acquired by the state, the state expenditures for coastal versus inland of properties, and the CZM program funds used.

Source: State Coastal Management Effectiveness In Protecting Beaches, Dunes, Bluffs and Rocky Shores: A National Overview. Final March 1998

**Table 16** identifies the availability of selected outcome data. It shows the number of states with some outcome data for selected management tools employed. Although 20 of the 29 states have computerized permit tracking systems, only 14 states have any data on habitable structures permitted. Fifteen (15) states have data on shoreline stabilizations permitted. The numbers drop off when looking at data on access and habitat permit restrictions. Although 15 of the 18 states with local plans track the number of approved plans, only 2 states have any outcome data on local plan implementation. Data is likewise sparse regarding SAMP and other plan outcomes. Looking at stewardship of state coastal lands, more states keep data on physical activities such as beach and dune restoration projects undertaken. But in almost all cases data is too scant to determine on-the-ground results of such actions.

**Appendix C** contains a summary of all the **available outcome data** associated with state regulation through permits for shoreline construction and shoreline stabilizations, restricting access, and protecting habitat. Appendix C also contains summary tables with outcome data associated with state ownership and management and coastal land acquisitions. These tables cover the tools utilized by state CZM programs and available outcome data on program implementation to protect beaches, dunes, bluffs and rocky shores. Findings regarding *outcome indicators* of effectiveness for state CZM tools employed to protect **beaches, dunes, bluffs and rocky shores** are presented on the following pages.

**Table 16: Availability of Selected Outcome Data**

Type of Outcome Data	States Using Mgt. Tool	States With Some Outcome Data
<b>State Coastal Permits:</b>		
Computerized Permit Tracking System	20	See Below
Habitable Structures Permits	29	14
Shoreline Stabilizations Permits	29	15
Pedestrian Access Permits	23	4
Vehicular Access Permits	23	3
Protected Areas Permits	27	9
Local Coastal Permits	20	1
<b>Local Plans:</b>		
Approved	18	15
Implementation Data	18	2
<b>Other Plans:</b>		
Special Area Mgt. Plans	12	3
State Land Management Plans	14	3
<b>Stewardship of State Coastal Lands:</b>		
Inventory coastal lands	29	17
Boardwalks/Crossovers	14	12
Dune Creation	13	9
Beach Nourishment	17	14
Natural Areas Protection	26	26
Acquisition of Coastal Lands	21	15

Source: State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.

## **REGULATORY OUTCOMES**

\*Although 20 of the 29 coastal states have computerized permit tracking systems (19 for habitable structures and 20 for shoreline stabilizations), none of the states coastal programs keep statewide databases on the linear miles, area, or resources affected by the permits approved for activities along the shoreline. Such information, when available, is contained only in the individual paper permit files. Only 16 states provided any permit data on structures and shoreline stabilizations to these researchers.

\* Coastal states restrict the size, location and design of structures and shoreline stabilizations to minimize adverse impacts on natural resources beach and dune systems. Conditions attached to individual permits are sometimes contained in paper files, but never in computer permit tracking systems. Of the 25 states that employ restrictions over activities, such as sand mining and beach nourishment, none routinely collect data on the results of these restrictions. Likewise, coastal states do not collect and analyse statewide data on changes in shoreline development or changes to conditions of natural resources from aerial photography or from permitted activities.

\* Regulatory program jurisdictions vary but tend to extend from mean high water (MHW) inland a certain number of feet, a distance based on erosion rates, or to the inland extent of a natural or manmade feature. Within this permit jurisdiction, several or no significant natural resources may be affected by any given permitted activity. No statewide data is available on specific resources affected by CZM-approved permits. This data may not even be contained in individual paper permit files. Trend data on changes in number of coastal permits issued and number of violations sited is also insufficient to use in assessing regulatory program effectiveness. Although some states keep data on numbers of coastal permits issued and violations corrected, the critical information missing is a break-down on type of activity permitted, length of project and area of coast and resources affected. Although some states issue permits for demolition or relocation landward of beachfront structures, multi-year data is not readily available. Only Upton-Jones data was available from FEMA. (See **Appendix A**) For states that delegate coastal permitting to local governments, no state maintains a multi-year database on local permit decisions.

\* 23 states restrict pedestrian and/or vehicular access. Several coastal states issue permits for boardwalks and dunes crossovers, but states with large number of boardwalks permits (such as Florida) do not have permit data available. A few states set guidelines but do not require permits if such structures comply with the guidelines, so there are no records on construction of these accessways. Only 4 states provided data on access permits and 3 states on vehicular access permits. Michigan data shows 200-250 public access projects approved between 1989-1995 and vehicular access restrictions along 23% of the coastline. New Jersey data shows 2 permits for boardwalks between 1994-1996 but no data on local level restrictions of vehicular access. Oregon data shows 12 boardwalks permitted between 1967-1995 and vehicular restriction along 70% of the coastline. South Carolina allows, without permit, small walkways over dunes if guidelines are met. Larger projects require permits. Data shows 12 boardwalks permits and 13 emergency vehicular access permits were issued between 1988-1995.

\* 27 states protect areas such as endangered species habitat by restricting activities and development in these areas. Only 9 states provided data on protection areas and even this data was scant and lacked information on the type of resources within protected acreage or condition of resource area. For several states, protection occurs only on state-held lands. Examples of state data collected:

AL- 3 miles of sea turtle nesting; 40 acres of beach mouse habitat; 25 acres of tern nesting habitat.

AK- 49,000 acres of Bald Eagle nesting habitat.

MI- 300 miles of critical dunes; 250 miles of natural preserves; 310 miles of high risk erosion areas.

NJ- 15 miles of bird nesting habitat

NY- 50 miles of beachfront bird nesting sites; 200 designated fish/wildlife habitat areas.

NC- 100 miles of undisturbed areas.

SC- 181 miles beachfront restricted during sea turtle nesting season.

VI- 13 recreational beaches; 9 sea turtle nesting beaches; 13 CRBA areas.

VA- 6 miles of sea turtle nesting sites protected.

Example of outcome data collected:

*The Rhode Island Coastal Resources Management Program (RICRMP) has had a computerized coastal permit tracking program in place since 1987. This system was upgraded and paper permit files dating back to 1971 are now in the computer system. Unfortunately this permit tracking system is of minimal value in assessing program outcomes in the area of resource protection at this time. The CRMP tracks permit data by activity type but not by location such as beaches, bluffs, rocky shores) So one cannot identify extent of permitted activity by resource area. (See **Table 17-A**) Likewise, the permit database does not reflect setback or pedestrian access or vehicular access restrictions. On a positive note, CRMP policies prohibit new development on undeveloped and moderately developed barrier beaches, and data show that at least 65% of the barrier beaches have had no new permitted development since 1971. (See **Table 17-B**) Likewise no new shoreline stabilizations were permitted on undeveloped and moderately developed barrier beaches since 1971. Permit data in Tables 15-A and 15-B do not reflect setback requirements which act to place development away from shoreline, erosion areas, and valuable habitat areas. **Table 17-C** indicates no outcome data on pedestrian or vehicular access restrictions. **Table 17-D** shows several special regulation areas covering setbacks from resource features, erosion setbacks, setbacks from dunes, and areas restricted from development based on adjacency to state waters classified as type 1 and 2.*

Table 17-A: State Permit Actions- RI

REGULATORY ACTION	CRM Council Permit	CRM Council Permit (Assents)
YEARS	1971-1977	1971-July 1996
Upland Jurisdiction Permit Applications	~600 (a)	unknown
Permits Approved	~ 97% (a)	14,762-- 95% in Tier 1
Subdivisions		312 (2%)
Dwelling Units		3950 (27%)(c)
Commercial/Indust Dev.		539 (4%)
Maintenance R/C/I		762
Accessory Blds.		1073
Recreation-Pools		208
Dredge/Fill		359
Roads		467
Marina Activities		778
Docks		2504 (17%)
Dock Maintenance		389
Discharge/Waste Fac.		477
Energy facilities		200
Demolitions		30
ISDS*		559
Landscaping		149
Federal Consistency		119
Other (d)		572
Shoreline Stabilizations		1066 (7%) (e)
Nonstructural Shore Proj		238 (1.6%) (f)
Violations Cited		no data
Habitable Structures		
destroyed by storms		no data
permitted to rebuild		no data
denied to rebuild		no data
relocated		3 Claims Approved under Upton Jones for demolition or relocation

Key: \*ISDS- Individual Sewage Disposal Systems

(a) 125 approved in FY1977 only (FEIS, p. iv). Approved after modifications suggested by council/staff to minimize adverse environmental effects. (b) Tier 1 -200 ft. inland of coastal features including beaches, dunes, bluffs, rocky shores and other shoreline feature areas such as wetlands. Tier 2- the inland extent of 7 types of activities. (c) 1715 new, 1703 alterations to DU. (d) Other includes buffer alterations (74), wetlands determinations (38), mosquito Ditches (18), ROW (10), and other (e) Shoreline Stabilization Structures: groins, bulkheads, rip rap, seawalls, retaining walls, and repairs. (f) Cover beach nourishment/conservation restoration activities (224) and non-structural shoreline protection/vegetation (14) Sources: Computer printout, Application Statistics by CRMC Project types, provided by Jeff Willis, August 29, 1996. Also Mark Crowell, Upton-Jones Data Base.

Table 17-B New Development & Shoreline Stabilization Permits by Barrier Beach Designations- RI

Barrier Type	% of Beach Shore	New Development	Permits 1971-1996
Undeveloped	65%	Prohibited	None(a)
Moderately Developed	(part of 35%)	Prohibited	None(b)
Developed	35%	Allowed	Unknown
Barrier Type	% of Beach Shore	New SS	Permits 1971-1996
Undeveloped	65%	Prohibited	None (c)
Moderately Developed	(part of 35%)	Prohibited	None (c)
Developed	35%	Allowed	Unknown

Note: Total Beach Shore is 27.3 miles  
 Key: New Development- residential, commercial, industrial development  
 SS- structural shoreline stabilizations  
 (a) neither public nor private development since 1954.  
 (b) no new development allowed.  
 (c) no new structural shoreline stabilizations allowed  
 Sources: 309 Assessment, Jeff Willis

Table 17-C: Pedestrian and Vehicular Access Restriction On Private Lands Protecting Habitat Areas- RI

REGULATORY ACTION
<p><b>Beachfront Boardwalk Permits</b> 1971-1995: Unknown, no permit required if meet state guidelines.  <b>Vehicular Traffic Restriction Areas</b> as of 1995: Many, no data base.</p> <p>A. Coastal Beaches and Dunes (210.1):                      - vehicles prohibited on dunes except on tails marked expressly for vehicular use.                      - vehicular use of beaches (where not otherwise prohibited by private/public management programs) required DEM Use Permit through DEM Division of Enforcement. Vehicles shall not be operated across protected (lifeguard) swimming beaches during protection period.</p> <p>B. Barrier Beaches (210.2)- Prohibit:                      - vehicle access across back barrier flat to access Salt Ponds                      - vehicles in vegetated areas anywhere on barrier</p> <p>C. Dunes (1995 Addendum- New Section 210.7- Dunes)-Prohibit:                      1. vehicles on dunes within 75 ft. of dune crest except on marked trails.                      2. alteration of foredune zone adjacent to Type 1 and 2 waters, except for protection/restoration, no hard structures.</p> <p><b>Habitat Protection Areas</b> as of 1995: Many, no data base.                      Source: Jeff Willis, RICRMP Regulations.</p>

Table 17-D Regulated Areas- type of regulated area, acres, shoreline miles, resources protected- RI

TYPE OF AREA	Acres/Shoreline Miles/Resources Protected or Benefit
A. Coastal Setback	acres-nd Mile- 100% All 700 miles of tidal & 311 miles of coastline setback at least 50 feet and up to 200 feet inland in some areas to protect coastal features.
B. Critical Erosion Areas	Acres-nd Miles-nd No data on percent of total 311 mile of coastline designated critical erosion areas. Areas designated and mapped based on 30 yr. erosion rate setback for residential and 60 yr. erosion rate setback for commercial/industrial. Table of required setback depths based on erosion category A, B, C, D.
C. Dunes Construction Setback	Acres-nd Miles-nd No data on miles of beachfront covered. setback based on edge of existing development as measured by utility lines and landlord walls: Misquamicut Beach- #miles-nd Coast Guard Beach- # miles-nd Sand Hill Cove- # miles-nd
D. State Waters Classification	Type I (Conservation) and Type 2 (Low Intensity) Acres- 3300 Miles- covers 70%-75% of the shoreline and development regulated along this entire shoreline area.

Sources: FEIS, RICRMP Regulations

## **ADOPTED PLAN OUTCOMES**

\* Most states with approved local comprehensive, land use, or coastal area plans provided information on the number of local plans the state has approved. Otherwise, no statewide data was available on the results of local plan implementation such as natural resource protection areas, local setbacks, land use designations, and changes to land use or zoning. Connecticut CZM illustrates this outcome data deficiency. (See Below)

\* For the states with adopted SAMP or other specialized plans, none of the following outcome measures are available: 1) aerial photo interpretation of on-the-ground changes since plan adoption; 2) periodic physical surveys of areas protected or managed under enforceable plans; 3) state and local permit data on activities permitted within approved plan areas, area and linear miles affected by approved permits and consistency of permitted activities with plan objectives. For public-held lands, there is some limited data on actions taken such as dune revegetation, but no data on results from such actions. (See under State Coastal Land Management and Acquisition section below) Only 2 of the 13 states with adopted SAMPs provided outcome data- Guam and California. (See page 43 for the Guam Recreational Water Use Management Plan)

*The California Malibu/Santa Monica Mountain (SMM) Transfer of Development Credit (TDC) Program is summarized below. In 1979, Coastal Conservancy and CCC developed TDC program requiring, as a permit condition, that proposed subdividers or builders of multifamily housing units extinguish or retire the development potential of comparable existing undeveloped parcels prior to the creation of new parcels or additional units in density. The purpose was to eliminate small undeveloped and poorly sited parcels that, if built, would increase erosion, runoff, and landslides. OUTCOME: By 1989, over 700 parcels of land were placed under open space easements or offers to dedicate open space easements in the SMM area. (Assessment, p.55)*

\* Only 3 of the 14 states with adopted plans affecting state lands provided outcome data. This include: OR- Territorial Sea Management Plan with Rocky Shore Strategy; PA- 8 approved local plans under Bluff Recession and Setback Act with setbacks covering 50 miles or 94% of bluff-front. FL- 500 miles of beach under state erosion plan; 100 miles of beaches restored. Other states provide data on number of plans and areas covered but no results. For example, NY data shows 2 erosion management plans approved covering 25 miles or 20% of beaches.

### **Examples of outcome data collected:**

*As indicated in **Table 18-A**, most (35 out of 41) of coastal towns and boroughs in Connecticut have adopted Municipal Coastal Program (MCPs) consistent with the CCMA policies and use guidelines. They contain long-range land use plans for coastal development and conservation, as well as implementing local zoning and subdivision regulations. Most have established setbacks from sensitive coastal resources and the high tide line. Through Municipal Coastal Site Plan Review (CSPR), municipalities regulate development between MHW and coastal boundary. There are no statewide data on local land use plans or local zoning and subdivision regulations or results of local implementation in Connecticut*

Table 18-A: Local Comprehensive Land Use Plans and Regulations, & Other Special Area Management Plans- CT

YEAR	1995	1995
COASTAL GOVERNMENT	MUNICIPALITIES (Towns and Burroughs)	
1. Number in CZ	41	(36/4)
2. Number with Approved Plans (Municipal Coastal Programs)	35*	
3. Number with Setback Regulations (Setbacks from beaches/dunes)	ND (a)	
4. Number with Dune Management Plans Acres Protected/Restricted Use	ND (b)	
KEY:		
NA- Not applicable		
ND no statewide data.		
* Local participation is voluntary. Of 6 not participating, three located along Long Island Sound: Madison, Greenwich, and East Haven		
(a) Most towns have setbacks from sensitive coastal resources (such as wetlands) and the high tide line required by zoning and/or subdivision regulations. But few have setbacks from the beach.		
(b) CZM has provided assistance the locals for development of dunes restoration plans		
Sources: 309 Assessment p. 16, Mary-Beth Hart, CZM staff.		

The **State of California** utilizes state goals, policies and guidelines with both state and local implementation. Local implementation is through adoption of Local Coastal Land Use Plans which 83% of the localities have adopted. All require either setbacks or case-by-case construction standards. However, no statewide database to determine effectiveness.

Table 18-B: Local Comprehensive Land Use Plans/Regulations, Other Special Area Management Plans- CA

YEAR	1995	1995
COASTAL GOVERNMENT CITIES/ COUNTIES/Total	LCP Segments(a)	
1. Number in CZ	58	15
	73	126
2. Number with Certified Local Coastal Land Use Plans (LUPs)	105 (83%)	
3. Number with Certified Implementation Plans	88 (70%)	
4. LCPs Certified and Issuing Permits	82 (65%)	
5. Geographic Area Covered by Certified LCPs	1,387,129 acres (86% of CZ)	
6. LCP Amendments Reviewed	738	
7. Areas of Deferred Certification	42	
8. Number with Beachfront Regulations	All with beaches*	
9. Number with Bluff Regulations	All with bluffs*	
10.. Number with Dune Management Plans Acres Protected/Restricted Use	unknown*	
11.. Number of SAMPs Acres Protected/Shoreline Miles	unknown*	
12. Number of Environmentally Sensitive Areas Resource Protection Areas in beaches/dunes/bluffs/rocky shores Acres protected/Shoreline Miles	unknown*	
13. Malibu/Santa Monica Mountain Transfer of Development Credit Program		
Results- +700 parcels placed on Open Space Easement (as of 1989) avoiding erosion, landslides on these small undeveloped and poorly sited lots.		
KEY:		
unknown- no statewide database.		
(a) The 73 coastal jurisdictions are divided into 126 segments for purposes of LCP planning.		
* All cities/counties with certified plans have provisions which meet state goals, policies and guidelines regarding beaches, dunes and bluffs and significant resource areas. However, some require setbacks, other have case-by-case siting/construction standards. No statewide database.		
Sources: Local Coastal Planning Program Annual report FY 1994-1995, p.16		

**Guam** has a single layer of government. All plans are island-wide. There is insufficient data in **Table 18-C** to make a determination of effectiveness of the State land Use Plan or State Seashore Protection Plan or the Territorial Parks System.

Guam has, however, adopted a Recreational and Water Use Management Plan for which data indicates that a 6 miles is protected and competing use conflicts managed.

**Table 18-C: State Comprehensive Land Use Plans and Other Special Area Management Plans- Guam**

Planning Tool	% of Coastline Covered (excluding federal lands)	% Guam Total Acreage/land Area (Guam CZ)
1. State Land-Use Plan	100%	100%
(a) Conservation Districts	nd	nd
(b) Habitat Protection Areas	nd	28,197 acres (21% land area)*
2. State Seashore Protection Plan	100%	10 fathom contour-10 meters inland
3. SAMPs		
(a) Flood Hazard Zones	nd	nd
(b) Recreational and Water Use Mgt. Plan **		
4. Territorial Parks System		
(a) Natural Preserves	nd	nd
(b) Conservation Reserves	nd	nd

KEY:  
nd- no statewide data.  
\* Island wide- includes upland areas, not just shoreline also includes both Guam Government and federal lands.  
\*\* A 6 miles stretch along coast and in water which addresses users conflicts along beach and in waters. Bird nesting areas identified and protected, Manahac fish-runs protected. Cannot operate jet ski except in management plan areas. Plan adopted as part of GCMP in 1990/91. Provides for "use zones" for certain water activities in planned areas, required buoyed areas for jet ski type vehicles and mechanized vehicular closure during predictable Manahac runs. Minimum operating age of 16 years for all mechanized water vehicles. Jet skis can only be operated in planned areas-- two such areas adopted, third area finalizing plan. In first area planned, Agana Bay to Piti, encompasses 6 linear miles of coast to a distance varying from two hundred yards to half a mile. The second area, Cocos Lagoon, is a triangular shaped lagoon 3 miles long on the land side, extending 2 miles seaward. The third area is Apra Harbor, which is Guam's commercial port, the Navy port and Guam's Harbor of Refuge.  
Sources: Michael L. Ham.

## **STATE COASTAL LAND MANAGEMENT AND ACQUISITION OUTCOMES**

\* All 29 coastal states own state parks along the shoreline that encompass one or more beach, dune, bluff or rocky shore. Only 17 states have inventory data on their state coastal land holdings such as number of shoreline miles in state parks or percent of shoreline in public ownership. Five (5) states do not have information on the total number of beach miles. Five (5) states do not know the number of state coastal parks. Ten (10) states do not know the number of beachfront coastal parks they own. Twelve (12) states do not have information on the miles of state coastal park lands they own. Eleven (11) states do not know the number of miles in state coastal lands.

\* Several states are active stewards of their public coastal land holdings. Stewardship outcome data is scarce regarding: 1) number of accessways, marked trails, boardwalks, and dune crossovers; 2) dune restoration projects measured in acres, miles of shoreline involved, state funds; 3) beaches restored or renourished as measured in cubic yards, beachfront miles, state funds; 4) number of shoreline stabilizations installed with acres and shoreline miles affected as a counter-indication to stewardship; and 5) acres, shoreline miles in state coastal lands designated as conservation, preservation or protection areas and aerial photo interpretation, periodic physical surveys to verify condition of resources.

\* Of the 14 states which use boardwalks or dunes crossovers within their state coastal parks to guide pedestrian traffic over fragile beach and dune resources, 12 have provided limited data on the number accessways installed (See **Table 14**). However, this data is of limited use without additional data which correlates access provided within each state park against length of shoreline or unmet access needs.

\* Of the 13 coastal states which employ dunes creation on state beachfront parks to repair and enhance the natural functions of their state-owned beach and dune systems, 9 have provided limited data on the

number of projects and/or miles of beachfront covered. (See **Table 14**). This information is of limited use in determining effectiveness, since there is no data which correlates need for dune restoration against projects completed or project results.

\* Of the 17 coastal states which have used beach nourishment or renourishment as a management tool, 14 state have very limited data on the number of projects and/or miles of beachfront renourished. There is almost no state data on cubic yards of sand involved, costs, or long-term results of these projects. However, 15 states involve beach nourishment projects sponsored by the USACE and there is some data on federally-funded beach nourishment projects (**See Appendix A, National Context Factors**).

\* Eleven (11) coastal states have chosen to armor or to repair existing armoring structures in high erosion areas. 15 state have had federal USACE shoreline protection projects built along their coastlines. As with beach nourishment projects, data is very scarce. (See **Table 14**) However, the fact that over 1/3 of the coastal states employ armoring on state-held lands indicates the policy priority preference for protecting upland structures and infrastructure in such areas.

\* Of the 26 coastal states which have designated natural resource protection areas, all have some limited data on the number of areas protected, the type of species protected, the type of resource area protected, and/or the number of acres protected. (See **Table 14**). There is a need, however, for data on the value or condition of the habitat protected and the results of the protection activities in order to assess program effectiveness.

\* Of the 21 coastal states which are utilizing acquisition to purchase additional valuable coastal resources, 15 states provided some data on the number of properties and acres acquired. Most are coastwide or statewide acquisition data. (See **Table 13**) For states with multiple coastline resources, data are not broken-down by beaches, bluffs or rocky shores. Very few states provided data on amount of money spent. There is need for data which can be used correlate acquisition of coastal lands versus all state lands acquired and to determine the relative priority of coastal land acquisition in the state's overall land acquisition program.

### **Example of outcome data collected:**

*The Massachusetts CZM Program illustrates the limitations on outcome data available to assess program effectiveness. About 25% of the Massachusetts coastline is in public ownership with only 5% being in state-ownership (See **Table 19-A**). There are 18 coastal parks covering 63 linear miles or 33,064 feet. Five coastal park management plans are in progress covering 5,000 acres. (See **Table 19-B**). There are no outcome data on pedestrian access restrictions. There has been one federal/state sponsored beach nourishment project covering 2-3 miles, and dunes have been restored. (See **Tables 19-B and 19-C**). The Rivers and Harbors Program funds dune restoration, beach restoration, and armoring projects-- no data were available, however, on projects funded or project results (See **Table 19-D**). The state has 14 designated Areas of Critical Environmental Concern covering 75,000 acres, but no data were provided on types of resources protected. Outcome indicator data show that 2,250 acres were acquired by state agencies (See **Table 19-E**).*

Table 19-A: State Coastline Ownership and Direct Land Management- MA

OWNERSHIP	LINEAR SHORELINE MILES
Total coastal miles	1,500
Public-Owned	~25%
State-Owned	~5%
Total Beachfront miles	222 miles of barrier beaches
Public-Owned	ND
State-Owned	ND
Total Rocky-Shore	ND
Public-Owned	ND
State-Owned	ND
Total Bluffs	ND

Key: ND- no data      Source: Deirdre Buckley

Table 19-B: State Coastline Ownership and Direct Land Management of State Parks- MA

MANAGEMENT	COASTAL NATURAL RESOURCE AREA
Activity	COASTAL FRONTAGE
# Parks	18
# MILES	63.46 miles
# FEET	335,064 feet
# Boardwalks	ND
# Park Plans	5 coastal park mgt. plans completed = 4,673 acres 5 coastal park beach plans in progress = 5,000 acres
# Dunes Restored	Yes- ND
# Beaches Renourished	2 - 3 MILES
# Protection Areas/Acres	14 ACECs = 75,000 acres

Key: ND- no data      ACE'Cs- Areas of Critical Erosion Concern  
Source: Deirdre Buckley

Table 19-C: Beaches Restored/Nourished/Renourished - MA

YEAR	PROJECT	MILES OF BEACH	CUBIC YARDS
1970 - 1996	Revere Beach	2 - 3 miles	ND

Note: USACE sponsored. There are several private projects and sand/material placement on beaches.- Jim O'Connell  
Key: ND-no data  
Source: Deirdre Buckley

Table 19-D: Dunes Restored and Shoreline Armored- MA

YEAR	PROJECT	MILES OF BEACH	CUBIC YARDS
1970 - 1996			
Dunes restored	Yes under Rivers and Harbors Program-	No data	
Shoreline Armored	Yes under Rivers and Harbors Program-	No data	

Source: Deirdre Buckley

Table 19-E: Coastal Lands Acquired- MA

Coastal Acquisitions: Open Space Bond Bill	
Year:	1978 - 1996
DEM	
Acquisitions:	
Acres/Linear Miles	2,100 acres/ no data on miles
Resource Area	coastal frontage
Acquisition Tool	Bond issue
Expenditures	36 million/ awarded \$70 million more through Open Space Bond Bill in 1987 and 1996
DFWELE	
Acquisitions	
Acres/Linear Miles	150 acres
Resource Area	coastal frontage - habitat protection
Acquisition tool	Bond Issue
Expenditures	3 million
MDC	
plans to restore Boston Beaches ; 5 year revitalization project , \$30 million	
DCS	
provides grants to municipalities to protect open space through Self-Help and Urban Self-Help Programs. Also DCS administers federal Land and Water Conservation /fund grants to targeted municipalities. To date only 273 acres of coastal frontage has been acquired through 17 acquisition project in over 20 years by local municipalities. Only 16 cities and towns have received grants - mostly in the Cape Cod/Islands region.	
Source: Deirdre Buckley	

## 7 CONCLUSIONS AND RECOMMENDATIONS

### CONCLUSIONS

Prior to enactment of the federal CZMA, state efforts to address protection of natural shoreline features such as beaches, dunes, bluffs and rocky shores were highly variable. State coastal management programs (CMPs) developed since passage of the CZMA were designed specifically to balance resource protection and development. State coastal programs have resulted in more attention to issues such as erosion, sea level rise, and cumulative adverse impacts resulting from development on receding beach and bluff shorelines and sensitive natural habitat areas. State CMPs have been at the forefront in addressing shoreline use conflicts such as the demand for shoreline armoring to protect existing upland structures to the detriment and loss of natural beach systems. Beach nourishment has been promoted by some coastal states as an alternative to continued loss of developed recreational beaches through shoreline hardening. Likewise, some coastal states have funded research into sand loss from inlet dredging and have demanded that beach quality sand from inlet dredging be placed on down-drift beaches. Whereas excavation of sand for coastal development was a common practice in the past, state CMPs prohibit such practices today and wage educational campaigns on the importance of protecting stabilized dune systems.

State CMPs serve as the institutional focus for addressing ongoing competing public and private demands for the use of our limited and sometimes fragile coastline resources. Our understanding of natural shoreline processes and the impacts of human development on these processes has grown. Today, we are no longer building as close to the shoreline. The development that does occur is better built to withstand coastal storm events. Efforts are made to guide access across fragile vegetated dunes. We are becoming better stewards of our natural coastal heritage through state CMP efforts. Balancing private property rights with natural resource protection goals remains a challenge.

**The national objective of protecting coastal resources is being achieved** through implementation of federally-approved state coastal management programs. State CMP efforts are effective overall in addressing protection of beaches, dunes, bluffs, and rocky shores, given that the CZMA requires states to balance competing needs and demands such as protection of properties from hazard risks and promotion of recreational use of the shoreline. Determination of CMP effectiveness has been based on process indicators and case examples. Process indicators such as state regulatory setbacks to keep development away from the immediate shoreline were used to determine program effectiveness. Throughout this report and in the appendices are 31 case examples which illustrate and document ways state CMPs are effectively protecting natural shoreline resources.

**Coastal states are utilizing 26 widely varying tools to achieve resource protection** including regulatory setbacks and controls over shoreline development in combination with planning, stewardship of state lands, coastal land acquisition, and research and public education about shoreline processes and human interaction. All but three coastal states identified protection of natural resources and/or minimization of loss of life and property from coastal hazards as a high priority management issue. Although all coastal states own coastal properties, only three use state ownership and land management as the primary tool. Of the twenty-five tools identified with beach and dune protection, the fewest tools used by a state is eleven and the most is twenty-three. Of the thirteen tools related to bluff and rocky shore protection, the fewest tools used by any state is five and the most is eleven.

**Regulatory controls are the most significant tools employed nationwide to protect shoreline resources**, since the majority of the oceanfront shoreline is in private ownership, migrating and subject to development pressures. Protection is achieved through setbacks; regulation of shoreline development and shoreline stabilizations; restrictions on pedestrian and vehicular access; habitat protection; and permit compliance/permit tracking systems. Setbacks are particularly effective-- acting as natural buffer areas and reducing hazard risks. Planning tools, when combined with regulatory, improve natural resource protection by offering either long-range vision or site-specific goals for the protection and development of

selected coastal areas. Stewardship of coastal lands, through state land management and acquisition, is also an important component of all state coastal programs. All coastal states own state parks along the shoreline, and most have natural protection areas and guided accessways. Many states have also acquired additional coastal land holdings.

**States are upgrading their CZM programs.** Coastal zone management is a growing and changing process meeting changing needs. As state CMPs recognize problems or management gaps, they take corrective action. States have made hundreds of significant changes to their programs. This study has documented over 60 significant changes in the way coastal states protect their natural shoreline resources. Most of these program changes involve alteration of the state CMP regulatory or planning tools, such as more stringent shoreline development setbacks and limitations on the use of shoreline stabilizations. States are giving greater consideration to natural shoreline processes, even when addressing other concerns such as the need to protect developed eroding shoreline using structural measures. Although changes complicate assessment of program effectiveness, a review of these changes could serve as an alternative methodology for assessing CMP effectiveness.

**More systematic resource protection is occurring through regulatory reviews.** State coastal management programs are providing more systematic, extensive and intensive planning and regulatory review of projects along the shoreline. This regulatory review is minimizing adverse impacts of improper development and erosion on natural systems and adjacent properties and structures. Greater attention is being given to cumulative effects of individual permit decisions. More states are measuring erosion rates and establishing construction setbacks. Concerns about the adverse long-term effects of shoreline armoring on natural beach sand transport are being addressed and opportunities are being taken to employ nonstructural solutions to coastal erosion. As a result, less inappropriate development is occurring in hazardous areas such as migrating beaches and eroding bluffs.

**There is insufficient nationally compatible outcome data to determine on-the-ground effectiveness.** Due to the scarcity of outcome data, it is not possible to determine the on-the-ground effectiveness of state CMP regulatory, planning, land management and acquisition programs. Regarding regulatory data, most coastal states have computerized permit tracking systems. However, no state maintains a statewide database on the miles affected, the area affected, or the resources affected by state or local coastal permits; or the results of pedestrian access and vehicular access restrictions and protected habitat areas. States with local plans tend to have information on the number of plans approved. However, the data stops there. Only some states have inventories of their coastal land holdings-- such as number of shoreline miles in state parks or percent of shoreline in public ownership. Even states that are active stewards of their public coastal land holdings, do not routinely document accessways installed, dunes restored, beaches restored, and other protection results. Coastal states which utilize acquisition have some data on the number of parcels acquired or acres of coastal lands acquired. However, for most states, these data are not categorized by type of resource area acquired, and very few states have data on amount of money spent or acquisition priorities. Therefore, determining "effectiveness" of state coastal programs in protecting natural coastline resources based on *on-the-ground outcome indicators* is elusive. Determining the "effectiveness" of state coastal programs in protecting natural coastline resources based on *process indicators* and case examples is more possible, but still difficult. Case examples can be effective in illustrating how a management tool has been implemented in a certain geographic area and the results of such implementation.

**Competing demands for the use of the shoreline and competing government policies continue to require balance, so the dilemma remains.** State CMPs continue to face decisions regarding competing demands for recreation and tourist development, protection of existing threatened properties and the rights of private property owners versus public health and safety. Shrinking federal and state dollars for state CMP administration, coupled with increased demand and expectations for CMP services, are long-term concerns for coastal programs. Several federal agencies, state CMPs, local coastal governments, and other non-profit organizations play a role in managing our nation's coastline resources. Inconsistencies between certain federal agency programs and state CMP objectives are ongoing concerns. For example, the FEMA flood insurance program and the federally-funded shoreline protection projects of the USACE achieve objectives which undermine some state CMP natural resource protection

objectives. The unique role of state coastal zone management programs has been and continues to be to focus attention and resources on improving the state and local land use controls and other tools to minimize the adverse impacts on natural resources.

## **Recommendations**

**Develop a computerized CZM database** - NOAA should seek funding from Congress to establish a computerized monitoring and tracking program for state and federal agency CZM activities, the results of which should be published in a biennial state-of-the-coast report to Congress. This should include a computerized coding system and an information tracking and recovery system for all information submitted by coastal states. NOAA should prepare up-datable state CZM program summary files for each coastal state with information about the state program, periodic changes to the program, program activities, CZM projects undertaken, results and reports produced.

**Share Information Through the Internet** - NOAA should create a home page on the Internet and a CD-ROM of the National CZM Effectiveness Study and other CZM databases.

**Incentives for Coastal States to Refine and Expand their Process and Outcome Data Collection and Record Keeping** - NOAA should seek funding from Congress to form a coastal states task force with the objective to change the coastal states reporting requirements under 306, 309, and 312 to better address results of state CZM activities and their effectiveness in meeting state and national CZM objectives. This should include accepted methods for organizing, collecting, storing, and reporting accurate and precise data on program activities and results which include trend data usable in future assessments of CZM effectiveness.

NOAA/OCRM should also encourage coastal states to: a) improve their daily record keeping and yearly reporting to NOAA/OCRM on program implementation and results; b) develop and refine computerized permit tracking systems regarding permitted activities and refine the individual permit entries to include data on type of project, area and resources affected, length of shoreline affected, size of project, permit restrictions/conditions and other data which, when analyzed yearly, could assess the individual and cumulative impacts of projects permitted along the coast; c) monitor, collect and report on local implementation and results for states that delegate implementation to local governments; d) explore the use of in-depth case studies as a way to provide more meaningful explanations of how CZM works and the on-the-ground results, rather than relying on case examples and success stories; and e) explore the use of aerial photo interpretation for measuring long-term changes in develop and resources along the coast.

**Utilize 309 Assessment Process to address issues associated with shoreline change.** OCRM and the Coastal States should continue to utilize the section 309 Assessment process to address substantive issues associated with the protection of natural coastal systems. Significant changes to state coastal programs such changes in activities exempt, shoreline armoring allowed and the landward extent of regulatory jurisdiction should be carefully scrutinized for their long-term effects on natural coastal systems.

**Federal agencies should monitor changes to the coastal environment and report on changes every 5 years.** Congress should fund activities to monitor changes along our nation's coastlines including: 1) federal level aerial surveillance and photo interpretations of shoreline development and changes in development patterns; 2) USACE to conduct follow-up national shoreline studies at least every ten years on erosion, shoreline armoring, beach nourishment, and public ownership of the coast; 3) USDOJ to compile data on coastal endangered species and habitat loss/protection changes and role of federal and state agencies in this effort; 4) NOAA to compile data from U.S. Bureau of the Census on population changes in coastal counties; 5) USDOJ to compile data on private development occurring on designated CBRAs and federal/state agency actions affecting CBRA designations and implementation success.

**Indicators of effectiveness.** To evaluate state CZM program effectiveness in protecting beaches, dunes, bluffs and rocky shores, the following "*indicators of effectiveness*" and "*survey methods*" should be used:

*Regulatory Program Outcomes:*

1. No further or reduced rate of encroachment into coastal resource areas.
2. No further or reduced rate of hardening of undeveloped beachfronts through shoreline stabilizations.
3. Controlled shoreline accessways.
4. Healthy and maintained intact natural habitat areas along the coast

*Adopted Plan Outcomes:*

1. Achievement of Plan Objectives through implementation and monitoring

*State Coastal Land Management and Acquisition Outcomes:*

1. Extent of state land holdings in parks/preserves containing beach, dune, bluff or rocky shores.
2. Active public natural resources stewardship of coastal land holdings
3. Coastal lands acquired

*Survey Methods-* for collecting data and measuring outcomes starting with a baseline followed by time series or periodic updates:

(a) aerial photography interpretation;

(b) computerized permit data collection and analysis -- showing trends in permitted shoreline structures or shoreline stabilizations on the beach and dune system, eroding bluff, coastal hazard areas, coastal floodplain, or immediate shoreline.

(c) periodic physical surveys of the condition of coastal resources protection areas;

(d) shoreline mapping of controlled accessways; delineating shoreline acres and miles where pedestrian and/or vehicular access is restricted; delineating habitat protection areas.

(e) state and local permit data on activities permitted within approved plan areas, area and linear miles affected, and consistency with plan objectives -- such as protection of designated "coastal resource areas" or "natural habitat areas", dune restoration; inlet management to place dredged sand on downdrift beaches, and designated coastal hazard areas where development is prohibited.

(f) documentation of direct state or local actions undertaken-- such as miles/acres of dunes revegetation; cubic yards of sand transferred due to installation of inlet sand transfer plant; coastline acres and linear shoreline miles in state ownership with resources present; number of accessways, marked trails, boardwalks, dune crossovers and demonstrated public use; acres or shoreline miles in state coastal lands designated as conservation, preservation or protection areas; miles and acres and type coastal shoreline resource areas acquired by the state.