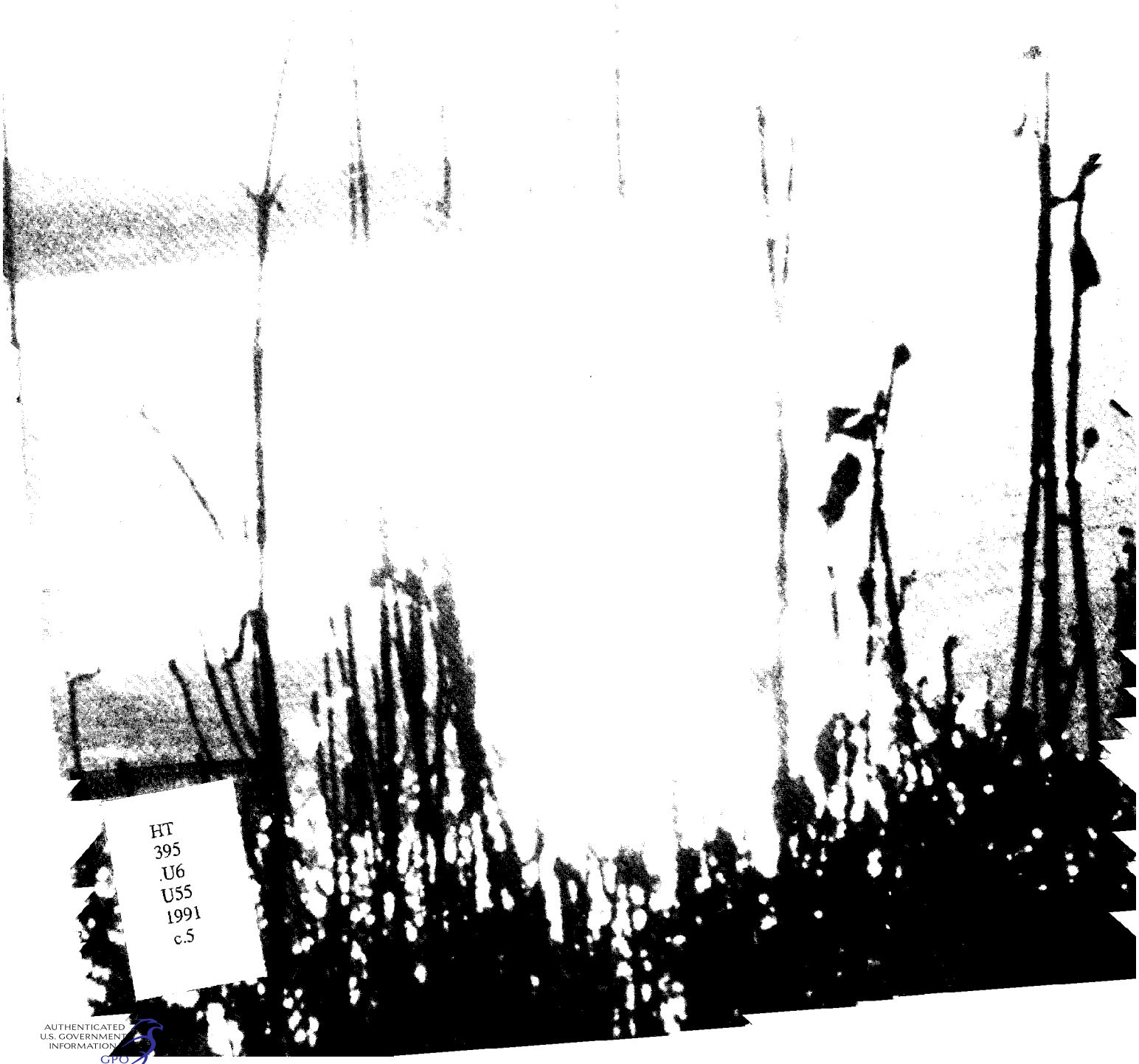
# Evaluation of the National Coastal Zone Management Program



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NCRI Publication No. NCRI-W-91-003

# EVALUATION OF THE NATIONAL COASTAL ZONE MANAGEMENT PROGRAM

by

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Chapel Hill, North Carolina 27599

February 1991

HT395.U6 U55 1991 c.5

This project was funded by the National Coastal Resources Research and Development Institute, Newport, Oregon, under Contract No. 2-5633-01 and by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C., through a grant made under Section 309 of the Coastal Zone Management Act of 1972, as amended, and printed through Grant No. NA16RG0167-01 by the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C.

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This study concludes that the federal Coastal Zone Management Act (CZMA) has met with great success in the nearly two decades since it was first signed into law. The states and territories which have chosen to participate in the program have seen vast improvement in many aspects of the management of their coastlines, in both economic and noneconomic terms. This report demonstrates that these coastal activity-related benefits have a direct relationship with federal CZMA expenditures, and that the value of continued federal support for coastal management at the state and territorial level cannot be underestimated.

The first chapter of this study addresses the question: "How have the nation's coastal resources been managed under CZMA?" by presenting an overview of the history of the program carried out under the Coastal Zone Management Act of 1972. This chapter emphasizes that, since its inception, the CZM program has been distinguished by its voluntary nature, using incentives instead of penalties to generate a unique federal/state/local partnership in which the states have considerable latitude to define their own priorities. It is likely that the nature of the partnership will continue to be an issue, with the coastal states seeking program flexibility and autonomy and the federal government seeking program focus and accountability. From this creative tension, as well as the longstanding tension between coastal conservation and development, future United States coastal management programs will evolve.

As the CZM program enters the 1990s, it clearly continues to be a dynamic, flexible and effective vehicle for addressing coastal issues. While the institutional structure at the federal level remains split among several agencies and programs, the "coastal management" concept has proven powerful enough to facilitate coordination, albeit with some friction. A testament to the power and importance of the concept is its ability to survive two terms in the 1980s under a hostile administration and to retain a vital programmatic focus into the 1990s. Review of its history shows that the CZMA of 1972 sired a unique and durable program whose life span already has exceeded that of many other intergovernmental planning initiatives.

The second chapter of the report deals with the consistency provisions of Section 307 of the CZMA, and the role that federal consistency has played in coastal management. One very important, although often overlooked aspect of the CZMA is its voluntary nature. Because states are not required to establish coastal management programs, their participation had to be secured by offering them 1) substantial federal financial assistance, and 2) the promise that, if the states underwent the complicated program development and approval process prescribed in the federal Act to establish legally-enforceable standards and procedures to protect the coastal zone and its resources, federal agencies and permittees engaged in activities affecting the coastal zone would act consistently with such standards. This "promise" is of course the heart of the federal consistency provisions of the CZMA.

However, the past decade has demonstrated that the federal consistency doctrine is not merely an appendage of the main body of coastal management practice in the United States, meant to serve as an incentive to states to participate in the CZMA. Rather, the consistency provisions constitute an essential mechanism for securing the compliance of federal agencies and permittees with legally enforceable state coastal policies. Without the federal consistency provisions, federally permitted and conducted activities that affect coastal areas and resources could be carried out with little or no regard for state coastal policies.

Implementation of the CZMA's consistency section has been generally successful. The body of consistency decisions by the Secretary of Commerce appears to strike a balance between state interest under the CZMA and coastal programs, and national economic and security interests. Based on this record, it is clear that federal development projects in the coastal zone, as well as private development projects that require a federal permit, are subject to state coastal management

policies and may be substantially modified at the insistence of the states to conform to these policies.

Chapter three provides an analysis of the National Estuarine Reserve Research System (NERRS). This program was created by Section 315 of the CZMA, and was originally conceived to protect the nation's estuarine areas and forestall the ecological degradation of this valuable natural feature. The NERRS has certainly accomplished this mandate; although legal provisions for the management and protection of estuaries are diverse and often complex, currently 18 reserves protect over 262,000 acres of estuarine acreage.

With the passage of the Reauthorization Act of 1985, education and research became the primary focus of the NERRS. The Reserves serve to protect estuaries as field "laboratories," and the NERRS encourages their use for long-term scientific research. Today, one of the most important services of the program is to provide information to the public at large, and to the coastal management decision-maker. By fostering a healthy atmosphere for learning now, future managers and planners will be able to act on responsible decisions concerning the protection of our estuarine environment.

It is difficult to assign a cost/benefit value to the NERRS. In the long run, perhaps the most valuable contribution will be to set aside extremely crucial areas that people now tend to take for granted. This, coupled with the NERRS role as educator, may ensure that future generations—both human and animal—will be able to derive the benefits from estuaries in their natural state for years to come.

Chapter four is entitled "An Analysis of the Coastal Energy Impact Program." At the time of its passage in 1976, the Coastal Energy Impact Program (CEIP) enjoyed broad-based support and a varied constituency. The CEIP was a program that appealed to state and local governments, environmentalists, and somewhat surprisingly, the energy industry. Simply stated, the purpose of the CEIP was to provide financial assistance to meet the needs of coastal states and local governments that result from energy activity affecting the coastal zone. The CEIP sought to strike a balance between the national objectives of achieving increased energy self-sufficiency and of protecting and managing the nation's coastal resources.

The CEIP provided financial assistance—loans, bond guarantees, and grants—to help coastal states and local communities affected by new or expanded coastal energy activity. The CEIP was unique among federal programs because it allowed considerable discretion by state and local governments in identifying the problems that local communities faced in overcoming Outer Continental Shelf (OCS) oil and energy activities, and establishing the priorities for projects to be funded. The CEIP funded many unusual projects, but in addition to that, the CEIP was a unique program because it involved a high level of state, federal, and local cooperation to complete these projects.

Despite the fact that the CEIP was widely supported and served as a model of how various levels of government can work together to meet local, state, and national objectives, and despite the fact the program was associated with two issues of national importance—energy independence and environmental quality—the CEIP did not become a permanent addition to the federal coastal management program; in fact, a few years after its inception, the program effectively ended.

One reason cited for the CEIP's demise is the lack of demand by states for credit assistance, due in part to the high interest rates charged by the CEIP. As state interest in CEIP funds began to wane, so too did the Carter Administration's support for the program. The 1980 presidential election provided the final component that was needed to end the CEIP; once elected, one of Ronald Reagan's first federal budget cutting targets was the CZM program, specifically the CEIP.

It is hard to assign an exact date as to when the CEIP ended, but for all practical purposes, the program expired in fiscal year 1983.

The CEIP was a short-lived program, and the majority of its existence was spent in start-up time. By the time the appropriations were awarded and the results of the funding became visible, the program had ended. Because the CEIP was young, it did not have time to develop an entrenched bureaucracy or powerful constituency and was, therefore, an easy target for budget cutting. More importantly, the issue that was the central focus of the CEIP, the "energy crisis," had faded from the public psyche. As the gas lines disappeared from the media's scrutiny, so, too, dissolved the nation's concern for energy independence and conservation. Ironically, many of the OCS energy activities that were controversial during the CEIP's existence are still being debated.

The next four chapters of the report describe in detail the state CZM programs. As the chapter introducing the state programs points out, a very difficult problem confronted those designing the national CZM program in the late 1960s and early 1970s. The coastal area has tremendous value and the need for improved management of development in coastal areas to protect this national treasure was clear. Then as now, however, the wide range of issues to be addressed and the diversity of the coast presented a daunting challenge to the design of a national CZM program.

The range of development issues to be addressed in coastal resource management is quite broad. Moreover, the nation's coasts have tremendous physical, economic, political and cultural diversity. This diversity of the nation's coastal area makes the design of a uniform national approach to coastal management issues impossible. The answer to this dilemma that was incorporated into the federal CZMA was to use state coastal management programs to address national concerns about proper management of coastal resources. State programs could incorporate the diversity of the coasts while meeting minimum national standards.

Twenty-nine states and territories have developed individual CZM programs that have been approved by the federal government as meeting the minimum national standards established by the CZMA. Under the CZMA, states and territories are granted considerable latitude on how best to allocate available funds to address priority national interest areas. An examination of how these funds have been allocated and what tasks the states have undertaken provides insight into coastal management priorities of the 1980s. This part of the study focuses on program expenditures in seven major categories, based on the national interest areas specified in the CZMA. The categories used for analysis are: 1) improving governmental decision-making; 2) natural resource protection; 3) improving public access to coastal resources; 4) urban waterfront development; 5) hazards mitigation; 6) natural resource development, and 7) ports and marinas. While there is a national concern with each of the seven subject areas, the incidence of each particular issue is not uniformly distributed around the country.

This study confirms that the CZMA has been successful in one of its key objectives—establishing a national program that incorporates state diversity. The states and territories are devoting the bulk of their attention to two key subjects, improving government decision-making and protecting the coast's natural resources; but the states and territories have retained the ability to address other national interest areas where they exist and need management attention.

Another striking finding of the study is how much has been done with limited resources. Coastal zone management has not been lavishly funded in the United States. Annual federal expenditures for program implementation in the study period were on the order of $34.75 million. The total federal grants for program implementation for the six year detailed analysis period (1982 through 1987) was $190 million. These funds were spread among 29 participating states and territorial programs and were used to address the wide variety of subjects noted above.

This collection of 29 uniquely designed state and territorial programs does serve important national interests. Through a variety of methods, government decision-making on coastal issues and natural resource protection has been improved in every participating state and territory. Where warranted, careful attention is also being given to other key issues, such as improved public access to the coast, better management of development in natural hazard areas, and development of coastal natural resources. Some programs are undoubtedly more active and more effective than others. Six states are not participating in the CZMA at all. Yet most of the nation's coastline is covered by an approved coastal management program and the aggregate of their efforts will result in a coastal zone that is healthier, more productive, and more attractive for the long-term benefit of the nation.

The final chapter of this report sets forth our findings on the economics of coastal zone management. This section addresses two questions of importance to coastal zone planners and policy-makers: *What is the economic value of the coastal zone*? and *What is the relationship between spending on coastal zone management activities and the economic value of the coastal zone*?

Proponents of coastal zone protection legislation typically claim that special action is needed to preserve the "value" of the coastal zone. Yet, only a few researchers have attempted to quantify that "value." That quantification is necessary to establish a baseline for further benefit-cost analysis of coastal protection activities.

We define the coastal zone was defined as the 413 counties in 30 states and 5 territories that are either adjacent to or within 50 miles of the oceans, bays, or Great Lakes, or lie within an estuarine region. The value of the economic activity and natural resources found in the zone has two components: 1) the current market value of all goods and services that are produced directly and indirectly from coastal resources and coast-related activities (which is equivalent to the gross national product (GNP)—originating in the coastal zone, or "coastal GNP"), and 2) the intangible value of recreation and other activities and resources that people enjoy, but for which they do not pay directly (termed "nonmarket values").

Economists have measured coastal value in different ways; by focusing on market and nonmarket values, and by estimating the importance of the coast for the nation as a whole and for specific places and types of activities or coastal resources. These estimates have one common interpretation: regardless of how one measures coastal value, it is sizeable. Looking at current market values of goods and services produced by just three coast-related industrial sectors, the value was $58 billion in 1987. When the list of sectors is expanded to some 60 industries, the estimate of coastal value doubles. When coastal value is measured in terms of the market value of the embodied energy at the coast, rather than in terms of standard transactions, the value is still higher. As high as these figures are, they still may understate the full value of the coast since they exclude the consumer surplus that is created by people's willingness-to-pay for beach access, coastal proximity, and coastal views in excess to what they are actually charged.

We identify three types of economic activity create value in the coastal zone: 1) economic activities, located in the coastal zone, that are locationally dependent on coastal resources—specifically, the ocean, bays, Great Lakes and estuaries, and their contents (*coast-dependent activities*); 2) economic activities that use the ocean, bays, Great Lakes and estuaries and their contents in the production process, or that produce intermediate inputs for coast-related activities, but are not necessarily in the coastal zone (*coast-linked activities*); and 3) economic activities, not included in 1), that are located in the coastal zone and provide service to residents and visitors to the coastal zone (*coastal service activities*). The sum of the value of these three types of activities can be considered to be the economic value of the coastal zone.

Based on payroll and employment, our raw measures of economic activity, our estimates demonstrate that the coastal zone is a key economic sector that contributes more than 30 percent of the national GNP. Most of this value comes from the service sector, but even without that type of economic activity, the coastal zone accounted for some $55 billion in 1985. Our estimates also show that the coastal zone has become more important over time, growing from 30.1 percent of GNP in 1978 to 31.4 percent in 1985. We show, finally, that the coastal zone is critical to the economies of many coastal states and territories.

Our study concludes that a strong relationship exists between program spending on CZM-related activities, specifically in the seven national interest areas contained in the CZMA and changes in coastal GNP. The existing literature does not address the relationship between CZM spending and coastal GNP directly. However, several studies relate coastal regulatory activities that may be supported by CZM program funds with gains in economic welfare.

Furthermore, we conducted correlations and ordinary least squares (OLS) regressions using absolute and relative changes in coastal GNP, in total and by activity type, and CZM expenditures. We found absolute real output change and CZM spending to be correlated positively for each of the components of coastal GNP. We also found that, for all specifications of the OLS model, a dollar increase of CZM spending is always associated with greater than a dollar increase in coastal output. The magnitude of the association, moreover, is sizable for all definitions of coastal GNP except "coast-linked." Admittedly, our evidence is sketchy and original statistical tests somewhat crude. But, at least circumstantially, we have compelling evidence that CZMA monies have been well spent in a benefit-cost sense. These results suggest that if the level of CZM spending were reduced, the level of coastal (and hence national) GNP would fall, as well.

The uniqueness of the CZMA lies in its voluntary nature, and the degree of flexibility granted to participating states and territories in using federal funds to manage their coastal zones. While not every aspect of the CZMA has had a lasting effect, (specifically, the CEIP), the CZM program has been widely successful. Twenty-nine states and territories have taken the initiative, under federal guidance, to conserve and even enhance the character and intrinsic value of the nation's coastline. The economic benefit in terms of both market and nonmarket activities derived from federal monies spent in the coastal zone has more than paid back the taxpayers' expenditures.

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## INTRODUCTION

The purpose of this chapter is to present an overview of the history of the program carried out under the Coastal Zone Management Act (CZMA) of 1972, from the early stirrings of the "coastal management" idea in the 1960s to its present mature stage in 1990. While the primary thrust here is to describe the program over time, it is impossible to avoid some assessment of its accomplishments and shortcomings in the course of the description. The primary question of interest is: *How have the nation's coastal resources been managed under the CZMA*?

The chapter is arranged in chronological fashion, proceeding through several time periods marked by coastal program developments. Given the broad and complex nature of the program and its responsiveness to societal change, such stages tend to include several concurrent and overlapping historical trends in addition to the major program activities. The primary stages include:

1) Precursors of Coastal Management: Recognition of the Resource Crisis 1962-1971
2) Passage of 1972 Coastal Management Act: Struggle for Program Control 1969-1972
3) State Coastal Program Planning: National Energy Crisis Impacts 1973-1980
4) Coastal Program Implementation: Effects of a Hostile Administration 1978-1988
5) Reassessing the Coastal Program: Forging an Agenda for the Nineties 1988-1990

To orient the reader, an overview of actions during the program stages is presented first and then amplified in the following discussion. This overview is keyed on the listing of events in the CZMA chronology contained in the Appendix at the end of this chapter. More details on selected aspects of the program, including federal consistency, the National Estuarine Reserve Research System (NERRS), the Coastal Energy Impact Program (CEIP), state coastal management activities, and the economics of coastal zone management are presented in the following chapters of this report.

### Overview of Program Stage Actions

#### Precursors

The Coastal Zone Management (CZM) program was preceded by a decade marked by rising tides of concern for protecting coastal recreation areas and estuaries, while at the same time making productive use of coastal resources, setting up what some perceive as dichotomous goals of coastal conservation and development. These concerns were crystallized in a number of federally-commissioned reports, the most notable of which was the Stratton Commission's 1969 report, Our Nation and the Sea. While the idea of coastal management legislation was under debate, a related Congressional debate on a national land use policy act was raging. Had it passed, a national land use act could have preempted the coastal management act, under the logic that coastal management was simply a subset of comprehensive land use management. At the same time, an effort was underway to modernize and strengthen the legal framework of land use regulation, exemplified in the American Law Institute's Model Land Development Code, and a push began for more environmentally sensitive land use planning under the National Environmental Policy Act of 1969.

#### Passage of the 1972 Act

Starting in 1969, a number of coastal management bills were introduced in Congress, distinguished by whether they emphasized "ocean development" under the aegis of the newly created National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce (DOC) or "conservation and land use" under the traditional federal land agency, the

Department of Interior (DOI). Some conservationists supported DOC over DOI, however, due to their perception of a pro-development bias in DOI. The 1972 Act settled the debate by placing administrative responsibility for coastal management under NOAA in DOC and by announcing goals of both coastal development and coastal conservation. It devolved primary responsibility for a two-stage program of 1) planning and 2) implementation to the individual coastal states, who were encouraged to participate voluntarily through a combination of federal grants and the promise of required "consistency" of federal actions with approved state coastal program provisions. At the signing of the bill, the President expressed support for a future national land use act that would encompass coastal management, but such an act never passed. The 1972 CZMA became the nation's only national environmental/land use legislation.

State Coastal Program Planning and the Energy Crisis

The coastal program started slowly, as administrators formulated a strategy for dealing with the diverse political realities of passing new coastal laws in individual coastal states. Funding also was slow, with the first appropriation not granted until FY 1974. However, the program picked up steam rapidly and 31 of the 34 eligible states and territories applied for and received program development grants under Section 305 of the Act in 1974. At the same time, the energy crisis, an outside event which would inject a new set of issues into coastal management, was taking shape. These issues came to a head in the CEIP enacted in the 1976 CZMA amendments, with authorized appropriations of $1.2 billion over 8 years, a quantum leap in the amount of resources allocated to coastal management. Meanwhile, states were completing their coastal management programs and submitting them to Washington for approval. By 1980, all 35 eligible states and territories had participated in the program and 25 had received approval of their programs.

Coastal Program Implementation

The second stage of coastal management began to gather momentum in 1980, as those states with approved programs acted to implement them. To focus these implementation efforts, Congress set forth nine areas of "national interest" that states must address, and tightened up performance review procedures. During this period, Congress also enacted another coastal initiative, not directly related to the CZMA program. The Coastal Barrier Resources Act of 1982, under the Secretary of Interior, withdrew federal flood insurance and financial assistance to designated undeveloped coastal barriers. Meanwhile, the initial consensus that both resource development and protection could be accomplished under a government management approach splintered under the private enterprise focus of the Reagan Administration. Congress continued to fund and reauthorize the federal coastal program, however, despite a determined effort by the Reagan Administration to eliminate it. The states also continued to support the coastal program and four more state programs were approved between 1980 and 1988, bringing the total to 29 states and territories implementing approved coastal programs.

Reassessing the Coastal Program

Toward the end of the 1980s, Congress began a broad reassessment of the goals, priorities, and procedures of the coastal program. Reauthorized in 1976, 1980, and 1986, the CZMA was due for reauthorization again in 1990. A sense began to build that coastal water quality had not been adequately protected under past approaches, and that new efforts were needed to link local land use planning to enforceable water quality standards and to wetlands protection. In addition, proposals were made to revitalize federal leadership, to increase state and local incentives for coastal management, and to resolve issues of consistency. Several bills were introduced to address these concerns, and at the eleventh hour before adjournment the 101st Congress passed the sweeping 1990 Coastal Zone Act Reauthorization as part of the budget reconciliation measure. In addition, the Congress adopted a number of changes in the Coastal Barrier Improvement Act, and

the Federal Emergency Management Agency (FEMA) requested that the National Academy of Sciences' National Research Council (NRC) advise them on strategies for coastal erosion zone management. It appeared that a new agenda, at least partly hearkening back to omissions in the original 1972 Act, was being formulated for coastal management in the nineties.

## PRECURSORS OF COASTAL MANAGEMENT: RECOGNITION OF THE RESOURCE CRISIS 1962-1971

The CZMA of 1972 emerged from an intense national re-evaluation of the effectiveness of U.S. environmental protection and land use planning, in which many argued that coastal management was only one part of the larger land use puzzle. This reevaluation was prompted by a growing sense of crisis over the exploitation of coastal natural resources.

The consensus supporting a national coastal initiative grew out of a series of national debates and studies of outdoor recreation, marine resource development, estuarine pollution, and land use policy. Each of these contributed to the final form of the CZMA of 1972 and to its subsequent amendments. Zile (1974, p. 236) divides the period prior to the act into four phases:

> The act did not grow out of a single concept advanced by a single interest or a set of compatible interests. It was brought about by discrete and sometimes discordant constituencies motivated by a variety of concerns and advocating the pursuit of diverse goals by a wide range of means. We believe that four fairly distinct clusters of ideas, political factors, and proposals dominated the four successive though somewhat overlapping periods of the act's history. We have chosen to refer to them chronologically as recreation phase, estuary protection phase, ocean development phase, and land use policy phase to indicate the central coastal concern at each of the four periods. The act in its final form reflects something of each of these concerns and phases. This perhaps accounts in large part for the act's form and contents, its gaps and contradictions, and the uncertainty of its future.

Outdoor recreation, typically seen in terms of public acquisition of lands along the shore, was the earliest organized, expressed reason for coastal management. A series of reports urged the preservation of virgin shorelines for public use. In 1962, the Outdoor Recreation Resources Review Commission issued its report, Outdoor Recreation for America, stating that only a small fraction of 5-7 percent of the recreational shorelines of the oceans and Great Lakes in the 48 contiguous states was in public ownership and dedicated to recreational uses. In 1968, the President's Council on Recreation and National Beauty issued its report, From Sea to Shining Sea, also calling for placing additional shoreline into public ownership. Meanwhile, there was some additional acquisition under the National Seashore Program between 1961 and 1972, when nine other seashores (Cape Cod, Point Reyes, Point Keyes, Padre Island, Fire Island, Assateague, Cape Lookout, Gulf Islands, and Cumberland Island) were added to the Cape Hatteras National Seashore established in 1937. And the National Lakeshore Program added four Great Lakes lakeshores (Pictured Rocks, Indiana Dunes, Apostle Islands, and Sleeping Bear Dunes) between 1966 and 1970. Matching grants for planning, acquiring, and developing land and water areas for outdoor recreation were made available under the 1964 Land and Water Conservation Act. Some of these funds were used for coastal recreation areas, but the amounts available were inadequate to meet the need. According to Zile (1974, p. 240), "the coastal programs generated in the recreation phase have been inadequate in scope and concept, and dismally implemented where undertaken."

Estuary protection was the second concern contributing to the eventual adoption of the CZMA. In 1965, a bill was introduced in the House to establish a Long Island National Wetlands Recreation Area and in 1966, this concept was broadened in a House bill to establish a national system of estuarine areas. After a number of objections and weakening amendments, an "eviscerated" version of the bill directing the Secretary of the Interior to study and inventory estuaries and

to recommend the desirability of a nationwide system of estuarine areas was passed in 1968 as the Estuary Protection Act (Zile, 1974). In 1970, the National Estuary Study authorized under this Act discussed the ongoing destruction of estuaries and recommended establishment of a system of estuarine areas under the federal/state management, but its recommendation was not implemented. Meanwhile, the report of the National Estuarine Pollution Study, authorized under the Clean Water Restoration Act of 1966 and issued in 1969, concluded that estuary protection should be an integral part of a comprehensive coastal zone management program. It recommended an approach remarkably similar to that adopted under the CZMA, with the states responsible for managing their coastal areas and the federal role confined to assistance to the states and coordination of federal activities. It said that enactment of federal enabling legislation should declare national policy, lay down broad guidelines, and grant funds to states for development and administration of coastal management programs. Meanwhile, estuary protection became one of a number of broader environmental protection concerns, highlighted in 1969 by the first major U.S. oil spill off Santa Barbara, and by the passage of the National Environmental Policy Act (NEPA).

Ocean development was a third concern expressed in the coastal management debate. Unlike the conservation posture of the recreation and estuarine resource studies, resource "development" was the thrust of the main report in this area, Our Nation and the Sea, issued in 1969 by the Stratton Commission under the Marine Resources and Development Act of 1966. According to Zile (1974, p. 256), the floor debate on this act "suggested the thing to do was to learn all that could be learned about the untapped wealth of the oceans and then tap it through boundless private initiative before others got there first," and "the Commission's report reflected the development bias of its mandate." The Stratton Commission report noted that the coast is, in many respects, "the Nation's most valuable geographic feature" where the greater part of our trade and industry takes place and the waters are among the most biologically productive. Its executive director claimed that the Commission was the first to coin the term "coastal zone", as an area having unique characteristics and requiring special management (Lawrence, 1976, p. 12). Concluding that the problems had outrun the abilities of local governments, the report recommended a management system focused on state responsiblity and action, similar to that of the National Estuarine Pollution Study but with federal coordination vested in a new National Oceanic and Atmospheric Administration (NOAA). Zile (1974, p.258) saw NOAA as a kind of "wet NASA for a never-before-attempted exploration and exploitation of the riches of the oceans," but the Commission also saw the need for encouraging coastal recreation and preventing coastal pollution. Essentially, they defined the primary problem of the coastal zone as a "management problem" and proposed that state coastal zone authorities be given broad powers for planning, regulation, land acquisition, and development, including the leasing of offshore areas, or "seasteads" (Knauss, 1976, p. 16). The Stratton Commission report recommendations were incorporated by Vice President Agnew into his 1969 announcement, as Chairman of the National Council on Marine Resources and Engineering Development, of a five point program in ocean sciences. Its recommendation for creation of NOAA was implemented within the DOC, under the President's 1970 Reorganization Plan.

Land use policy was the fourth concern interwoven with the coastal management debate. As Zile (1974, p. 268) states,

> "During this fourth and final phase the coastal zone was, at last, considered in the context of the total natural environment. The coast was now perceived not merely as a playground, an ecologically fragile water's edge, or a land base for the support of an unfolding ocean technology, but also as an integral part of the entire land mass. The conclusion was reached that there could be no rational policy toward the land component of the coastal zone in the absence of a policy toward the management of all lands."

During this time the American Law Institute was conducting its pathbreaking study of improvements in the nation's legal framework affecting land use. This study, initiated in 1964 by top land use law experts, produced the first of several draft proposals in 1968 leading to the adoption in 1975 of its Model Land Development Code. Along with its increased attention to the state role in land use planning and regulation, this Code contained two new concepts which would influence the CZMA: 1) "Areas of Critical State Concern", where special development principles were needed to prevent uncontrolled development, and 2) "Development of Regional Benefit", where special provisions were made to allow developments that provide benefits to an area beyond a single local government but may cause problems within the local area, such as a public utitility or low income housing project. In 1970, the Public Land Law Review Commission issued its final report, One Third of the Nation's Land, which pointed out the need to coordinate land use planning for both federal and nonfederal lands. Meanwhile, the first national land use policy bill was introduced by Senator Jackson in 1970, and by spring of 1972 there were over 200 other land use policy proposals before 13 congressional committees. There were two adverse consequences for coastal zone management in this situation. First, a national land use policy act could preempt the narrower coastal zone focus but would at the same time be more controversial and less likely to pass. Second, the growth in the number of proposals and interested congressional committes complicated the legislative process and also decreased chances of passage.

Thus, the precursors of coastal zone management set the stage for the congressional debate, recognizing the coastal resource crisis and putting forth some proposed solutions. It was then up to the Congress to bring this raw material together into acceptable legislation.

## PASSAGE OF 1972 COASTAL MANAGEMENT ACT: STRUGGLE FOR PROGRAM CONTROL 1969-1972

Passage of the CZMA took 3 years, during which there was a heated struggle over whether the act would be focused on ocean development with NOAA as the lead agency or on land use and conservation with the DOI as lead agency. A related struggle occured over whether there would be a free-standing, some said "piecemeal", coastal act or coastal management would be subsumed under a "comprehensive" national land use policy act. In the end, the coastal act garnered enough support to win Congressional passage, while the national land use act failed. The coastal management compromise focused both on development and conservation to be achieved by individual state management programs under NOAA as lead agency.

### Hammering Out the Legislation

In 1969 during the 91st Congress, the first coastal management bills (H.R. 13247 and S. 2802) attempted to enact the recommendations of the Stratton Report as amendments to its parent Marine Resources and Engineering Development Act of 1966. They were followed by an Administration bill in the House (H.R. 14845) and a counterpart in the Senate (S. 3183) that took an opposing tack, with DOI as lead agency under a new section of the Federal Water Pollution Control Act. Various other bills followed and were sorted out according to whether they had a "landward" or "seaward" orientation (Lee, 1976, p. 4). Those concentrating on water-related problems and assigning responsibility to the National Council on Marine Resources and Engineering Development were referred to the Senate DOC or House Merchant Marine and Fisheries Committees. Those with a land use/conservation focus and favoring the DOI were referred to the Senate Public Works or the House Public Works Committees. However, the consensus on an individual state management approach in these bills persisted through the Congressional debates and appears in the adopted CZMA of 1972.

Critics felt that the individual state management approach was too soft to achieve effective management of the coastal system, and that Congress was submitting to perceptions of politically

feasible action in playing down the federal role (Zile, 1974, p. 261). The coastal states saw it differently. They formed the Coastal States Organization (CSO) in 1970, composed of gubernatorial delegates from 22 coastal states to assure state representation in the development of national coastal policy (Brower and Carol, 1984, p. 3). They were staunch backers of the concept of delegating substantive program decisions to the individual coastal states.

In 1971 during the 92nd Congress, the Administration's position changed from support of a coastal management program under DOI to support of a comprehensive national land use policy. The new coastal bills introduced during this first session all favored the Stratton Commission recommendations (S. 582, S. 638, H.R. 2492, H.R. 2493, H.R. 9229). It appeared that, without Administration support for a coastal program under DOI, the advantage had shifted to NOAA and DOC. However, as the favored approach moved toward adoption during the second session in 1972, DOI again entered the picture. The Senate passed S. 3507 (an amended S. 582) by a unanimous vote. But in the House vote on H.R. 14146 (an amended version of H.R. 9229), a surprise floor amendment was approved, moving responsibility from DOC to DOI and stunning Congressman Lennon, the bill's sponsor who attributed the switch to an intense lobbying campaign, particularly by the American Petroleum Institute (Zile, 1974, p. 372). Some felt that this would block passage of any bill, but a last minute compromise (S. 3507) was worked out just before adjournment which gave responsibility for implementation to the Secretary of DOC with an expectation that he would delegate it to NOAA, with the requirement that DOI's concurrence be obtained in case of overlap with any national land use program which might be enacted. This compromise by the conference committee was approved in both chanbers in October 1972.

President Nixon signed the CZMA of 1972 (P.L. 92-583) on October 27, a few days before the presidential election. However, he expressed displeasure that responsibility was placed in DOC rather than DOI and that Congress had not approved a national land use policy act. He urged creation of a new Department of Natural Resources, to reverse the fragmentation of federal environmental programs.

Provisions of CZMA

The resulting Act was relatively broad and simple in outline. It declared that it is the national policy:

(a) to preserve, protect, develop, and where possible, to restore, to enhance, the resources of the nation's coastal zone for this and succeeding generations,

(b) to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve the use of the land and water resources of the coastal zone giving full consideration to ecological, cultural, historic, and esthetic values as well as to needs for economic development,

(c) for all federal agencies engaged in programs affecting the coastal zone to cooperate and participate with state and local governments and regional agencies in effectuating the purposes of this title, and

(d) to encourage the participation of the public, of federal, state, and local governments and of regional agencies in the development of coastal zone management programs.

It also declared it is the national policy to encourage cooperation among state and regional agencies including establishment of interstate and regional agreements, cooperative procedures, and joint action particularly regarding environmental problems.

The Act defined its key terms, including:

(a) "coastal zone" means coastal waters and adjacent shorelands strongly influenced by each other and in proximity to the shorelines of the coastal states.

(b) "coastal waters" means the areas of the Great Lakes within the U.S. territorial jurisdiction and in other areas those waters adjacent to the shorelines containing a percentage of sea water, extending outward to the outer limit of the territorial sea and the international boundary with Canada and inland to the extent necessary to control shorelands whose uses have a direct and significant impact on coastal waters, and excluding Federal lands.
(c) "coastal state" means a state bordering the Atlantic, Pacific, or Arctic Ocean, Gulf of Mexico, Long Island Sound, or a Great Lake, and includes Puerto Rico, the Virgin Islands, Guam, and American Samoa.
(d) "estuary" means that part of a river or stream or other water body having connection with the open sea, where sea water is diluted with fresh water from land drainage, including Great Lakes estuaries.
(e) "estuarine sanctuary" means a research area including all or part of an estuary, adjoining transitional areas, and adjacent uplands, constituting to the extent feasible a natural unit.
(f) "secretary" means the Secretary of Commerce.
(g) "Management program" includes a comprehensive statement prepared and adopted by the state setting forth objectives, policies, and standards to guide public and private uses of lands and waters in the coastal zone.
(h) "water use" means activities conducted on the water, but does not include establishment of water quality standards or criteria or regulation of discharge or runoff of water pollutants.
(i)"land use" means activities conducted on the shorelands within the coastal zone.

Three major sections of the Act laid out its primary techniques and concepts. These included initial grants to "develop" management programs for federal approval under Section 305, follow-up grants to "administer" or implement these approved programs under Section 306, and a requirement that federal actions be "consistent" with approved state coastal management programs under Section 307.

Section 305 of the Act defined Management Program Development Grants. These initial grants could cover up to two-thirds of the costs of program development over a 3-year period. Management programs had to include:

1. Identification of the boundaries of the coastal zone.
2. Definition of permissible land and water uses within the coastal zone.
3. Inventory and designation of areas of particular concern.
4. Identification of means by which state control is proposed to be exerted over land and water uses, including constitutional provisions, legislative enactments, regulations, and judicial decisions.
5. Broad guidelines on priority of uses in particular areas.
6. Description of the organizational structure proposed to implement the management program, including responsibilities and interrelationships of local, areawide, state, regional, and interstate agencies.

Section 306 of the Act defined Administrative Grants. These second stage grants also could cover up to two-thirds of the costs of administering a state's coastal management program, with no time period specified. To be eligible for an administrative grant, a state first had to receive approval of its management program, which had to meet both procedural and substantive requirements. The program had to provide for control of land and water uses within the coastal zone under one or a combination of:

1. state establishment of criteria and standards for local administration, subject to admistrative review and enforcement of compliance,

2. direct state land and water use planning and regulation, and/or
3. state administrative review of all development plans, projects, or regulations proposed by state or local authority or private developer for consistency with the coastal management program, with power to approve or disapprove.

It also had to provide a method of assuring that local regulations do not unreasonably restrict or exclude uses of regional benefit, and that adequate consideration is given to the national interest involved in the siting of facilities necessary to meet requirements other than local in nature.

Section 307 of the Act provided for Interagency Coordination and Cooperation, including the federal "consistency" provisions. It required the Secretary to coordinate program activities with other federal agencies, and required all federal agencies to ensure that their licenses, permits, and financial assistance are consistent with approved state coastal management programs. It further specified that federal activities and development projects must be conducted in a manner consistent to the maximum extent practicable with approved state management programs. It recognized and protected a number of existing authorities and laws, specifically exempting requirements of the Federal Water Pollution Control and Clean Air Acts from effect by the Act. It also required the Secretary to obtain the concurrence of DOI or any other administrator of any future federal national land use program before approving a state's coastal management program which includes shorelands also subject to the land use program.

The Act also contained some further provisions relating to administration. Section 308 set Public Hearing procedures. Section 309 directed the Secretary to conduct a continuing Review of Performance of the state management programs. Section 310 required grant recipients to keep Records as prescribed on the amount and disposition of funds. Section 311 authorized the establishment of an Advisory Committee. Section 312 authorized grants of up to 50 percent of the costs of acquisition, development and operation of Estuarine Sanctuaries for natural field laboratories. Section 313 required the submission of an Annual Report. Section 314 required the promulgation of program Rules and Regulations. Section 315 was the Authorization of Appropriations, totaling some $186 million for FYs 1973-1977. (As the Act was later amended, some section numbers and titles were changed.[1]

With passage of CZMA, coastal zone management was finally underway. Critics, such as Zile (1974, pp. 235-36 and 274), described the act as "poorly drafted, deficient in substantive standards, vague on policy, and uncertain regarding agency responsibility" and characterized the start as "shaky and uncertain". Environmentalists would have preferred an Act with a stronger federal role with substantive environmental performance standards and required state participation with centralized state authorities for coastal planning and management. Pragmatists were willing to accept the Act as a beginning and to use it to build coastal management support and capacity at the state level. They believed that only an incentive-based, voluntary state participation program built upon existing state regulatory authority could have passed Congress (Kitsos, 1985, p. 278).

## STATE COASTAL PROGRAM PLANNING: NATIONAL ENERGY CRISIS IMPACTS 1973-1980

The next stage of coastal management belongs to NOAA and the coastal states. Congress set the initial policy framework and returned periodically to review and amend it. But the job of turning broad federal policy guidelines into explicit state coastal management programs devolved upon a new set of coastal bureaucrats. Since no one had done "coastal zone management" before, the new managers had to invent concepts and procedures on the job.

Building A Coastal Program and Bureaucracy

The Nixon Administration appropriated no funds to the program during its first year, reflecting the President's reservations about the CZMA. It was nearly 14 months after the enactment of the law before the first $7.2 million appropriation was made (Kitsos, 1985, p. 278). However, NOAA established a Coastal Zone Management Task Force to inventory the status of state coastal programs, develop guidelines and recommendations, coordinate federal agencies, and assess information needs. This group became the Office of Coastal Zone Management (OCZM) within NOAA when funding was provided in 1974. According to a top federal coastal official, by then states were at various stages in developing their programs (Matuszeski, 1985, p. 267). Some, such as California and Rhode Island, already were operating programs and expected immediate federal approval. Others saw the planning grants primarily as another source of federal funds. But most saw the value of the funds to start up coastal management and understood they had a limited time to get the job done.

Once the initial appropriation was made, the OCZM moved rapidly to award the first Section 305 program development grants. In 1974, 31 of the 34 eligible states and territories received planning grants totaling $7.199 million. This initial response was so strong the the original $9 million planning grant authorization under Section 305 appeared, after only a short time, to be insufficient (Kitsos, 1985, p. 278).

In 1975, the 93rd Congress approved, without opposition, amendments (PL 93-612) making minor administrative changes and increasing the grant authorization to $12 million for each FY through 1977, an increase of $27 million. A number of coastal interest groups testified in support of the coastal management program and the amendments, including the CSO, the presidentially-appointed National Advisory Committee on Oceans and Atmosphere, and representatives of individual states. Meanwhile, the Senate Commerce Committee and the House Merchant Marine and Fisheries Committee had staked out the coastal management area, and a coastal policy "iron triangle" composed of NOAA, the committee staffs, and the state bureaucrats had formed. According to one observer, "By the start of the 94th Congress, coastal management had become institutionalized, although somewhat tenuously, in the fabric of the political system" (Kitsos, 1985, p. 279).

Energizing Effects of the Energy Crisis

At the same time that the coastal management program development effort was underway, the national energy crisis was taking shape. The two were closely linked because of the large potential offshore oil and gas reserves. Under the 1953 Outer Continental Shelf Lands Act (PL 83-212), the DOI manages the outer continental shelf (OCS) extending seaward from the 3-mile territorial sea which is the boundary of the coastal zone. Following the 1973 OPEC oil embargo, President Nixon directed the DOI to greatly expand OCS leasing, moving it beyond the Gulf of Mexico, in an effort to increase energy independence. Because of the potential onshore and coastal waters environmental impacts of OCS development, the coastal states were alarmed about this increase.

Their fears were not calmed by a 1975 U.S. Supreme Court ruling in United States v. Maine that the federal government has sole jurisdiction over resource development beyond the 3-mile limit. States were excluded from OCS development decisions and from any bonuses or royalties from offshore leasing.

The 94th Congress waded into the coastal energy issue on two fronts, taking up both a CEIP amendment to the CZMA to help coastal states address the effects of OCS leasing, exploration, and development, and an OCS revenue sharing bill to give coastal states a cut of the federal

revenues from offshore production (Kitsos, 1985, p. 279). The OCS revenue sharing bill failed, but the CEIP approach succeeded. The Senate and House both passed bills (S. 586 and H.R. 3981) and the conference committee went to work. After intense negotiation with the Administration, a compromise CEIP measure was passed in 1976 and President Ford signed PL 94-370, the CZMA Amendments of 1976.

Inspired by the crisis atmosphere and some dramatic projections of potential impacts, the 1976 Amendments made radical changes in the CZMA. They stated that the national objective of greater energy self-sufficiency would be advanced by federal financial assistance to meet state and local needs resulting from new or expanded energy activity in the coastal zone. To this end they created the CEIP with authorized appropriations of $1.2 billion (including $.8 billion for loans over 10 years and $.4 billion for grants over 8 years), along with increases in other CZMA activities of $20 million for interstate grants, $40 million for research and technical assistance, $24 million for estuarine sanctuaries, and $100 million for beach access. And they raised the federal share of grants from two-thirds to 80 percent. The total authorization was a whopping $1.664 billion. With this major funding increase in the 1976 Amendments, coastal management gained the potential to become a "big money" program (Kitsos, 1985, p. 280), although congressional representatives did not expect actual CEIP appropriations to reach the $1.2 billion authorization level. And as it turned out, the support for CEIP waned quickly after the end of the seventies (not to reappear until the next energy crisis at the end of the 1980s).

The 1976 Amendments also tried to straighten out the issue of the states' role in OCS development, requiring OCS leasing to be consistent with approved state coastal management programs. (However, the U.S. Supreme court in a 1984 decision, Secretary of Interior v. California, was to rule that consistency provisions only covered actual development, not leases.) And they provided for a mediation process to resolve federal/state disagreements of state coastal management programs. Almost unnoticed were some procedural changes, which both eased and complicated the planning process (Matuszeski, 1985, p. 269). Planning funds were extended for 3 years; total planning grants were limited to 4 years unless "preliminary approval" was granted; segmented approval of a portion of a state's coastal zone was allowed (which would be used in New Jersey and New Hampshire); and new planning requirements were added for beach access, energy facility siting, and shoreline erosion (Sections 305(b)(7)(8)(9)).

Defining Program Approval Standards

The OCZM had requested that the program be reauthorized by Congress in 1976, a year earlier than required under the initial 5-year authorization. This reauthorization was made a part of the 1976 Amendments. As a result of the 1976 reauthorization debate, federal CZM officials realized that time was running out on the planning funds and that they needed to define a clear process for "approval" of state programs so that the states could enter the "administration" or implementation phase (Matuszeski, 1985, p. 269). In retrospect, it is surprising that the formal regulations were issued so late, with the original program development regulations published in 1977 and program approval regulations published in 1978. However, as Matuszeski (1985, p. 269) points out, in 1976 the federal staff did not have enough experience with the results of the state planning efforts to be able to match them against the very general CZMA requirements and the unhelpful CZMA program organization options (direct state control, state review of local programs, and state review of local decisions). They had to deal with how to approve a state program that relied on local coastal plans before the local plans were completed and how to judge whether a "networked" state program created from linking existing state laws and programs rather than creating a new coastal management statute would be sufficient in scope, specificity, and enforceability. What this came down to was a careful case-by-case review of each unique state program.

The Washington state program was the first to be approved, in 1976. By the end of 1979, when the funding for the program development effort under Section 305 expired, 19 programs had been approved, creating the start of a national network of operating coastal management programs. Another group of seven programs was approved in 1980 (see Table 1).

Table 1. APPROVED STATE COASTAL ZONE MANAGEMENT PROGRAMS

| PARTICIPATING STATE OR TERRITORY | PROGRAM APPROVED | PARTICIPATING STATE OR TERRITORY | PROGRAM APPROVED |
|---|---|---|---|
| Washington | 1976 | Delaware | 1979 |
| Oregon | 1977 | Alabama | 1979 |
| California | 1978 | South Carolina | 1979 |
| Massachusetts | 1978 | Louisiana | 1980 |
| Wisconsin | 1978 | Mississippi | 1980 |
| Rhode Island | 1978 | Connecticut | 1980 |
| Michigan | 1978 | Pennsylvania | 1980 |
| North Carolina | 1978 | New Jersey (remaining section) | 1980 |
| Puerto Rico | 1978 | Northern Marianas | 1980 |
| Hawaii | 1978 | American Samoa | 1980 |
| Maine | 1978 | Florida | 1981 |
| Maryland | 1978 | New Hampshire | |
| New Jersey | | (ocean & harbor segment) | 1982 |
| (bay & ocean shore segment) | 1978 | New York | 1982 |
| Virgin Islands | 1979 | Virginia | 1986 |
| Alaska | 1979 | New Hampshire | |
| Guam | 1979 | (remaining section) | 1988 |

| NONPARTICIPATING STATES | DATE OF ACTION |
|---|---|
| Illinois | withdrew 1978 |
| Minnesota | withdrew 1978; developing program 1990 |
| Ohio | withdrew 1980; developing program 1990 |
| Georgia | not approved 1980 |
| Indiana | withdrew 1981 |
| Texas | withdrew 1981 |

Program Development Funding

The program development phase was limited to 3 years in the initial Act. This was extended to 4 years in the 1976 amendments to the Act, and could be stretched out for two more years under the preliminary approval provisions of Section 305(d) (Matuszeski, 1985, p.274). In all, the program development phase extended from FY 1974 through FY 1979. Program development grants to states under Section 305 during that period totaled $69.72 million. (See Table 2 for an overview of program development funding.)

Table 2. CZMA PROGRAM DEVELOPMENT FUNDING ($ 000)

| SECTION | FY74 | FY75 | FY76 | TQ | FY77 | FY78 | FY79 | TOTAL |
|---|---|---|---|---|---|---|---|---|
| 305 | 7,199 | 8,991 | 14,892 | 2,832 | 15,356 | 9,351 | 2,291 | $60,912 |
| 305(b)(7)(8)(9) | -- | -- | -- | 64 | 1,988 | 309 | 450 | 2,811 |
| 305(d) | -- | -- | -- | -- | 1,159 | 2,385 | 2,453 | 5,997 |
| TOTAL | | | | | | | | $69,720 |

(305—program development; 305(b)(7)—beach access, (8)—energy facility siting, (9)—shoreline erosion; 305(d)—program not yet finally approved)
Source: OCRM, 1988-a

In 1978, Congress enacted the OCS Lands Act Amendments (PL 96-464), which included changes to the CEIP. Appropriations procedures were adjusted and authorizations for OCS formula grants were increased from $50 million per year to $130 million per year and from 8 years to 10 years. Appropriations for the formula grants never reached their authorization level, but they grew to $27.7 million in 1980.

Early Program Evaluations

Given the staying power of the CZMA for some 18 years over dramatically changing coastal issues, today it is somewhat ironic to look back at the number of times that the future of the program has been characterized as "uncertain". In 1976, the U.S. General Accounting Office (GAO) issued its report, The CZM Program: An Uncertain Future, in connection with the re-authorization hearings. The GAO report questioned the role of NOAA as "the state's friend" in the program development process, and in response some observers believed that NOAA became less collaborative and more directive (Lowry, 1985, p. 295). The 1979 report by the Office of Coastal Zone Management, The First Five Years of Coastal Zone Management: An Initial Assessment, was more optomistic. It stated that all 35 eligible states and territories had participated in the program and that 13 state programs had been approved during the first 5 years of the Act. Noting that it is too early to expect full scale results, the report nevertheless said that the coastal management effort is "beginning to make a difference". Looking ahead to the 1980 reauthorization debate, the report identified significant accomplishments in resource protection, development management, recreational access, and improved government decision-making. A parallel assessment by the House Oceanography Subcommittee declared that the basic provisions and concepts incorporated into the Act 8 years ago remain sound and the "partnerships which have developed between the Federal Government and state and local governments have been responsible for many of the successes in coastal management" (U.S. Congress, 1980).

As the decade drew to a close, the CZMA appeared to be off to a good start. President Carter designated 1980 as "The Year of the Coast", although the DOC sent a CZM reauthorization bill to Congress that would begin to decrease program funding in light of federal budgetary problems. In commenting on the Administration's bill, the Chairman of the House Subcommittee on Oceanography of the Committee on Merchant Marine and Fisheries, Congressman Gerry Studds, remarked, "I guess you cannot see the coast from the Rose Garden." (U.S. Congress, 1980. p.1900) As the coastal program entered its implementation years, it began to meet with mixed

signals. Looking back, one veteran congressional coastal staffer characterized the period from 1975 to 1980 as the "halcyon years" and noted that the CZM bubble burst quickly after the inauguration of President Reagan (Kitsos, 1985, pp. 279-82).

## COASTAL PROGRAM IMPLEMENTATION: EFFECTS OF A HOSTILE ADMINISTRATION 1980-1988

The implementation period of a federal program is the "payoff", when the hopeful declarations of policy are measured against the realities of practice. The coastal program had the bad fortune to enter its implementation period under the cloud of a hostile Administration bent on deregulation of private enterprise in every area of public policy and of a president who previously had specifically opposed coastal management as governor of California. Not only did the Reagan Administration propose to phase-out federal financial support for the CZM and CEIP programs beginning in 1982, it staunchly opposed funding the program throughout President Reagan's two terms. And it sought to increase the OCS leasing program through actions by Interior Secretary James Watt.

On the other hand, the coastal program was fortunate in its federated structure, which placed the major implementation responsibility in the hands of the participating coastal states. Not only were these states ready to carry out program implementation, they also were willing to support continuation of the federal program by Congress. The collaborative philosophy adopted by the federal coastal planners in the early years generated solid continuing working relationships with the coastal states. Even though some believed that the federal officials became more directive after the 1976 reauthorization debates (Lowry, 1985, p. 295), the direction of the program was by then solidly structured around the individual state programs and their perceptions of what should be done to manage their coastal zones. With this continuing base of state support, Congress continued to reauthorize and support CZMA through the 1980s.

### The Second Reauthorization Hurdle

The 96th Congress passed the Coastal Zone Management Improvement Act of 1980 (PL 96-464), which was aimed at guiding the implementation process. This Act added a new finding that demands for food, energy, minerals, defense needs, recreation, waste disposal, transportation, and industrial activities are creating the need for resolution of conflicts among competing uses and values in coastal and ocean waters. In order to provide more specific criteria for state coastal managment efforts and to recognize the cooperative nature of the program under which states implement national objectives, the Act declared a new national policy defining nine areas of national interest that states must address:

1. natural resource protection,
2. hazards management,
3. major facility siting,
4. public access for recreation,
5. redevelopment of urban waterfronts and ports,
6. simplification of decision procedures,
7. coordination of affected federal agencies,
8. public participation, and
9. living marine resource conservation.

In the 1980 Act, Section 312, Review of Performance was amended to require written assessment of the extent to which a state has addressed the national interest needs and to provide for reduced funding if significant improvement is not made in achieving them. The Act also declared a national policy to encourage the preparation of special area management plans

providing for increased specificity in protecting natural resources, reasonable coastal-dependent economic growth, protection of life and property in hazardous areas, and predictability in governmental decision-making. It added a new title, Section 306A, authorizing resource management improvement grants funded at $20 million per year for 5 years to help states finance low-cost construction projects, preserve fragile coastal areas, redevelop waterfronts and ports, and provide public access to the shore. And it provided CEIP grants to mitigate environmental or recreational losses from coal shipment facilities.

The Companion Coastal Act: CBRA

In 1982, Congress passed another law affecting the coastal zone but not part of the existing coastal management program, the Coastal Barrier Resources Act of 1982 (CBRA). In a major departure from past federal policy, the Act used the removal of federal financial assistance and flood insurance as leverage to curb public losses associated with development of undeveloped coastal barriers (Godschalk, 1987). Its passage was the result of an unusual coalition of environmentalists and fiscal conservatives within the budget-cutting environment of the 97th Congress (Kitsos, 1985, p. 283). Administration of CBRA is the responsibility of the DOI, which has continued to revise its coverage and definitions of undeveloped barriers. By placing CBRA under DOI, as well as having federal flood insurance administered by the FEMA and maritime water quality under the Environmental Protection Agency (EPA), some believe that the necessary integrated response to comprehensive coastal management was unduly fragmented.

Progress Toward a Coastal Network

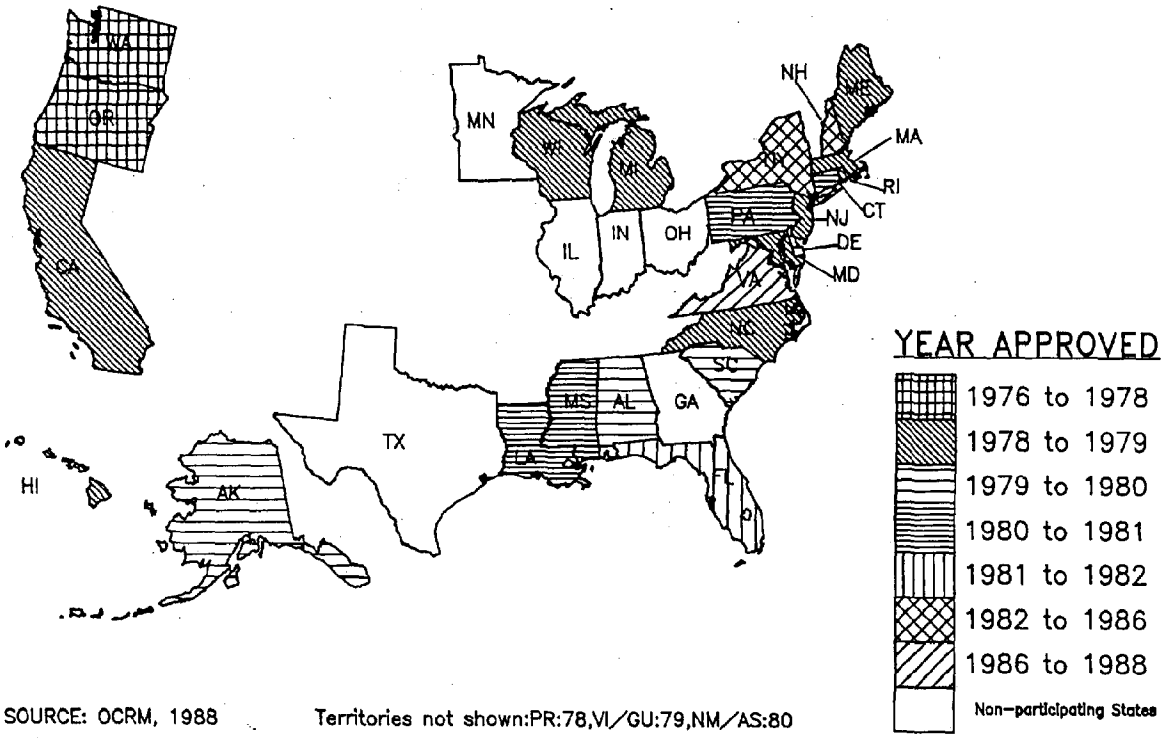
During the 1980s, the total number of approved programs increased to 29, with the addition of Florida in 1981, New York and New Hampshire (ocean and harbor segment) in 1982, Virginia in 1986, and the remaining section of New Hampshire in 1988. (See Figure 1.) Of the 35 eligible states and territories, 6 elected not to participate. Nonparticipants included the Great Lakes states of Ohio, Indiana, Minnesota, and Illinois, as well as Georgia and Texas.[2] Ohio did not enact necessary state legislation; Indiana did not establish the new organizational structure required for implementation: Minnesota withdrew as a result of opposition from two rural counties, but has continued with harbor management plans; the Illinois state legislation failed to pass; Georgia was found to be not making satisfactory progress toward program approval; the Texas coastal program was withdrawn by the Governor (Coastal States Organization, 1985). Even with the six nonparticipants, it appeared on the surface that the coastal program was prospering during the 1980s but underneath a sea change was taking place.

According to Mitchell (1986, p. 319), the early 1980s were "watershed years" for U.S. coastal management. Although few of the basic laws were significantly amended, the advent of the Reagan Administration's markedly different policies made important changes. The Reagan Administration sought to reduce federal spending and the scope of federal government and to develop natural resources to increase the country's economic independence. It declared that the need for a federal role in coastal management had ended, terminated federal activities such as technical assistance, proposed that Congress appropriate no money for 306 grants, and sought to have the states take responsibility for coastal management.[3] Mitchell believes that the Reagan Administration policies profoundly changed the U.S. coastal program, weakening the federal Office of Ocean and Coastal Resource Management (formerly the OCZM) to the point that it no longer provided vigorous national leadership.

Mid-Course Evaluations

Other evaluations echoed concerns about coastal program problems. A 1986 GAO report summarizing previous coastal program evaluations listed a number of problems, including:

## Figure 1. Participating and Non-participating Coastal States in the Federal Coastal Zone Management Program




SOURCE: OCRM, 1988 Territories not shown:PR:78,VI/GU:79,NM/AS:80

1. delays in implementing coastal management plans,
2. failure to use appropriate evaluation guidelines and criteria,
3. many staff vacancies and high turnover rates among program managers,
4. poor communications between Federal and State offices,
5. inadequate follow-up on corrective actions, and
6. various types of bureaucratic infighting.

The impact was not limited to the federal coastal agency. The GAO report surveyed the states and territories participating in CZMA and found that termination of federal funding would cause six to end their programs and would bring significant reductions in the activities of the others.

In a 1985 special issue of the Journal of the American Planning Association, state program managers reported on some of the best coastal programs, those in North Carolina (Owens, 1985), California (Fischer, 1985), and New Jersey (Kinsey, 1985). Each describes dwindling interest and commitment at the state level. Mitchell (1986) attributes this decrease in the dynamism of coastal government agencies to the impact of an abrupt change in government ideology that trickled down from Washington, DC.

A second major factor affecting coastal management was the radical change in policies governing leasing of federal OCS lands to private companies which took effect in 1983. During 1983 and 1984, an additional 270 million acres were opened to competitive bidding, and some 14 million acres were newly leased, more than had been leased in the previous 8 years (Mitchell, 1986, p. 333). This was accompanied by a 1984 Supreme Court ruling in Secretary of Interior v. California that OCS leases were not subject to consistency requirements under the CZMA because the act of leasing did not directly affect the coastal zone, as did oil and gas development activities. The Court majority declared that the 1972 Congress did not intend that Section 307(c)(1) should cover OCS lease sales, "finally putting to rest a controversy that in many ways diverted energy and attention away from the substantive goals and achievements of the federal-state cooperative scheme" (Wolf, 1985, p. 19). Yet at the same time, the market for leasing declined, reflecting a fall in world oil prices, continuing state opposition, unsuccessful explorations, and lengthy legal diversions.

In 1984, OCRM issued its Biennial Report to Congress on Coastal Zone Management: Fiscal Years 1982 and 1983, as required under Section 316 of CZMA as amended. This report discussed the allocation of funds in response to the 1981 Administration proposal to phase-out federal financial support for the CZM and CEIP programs beginning in 1982, when they were deemed sufficiently successful to be returned to the states. In 1982, Congress reprogrammed $33 million from the Coastal Energy Impact Fund for final state CZM grants and $7 million for final CEIP grants. In 1983, Congress appropriated $7 million for CZM grants. According to the report by OCRM (1984, p. 17), the situation was not entirely negative (a view not shared by program supporters in Congress or the coastal states):

> "During the period of phase down of Federal funds, the states have modified the structure of their staffs and emphasized the maintenance of a strong core program. Changes have included reducing the number of staff, transferring staff to other funding sources, and requiring individual staff members to diversify their areas of responsibility. Resources have been directed toward basic program functions such as permitting, monitoring and enforcement, and coordinating and consolidating agency activities. States have not concentrated on expanding state capabilities and initiating innovative programs...Despite some areas of conflict, relationships between the states and the Federal agencies continue to improve. In part this progress resulted from greater state attention as programs evolved from the development into the implementation phase. The recognition of common goals and the need to simplify government processes also contributed to this trend. Finally, the expertise which

several of the states developed in coastal problems, such as those mentioned above, encouraged the Federal agencies to look to the states for advice."

The Third Reauthorization

The Administration recommended rescinding the 1985 state grant appropriations, but Congress continued funding for Section 306 grants. And in 1986, the 99th Congress passed the Coastal Zone Management Reauthorization Act of 1985 (PL 99-272). This Act kept the coastal program alive but put it on an increasingly strict diet. Administrative grant matching ratios were reduced to four to one (from the previous five to one or 80 percent) in FY 1986, 2.3 to one in FY 1987, 1.5 to one in FY 1988, and one to one (50 percent match) thereafter. The Act also renamed estuarine areas as National Estuarine Reserves and created the NERRS under Section 315.

Cumulative Program Funding

As national expenditures go, the coastal program has not been a big spending effort. Cumulative federal funding from the first grants in FY 1974 through FY 1988 for all elements of the coastal program has amounted to less than $696 million. (See Table 3.) The largest amount, some 49 percent, has been allocated to Program Administration, encompassing the activities by the states to implement their approved coastal programs. The next largest amount, about 34 percent, has gone to the CEIP. Program Development, the phase in which the states designed and enacted their coastal management program, received 10 percent of the overall funding for the period. Estuarine Reserves received just under 5 percent. And modest amounts of less than 1 percent of the total were allocated to Interstate Coordination, Research and Technical Assistance, and P.L. 92-532, the Marine Protection, Research, and Sanctuaries Act of 1972.

Table 3. Coastal Program Expenditures, Fiscal Years 1974-1988. (OCRM, 1988-a)

| Section | | Amount | Percent of Total |
|---|---|---|---|
| 305 | Program Development | 69,720 | 10.02 |
| 306. | Program Administration (Implementation) | 341,477 | 49.08 |
| 308 | CEIP | 239,217 | 34.38 |
| 309 | Interstate Coordination | 4,208 | 00.60 |
| 310 | Research & Technical Assistance | 236 | 00.03 |
| 315.1 | Estuarine Reserves | 33,589 | 04.83 |
| P.L.92-532 | (Marine Sanctuaries) | 6,733 | 00.97 |
| Total (does not add due to rounding) | | $695,775 | |

Progress Assessments

One way to assess the progress of the coastal program is to compare its costs and benefits over its lifetime to other possible uses of the federal funds allocated to it. For example, it is tempting to make comparisons with the costs of various pieces of expensive military hardware or with the success of other national programs, such as air quality, in meeting mandatory national standards. Rather than make such possibly spurious comparisons, this research has instead focussed on the accomplishments of the coastal program and on the relative importance of the coastal zone to the U.S. economy. By these measures, the $696 million invested in the coastal

program over its first 14 years has generated remarkable returns, motivating 29 states to design and carry out far-ranging coastal management efforts in the coastal counties where some 31.7 percent of the 1985 U.S. Gross National Product (GNP) originated and where 59 percent of the nation's population growth between 1980 and the year 2000 is expected to occur. And the participating coastal states are matching the federal grants, at least dollar for dollar and in some cases more, with their own state funds. At this macro scale, the coastal program's relatively small federal funding "carrot", coupled with its willingness to let the states design programs to fit their individual situations, has produced a very active intergovernmental coastal management partnership.

Another way to assess the programs' progress in dealing with coastal problems is to review the way that states spent their implementation funding relative to the national priorities declared by Congress. Looking at the use by the states of their federal program grants, a great variety of allocations is evident. Table 4 shows the amounts and percentages of state program implementation funds allocated to a set of seven national interest areas (aggregated from the nine areas specified in the 1980 Act) for the six FYs between 1982 and 1987, the latest period for which data was available. Not unexpectedly in a program dedicated to resolving coastal interagency and private sector conflicts, the largest expenditure category, totaling some 39 percent, was improved government decision-making. Second highest, at about 28 percent, was natural resource protection. Public access was the third highest category at about 11 percent. Urban waterfront redevelopment, hazard mitigation, and natural resource development were grouped together in fourth place, at between 6 percent and 8 percent each. And ports and marinas expenditures were the smallest, at about 2 percent.

Table 4. State Allocation of CZMA Program Implementation Funds to National Interest Areas, 1982-1987 (1982 Constant Dollars)

| Item | Dollars | Percent |
|---|---|---|
| Improved Government Decision-Making | 73,930,076 | 38.88 |
| Natural Resource Protection | 52,796,776 | 27.76 |
| Public Access | 20,034,997 | 10.54 |
| Urban Waterfront Development | 14,259,697 | 7.50 |
| Hazards Mitigation | 13,969,763 | 7.35 |
| Natural Resource Development | 11,933,415 | 6.28 |
| Ports and Marinas | 3,237,976 | 1.70 |

Source: Compiled from OCRM data

A 1988 report by OCRM documented a number of successful projects carried out by the 29 federally-approved state coastal management programs. This report described accomplishments in terms of the nine national interest areas under the CZMA. For each area, the problem was identified and specific benefits ascribed to state CZMA projects, following the format of a similar 1985 report by the CSO. This framework, also to be utilized in the new 1989 Section C-Annual Report of Performance, provides decision-makers with a more structured way to evaluate the funding priorities of state programs relative to national policies. In the past, it has been difficult to assess the central trends in state coastal program spending and the relationship of state to federal priorities.

Interstate Coordination

In addition to the 306 Program Administration grants, states have received other funding related to specific elements of the CZMA. The CEIP and estuarine reserves programs are discussed in later chapters. One other program element is Interstate Projects, which were authorized under Section 309 of the 1976 amendments to the CZMA, in order to improve coordination between neighboring coastal states and between federal and state agencies. Section 309 authorizes grants to any group of two or more states under an interstate agreement or compact or temporary planning and coordinating entity. (See Table 5 for funding summary.) The intent of Congress is to provide incentives and mechanisms to improve interstate planning efforts and to reduce the likelihood of conflict between Federal and state managers of the coastal area. Examples of recent interstate projects are:

- the Long Island Sound Dredged Materials Management Plan involving Connecticut and New York state,
- the Comprehensive Regional Ocean and Coastal Resource Management and Planning project involving California, Oregon, Washington, and Alaska;
- the Habitat Requirements for Chesapeake Bay Living Resources project involving Maryland, Virginia, and Pennsylvania; and
- the Controlling Toxic Pollution in the Great Lakes project involving Illinois, Indiana, Michigan, Minnesota, Ohio, New York, Pennsylvania, and Wisconsin.

Table 5.
309 Project Funding Through Fiscal Year 1989 By Region ($000)

| | |
|---|---|
| North Atlantic | $1.076.4 |
| Pacific | 1,419.6 |
| South Atlantic/Gulf | 1,443.5 |
| Great Lakes | 729.3 |
| Chesapeake Bay | 350.3 |
| Total | $5,019.1 |

Source: OCRM, nd.

REASSESSING THE COASTAL PROGRAM:
FORGING AN ARENA FOR THE NINETIES 1988-1990

Looking back on the implementation of the CZMA during the 1980s, it is clear that the program continued to function despite the impact of a hostile Administration. Even those critics who judge that the governmental sector of the coastal field has become less dynamic, more fragmented, narrower in application, and less innovative, find that active coastal management initiatives continue within individual federal agencies and states. They see a balancing expansion of the roles of nongovernmental organizations, such as scientific and conservation groups. And they identify a new intellectual phase of coastal management marked by greater breadth of vision in which "coastal scholars and managers are beginning to ponder fundamental choices among contrasting management philosophies, interrelationships among coastal and marine management, links between coasts and the broader canvas of the global environment, and ways of developing more effective, flexible partnerships between public and private sectors" (Mitchell, 1986, p. 345).

In looking to the future, coastal interests currently advocate maintaining the national coastal program, but broadening and strengthening it. At a 1989 meeting of national coastal and estuarine program managers (OCRM, 1989, p. 3), the Assistant Administrator of the National Ocean Service supported reauthorization and pointed out that it will have to consider issues of coastal pollution, sea level rise, wetlands loss, hazards, and significant program improvements. Others cautioned about the uncertain potential for increased federal CZM appropriations and about regaining consistency authority over OCS lease sales through legislation. There was agreement that coastal pollution and hazards issues provide a basis for reauthorization, if grass roots political support is forthcoming from the states, which seems likely.

The issues facing the coastal program were higlighted by a 1988 oversight report from the House Committee on Merchant Marine and Fisheries, entitled Coastal Waters in Jeopardy: Reversing the Decline and Protecting America's Coastal Resources, and by a 1990 report from the National Research Council, entitled Managing Coastal Erosion.

The 1990 Reauthorization

Congressional action on reauthorization of the coastal program in 1990 could have taken several forms. Congress could have simply continued the program on its present tack, incrementally or radically revised and strengthened it, built linkages between it and other environmental programs, or decided to terminate it. Termination was unlikely, in light of the program's record of achievement and its new found support from the Bush Administration, which reversed the Reagan policy and requested Congressional appropriations for state implementation of the coastal program and proposed its own bill to reauthorize the CZMA in 1990. During the pre-authorization debates, the most likely outcomes were either continuation or further strengthening and linking to other environmental programs.

The 101st Congress held hearings on a number of bills affecting coastal management, whose content illustrates the current issues under debate during the reauthorization period. The Report from the Committee on Merchant Marine and Fisheries (U.S. Congress, 1990) on H.R. 4450, Coastal Zone Act Reauthorization Amendments of 1990, lists eight coastal issues of the 1990s:

1. Coastal environmental protection problems emphasize the need for a stronger priority for maintaining the function of natural systems in the coastal zone, in light of impacts from pollution of beaches and coastal waters, continued growth in coastal population, and the potential for sea level rise in response to global warming.
2. Coastal pollution problems emphasize the need for improved coordination between coastal management of land use and coastal water quality, particularly nonpoint source pollution, to reverse the declining health of coastal waters.
3. Wetlands managment and protection problems emphasize the need for better mechanisms for managing and protecting coastal wetlands, in order to achieve the proposed goal of "no net loss" of the nation's remaining wetlands base.
4. Natural hazards management problems emphasize the need for more effective state and local measures to manage and deter development in hazard-prone areas through setbacks, limitations on infrastructure in hazard areas, and other techniques, whose value was highlighted by the impacts of Hurricane Hugo.
5. Public access problems emphasize the need for increasing the ability of the public to gain access to the shore as coastal population increases, through means such as purchase of land, low cost construction of boardwalks, and other methods.
6. Cumulative and secondary impacts problems result from the collective effects of various land and water using activities and from those indirect effects that do not result directly from the activity itself but have impacts on related resources, requiring new impact assessment approaches that do not look at individual projects in isolation or narrowly.

7. Coastal energy development problems emphasize the need for effective ways to site necessary coastal energy facilities while protecting the environment, especially in light of the high level of oil imports and the uncertainty about future Persian Gulf sources.
8. Federal consistency with state CZM programs problems center around the issues of whether oil and gas leases should undergo consistency review and what other activities "directly affect" the coastal zone, following the 1984 Supreme Court decision in Secretary of the Interior v. California that lease sales do not directly affect the coastal zone.

Other coastal resource issues in the 101st Congress included a possible reorganization to elevate coastal zone management to a higher position at NOAA and a search for alternate ways to fund both traditional and new coastal management programs. As Simmons (1990) points out, not all of these issues were addressed in a single bill, and several alternative approaches were proposed. Four bills focused on coastal management program approaches: H.R. 4030, H.R. 4450, H.R. 4438, and S. 1189. Three other bills added key roles for EPA in improving coastal water quality through the Clean Water Act, sometimes in combination with the CZMA: H.R. 2647, S. 1178, and S. 1179.

In the end, Congress adopted a comprehensive and innovative coastal management bill (including parts of H.R. 4030, H.R. 4450, and S. 1189, and identified as H.R. 4450), as part of the Omnibus Budget Reconciliation Act. Despite opposition from a number of cabinet-level federal departments, especially to the consistency-overturning provision, Congress passed the Coastal Zone Act Reauthorization Amendments of 1990, which made the following major changes to the CZMA of 1972.

1. Amended the federal consistency provisions (Section 307) in order to overturn the Supreme Court's 1984 decision in Secretary of Interior v. California, clarifying that all federal agency activities, in or outside the coastal zone, are subject to the consistency provisions of the CZMA if they affect natural resources, land uses, or water uses in the coastal zone.
2. Established a Coastal Zone Management Fund (under Section 308) consisting of CEIP loan repayments from which the Secretary shall pay for the federal administrative costs of the program and fund special projects, emergency state assistance, and other discretionary coastal management activities.
3. Reinstated program development grants (Section 305) by authorizing the Secretary to provide assistance to a state for development of a CZM program.
4. Set up the Coastal Zone Enhancement Grants Program (Section 309) to encourage each coastal state to continually improve its CZM program in one or more of eight areas: coastal wetlands management and protection; natural hazards management (including potential sea and Great Lakes level rise); public access improvements; reduction of marine debris; assessment of cumulative and secondary impacts of coastal growth and development; special area management planning; ocean resource planning, and siting of coastal energy and government facilities.
5. Authorized annual Walter B. Jones Awards (Section 313) to recognize individuals, local governments, and graduate students for outstanding accomplishments in coastal management.
6. Authorized appropriations for five years at increased levels.
7. Established a Coastal Nonpoint Pollution Control Program to require each state to develop a program to be implemented through the CZMA and Section 319 of the Clean Water Act, to protect coastal waters from nonpoint pollution from adjacent coastal land uses.

In addition to the reauthorization of CZMA, the 101st Congress passed an expanded version of the CBRA of 1982. The 1990 Coastal Barrier Improvement Act significantly expanded the coverage of the Coastal Barriers Resources System to include areas in the Florida Keys,

Puerto Rico, and the Virgin Islands, as well as areas of associated aquatic habitats, and secondary barriers, and authorized a joint study of options for future conservation of coastal barriers.

The breadth of topics in the 1990 coastal management and related bills illustrates the contemporary increase in concerns linked to coastal management. However, the historical perspective also shows that, along with the new issues of sea level rise and wetlands preservation, a number of the early issues, such as the parity of conservation and development, state versus national standard setting, impacts of coastal land use on water quality, coastal energy development, and relationships with other federal environmental agencies have resurfaced.[4] The 1990 reauthorization debates produced a clear consensus on the need for more effective coastal environmental protection; the challenge was one of creating consensus on the means to achieve it. The bold initiatives adopted by Congress showed their willingness to develop new and innovative means to make coastal management effective in the face of increasing challenges.

Directions for the Next Stage

Since its inception, the coastal program has been distinguished by its voluntary nature, using incentives instead of penalities to generate a federal/state/local partnership in which the states had considerable latitude to define their own priorities. As the program has matured, Congress has increasingly sought to focus it on more specific national interest areas. That effort was reflected in the delineation of eight coastal zone enhancement objectives in the adopted 1990 reauthorization amendments. It is likely that the nature of the partnership will continue to be an issue, with the coastal states seeking program flexibility and autonomy and the federal government seeking program focus and accountability. From this creative tension, as well as the longstanding tension between coastal conservation and development, future U.S. coastal management programs will evolve.

As the CZM program enters the 1990s, it clearly continues to be a dynamic and flexible vehicle for addressing coastal issues. While the institutional structure at the federal level remains split among several agencies and programs, the "coastal management" concept has proven powerful enough to facilitate coordination, albeit with some friction. A testament to the power and importance of the concept is its ability to survive two terms in the 1980s under a hostile administration and to retain a vital programmatic focus into the 1990s. As this review of its history has shown, the CZMA of 1972 has sired a unique and durable program whose life span already has exceeded that of many other intergovernmental planning initiatives. Given the extent to which its scope and resources have been enlarged by Congress during the 1990 reauthorization, coastal management should remain one of our premier intergovernmental environmental programs into the next century.

ENDNOTES

[1]The titles of Sections 301-306 were unchanged through the 1985 amendments. As of the 1985 amendments, changes in section titles and numbers included the following.

| Section | 1972 Act | 1976 Amendments | 1980 Amendments | 1985 Amendments |
|---|---|---|---|---|
| 306A | — | — | Resource Management Improvement Grants | |
| 307 | Interagency Co-ordination and Cooperation | Coordination and Cooperation | | |
| 308 | Public Hearings | Coastal Energy Impact Programs | | |
| 309 | Review of Performance | Interstate Grants | | |
| 310 | Records | Research & Technical Assistance for Coastal Zone Management | | Repealed |
| 311 | Advisory Committee | Public Hearings | | |
| 311A | — | — | Citizen Suits | |
| 312 | Estuarine Sanctuaries | Review of Performance | | |
| 313 | Annual Report | Records and Audit | | |
| 314 | Rules and Regulations | Advisory Committee | | Repealed |
| 315 | Authorization of Appropriations | Estuarine Sanctuaries and Beach Access | Estuarine Sancruaries and Island Preservation | National Estuarine Reserve Research System |
| 316 | — | Annual Report | Coastal Management Report | |
| 317 | — | Rules & Regulations | | |
| 318 | — | Authorization of Appropriations | | |

[2]In the 1990s, some nonparticipants have started to return to the fold. Approval of Ohio's program is listed as "pending" in the 1988-1989 Report to Congress on Coastal Zone Management (OCRM, 1990), and Minnesota is reported to be developing a coastal program.

[3]In response, the states undertook more national efforts, including strengthening the CSO from a small informal operation to an active Washington office with full-time staff members.

[4]Along with the earlier issues, some of the earlier players also are back on the scene. For example, Dr. John Knauss, who testified before Congress as the NOAA Administrator (Under Secretary for Oceans and Atmosphere in the Department of Commerce) in the recent hearings, also testified some 20 years ago on behalf of the original legislation as chair of the Stratton Commission's Panel on Coastal Zone Management, which originally brought coastal management to the forefront of national attention.

REFERENCES

American Law Institute. 1976. A Model Land Development Code. Philadelphia.

Brower, David J., and Daniel S. Carol. 1984. Coastal Zone Management as Land Planning. Washington, D.C.: National Planning Association.

Coastal States Organization. 1985. America's Coasts: Progress and Promise. Washington, D.C.

Fischer, Michael L. 1985. "California's Coastal Program: Larger-than-Local Interests Built into Local Plans". Journal of the American Planning Association 51,3.

Godschalk, David R. 1987. "The 1982 Coastal Barrier Resources Act: A New Federal Policy Tack". In Cities on the Beach: Management Issues of Developed Coastal Barriers, Platt et al, editors. University of Chicago, Department of Geography.

Kinsey, David N. 1985. "Lessons from the New Jersey Coastal Management Program". Journal of the American Planning Association 51,3.

Kitsos, Thomas R. 1985. "Coastal Management Politics: A View from Capitol Hill". Journal of the American Planning Association 51,3.

Knauss, John A. 1976. Testimony to House Merchant Marine and Fisheries Conference on Coastal Zone Management. In Legislative History of the CZMA of 1972. Washington, D.C.: Library of Congress, Congressional Research Service.

Lawrence, Samuel A. 1976. Testimony to House Merchant Marine and Fisheries Conference on Coastal Zone Management. In Legislative History of the CZMA of 1972. Washington, D.C.: Library of Congress, Congressional Research Service.

Lee, Martin R. (compiler) 1976. Legislative History of the CZMA of 1972. Washington, D.C.: Library of Congress, Congressional Research Service.

Lowry, Kem. 1985. "Assessing the Implementation of Federal Coastal Policy". Journal of the American Planning Association 51,3.

Matuszeski, William. 1985. "Managing the Federal Coastal Program: The Planning Years". Journal of the American Planning Association 51,3.

Mitchell, James K. 1986. "Coastal Management Since 1980: The U.S. Experience and Its Relevance for Other Countries". Ocean Yearbook. University of Chicago.

National Research Council 1990. Managing Coastal Erosion. Washington, D.C.

Office of Coastal Zone Management. 1979. The First Five Years of Coastal Zone Management. Washington, D.C.: National Oceanic and Atmospheric Adminstration.

Office of Ocean and Coastal Resource Management. nd. Summary of Interstate Projects Funded Under Section 309 of the CZMA. Washington, D.C.: National Oceanic and Atmospheric Adminstration.

Office of Ocean and Coastal Resource Management. 1984. Biennial Report to Congress on Coastal Zone Management: Fiscal Years 1982 and 1983. Washington, D.C.: National Oceanic and Atmospheric Adminstration.

Office of Ocean and Coastal Resource Management. 1988. Coastal Management: Solutions to Our Nation's Coastal Problems. Washington, D.C.: National Oceanic and Atmospheric Adminstration.

Office of Ocean and Coastal Resource Management. 1988-a. Summary of Financial Assistance Programs: FY 1974-FY 1988. Washington, D.C.: National Oceanic and Atmospheric Administration.

Office of Ocean and Coastal Resource Management. 1989. Proceedings of the National Coastal & Estuarine Program Managers' Meeting, March 20-22, 1989, Bethesda, Maryland. Washington, D.C.: National Oceanic and Atmospheric Adminstration.

Office of Ocean and Coastal Resource Managment. 1990. Biennial Report to the Congress on Coastal Zone Managment: Fiscal Years 1988 and 1989. Washington, D.C.: National Oceanic and Atmospheric Administration.,

Outdoor Recreation Resources Review Commission. 1962. Outdoor Recreation for America. Washington, D.C.

Owens, David W. 1985. "Coastal Management in North Carolina: Building a Regional Consensus". Journal of the American Planning Association 51,3.

President's Council on Recreation and Natural Beauty. 1968. From Sea to Shining Sea. Washington, D.C.

Public Land Law Review Commission. 1970. One Third of the Nation's Land. Washington, D.C.

Simmons, Malcolm M. 1990. "Coastal Resource Issues in the 101st Congress". Washington, D.C.: Congressional Research Service, Library of Congress.

Stratton Commission. 1969. Our Nation and the Sea. Washington, D.C.: U.S. Commission on Marine Science, Engineering and Resources.

U.S. Army Corps of Engineers. 1971. National Shoreline Study. Washington, D.C.

U.S. Congress, House Committee on Merchant Marine and Fisheries. 1990. Report to Accompany H.R. 4450, Coastal Zone Act Reauthorization Amendments of 1990. Washington, D.C.

U.S. Congress, House Committee on Merchant Marine and Fisheries. 1989. Coastal Waters in Jeopardy: Reversing the Decline and Protecting America's Coastal Resources. Washington, D.C.

U.S. Congress, House Committee on Merchant Marine and Fisheries. 1980. Hearings Before the Subcommittee on Oceanography on Coastal Zone Management. Washington, D.C.

U.S. Department of Interior. 1969. The National Estuarine Pollution Study. Washington, D.C.

U.S. Fish and Wildlife Service. 1970. National Estuary Study. Washington. D.C.: Department of Interior.

U.S. General Accounting Office. 1976. The CZM Program: An Uncertain Future. Washington, D.C.

U.S. General Accounting Office. 1986. Resource Management: Information on the Coastal Zone Management Program. Washington, D.C.

Wolf, Michael A. 1985. "Accommodating Tensions in the Coastal Zone: An Introduction and Overview". Symposium on Coastal Zone Management. Natural Resources Journal 25, 1.

Zile, Zigurds L. 1974. "A Legislative-Political History of the CZMA of 1972". Coastal Zone Management Journal 1, 3.

## APPENDIX.
## COASTAL ZONE MANAGEMENT ACT CHRONOLOGY

### PRECURSORS OF COASTAL MANAGEMENT: RECOGNITION OF THE RESOURCE CRISIS 1962-1971

1962 - Outdoor Recreation Resources Review Commission report, Outdoor Recreation for America, calls for public preservation of diminishing recreational shorelines

1966 - U.S. Commission on Marine Science, Engineering, and Resources (Stratton Commission) created by the Marine Resources and Engineering Development Act of 1966

1966 - The Clean Water Restoration Act of 1966 authorizes a comprehensive study of the effects of pollution in estuaries

1968 - President's Council on Recreation and Natural Beauty report, From Sea to Shining Sea, recommends public acquisition of shorelines

1968 - Estuary Protection Act directs Department of Interior to study nation's estuaries

1968 - American Law Institute issues Tentative Draft No. 1 of the Model Land Development Code (subsequently adopted in 1975 with provision for regulation of areas of critical state concern and developments of regional impact)

1969 - Stratton Commission issues final report, Our Nation and the Sea, recommending a federal act creating state coastal zone authorities funded by matching federal grants under the proposed National Oceanic and Atmospheric Administration

1969 - The report of the National Estuarine Pollution Study (under Clean Water Restoration Act of 1966) concludes that estuary protection should be part of a comprehensive coastal zone management system

1969 - Santa Barbara oil spill occurs.

1969 - Vice President Agnew, Chairman of the National Council on Marine Resources and Engineering Development, announces an Administration program in ocean sciences, including coastal zone management

1969 - Congress passes the National Environmental Policy Act (NEPA).

1970 - Department of Interior (under the Estuary Protection Act) issues National Estuary Study, concluding that estuaries are in jeopardy, describing management problems, and calling for a federal/state management system.

1970 - Public Land Law Review Commission issues final report, One Third of the Nation's Land, recognizing need to coordinate land use planning for federal and nonfederal lands.

1970 - Senator Henry Jackson introduces first national land use bill, the start of a flood of land use policy proposals which grew to over 200 before 13 Congressional committees by 1972, and which threatened to preempt the coastal management proposals.

1970 - National Oceanic and Atmospheric Administration (NOAA) created in the Department of Commerce under President's Reorganization Plan.

1971 - National Shoreline Study, authorized by 90th Congress in response to coastal erosion concerns, published.

PASSAGE OF 1972 COASTAL MANAGEMENT ACT:
STRUGGLE FOR PROGRAM CONTROL 1969-1972

1969 - Coastal management bills based on the Stratton Commission recommendations (an ocean development emphasis) introduced in the House (H.R. 13247) and Senate (S. 2802) as amendments to the Marine Resources and Engineering Development Act of 1966, during 91st Congress.

1969 - Coastal management bills based on the National Estuarine Pollution Study introduced in the House (H.R. 14845) and Senate (S. 3183) with Department of Interior as lead agency (a land use/conservation emphasis) and proposing to create a new section of the Federal Water Pollution Control Act

1970 - Coastal States Organization forms, as an unofficial adjunct of the National Governors Association.

1971 - Adminstration withdraws support for coastal management under Department of Interior in favor of a national land use policy.

1971 - Coastal management bills introduced in the House (H.R. 2492, 2493, 9229) and Senate (S. 582, 638) based on Stratton Commission recommendations, during 92nd Congress.

1972 - Senate passes coastal management act (S. 3507, a revision of S. 582, with NOAA as lead agency) and House passes an act (H.R.14146, an amendment of H.R. 9229 with Department of Interior as lead agency), during 2nd session of 92nd Congress.

1972 - House and Senate agree to conference committee recommendation (S. 3507) with implementation by Secretary of Commerce, and thus NOAA; Coastal Zone Management Act of 1972 authorizes $186 million appropriations for FY 1973-1977.

1972 - President Nixon signs CZMA of 1972 (PL 92-583), while expressing hope that Congress will next pass a national land use policy act with Department of Interior as lead agency and that a new Department of Natural Resources can be created to end fragmentation of federal programs.

STATE COASTAL PROGRAM PLANNING:
NATIONAL ENERGY CRISIS IMPACTS 1973-1980

1973 - NOAA Coastal Zone Management Task force created to inventory status of state coastal management, develop guidelines and regulations, coordinate federal agencies, and assess information needs.

1973 - Administration provides no funds for program during its first year.

1974 - First funding of the Act occurs with appropriation of $8.023 million (including $7.199 million for S ection 305 program development grants) for FY 1974.

1974 - First Section 305 program development grants made to 31 of 34 eligible states and territories.

1973-1974 - Arab oil embargo produces call for U.S. energy self sufficiency.

1975 - 93rd Congress passes Amendments of 1974 (PL 93-612), making minoradministrative changes and increasing authorization for appropriations by $27 million through 1977.

1975 - U.S. Supreme Court in United States v. Maine determines that federal government has sole jurisdiction over resource development beyond the 3-mile limit, excluding states from Outer Continental Shelf (OCS) development decisions and lease proceeds.

1975 - NOAA requests early reauthorization for the CZMA.

1975-76 - 94th Congress introduces a number of bills dealing with coastal energy concerns; Senate passes S. 586 and House passes H.R. 3981; conference committee agrees on amendments stating that the national objective of greater energy self-sufficiency would be advanced by federal financial assistance to meet state and local needs resulting from new or expanded energy activity in the coastal zone, creating a Coastal Energy Impact Program with authorized appropriations of $1.2 billion, requiring OCS leasing to be consistent with approved state coastal management programs, providing for a mediation process in case of federal/state disagreement over a state coastal program, increasing the federal CZM share from 66 2/3 percent to 80 percent, and authorizing additional funding for interstate grants, research and technical assistance, estuarine sanctuaries, and beach access.

1976 - President signs CZMA Amendments of 1976 (PL 94-370), stating that energy and environment issues would be of high priority in the future.

1976 - Washington state CZM program approved.

1976 - U.S. General Accounting Office issues report, The CZM Program: An Uncertain Future.

1977 - Oregon CZM program approved.

1978 - California, Massachusetts, Wisconsin, Rhode Island, Michigan, North Carolina, Puerto Rico, Hawaii, Maine, Maryland, and New Jersey (bay and ocean shore segment) CZM programs approved.

1978 - 95th Congress amends Act by adjusting appropriations procedures and increases authorized appropriations for section 308(b) coastal energy impact program grants and for section 308(c)(2) energy facility siting.

1979 - Virgin Islands, Alaska, Guam, Delaware, Alabama, and South Carolina CZM programs approved.

1979 - Section 305 program development funding expires, not reauthorized.

1979 - Office of Coastal Zone Management issues report, The First Five Years of Coastal Zone Management: An Initial Assessment, stating that all 35 eligible states and territories had participated in the program and that 13 state programs have been approved during the first 5 years of effort under the Act.

1980 - Louisiana, Mississippi, Connecticut, Pennsylvania, New Jersey (remaining section), Northern Marianas, and American Samoa CZM programs approved.

COASTAL PROGRAM IMPLEMENTATION:
EFFECTS OF A HOSTILE ADMINISTRATION 1980-1988

1980 - 96th Congress passes Coastal Zone Management Improvement Act of 1980 (PL 96-464), adding a new finding on the need for resolution of conflicts among competing uses and values in coastal and ocean waters; adding nine areas of national interest to be addressed by state programs; encouraging preparation of special area management plans linking natural resource protection and coastal-dependent economic growth; and adding section 306A, resource management improvement grants.

1981 - Administration proposes to phase-out federal financial support for the CZM and CEIP programs beginning in 1982.

1981 - Florida CZM program approved.

1982 - Coastal Barrier Resources Act of 1982 passed, withdrawing federal financial assistance and flood insurance to undeveloped coastal barriers.

1982 - New York and New Hampshire (ocean and harbor segment) CZM programs approved.

1984 - Supreme Court in Secretary of Interior v. California ends consistency requirements for OCS lease sales.

1984 - OCRM issues Biennial Report to Congress on Coastal Zone Management for FY 1982 and 1983, describing Congressional funding in response to Administration phase-out proposal and program activities.

1985 - National estuaries study/management program initiated by EPA, with $4 million appropriation and four demonstration sites: Narragansett, Buzzards Bay, Long Island Sound, and Puget Sound,

1986 - EPA initiates Near Coastal Waters Program to coordinate coastal water quality protection efforts.

1986 - Virginia CZM program approved, bringing approved programs to 29, with six non-participating states (Ohio, Indiana, Georgia, Minnesota, Illinois, Texas).

1986 - 99th Congress passes Coastal Zone Management Reauthorization Act of 1985 (PL 99-272), gradually reducing Section 306 administrative grant matching ratios from 80 percent federal to 50 percent federal after FY 1988 and creating a National Estuarine Reserve Research System.

1987 - Water Quality Act of 1987 adds Section 320 to establish National Estuaries Program within EPA.

1988 - New Hampshire CZM program (remaining section) approved.

REASSESSING THE COASTAL PROGRAM:
FORGING AN AGENDA FOR THE NINETIES 1988-1990

1988 - Committee on Merchant Marine and Fisheries issues oversight report, Coastal Waters in Jeopardy: Reversing the Decline and Protecting America's Coastal Resources.

1989-90 - Congress holds hearings on bills dealing with changes in the coastal zone management program, with special attention to marine and estuarine water quality.

1990 - National Research Council issues Managing Coastal Erosion.

1990 - 101st Congress passes Coastal Zone Act Reauthorization Amendments of 1990, strengthening federal consistency provisions, establishing a Coastal Zone Management Fund, reinstating program development grants for nonparticipating states, setting up a Coastal Zone Enhancement Grants Program, creating Walter B. Jones Awards, increasing authorized appropriations, and setting up a Coastal Nonpoint Pollution Control Program.

1990 - 101st Congress passess Coastal Barrier Improvement Act, expanding coverage of the Coastal Barrier Resources System.

## INTRODUCTION

The consistency provisions of Section 307 of the Coastal Zone Management Act (CZMA, 16 U.S.C. 1456) comprising the federal consistency doctrine have become well-known in recent years because of several highly-publicized controversies between state coastal managers and environmental organizations, on one side, and federal officials and industry, on the other, concerning sizable projects involving offshore oil and gas, at-sea incineration, and the disposal of dredge spoils. Unfortunately, the size and costs of these large scale coastal and ocean projects and the conflicts they have generated have tended to overshadow other elements of the federal-state consistency review process. Through many years, state and federal agency staff as well as applicants for federal permits have routinely used the consistency process to facilitate the successful review of thousands of projects affecting coastal resources and uses.[1]

Despite the fact that the consistency provisions of the CZMA have become generally known among the interests and actors concerned with coastal and ocean resource management, misunderstanding of the elements of the doctrine persisted, and more seriously, federal and state officials continued to disagree about its legal status throughout the 1980s.[2] Much of this misunderstanding and uncertainty, especially with respect to the activities of federal agencies, including the conduct of offshore oil and gas lease sales by the Department of the Interior (DOI), has been resolved as a result of the 1990 amendments to the CZMA, as discussed more fully below.

This chapter 1) considers the role of the federal consistency provisions, as amended by the Coastal Zone Act Reauthorization Amendments of 1990 in the context of the national coastal zone management program; 2) briefly describes the consistency appeals that have been decided by the Secretary of Commerce, and 3) examines the implementation of the consistency provisions by the states. As appropriate, the chapter addresses the legal issues described above.

## THE ROLE OF FEDERAL CONSISTENCY IN COASTAL MANAGEMENT

One very important, although often overlooked, aspect of the CZMA is its voluntary nature. Because states are not required to establish coastal management programs, their participation had to be secured by offering them 1) substantial federal financial assistance and 2) the promise that, if the states underwent the complicated program development and approval process prescribed in the federal Act to establish legally-enforceable standards and procedures to protect the coastal zone and its resources, federal agencies and permittees engaged in activities affecting the coastal zone would act consistently with such standards. This "promise" is of course the heart of the federal consistency provisions of the CZMA.

However, the federal consistency provisions are not so much an "incentive" to secure state participation, but an essential and significant component of a national program dependent upon state authority to protect coastal resources from the consequences of thousands of projects affecting such resources either conducted or permitted by federal agencies. Thus, rather than an afterthought added to the main features of the CZMA, federal consistency should be seen an integral part of national coastal management policy necessary to ensure its success. It is the single mechanism in the CZMA to ensure that the federal government itself obeys the law with respect to proper management of the coastal zone and its resources.

## THE CONSISTENCY PROCESS

The consistency review process applicable to the categories of federally-conducted, permitted, and assisted activities is discussed following.

Federal Agency Activities

Under Section 307(c)(1) of the CZMA, as amended (1990), activities conducted by federal agencies either "within or outside the coastal zone" that affect "any land or water use or natural resource of the coastal zone" must be carried out in a manner which is consistent "to the maximum extent practicable" with "the enforceable policies of approved state management programs." Section 307(c)(2) of the CZMA, applicable to federally conducted development projects "in the coastal zone" was amended to require compliance with "enforceable" state policies. Finally, the 1990 amendments clarify that all federal agency activities are subject to the provisions of Section 307(c)(1) unless they are subject to the provisions of Section 307(c)(2) (federal development projects in the coastal zone) or (c)(3) (federally permitted activities).

This category of activities proved to be the most controversial. For example, the DOI and the oil and gas industry during the late 1970s and 1980s opposed state claims to review oil and gas lease sales under the Outer Continental Shelf (OCS) Lands Act (43 U.S.C. 1801 et seq.) for consistency with state policies protective of coastal resources and uses thought to be affected by subsequent exploration and development activities on the leased tracts. In 1984, a sharply divided Supreme Court decided, based on a reading of the legislative history concerning the phrase "directly affecting" in section 307 (c)(1), that leasing of oil and gas tracts on the outer continental shelf offshore central California were not subject to state review under the CZMA even when the State objected to leasing of tracts located in or near sensitive marine habitat areas (Secretary of the Interior v. California, 1984). This decision has now been overturned by the 1990 amendments.

Despite the 1984 decision, the National Oceanic and Atmospheric Administration (NOAA) continued to interpret Section 307 (c)(1) to apply to the activities of federal agencies if they "directly affected" the coastal zone, regardless of the location of such activities. But other federal agencies including the Environmental Protection Agency (EPA) and the Army Corps of Engineers (COE) argued, on the basis of the 1984 decision, that their activities were precluded from state review, regardless of any effects on coastal resources and uses, if such activities occurred outside the boundaries of the coastal zone or if they are exempted by federal law.[3] In view of the 1990 amendments, these arguments are groundless.

Apart from disputes about the geographical scope of Section 307(c)(1) and whether certain federal activities are included under the section, there were relatively few disagreements between the states and federal agencies concerning other requirements of this section during the 1980s. For example, no serious questions have yet been raised about the process requirements of state review of federal agency activities or about the meaning of the phrase consistent "to the maximum extent practicable." With respect to the procedural requirements of Section 307(c)(1), it was agreed that federal agencies initially determined whether their activities "directly affected" a state's coastal zone (33 F.C.R. 930.33). Although the 1990 amendments deleted the qualifier "directly" from the phase "directly affecting," and clarified that the "effects" of interest are those on "any land or water use or natural resource of the coastal zone," it is clear that the burden remains on federal agencies to make the initial determination of the effects of their activities. A state coastal agency, however, may object to the determination by the federal agency, and, if the disagreement cannot be resolved informally or through mediation by the Secretary of Commerce, the state may seek to enjoin the federal agency from carrying out its activity on the ground that the activity is "inconsistent" with the state program (15 C.F.R. 930.116).

The 1990 amendments provide another mechanism to resolve disputes between federal agencies and coastal states under (c)(1). After a "final judgment" of a federal court "that a specific federal agency activity is not in compliance "with the provisions of 307(c)(1)(A), and if the Secretary certifies that mediation will not resolve the dispute, the Secretary may request the

President, in writing, to exempt from compliance "those elements of the Federal agency activity that are found by the Federal court to be inconsistent with an approved state program..." The President may authorize such an exemption if he finds that the activity "is in the paramount interest of the United States." The President, however, may not base any exemption on the ground of the lack of appropriations unless the President specifically requested such appropriations and Congress failed to make them (Section 307(c)(1)(B)). The 1990 amendments further clarify that federal agencies must provide consistency determinations to control states no later than 90 days before final approval of the federal agency activity unless both the federal and state agencies agree to a different schedule (Section 307(c)(1)(C)).

The few attempts to mediate (c)(1) consistency disputes between state and federal agencies have been unsuccessful, indicating at least a partial failure in the consistency review process envisioned by the Congress (NOAA, 1985). But no serious legal challenge to the other elements of this process has yet been brought; the federal court cases decided to date have all concerned challenges to the state's right under the CZMA to review a particular federal agency activity rather than challenges to aspects of the Section (c)(1) consistency review process (Eichenberg and Archer, 1987). In view of the 1990 amendments, the state's review authority under (c)(1) is no longer open to question.

With respect to the meaning of the phrase consistent "to the maximum extent practicable"—the standard of compliance with state policies that federal agencies must meet—NOAA and the coastal states have enforced the longstanding rule (since 1979) requiring federal agency activities to be "fully consistent" with state policies "unless compliance is prohibited based upon the requirements of existing law applicable to the Federal agency's operations" (15 C.F.R. 930.32(a)). The 1990 amendments do not affect this longstanding standard of compliance; indeed, they may be needed to support the existing standard.

In spite of the several, serious disputes between state and federal agencies concerning the consistency of particular federal activities with state coastal policies, little attention has been given until 1990 to clarifying the legal theory supporting state consistency review of federal agency activities under Section 307(c)(1). Some have argued that state exercise of federal consistency authority is "unconstitutional" or otherwise illegal, because the states have invaded the dominion of federal agencies committed to them by federal law and the Constitution (Whitney, et al., 1988). These arguments fail to consider that, in enacting Section 307 (c)(1) of the CZMA, Congress in effect waived the sovereign immunity of federal agencies with respect to activities affecting the coastal areas and resources—a technique to achieve legislative purposes that Congress has employed in many similar instances—and required federal agencies to subject themselves to the substantive and procedural standards of state coastal and environmental law. The 1990 amendments clarify the conditions of the 1972 waiver of sovereign immunity by incorporating a Presidential exemption mechanism with respect to inconsistent federal agency activities that are determined to be in the nation's "paramount interest". This language closely parallels the provisions of other federal law waiving the community of federal agencies vis-a-vis state substantive and procedural requirements (Archer, 1989).

Federally-Permitted and Assisted Projects and Activities

Under Section 307(c)(3)(A) and (B), federally-permitted activities, either "in or outside of the coastal zone," including outer continental shelf oil and gas exploration, development, and production activities, must be "consistent" with "enforceable" state program policies if they "affect" the land and water "uses" and resources of the coastal zone (16 U.S.C. 1456 (c)(3)(A) and (B), as amended). Permit applicants "certify" to the state that their projects are consistent with state policies; if the state determines that such projects are inconsistent, federal permits may not be issued, unless the Secretary of Commerce overrides the state's consistency

objection and authorizes the permit to be issued. (See 15 C.F.R. Subpart D, 930.50 et seq. (federal permits); Subpart H, 930.120 et seq. (administrative appeals); also see Eichenberg and Archer, 1988 for a complete description and analysis of the Section 307(c)(3) consistency review process).[4]

As in the case of Section 307(c)(1), OCS oil and gas activities have been the occasion for conflict between state agencies and the industry and DOI. Of the 21 consistency appeals to the Secretary of Commerce filed through 1987, 6 involved sizable exploration and development projects offshore California (Eichenberg and Archer, 1987). Although there have been disputes concerning other federally-permitted projects (10 appeals involved disputed COE permits), it is the body of early consistency appeals of state objections to offshore oil and gas projects that has helped to define the secretarial appeals process and to establish the standards according to which all consistency appeals may be decided (NOAA, 1985; Eichenberg and Archer, 1987; Archer and Bondareff, 1988). These administrative decisions have interpreted and applied the consistency appeals criteria set forth in the CZMA. The Secretary may override a state's objection after finding that the activity or project, although inconsistent with the state program, is 1) nevertheless consistent with the national objectives of the CZMA, or 2) is necessary in the interest of national security (16 U.S.C. 1456(c)(3) and (d)).

The statutory override criteria have been further defined by NOAA in its consistency regulations. To override on the first ground, the Secretary must find that the activity meets all of four separate tests:

(1) it must further one or more of the "competing national objectives" of the CZMA;

(2) its contributions to the national interest must outweigh its adverse individual and cumulative environmental impacts;

(3) it must not violate any standard under the Clean Air and Clean Water Acts, and

(4) there must be no "reasonable alternative" to the activity that would allow it to be conducted consistently with the state coastal policies (15 C.F.R. 930.121).

To override on the second ground, the Secretary must find that the activity "directly supports" national defense or other national security objectives or that such objectives, would be "significantly impaired" if the activity were not permitted to go forward as proposed (15 C.F.R. 930.122).[5]

The legal basis for state consistency review of applications for federal permits, and of proposed federal financial assistance projects, may be set forth briefly. Congress, which possesses sufficient authority under the U.S. Constitution to enact legislation regulating such areas as water quality, offshore energy exploration and production, and the filling of wetlands, may delegate to the states all or any part of such authority. As is well understood, such delegations have occurred under the Clean Water and Air Acts, as well as other federal laws.

Although federal agencies and some legal writers have argued that the CZMA does not authorize the states to impose requirements on applicants for federal permits in addition to those imposed by other federal law (Whitney, et al., 1988), it is clear that the CZMA's consistency provisions (Section 307 (c)(3)) are in fact a delegation of authority by the Congress to the states, and that states may effectively prohibit the issuance of federal permits for activities that are inconsistent with state program policies developed under the CZMA and approved by the Secretary of Commerce.

STATE IMPLEMENTATION

The only comprehensive study of state implementation of the federal consistency provisions of the CZMA was prepared by the Office of Ocean and Coastal Resource Management (OCRM) in NOAA and published in draft form in 1985. The Federal Consistency Study consists of three volumes of data and information, including summaries of comments of state and federal officials and individuals describing the experience of implementing the federal consistency doctrine over many years. In addition, the Study focuses attention on state review of more than 8,300 federally-conducted or permitted activities during fiscal year 1983, and provides the following summary table:

The data from federal agencies show that for FY 83:

-States concurred with about 93 percent of the approximately 400 direct federal activities reviewed under Section 307(c)(1) (including OCS lease sales which were reviewed during FY 83 only);

-States concurred with about 82 percent of the approximately 5,500 federally licensed and permitted activities reviewed under Section 307 (c)(3)(A) (nearly 5,000 of which were COE dredge and fill permits);

-States concurred with about 99 percent of the nearly 435 plans for OCS exploration (POEs) and development and production (DPPs) reviewed under Section 307(c)(3)(B); and

-States concurred with 99.9 percent of the nearly 2,000 federal assistance proposals reviewed under Section 307(d) (NOAA, 1985, Vol. I at i).

Based on the findings of the Federal Consistency Study, NOAA concluded that even in cases when a state program objected to a proposed project of activity:

objections were often resolved by further negotiations to develop conditions or mitigating measures. In a relatively few cases in which a state objected, the issues were litigated, appealed to the Secretary of Commerce under the CZMA, or resolved by Congressional intervention (NOAA, 1985, Vol. I at i).

The Federal Consistency Study also examined the time periods for categories of state consistency reviews:

First, states often request extensions of the 45-day review period for direct federal activities and, in a number of cases, the consistency review required more than 60 days. In nearly all cases examined in which the consistency review lasted more than 60 days, the state and federal agencies were able ultimately to reach an agreement. Second, most federally licensed and permitted activities were reviewed within 90 days (90-100 percent) although the CZMA allows a maximum of 180 days to review Federal licenses or permits under Section 307(c)(3)(A) and (B). Also, NOAA compared the time required to review OCS plans by Louisiana and California.

In both states, the relatively less complicated POEs took less time to review than DPPs. The average review period for POEs was 25 days in Louisiana and 31 days in California. The average review period for DPPs was 46 days in Louisiana and 116 days in California (NOAA, 1985, Vol. I at i-ii).

As a result of this comprehensive study, NOAA concluded that the consistency review

process was working reasonably well, and no specific legislative fixes were required (NOAA, 1985, Vol. I at ii).

A 1988 study of state implementation of the federal consistency provisions during 1987 by researchers at the University of Hawaii updated the findings of NOAA's 1985 Federal Consistency Study and assessed the relationship between state coastal management agencies and their federal counterparts and the overall effectiveness of the federal consistency review process (Lowry, et al., 1988). In addition to the questions posed in the earlier study with respect to the categories and numbers of federal activities reviewed by state coastal agencies, state officials were asked to describe their relationships with specific federal agencies and to indicate any changes over the previous 5-year period, to judge the effectiveness of consistency review in ensuring that state coastal policies have been adequately considered, and to determine the strengths and weaknesses of the consistency review process.

The results of the 1988 study, although limited to fewer states than surveyed in the national study, substantially support the findings of the earlier study with respect to the types and numbers of consistency reviews. In 1983, coastal states ultimately concurred with about 99 percent of all federal activities reviewed; in 1987, they concurred with about 97 percent. As in 1983, the greatest number of objections involved Corps of Engineers dredge and fill permits, which made up the largest category of federal activities reviewed in both years (63 percent). The 1988 findings clearly indicate an increasing effort by the coastal states to modify projects involving dredge and fill activities. In 1987, states agencies sought to impose additional conditions on 30 percent of the projects subject to review (17 percent in 1983), and used their consistency authority in an attempt to enforce compliance (Lowry, et al., 1988, at 5-10).

State coastal agency officials rated their relationships with federal agencies generally "good" or "fair". Among the states surveyed, the following agencies received "excellent" or "good" ratings: the National Marine Fisheries Service, the Office of Ocean and Coastal Resource Management, Fish and Wildlife Service, Corps of Engineers and the Environmental Protection Agency. The Department of Transportation's Federal Highway Administration received the lowest ratings. Practically all states surveyed found a definite trend toward improvement in federal-state agency interactions under the CZMA during the 5-year period preceding the study (Lowry et al., 1988, at 17-18).

State officials rated the consistency review process as highly effective in securing federal compliance with state coastal policies, particularly with respect to dredge and fill activities, less so with respect to offshore oil and gas exploration and drilling plans (Lowry et al., 1988, at 19-20). "Enhanced" state involvement in federal coastal and ocean resource management decisions was cited as the main strength of the consistency review process. Identified weaknesses included short time limits for consistency reviews, inadequate information for determining consistency of federal activities, problems in enforcing "conditional concurrences," disagreements regarding the consistency review process, and the burdens of technical analysis and paperwork to carry out the review process (Lowry et al., 1988, at 21).

## CONCLUSION

The past decade has demonstrated that the federal consistency provisions are not merely an appendage of the main body of coastal management practice in the United States, but constitute an essential mechanism for securing the compliance of federal agencies and permittees with legally-enforceable state coastal policies. Federal agencies, facilities, and projects all have major impacts on coastal areas and resources. There are, by one count, an estimated 20,000 federal facilities in the United States, many of them located in the coastal zone. These facilities are the source of substantial pollution to their surrounding environment (Breen, 1985).

By law, all federal facilities are excluded from the coastal zone. The federal consistency doctrine ensures that federally-conducted activities, wherever they occur, must be consistent with state policies if they affect the coastal zone and its resources.

With respect to federally-permitted activities, the Federal Consistency Study amply documents the number, if not the magnitude, of such activities affecting coastal areas and resources. Except for the federal consistency provisions, such activities would be carried out with little or no regard for state coastal policies.

The Federal Consistency Study is currently the only reliable source of information regarding state practice in implementing the CZMA's consistency provisions. It tells a generally successful story of this implementation record. Further, the body of consistency decisions by the Secretary of Commerce has filled in the regulatory outlines of the consistency process as provided by the Act and its regulations. These decisions appear to strike a balance between state interest under the CZMA and coastal programs, and national economic and security interests. On the record of these decisions, it is clear that development projects in the coastal zone are subject to state coastal management policies and requirements, and may be substantially modified at the insistence of the states to conform to these requirements. None of the Secretary's consistency decisions has yet been appealed to federal court.

The 1990 amendments settled many questions that arose from the 1984 Supreme Court decision in Secretary of the Interior v. California. First, the specific holding in that decision was overturned, as discussed above, and OCS oil and gas lease sales are once again subject to state review. In addition, the amendments make clear that federal agency activities both "within or outside the coastal zone" are covered by, and that no federal agency activity is exempted from, the requirements of the CZMA's federal consistency doctrine. Finally, the provision of a Presidential exemption mechanism for inconsistent federal agency activities that are determined to be in the nation's "paramount interest" provides additional support for the view that the Congress has waived the sovereign immunity of federal agencies with respect to their activities subject to the CZMA's federal consistency doctrine.

ENDNOTES

[1]According to the only comprehensive study done of state implementation of the federal consistency provisions of the CZMA, in FY 83 state coastal programs reviewed more than 8,300 federally-conducted, permitted or assisted activities and projects affecting the coastal zone for consistency with their coastal policies (Office of Ocean and Coastal Resource Management, Nat'l Ocean Serv., Nat'l Oceanic and Atmospheric Administration, "Federal Consistency Study - Draft," 1985 (hereafter Federal Consistency Study) I at i).

[2]Conflicting views were held by federal agencies themselves. The Raegan Administration Department of Justice adopted an especially jaundiced view of state consistency authority, and stated opinions contradictory to NOAA's consistency regulations and to the Agency's implementation of federal consistency. For example, in the dispute between the states of South Carolina (which has a coastal program) and Georgia (which does not) over a development project in the Savannah River, NOAA supported South Carolina's claim to conduct a consistency review of the project based on the substantial effects on its coastal zone. The Army COE and Justice supported Georgia, and Justice stated that the CZMA "provides no strong sense that Congress intended to allow NOAA...to be the ultimate arbiter of such interstate conflicts" (Letter to NOAA General Counsel from Donald A. Carr, U.S. Dept. of Justice, April 27, 1989; see Archer and Eichenberg, 1989).

In a memorandum prepared by the Department of Justice addressing the proposed expansion of the U.S. territorial sea to 12 miles, the Department also discussed the effects of such an extension on existing federal law, including the CZMA. With respect to whether state consistency authority extended to activities seaward of the coastal zone, Justice stated its view that Section 307(c)(1) and (3) of the CZMA, as originally enacted in 1972, did not apply to activities seaward of the coastal zone (U.S. Dept. of Justice Memorandum for the Legal Adviser, Presidential Proclamation to Extend the Territorial Sea," (October 4, 1988, p. 33). Justice's 1988 opinion directly contradicted both the 1979 and current NOAA consistency regulations (15 C.F.R. 930.33 and 930.53) as well as the Department's 1979 opinion which held that OCS lease sales were subject to state consistency review (see U.S. Dept. of Justice Advisory Opinion (April 20, 1979)).

[3]See COE's proposed rules governing the discharge of dredged material in U.S. and ocean waters, in which COE argues that it need only be consistent with state coastal policies when the discharge would occur "within the coastal zone" (51 Fed. Reg. 19,694, 19,699 (1986)); also see Memorandum from Acting Assistant Administrator for Water, EPA, entitled "Coastal Zone Management Act Consistency Provisions and Designation of Ocean Dumping Sites under Section 102(c) of Ocean Dumping Act" (October 23, 1989), in which EPA states that it does not necessarily assent to the view that the consistency provisions require it to be consistent with state programs, but that EPA will determine the consistency of its proposed site designations with state programs "as a matter of policy."

[4]Federal financial assistance projects to state and local governments must also be "consistent" with state coastal policies, and federal funds for such a project may not be granted unless the state concurs in the consistency of the project (16 U.S.C. 1456(d) and 15 C.F.R. Subpart F, 930.90 et seq.).

[5]The Secretary has not yet relied on the "national security" criterion to override a state consistency objection.

REFERENCES

Archer. Resolving Intergovernmental Conflicts in Marine Resource Management: The U.S. Experience. Ocean and Shoreline Management. 12(3):253-269; 1989.

Archer; Knecht. The U.S. National Coastal Zone Management Program—Problems and Opportunities in the Next Phase. Coastal Management. 15(2):103-120; 1987.

Archer; Bondareff. Implementation of the Federal Consistency Doctrine—Lawful and Constitutional: A Response to Whitney, Johnson and Perles. The Harvard Environmental Law Review. 12(1):115-156; 1988.

Breen. Federal Supremacy and Sovereign Immunity Waivers in Federal Environmental Law. Environmental Law Reporter. 15:10326-10332; 1985.

California Attorney General Memorandum. The Effect of the Presidential Proclamation Extending the Territorial Sea to 12 Miles on the Obligations of the California Coastal Commission. 1989. p. 24.

Eichenberg; Archer. The Federal Consistency Doctrine: Coastal Zone Management and 'New Federalism'. Ecology Law Quarterly. 14(1):9-68; 1987.

Hancock v. Train, 426 U.S. 179 (1976).

Lowry; Jarman; Maehara. Federal-State Coordination in Coastal Management: A Study of the Federal Consistency Provisions of the CZMA. Unpublished Sea Grant Study. Honolulu: University of Hawaii. 1988

NOAA. Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. Federal Consistency Study -Draft. Three Vols; 1985.

Secretary of the Interior v. California, 464 U.S. 312 (1984).

Whitney, et al. State Implementation of Coastal Zone Management Consistency Provisions: Ultra Vires or Unconstitutional? The Harvard Environmental Law Review. 12(1):67-114; 1988.

## INTRODUCTION

The estuaries of the United States are recognized as one of our nation's most valuable natural features. Until passage of the Coastal Zone Management Act (CZMA) of 1972, however, there were no federal laws to regulate development and exploitation of this fragile ecotype (Wright, 1987). The coastal zone management initiative recognizes that coastal resources management must embrace land and water issues jointly and concurrently. "It is clear that land, or "dryside", developments can have a strong effect on water, or "wetside", resources" (Clark and McCreary, 1987). History has shown that some of the most controversial coastal management issues involve controlling "dryside" impacts. One of the CZMA's primary goals was to bring "dryside" land development under control through a joint land-use regulatory undertaking with the states (Clark and McCreary, 1987).

"While the coastal management program was thought to have a good potential for success in "dryside" control, neither Congress nor any of the outside proponents believed that adequate protection for research estuaries could be guaranteed by regulation" (Clark and McCreary, 1987). At the same time, there was a growing need for more and more information regarding the functions and processes of estuarine ecosystems, and human's effects on them, but fewer and fewer undisturbed or non-polluted estuarine areas remained for scientific study and public education. (Division of Coastal Management, 1985). In response to these issues, Congress established the National Estuarine Sanctuary Program. The primary purpose of the program, now renamed the National Estuarine Reserve Research System (NERRS), was to forestall ecological degradation of certain estuaries, and to encourage long-term scientific research in these field "laboratories." Today, the program also has a strong emphasis on public education, helping to provide citizens with an opportunity to acquire knowledge, skills, values, and attitudes concerning the protection of estuaries.

## LEGISLATIVE HISTORY OF THE NATIONAL ESTUARINE RESERVE RESEARCH SYSTEM (NERRS)

### Section 315 of the CZMA of 1972, as Amended

The NERRS was created by Section 315 of the CZMA of 1972 (PL 92-583). Provisions under Section 315 authorized the Secretary of Commerce to, "Acquire, develop, or operate estuarine sanctuaries, to serve as natural field laboratories in which to study and gather data on the natural and human processes occurring within the estuaries of the coastal zone" (16 U.S.C. 1461, 1972). The intent was to maintain a representative sample of unique natural areas in "near-baseline" conditions (Clark and McCreary, 1987). In addition, under the 1972 Act, the program was to, "Acquire lands to provide for access to public beaches and other public coastal areas of environmental, recreational, historical, aesthetic, ecological, or cultural value, and for the preservation of islands" (16 U.S.C. 1461, 1972). To accomplish these goals, the Secretary was authorized to make financial assistance awards on a 50-50 basis to coastal states (including the Great Lakes). The grant funds were to be used for planning, acquisition, and the first 5 years of managing the approved sanctuaries.

### Section 303 of the Coastal Zone Management Improvement Act of 1980

In regards to the Estuarine Sanctuaries, Section 303 of the Coastal Zone Improvement Act (CZIA) of 1980 (P.L. 96-464) contained a few minor alterations to the language of the original bill. Perhaps the most striking change in respect to the NERRS program involved the amendments to Section 303 of the original CZMA. This Section (16 U.S.C. 1452), also known as the "Congressional Declaration of Policy", included guidelines that the coastal states must follow in their respective coastal programs. The first provision called for, "The Protection of natural

resources, including wetlands, floodplains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat, within the coastal zone" (16 U.S.C. 1452, 1980). In addition, the guidelines provided each state with, "Assistance to support comprehensive planning, conservation, and management for living marine resources..." (16 U.S.C. 1452, 1980). Clearly, these guidelines directed states to give a priority to the protection of estuarine areas. With this amended Declaration of Policy, Congress had voiced its support for the mission of the Estuarine Sanctuary Program.

The Clark Report ("Assessing the National Estuarine Sanctuary Program")

In 1974, NOAA published guidelines for selection and operation of sanctuaries and for the operation of the Estuarine Sanctuary Program (ESP) (Clark, 1982). To aid in the selection of sites, the NOAA guidelines contained a biogeographic classification system (BGC) which defined 11 "types" of estuarine ecosystems including a brief description of each. Based on the BGC classification, the first 12 sites were selected (Clark, 1982).

In 1981, the Office of Coastal Zone Management (OCZM) commissioned John Clark (1982) to evaluate the 1974 BCG system and make specific recommendations. Clark added 27 biogeographical subcategories termed Regions to the original 11 ecosystem classifications, and suggested a typology classification to be used for site evaluation and selection which considered estuary characteristics that were not related to regional locations. This two-tiered approach allowed for "regional differentiation" as well as ensured a "variety of ecosystems" for the ESP.

Section 6041 of the Coastal Zone Management Reauthorization Act of 1986

While the original goal of the ESP was to acquire, develop, and operate estuarine areas as natural field laboratories, the Coastal Zone Reauthorization Act of 1986 (PL 99-272) added a new emphasis to the Program—that of education—deleted the nonfunded section for barrier island acquisition, and changed the name of the program to the NERRS. The 1986 Act also called for revisions of the procedures for selecting, designating, and operating Estuarine Sanctuaries, as suggested in the "Clark Report." In addition, a new preacquisition framework was included, whereby eligible states could apply for awards to aid in selecting an estuarine sitein conformity with the classification scheme and typology in site selection. The 1986 reauthorization language emphasized, for the first time, the research value of a site. An area can be designated a National Estaurine Research Reserve if the Secretary of Commerce finds, among others, that "the area is a representative estuarine ecosystem that is suitable for long-term research and contributes to the biogeographical and typological balance of the System. That is why it was renamed to National Estuarine Research Research System.

Site Description

Clark defined an Estuarine Sanctuary as, "A research area which may include any part or all of an estuary and any island, transitional area, and upland in, adjoining, or adjacent to such estuary, and which constitutes to the extent feasible, a natural unit, set aside to provide scientists and students the opportunity to examine, over a period of time, the ecological relationships within the area" (Clark, 1982). Currently, there are 18 established Reserves in the NERRS protecting approximately 262,000 acres of estuarine lands. This figure represents less than 20 percent of the total number of estuaries in this country. Table 1 lists the NERRS sites by region.

In addition to the 18 Reserves now in the system, new sites are proposed in Maryland (two components), South Carolina (two reserves); Virginia (four components); the St. Lawrence River Basin, Delaware (two components); San Francisco Bay, and major expansions proposed at Rookery Bay, Maryland and North Carolina. The goal of the NERRS is to establish and manage

a system of reserves representing different coastal regions and estuarine types that exist in the United States and its territories. The completed NERRS will include a site representing each of the nation's biological and geographic coastal regions (Wright, 1987). Clark believed that to fulfill this goal the NERRS should contain a total of at least 27 sites (Clark, 1982).

Table 1. National Estuarine Reserves, 1990

| | Name and Location | Designated | Area (Acres) Land & Water |
|---|---|---|---|
| **Designated Estuarine Reserves** | | | |
| 1 | South Slough, Oregon | 1974 | 4,700 |
| 2 | Waimanu Valley, Hawaii | 1976 | 3,600 |
| 3 | Sapelo Island, Georgia | 1976 | 5,905 |
| 4 | Rookery Bay, Florida | 1978 | 8,400 |
| 5 | Apalachicola, Florida | 1979 | 193,758 |
| 6 | Elkhorn Slough, California | 1980 | 1,330 |
| 7 | Padilla Bay, Washington | 1980 | 2,564 |
| 8 | Narrangansett Bay, Rhode Island | 1980 | 2,626 |
| 9 | Old Woman Creek, Ohio | 1980 | 543 |
| 10 | Chesapeake Bay, MD (Monie Bay only) | 1981 | 3,426 |
| 11 | Jobos Bay, Puerto Rico | 1981 | 2,800 |
| 12 | North Carolina (3 components) | 1982 | 4,639 |
| 13 | Tijuana River, California | 1982 | 2,150 |
| 14 | Hudson River, New York | 1982 | 4,130 |
| 15 | Wells, Maine | 1984 | 1,550 |
| 16 | Weeks Bay, Alabama | 1986 | 3,028 |
| 17 | Waquoit Bay, Massachusetts | 1988 | 2,199 |
| 18 | Great Bay, New Hamshire | 1989 | 6,129 |
| Subtotal Designated Reserves | | | 253,477 |
| **Additional Components and Expansions of Existing Reserves in Progress** | | | |
| 4 | Rookery Bay (expansion | 1990-91 | 142,000 |
| 10 | North Carolina (Masonboro) | 1990 | 5,046 |
| 12 | Maryland (Otter Creek) | 1990 | 700 |
| | (Jug Bay) | 1990 | 722 |
| 14 | Hudson River | 1990 | 402 |
| Subtotal Expansions and New Components | | | 148,870 |
| **New Reserves in Development** | | | |
| 19 | Ches. Bay, VA (York River) | 1990 | 5,403 |
| 20 | Delaware Bay, Delaware | 1991 | 13,000 |
| 21 | A.C.E. Basin, SC | 1991 | 15,802 |
| 22 | North Inlet, SC | 1989 | 8,000 |
| 23 | Lake Ontario/St. Lawrence, NY | TBD | 5,000 |
| 24 | San Francisco Bay, CA | TBD | TBD |
| Subtotal New Reserves | | | 191,205 |
| **TOTAL ALL SITES** | | | 593,552 |

Source: NOAA 6/15/90

Acquiring NERRS Funds and Funding Levels

Funding appropriations for the NERRS are designed to accomplish numerous objectives. NOAA is authorized to make 50 percent grants to coastal states to help defray the costs associated with the designation and operation of the reserves. Three types of grants are available: 1) the preacquisition award, for site selection and draft management plan preparation; 2) the acquisition and development award, for land acquisition, minor construction activities (such as nature trails and boat ramps) and program development, and 3) the operation and management award, for assistance in implementing the research, educational, and administrative programs that are detailed in the individual research reserve management plans. Any coastal state with laws that afford long-term protection to estuarine resources is eligible for the matching grants. At the conclusion of federal financial assistance, funding for the long-term operation of the reserve becomes the state's responsibility (Jarman, 1987).

Following a "start-up" appropriation of $4,000,000, funding levels during the initial stages of the program (FY 1975-1978) remained below $2 million. Because the program was new, it took most of the coastal states a few years "start-up" time to begin their Estuarine Research Reserve programs. As more and more states began their programs, funding levels began to increase. Beginning in FY 1979, funding levels approached $3 million, and they remained at this level during most of the 80s although there were some fluctuations. Funding finally broke the $3 million level in 1990 with a $3.49 million appropriation.

Research Programs

Although protection of estuaries is a primary goal of the NERRS, many estuaries are part of a multiple-use system where natural resources are used as well as studied. In order to stimulate high-quality research within designated estuaries, the Office of Ocean and Coastal Resource Management's Marine and Estuarine Management Division (MEMD) provides limited financial support for research in the NERRS. Funds are available on a competitive 50 percent matching basis to any university, qualified public or private research institution, or coastal state to conduct estuarine research. Each reserve management plan specifies priorities and outlines research needs within its system. In addition to these site-specific needs, NOAA announces annual research opportunities for each fiscal year. A phased monitoring program was started in 1989. Phase I concerns site characterization. Phase II is the development of a site profile document. Phase III is a long-term monitoring program.

Education Programs

Educational programming at the Reserves creates a direct link between estuarine scientists and the public. A variety of classes, guided walks, and workshops are offered at the Reserves and are available to schools from kindergarten through college level (OCRM, 1987). Specifically, the 1985 Coastal Zone Management Reauthorization Act authorized the award of grants for educational and interpretive activities, including: design, development, and distribution/placement of educational media; development and presentation of curricula, workshops, lectures, for on-site facility and field use; extension/outreach programs; and creative and innovative methods for implementing interpretive or educational projects (Federal Register, 1988).

CONCLUSION

Estuaries are among the most biologically productive systems on earth. The NERRS was originally conceived to protect natural estuarine areas as laboratories for teaching and research. The program has certainly accomplished this mandate, currently 18 Reserves protect over 262,000 acres of estuarine acreage. Each of these Reserves has its own character and flavor, a

reflection of local commitment to the program. Although legal provisions for the management and protection of estuaries are diverse and often complex, progress is being made toward protecting these important coastal wetlands. More recently, the reserves have served purposes other than protection; some sites in the reserve program have become models for testing innovative combinations of land regulation, purchase of public land, and resource management to protect a single ecosystem (Clark and McCreary, 1987).

With the passage of the Reauthorization Act of 1985, education and research became the primary goals of the program. The reserves are operating long-term scientific and educational programs that provide information for coastal management decision making. The education programs involve a diverse group of individuals, including students. By providing a healthy atmosphere for learning now, future leaders will be able to enact responsible decisions concerning the protection of the environment in later years.

It is difficult to assign a cost/benefit value to the NERRS. Perhaps the most important service provided by it cannot be measured in dollars and cents. In the long run, the most valuable contribution will be to set aside extremely important areas that people now tend to take for granted. Future generations—both human and animal—will be able to enjoy estuaries in their natural state, free from the changes caused by growth and development.

REFERENCES

Bureau of Coastal Zone Management. Apalachicola National Estuarine Research Reserve Draft Management Plan. Florida Department of Environmental Management, Tallahassee, Florida. 1988. 363 p.

Clark, J.R. Assessing the National Estuarine Sanctuary Program: A report to the Office of Coastal Zone Management. The American Littoral Society. Highlands, New Jersey. 1982. 54 pp.

Clark, J.R.; S.C. McCreary. Special Area Management at Estuarine Reserves. In: Managing Land-Use Conflicts. eds. D.J. Brower and D.S. Carol. North Carolina: Duke University Press; 1987. 323 p.

Division of Coastal Management. Annual Report: North Carolina National Estuarine Sanctuary Program. N.C. Department of Natural Resources and Community Development, Raleigh, North Carolina. 1983. 106 p.

Estuarine Protection Office. NOAA Estuarine Research Development Plan. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Washington, D.C. 1987. 18 p.

Federal Register. 15 C.F.R. Part 921, National Estuarine Sanctuary Program Regulations: Final Rule. 49(125): 26502-26520; 1984, June 27.

Federal Register. 15 C.F.R. Part 921, National Estuarine Research Reserve System Regulations: Proposed Rule. 53(209):43816-43828; 1988, October 28.

Jarman, M.C. Alternatives to fee simple acquisition of property for estuarine reserves. In: Coastal Zone '87. Proceedings of the Fifth Symposium on Coastal and Ocean Management. eds. O.T. Magoon, H. Converse, D. Miner, L.T. Tobin, D.Clark, and G. Comurat. (1):161-169; 1987.

Knox, G.A. Estuarine Ecosystems: A Systems Approach. Volume 1. Boca Raton, Florida: CRC Press, Inc; 1986. 198 p.

Livingston, R.J. Resource atlas of the Apalachicola Estuary. Florida Sea Grant Report No. SGR-55. Gainesville, Florida. 1983. 64 p.

McClusky, D.S. The Estuarine Ecosystem. New York: John Wiley and Sons; 1981. 225 p.

National Oceanic and Atmospheric Administration. National Estuarine Inventory Data Atlas, Volume 2: Land Use Characteristics. U.S. Department of Commerce, Washington, D.C. 1987. 33 p.

Office of Ocean and Coastal Resource Management. Bulletin: Research opportunities in the National Estuarine Research Reserve System. Marine and Estuarine Management Division, Department of Commerce. Washington, D.C. 1987. 2 p.

Office of Ocean and Coastal Resource Management. Bulletin: Education opportunities in the National Estuarine Research Reserve System. Marine and Estuarine Management Division, Department of Commerce. Washington, D.C. 1987. 2 p.

Sadler, L.A. Suggestions on the development of estuarine sanctuary education programs. In: Proceedings of the workshop on the National Estuarine Sanctuary Program, October, 1979. eds. J. Zinn and H. Neuhauser. Office of Coastal Zone Management, Department of Commerce. Washington, D.C. 1982. 119 p.

Sullivan, J.K.; J.H. Falk. Perspectives in estuarine sanctuaries. In: Proceedings of the workshop on the National Estuarine Sanctuary Program, October, 1979. eds. J. Zinn and H. Neuhauser. Office of Coastal Zone Management, Department of Commerce. Washington, D.C. 1982. 119 p.

Taggert, J.; E.A. Blair. Opportunities in the National Estuarine Research Reserve System. Unpublished Bulletin. 1988. 4 p.

Wright, G. The National Estuarine Reserve Research System: A Review. Natural Areas Journal 7(2):75-78; 1987.

16 U.S.C. 1452. 1972.

16 U.S.C. 1461. 1972.

## INTRODUCTION

On July 26, 1976, after intense debate and compromise between Congress and the Administration, President Ford signed Public Law 94-370, the Coastal Energy Impact Program (also known as the Coastal Zone Act Amendments of 1976, or "1976 Amendments"). The amendments addressed the concern voiced by members of Congress that coastal states needed assistance in the form of grants and loans to address the effects that OCS leasing, exploration, and development had on their coastal zones. The bill as signed included a provision, on the Adminis-tration's insistence, that the grants would be issued only if a state had used up its loan funds.

At the time of its passage, many believed that the CZMA, strengthened by the CEIP amendments, would become an important national resource management program (OCZM, 1976; Kitsos, 1985). At the time of its passage, the program enjoyed broad-based support. A diverse mix of special interest groups lobbied for the bill's passage and testified during the Congressional hearings.

Simply stated, the purpose of the CEIP was to provide financial assistance to meet the needs of coastal states and local governments which result from energy activity affecting the coastal zone. Coastal energy activity was defined in the CZMA to include: (1) Outer Continental Shelf (OCS) energy activity; (2) any transportation or processing of liquefied natural gas; and (3) any transportation, transfer, or storage of coal, oil, or natural gas (OCZM, 1976).

## CEIP PROJECTS

The CEIP was unique among federal programs because it allowed considerable discretion by state and local governments in identifying the problems that local communities faced in overcoming OCS oil and energy activities and establishing the priorities for projects to be funded. There was a lot of flexibility in the program, and to most, this was a plus. The CEIP was designed to be adaptable because OCS activities presented a multitude of potential impacts on the coastal zone. More importantly, energy related impacts and concerns varied by region.

The CEIP was designed to be able to address the impacts of energy facility siting as well as the impacts that would become evident as energy activities increased. Given the varied methods of obtaining appropriations, the range of CEIP projects receiving funding was very broad. Eligible community development projects included planning or funding for roads, libraries, schools, hospitals, parks, police, jail facilities, police cars, and fire equipment.

The CEIP funded many unusual projects, but in addition to that, the CEIP was a unique program because it involved a lot of state, federal, and local cooperation to complete these projects. The program stressed innovative solutions and approaches to problems, and was a model of how local, state, and the federal governments can work together by funding various programs and activities to meet national, state, and local objectives (Mylroie, 1979). By the late 70s, there were few vocal critics of the program. The CEIP enjoyed broad-based support, and it was associated with two issues of national importance, energy independence and environmental quality. It appeared that the CEIP would certainly become a permanent addition to the federal coastal management programs; however, less than three years later the program effectively ended. The question is, why?

## THE END OF THE CEIP

Although the CEIP began in 1976, there was little movement regarding the program until 1978. The CEIP originated in a national and political climate that was changing rapidly. In retrospect, the CEIP was a short-lived program that was gaining popularity as it was ending.

Although the 1978 Amendments to the Outer Continental Shelf Lands Act (OCSLA) significantly increased the CEIP formula grant funding levels, and despite the fact that the authorization period for these grants was extended, there was virtually no demand from the states for CEIP credit assistance. This lack of demand was based in part upon the program's high interest rates. Another, perhaps larger, reason for this lack of demand was that many of the anticipated impacts from OCS activities had not materialized.

As state interest in CEIP funds began to wane, so too did the administration's support for the program. During the Carter years, formula grants appropriations decreased in the budget proposal, and there were no new funding requests for the CEIP in the budget. Clearly, the CEIP was a program that seemed to be reaching the end of its legislative life.

The 1980 presidential election provided the final component that was needed to end the CEIP. During the campaign, Ronald Reagan promised severe federal budget cutting measures. Once elected, one of his first targets was the coastal zone management program, specifically the CEIP. The OMB justified the termination of the program because the original "boom-and-bust" cycle never materialized. Budget cuts of previously allocated CEIP loan funds effectively ended the CEIP program, and in the subsequent fiscal years funds remaining in the CEIP treasury were rescinded or dispersed by Congress. It is hard to assign an exact date as to when the CEIP ended; for all practical purposes, the program ended in fiscal year 1983. In the three following years, some loan payments continued to reach the program and were dispersed to states for previously accepted grant proposals, but the administrative staff was dismantled and reassigned to other OCZ offices.

## CONCLUSIONS

The CEIP was a short lived program, and the majority of its existence was spent in start up time. By the time the appropriations were awarded and the results of the funding became visible, the program had ended. Because the CEIP program was young, it did not have time to develop an entrenched bureaucracy or powerful constituency, therefore, it was an easy target for budget cutting. More importantly, the issue that was the central focus of the CEIP, the "energy crisis", faded from the public psyche. As the gas lines disappeared from the media's scrutiny, so too, dissolved the nation's concern for energy independence and conservation. Ironically, many of the OCS energy activities that were controversial during the CEIP's existence are still being debated today; witness California, North Carolina, and New Jersey.

## REFERENCES

Coastal Zone Management: 9(2). J.R. Botzum and R. Jacobius, eds. Washington, D.C.: Nautilus Press; January 11, 1978. 6p...

Coastal Zone Management: 10(3). J.R. Botzum and R. Jacobius, eds.. Washington, D.C.: Nautilus Press; January 17, 1979. 6. p.

Coastal Zone Management: 10(38). J.R. Botzum and R. Jacobius, eds. Washington, D.C.: Nautilus Press; September 26, 1979. 6p...

Coastal Zone Management: 11(27). J.R. Botzum and R. Jacobius, eds. Washington, D.C.: Nautilus Press; July 9, 1980. 6p...

Coastal Zone Management: 12(5). J.R. Botzum and R. Jacobius, eds. Washington, D.C.: Nautilus Press; February 4, 1981. 6p...

Coastal Zone Management: 12(27). J.R. Botzum and R. Jacobius, eds. Washington, D.C.: Nautilus Press; July 15, 1981. 6p...

Coastal Zone Management: 13(6). J.R. Botzum and R. Jacobius, eds. Washington, D.C.: Nautilus Press; February 10, 1982. 6p...

Gendler, M. Offshore Oil Power Plays: Maximizing State Input Into Federal Resource Decision Making. Natural Resources Lawyer 12(2):347-388; 1979.

Hildreth, R.G.; R.W. Johnson. Ocean and Coastal Law. New Jersey: Prentice-Hall, Inc.; 1983. 514 p.

Kitsos, T.R. Coastal Management Politics: A View from Capitol Hill. J. American Planning Association. 51(3):275-287; 1985.

Lowry, K. Assessing the Implementation of Federal Coastal Policy. J. American Planning Association. 51(3):288-298; 1985.

Matuszeski, W. Managing the Federal Coastal Program: The Planning Years. J. American Planning Association. 51(3):266-274; 1985.

Mylroie, G.R. The Coastal Energy Impact Program—A Workshop for Local Officials in Coastal Zone Management. Today and Tomorrow-the Necessity for Multiple Use (Vol. II), eds. K.B. Fitzpatrick and J.L. Rasmussen. Glenden Beach, Oregon, February 20-23, 1979. 140 p.

Mylroie, G.R. The Coastal Energy Impact Program. Practicing Planner. 23-25; 1978.

National Oceanic and Atmospheric Administration. Secretarial Decision Paper: Coastal Energy Impact Fund (CEIF), Executive Summary. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Washington, D.C. 1982. 13 p.

Office of Coastal Zone Management. Draft Environmental Impact Statement. Rules and Regulations for Implementing the Coastal Energy Program Section 308. The Coastal Zone Management Act of 1972 as Amended. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Washington, D.C. 1976. 23 p.

Office of Coastal Management. The CTARP energy facility siting study. Volume 1: Coastal Facility Siting and the National Interest. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Washington, D.C. 1979. 132 p.

Office of Coastal Zone Management. Coastal Energy Impact Program, an Evaluation. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Budget and Program Evaluation, and Assistant Secretary for Administration, Washington, D.C. 1980. 90 p.

Office of Coastal Zone Management. Managing the Nation's Coast, Biennial Report to the Congress on Coastal Zone Management. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Washington, D.C. 1982. 139 p.

Ohio Department of Energy (ODOE). Evaluation findings for the Ohio Coastal Energy Impact Program covering the period from February 1978 through September 1982 inclusive. Ohio Department of Natural Resources, Columbus, Ohio. 1983.

Rhode Island Coastal Management Program (RICMP). Evaluation findings for the Rhode Island Coastal Zone Management Program covering the period from January 1982 through April 1983, The Coastal Energy Impact Program from April 1978 through April 1983, and the Narragansett Bay National Estuarine Sanctuary covering the period from September 1980 through April 1983. Department of Environmental Management, Providence, Rhode Island. 1983. 66 p.

Rosener, J. B. The Federal Coastal Energy Impact Program (CEIP): aid or SOP to State and local governments? Oral presentation to the annual meeting of the American Society of Public Administration, San Francisco, California, April 14, 1980.

Stobaugh, R. and D. Yergin. Energy Future, Report of the Energy Project at the Harvard Business School. New York: Random House, Inc.; 1980. 493 p.

United States General Accounting Office. Issues in leasing offshore lands for oil and gas development (Report to the Congress by the Comptroller General). EMD-81-59. United States General Accounting Office, Washington, D.C. 1981.

## ROLE OF THE STATES IN THE NATIONAL COASTAL ZONE MANAGEMENT PROGRAM

A very difficult problem confronted those designing the national coastal zone management (CZM) program in the late 1960s and early 1970s. The coastal area has tremendously value and the need for improved management of development in coastal areas to protect this national treasure was clear. Then, as now, however, the wide range of issues to be addressed and the diversity of the coast presented a daunting challenge to the design of a national CZM program.

The range of development issues to be addressed in coastal resource management is quite broad (CSO 1979; Knecht 1979; Myers 1981). Coastal management includes protecting wetlands, coastal water quality, dunes and beaches, and other important natural areas, preventing loss of life and property due to storms and erosion, providing public access to beaches and waters, assuring adequate space for ports, and resolving increasingly intense conflicts between competing uses for limited and environmentally sensitive coastal resources.

Moreover, the nation's coasts have tremendous physical, economic, political and cultural diversity. The physical setting along the United States' 95,000 mile coast varies tremendously. It includes natural systems as different as the rocky headlands of Maine, the barrier islands of the Carolina's, the wetlands of Louisiana, the harbors of Lake Michigan, the rugged Alaska shores, and the coral reefs of American Samoa. The type and extent of development pressures also varies tremendously. Some portions of the American coast are heavily urbanized, with intense pressure for additional residential, commercial, and industrial development. Others are resort communities. Still others are largely rural areas, with agricultural, forestry, and fisheries development predominating. Some coastal areas are having a difficult time coping with tremendous development pressures while others are suffering through economic decline and high unemployment. The nation's coastal area also has tremendous political diversity. The coastal area has 35 states and territories with over 400 coastal counties and thousands of municipalities and special purpose authorities. Each has different laws, varying state-local legal relationships, and disparate approaches to the management of coastal development.

This diversity of the nation's coastal area makes the design of a uniform national approach to coastal management issues impossible. The answer to this dilemma that was incorporated into the federal Coastal Zone Management Act (CZMA) was to use state coastal management programs to address national concerns about proper management of coastal resources. State programs could incorporate the diversity of the coasts while meeting minimum national standards.

Twenty-nine states and territories have developed individual coastal zone management programs that have been approved by the federal government as meeting the minimum national standards established by the CZMA.

This chapter address the question of what the states have actually done with their coastal management programs. We examined the types of projects completed and the pattern of expenditures of federal grant funds. The focus was on results—what has actually been done in the states to implement the national mandate of improving coastal zone management.

### Study Methods

Work on this project began in June 1989 with the development of a detailed study plan, which was approved by the project's Technical Advisory Committee on July 11, 1989. This plan envisioned gathering information on state CZM program activities from literature reviews, data from the federal Office of Ocean and Coastal Resource Management (OCRM) of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce, and direct

solicitations of information from the 29 states participating in implementation of the CZMA as of the end of 1989.

An initial request for studies, reports and relevant information was made to delegates of the Coastal States Organization (CSO) on July 10, 1989 at that organization's annual meeting in Charleston, S.C. A letter requesting information and a contact person for review of preliminary project reports on state activities was sent to all state coastal zone program managers on August 30, 1989.

Previously published reports of state program activities were also reviewed. These included both general program overviews (Burgess 1989; Knecht 1979; Matuszeski 1985; OCRM 1988; OCZM 1984; OCZM 1982) and reports on particular subject areas, such as hazard area management (OCRM 1990a) and nonpoint source water pollution (OCRM 1990b). Also, overviews prepared by the states collectively (CSO 1985; CSO 1981; CSO 1979) and by Congressional review agencies (U.S. GAO 1986; U.S. GAO 1980) were reviewed, as were detailed discussions of individual state programs (DeGrove 1984; Fischer 1985; Guy 1983; Kinsey 1985; McCrea and Feldman 1977; Owens 1985).

The next step in the study was to have a study team member review state program files at OCRM to prepare individual state and territory summaries of program activities. In addition to textual summaries of program accomplishments, a review was made of the grant files to allocate program expenditures by seven major subject areas. The seven subject area categories chosen were based on the national interest areas specified in the CZMA. The categories used for analysis were: 1) Improving governmental decision-making (e.g., permit simplification efforts, land use plan preparation, and intergovernmental conflict resolution); 2) natural resource protection (e.g., permitting for wetland protection, water quality studies, habitat protection projects); 3) improving public access to coastal resources (e.g., beach access studies, acquisition and construction of parking and access facilites); 4) urban waterfront development; 5) hazards mitigation (e.g., erosion and flooding studies, development of setback programs and hazard education efforts); 6) natural resource development (e.g., improvement of fisheries facilities, acquaculture development); and 7) ports and marinas.

The task of assigning CZMA expenditures to these subject areas was complicated by the fact that there are no uniform grant application, performance report or program evaluation standards that compile expenditure information in a consistent fashion. Also, some projects address several subject areas and others do not clearly fit into any of the seven categories. Therefore, the expenditure analysis should be regarded as a general indication of the areas of spending and the relative degree of effort devoted by the states to these subjects—not a precise fiscal analysis.

The study limited its detailed analysis of financial expenditures to the six fiscal years of 1982 through 1987. This was done for several reasons, including the availability of grant files at OCRM, selecting a period when a complete range of states and territories were actively participating in the program, and having final performance reports of the year's activities available for review. Grant applications, state performance reports, 312 evaluations, state program reports, and interviews with OCRM staff were used to develop these state summaries. This work was carried out from September to December 1989.

Individual draft summaries of state programs and the allocation of their grant funds were sent to the designated state contact persons for review and comment on January 10, 1990. Revisions were made and a revised draft was sent to the states and territories for final review on March 9, 1990. Discussions were held with a number of states to clarify the reports and resolve questions at the national coastal zone program managers meeting in Washington, D.C. on

March 28, 1990. Final comments from all 29 states with approved coastal management programs were received by early May, 1990.

Overview of the Findings

The principal means of federal financial support for the implementation of coastal zone management programs has been grants to states under Section 306 of the CZMA. Chart 1 depicts the level of funding of this program over its entire history, with the period of detailed analysis for this study indicated.

Under the CZMA, states and territories are granted considerable latitude on how best to allocate available funds to address priority national interest areas. Grants are made on an annual basis, with each state's share of available federal funds being determined by a formula that considers shoreline mileage and population.

An examination of how these funds have been allocated and what tasks that states have undertaken provides insight into coastal management priorities of the 1980's. Chart 2 indicates the relative funding attention the seven major national interest subjects received in the first full decade of program implementation.

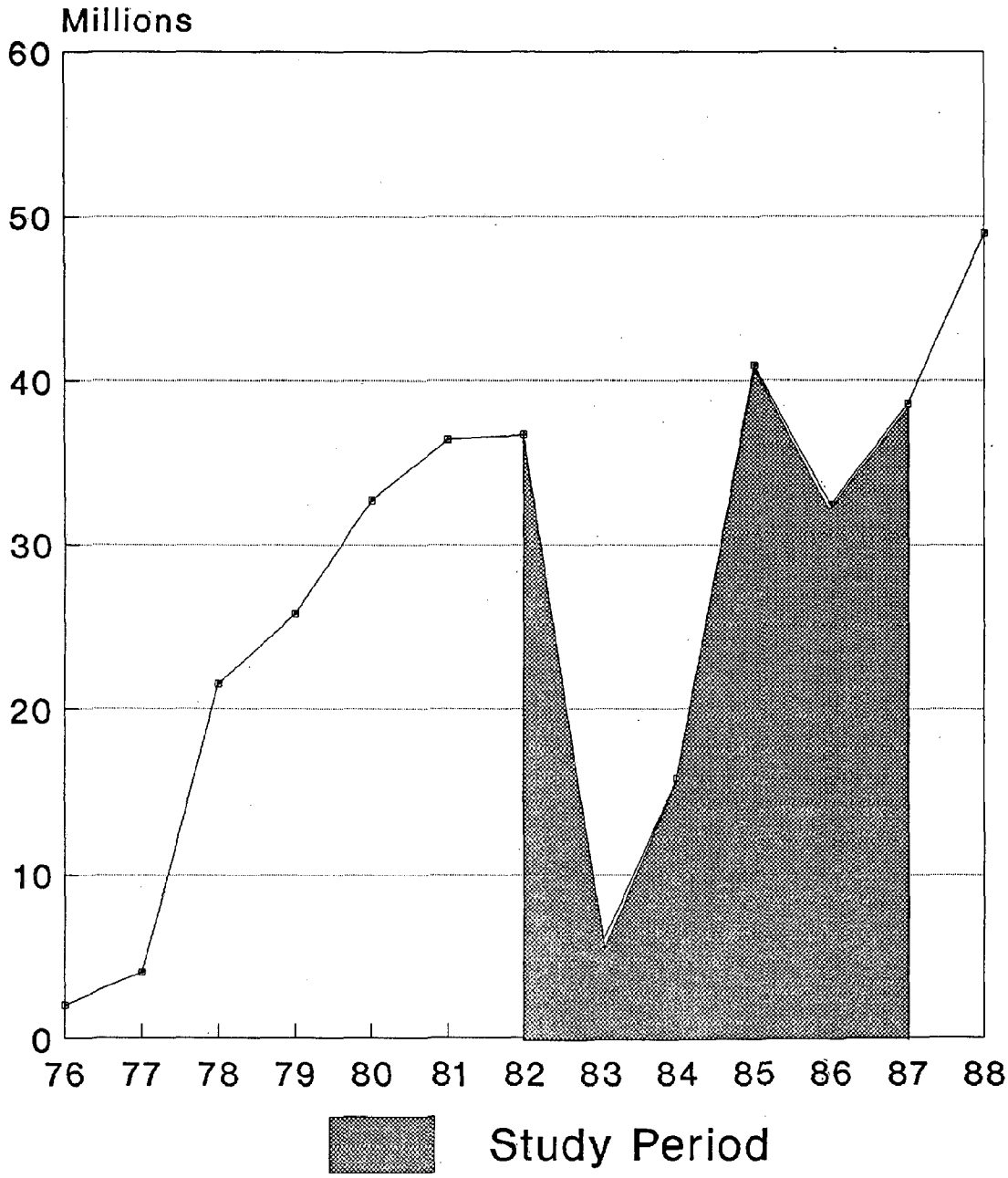
To see the relative allocation of resources in constant 1982-dollars see Table 1.

CZM programs occupy the unique niche of looking at the coastal region in its entirety, including its environmental, economic, social, and cultural dimensions. The state and territorial programs identify problems, facilitate solutions, and attempt to coordinate the multitude of single purpose governmental programs that affect development and use of coastal resources. Therefore it is not surprising that the focus of state coastal management programs has been in improving government decision-making. This category of work includes expediting and simplifying permit reviews, developing and implementing new plans, improving the data available for management decisions, and increasing public participation in coastal zone management. Thirty nine percent of the federal funds available to the states and territories for program implementation in the 1982-87 study period were devoted to this purpose. The second largest area of concentration has been the protection of natural resources, with 28 percent of the funds being devoted to this purpose. These two program activities, which together account for two-thirds of coastal zone management spending, indeed reflect the core of what the CZMA was designed to accomplish—implementation of more effective decisions to better protect the natural resources of the coast.

State programs have also addressed other critical concerns in their particular state or territory. Improving public access to coastal resources, with 11 percent of the funds, was the third largest area of state coastal zone program activity. Natural resource development, hazards mitigation and urban waterfront development each received 6-7 percent of the funds, with port projects getting 2 percent. This allocation of management attention is consistent with the original design of the program; that of allowing individual states to devote priority attention to those critical national interest areas that most affect their coast, but doing so in the context of the national program.

The expenditure data for individual programs supports the wisdom and necessity of this flexible approach. The diversity of state programs and their expenditure pattern indeed reflects the diversity of their coasts. All of the programs devoted at least some of their financial resources to the two core subjects of improving government decision-making and natural resource protection. But even for these the range of need and importance varied significantly. For example, five programs spent less than 20 percent of their resources on improving governmental decision making, but three programs spent more than 70 percent on this. Similarly, for natural resource

# CHART 1
## Federal Coastal Zone Management Act Section 306 and 306A Funding: 1976-1988



# CHART 2

## Section 306 and 306A Grant Expenditures (Constant 1982 Dollars) 1982-1987

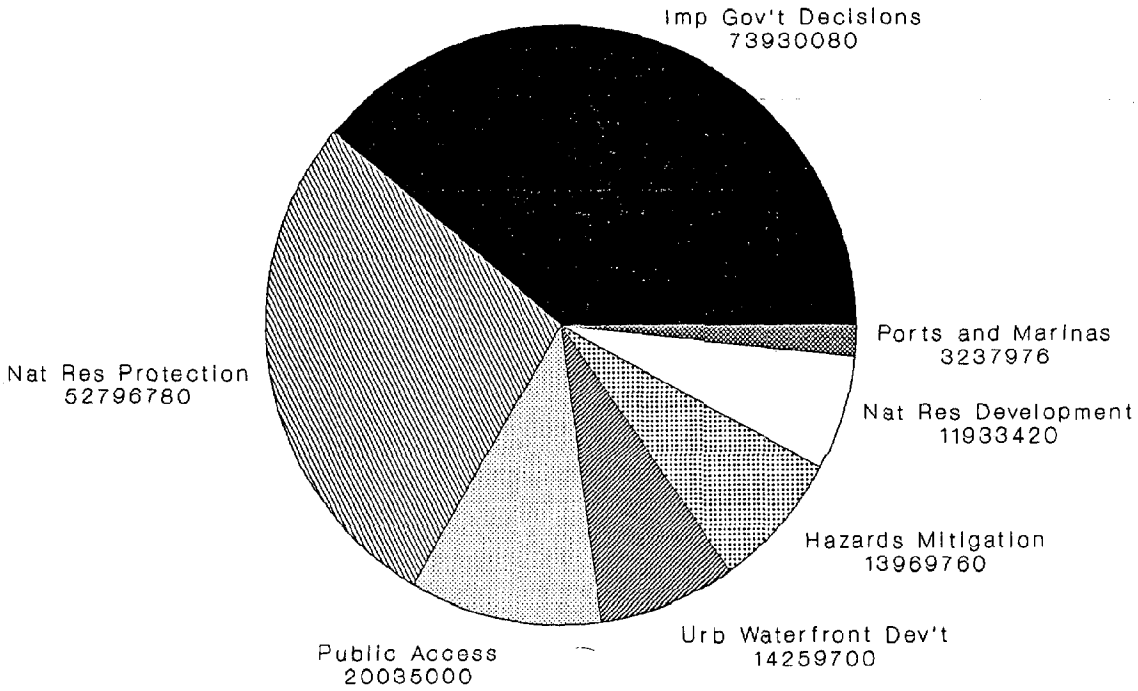


Table 1.

State Allocation of CZMA Program Implementation Funds, 1982-87
(1982 Constant Dollars)

| | Improved Government Decision Making | Natural Resource Protection | Public Access | Urban Waterfront Development | Hazards Mitigation | Natural Resource Development | Ports and Marinas |
|---|---|---|---|---|---|---|---|
| Total Expenditures | 73,930,076 | 52,796,776 | 20,034,997 | 14,259,697 | 3,969,763 | 11,933,415 | 3,237,976 |
| Percent of Total | 38.88 | 27.76 | 10.54 | 7.50 | 7.35 | 6.28 | 1.70 |

protection, two programs spent more than 50 percent of their resources on this topic, and two programs spent less than 10 percent.

While there is a national concern with each of the seven subject areas, the incidence of each particular issue is not uniformly distributed around the country. Port expansion may be a major concern for one state while another may not even have nor need a commercial port. This diversity of interest and need is reflected in state and territorial program activity. For five subject areas, at least two programs did not devote any CZMA funds to that subject. However, other state programs devoted significant attention to each of these subjects. Twelve programs devoted more than 10 percent of their funds to public access improvements, nine over 10 percent for natural resource development, eight over 10 percent for both hazard area mitigation and urban waterfronts, and two over 10 percent for ports issues.

This study confirms that the CZMA has been successful in one of its key objectives—establishing a national program that incorporates state diversity. The states and territories are devoting the bulk of their attention to two key subjects, improving government decision-making and protecting the coast's natural resources, but the states and territories have retained the interest and ability to address other national interest areas where they exist and need management attention.

Another striking finding of the study is how much has been done with limited resources. Coastal zone management has not been lavishly funded in the United States. Annual federal expenditures for program implementation in the study period were on the order of $34.75 million. The total federal grants for program implementation for the 6-year detailed analysis period was $190 million. These funds were spread among 29 participating state and territorial programs and were used to address the wide variety of subjects noted above.

This fact should be kept in mind as the program accomplishments are discussed below. For example, $15.3 million was devoted over 6 years to hazards mitigation. Yet this modest investment has produced significant results. Thirteen states have instituted shorefront setback programs. Studies have been completed to determine erosion rates. Plans have been developed for storm evacuation and post-storm rebuilding. Flood warning and shore protection plans have been developed. Critical hazard areas have been purchased for open space and recreational use. Coastal managers played a critical role in securing reform of the flood insurance program to promote relocation and other pre-storm loss reduction measures. As Hurricane Hugo so graphically proved in the Virgin Islands and South Carolina in 1989, coastal storms put billions of dollars of public and private development at risk every year. The coastal management projects undertaken by the state programs will significantly reduce these losses in the future.

These data also confirm that through the constructive use of financial assistance, state priorities can be shifted to devote greater attention to critical national policy concerns. The clearest example of this is found in the expenditure information on public access to coastal resources. For the first 3 years of the detailed study period, 1982-84, expenditures on public access averaged $1.7 million per year. In 1985 funds were for the first time made available under Section 306A for land acquisition and low cost construction projects to improve public access. For the final three years of the detailed study period, 1985-87, expenditures on public access increased to an average of $5.7 million per year. Part of this increase can be attributed to higher overall funding levels for Sections 306 and 306A. However, the allocations by the states for public access relative to other subjects also rose dramatically after 1985. In 1982-84, public access received an average of 6.25 percent of available funds. In 1985-87, this rose to 13.67 percent.

Section 306A has been popular with the states and territories. Of the 28 states that received program implementation grants in 1985-87, seventeen exercised the option of using some of their funds for Section 306A funding. In all, the states and territories devoted an average of 12.67 percent of each year's available funds to these projects. Public access projects were the leading use of these funds. By adjusting the eligibility standards to allow broader use of funds for installation of beach access projects, the states' and territories' relative effort on public access was doubled.

It is difficult to make generalized conclusions about these 29 individual programs. The individual programs vary significantly, as do their coasts and their development pressures. Some programs directly regulate development to protect environmental resources. Others primarily play a role of coordinator, broker, or facilitator amongst other line agencies at the state and local level (Born and Miller 1988).

This collection of 29 uniquely designed state and territorial programs does serve important national interests. Through a variety of methods, government decision-making on coastal issues and natural resource protection has been improved in every participating state and territory. Where warranted, careful attention is also being given to other key issues, such as improved public access to the coast, better management of development in natural hazard areas, and development of coastal natural resources. Some programs are undoubtedly more active and more effective than others. Six states are not participating in the CZMA at all. Yet most of the nation's coastline is covered by an approved coastal management program and the aggregate of their efforts will result in a coastal zone that is healthier, more productive, and more attractive for the long term benefit of the nation.

REFERENCES

Born, Stephen M.; Allen H. Miller. Assessing Networked Coastal Zone Management Programs. Coastal Management 16:229-243; 1988.

Burgess, James P. Status of the Coastal Program—A Federal Perspective. In Coastal Zone '89. New York: American Society of Civil Engineers; 1989.

Coastal States Organization. America's Coasts: Progress & Promise. 1989.

Coastal States Organization. Coastal Management—A Sound Investment. 1989

Coastal States Organization. Coastal Management—Options for the '80's Final Report. 1979.

DeGrove, John M. Land Growth & Politics. Chicago: APA Planners Press; 1979.

Fischer, Michael L. California's Coastal Program: Larger-Than-Local Interests Built into Local Plans. J. American Planning Association. 51:312-321; 1985.

Guy, William E., Jr. Florida's Coastal Zone Management Program: A Critical Analysis. Coastal Zone Management Journal. 11:219-245; 1983.

Kinsey, David N. Lessons from the New Jersey Coastal Management Program. J. American Planning Association. 51:330-336; 1985.

Knecht, Robert W. Coastal Zone Management: The First Five Years and Beyond. Coastal Zone Management Journal. 6:259-272; 1979.

Matuszeski, William. Managing the Federal Coastal Program: The Planning Years. J. American Planning Association. 51: 266-274; 1985.

McCrea, Maureen; James H. Feldman. Interim Assessment of Washington State Shoreline Management. Coastal Zone Management Journal. 3:119-150; 1977.

Myers, Jennie C. America's Coasts in the '80's: Policies & Issues. Washington, D.C.: The Coast Alliance; 1981.

Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, U. S. Department of Commerce. The First Five Years of Coastal Zone Management: An Initial Assessment. Washington, D.C.: U.S. Government Printing Office; 1979.

Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. Managing the Nation's Coast: Biennial Report to the Congress on Coastal Zone Management for Fiscal Years 1980 and 1981. Washington, D.C.: U.S. Government Printing Office; 1982.

Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. Biennial Report to the Congress on Coastal Zone Management for Fiscal Years 1982 and 1983. Washington, D.C.: U.S. Government Printing Office; 1984.

Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. Coastal Management: Solutions to Our Nation's Coastal Problems. Technical Assistance Bulletin No. 101. Washington, D.C.: U.S. Department of Commerce; 1988.

Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. Coastal Management Solutions to Nonpoint Source Water Pollution. Technical Assistance Bulletin No. 102. Washington, D.C.: U.S. Department of Commerce; 1990a.

Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. Coastal Management Solutions to Natural Hazards. (Draft). Technical Assistance Bulletin No. 103. Washington, D.C.: U.S. Department of Commerce; 1990b.

Owens, David W. Coastal Management in North Carolina: Building a Regional Consensus. J. American Planning Association. 51:322-329; 1985.

U.S. General Accounting Office. Problems Continue in the Federal Management of the Coastal Zone Management Program. Washington, D.C.: U.S. General Accounting Office; 1980.

U.S. General Accounting Office. Resource Management: Information on the Coastal Zone Management Program. Washington, D.C.: U.S. General Accounting Office; 1986.

## INTRODUCTION

The 29 states and territories actively participating in implementation of the federal Coastal Zone Management Act (CZMA) have completed a wide range of activities to address national and state interests. This chapter summarizes these activities in seven key subject areas: 1) improved government decision-making; 2) natural resource protection; 3) improved public access to coastal resources; 4) urban waterfront development; 5) hazards mitigation; 6) natural resource development, and 7) ports and marinas.

This description covers highlights and illustrations of state program activities rather than attempting a comprehensive listing of all program accomplishments. Detailed individual state by state summaries of program activities are in Chapter 8.

Throughout this chapter the abbreviation "CMP" is used for "Coastal Management Program." This generic term is used for all state and territorial programs under the CZMA, though they have a wide variety of actual titles (e.g., "Coastal Zone Management," Coastal Resource Management," etc.).

## IIMPROVED GOVERNMENTAL DECISION-MAKING

The activities states are pursuing to improve government decision-making and operations in coastal zone management are many and diverse. Each state has advances to report in permitting processes; enforcement of local, state, and federal laws and regulations; coordination of governmental agencies; public outreach; and numerous other areas.

### Improving Permit Review Process

Many states are making efforts to expedite their review process for the issuance of coastal development permits. Cooperation among state and federal agencies, as well as between the state and local governments, has ensured consistency among various agencies' standards and policies, as well as eliminated unnecessary duplication of permit requirements. For instance, in Rhode Island, the CMP is attempting to expand its permit review process for all substantial impact projects to include local review and comment. This program involves a coordinated review effort by the CMP and the town to concurrently review projects that meet both local requirements and state coastal policy. Typical of federal-state level cooperation is the Memorandum of Agreement between Michigan and the Army Corps of Engineers (Corps). The agreement provides for the issuance of joint public notices and allows for the use of one permit application which is shared by both agencies for statutes regulating the land and water interface.

Other states, such as North Carolina, have developed coordinated state-federal wetland permitting programs. These programs result in the Corps issuing a general federal permit for state permitted activity. This reduces permit processing time for the applicant and saves the federal government the cost of a duplicative permit review.

### Assisting Local Coastal Management

Approximately one-third of the State CMPs have been instrumental in assisting local governments to actively manage coastal areas within their jurisdictions, and to enforce both state and local regulations. For instance, in Maine, a formal training program and certification procedure for local code enforcement officers has been instituted. Certified code enforcement officers are now able to testify in district court, consequently improving enforcement of local zoning and environmental laws. In Washington, local governments have been granted authority to institute a civil fine procedure to deal with violations of the State Shoreline Management Act.

The Washington Department of Ecology provides basic policy guidance and recommendations to local governments on how to construct procedures for fines, penalties, and liens.

Another activity to improve government decision-making has been the production of detailed land use and similar studies and plans. For example, in North Carolina all 20 coastal counties and over 60 municipalities have prepared CZM mandated comprehensive plans that meet minimum state standards. The plans are updated, largely using CZMA funds, every 5 years.

Advances in Technology

Several states have improved their coastal zone management operations by updating the technology used. For instance, the Pennsylvania CZM program has streamlined its administrative process through computerization, resulting in a substantial time and cost savings to the program. The computer system can also be used to track grant tasks and reviews, and has improved the management of grants and projects. The Northern Marianas has put land use and natural resource data onto a Geographic Information System (GIS). Information will be used in a cooperative effort with the Marianas Public Land Corporation to update the CNMI Plan for public land use. Virginia's CMP is providing support to Virginia's developing EcoMaps Program, a comprehensive natural resources inventory and GIS which will be used by state and local governments in making environmental management decisions. In Rhode Island, the CMP has helped develop an interactive setback computer program for activities located within the coastal zone. Based on average annual erosion rates and the anticipated sea level rise for a given area, the program determines an adequate construction setback for proposed activities.

Public Involvement

Most state CMPs have attempted to involve the public in coastal management operations. The CMP in Maryland has conducted a number of workshops on issues of coastal zone management concerns, e.g., recreational boating workshops for the public to address the issues of boating safety, excessive noise, and shoreline erosion caused by boat wakes. A local outreach program to the local village chiefs in the American Samoas attempts to gain the chiefs' support for the American Samoan CMP and to foster their participation in the program. Many states and territories have also developed newsletters, magazines, and other public information on programs to educate and involve the public.

NATURAL RESOURCES PROTECTION

Permitting

Many state coastal management agencies put a permitting process to use in protecting natural resources. For instance, the Michigan Department of Natural Resources reviews and issues project permits under a consolidated permit process that encompasses a total of nine state statutes and four federal programs. New Hampshire uses wetland inspectors in an expanded pre-application review process to protect coastal wetlands. The Connecticut Coastal Management Act requires that towns conduct coastal site plan reviews in conjunction with zoning and building permit reviews for all coastal development projects to determine the possible effects on coastal resources.

The Massachusetts Wetlands Restriction Program addresses the cumulative impacts of development on wetlands by acting as a zoning overlay, barring certain activities on a town-by-town basis. Subdivision proposals in Rhode Island must have mitigation and control plans for stormwater runoff, and approval is stipulated on a ban on certain lawn care pesticides and fertilizers in areas of concern. In Virginia, a study was conducted which evaluated wetlands

compensation mitigation as a management tool for use within Virginia's shoreline permit program.

Several states have introduced special permitting processes to be used in certain designated coastal areas. In North Carolina, the states coastal waters, wetlands, beaches, and other sensitive areas have been designated as "Areas of Environmental Concern" where all development activities require a Coastal Area Management Act permit. The North Carolina CMP reviews approximately 2,000 development projects per year under this program. New York has established Scenic Areas of Statewide Significance for the Hudson River coastal region to provide regulatory protection. In the Virgin Islands, Areas of Particular Concern are used to improve predictability in the decision-making process for permits, and to determine which areas should not be developed at all.

Some states, such as Maine, have instituted a system of computerized maps to ensure that permit decisions are consistent and are based on sound geological criteria. In New Hampshire, wetlands maps are distributed for use by state and local regulatory agencies responsible for making permit and other resource management decisions. Often data from mapping projects are incorporated into a GIS for use in water use permitting, as is done in Wisconsin.

Coastal Pollution Control

Many of the state coastal management programs address the issue of marine and coastal pollution, including oil spills. The Massachusetts CMP is involved in and provides staff support for planning a long-term solution to the problems of pollution in Boston Harbor, and is working with federal, state, and local officials to update the regional oil spill contingency plans in two of Massachusetts' bays. CMP funds in American Samoa are used to contract with a local boat owner who has been given authority to issue fines and citations to polluters and to patrol Pago Pago Harbor to remove debris. The crew has received training in oil spill cleanup. The Washington Ocean Resources Management Act designates financial responsibility for vessels that spill oil; while the New Hampshire CMP has been instrumental in developing a comprehensive oil spill contingency plan, to which oil industry representatives have responded by agreeing to purchase oil spill response equipment. A new litter law incorporated into Mississippi's MCP prohibits discharge of litter in the ocean and nearshore coastal waters, and includes standards and guidelines based in part on recommendations made at the MARPOL conference. In South Carolina, guidelines controlling nonpoint pollution and stormwater runoff are a major consideration in the processing of over 1,400 federal consistency reviews each year. The 1988 revisions to the South Carolina guidelines require both a pollution control system and assurances that the system will be maintained.

Special Area Management Plans

Many states have in place Special Area Management Plans (SAMPs) or similar plans designed to protect coastal natural resources. The Florida CMP has focused efforts to develop a statewide perspective of estuarine pollution and develop an overall estuarine management policy. In addition, management plans for many aquatic preserves have been developed with funds from the Florida CMP to protect resources from degradation due to population growth. In South Carolina, SAMPs address the effects of treated sewage and stormwater on water quality, alterations of natural land drainage patterns, creation of artificial lagoons and reservoirs, dredge and fill of wetlands, beach erosion, and threats to prehistoric and archaeological sites. A model Mangrove Management Plan for selected areas in Puerto Rico was generated to be used as a basis for an island-wide management plan, with the goals of designing protective measures and development of recommendations for land uses compatible with the ecology of the area.

Natural Resource Acquisition

Several states have undertaken direct responsibility for natural resource protection by acquisition of land in the coastal zone. Often, as was the case in Delaware and California, the State CMP catalyzes the purchase and acquisition of parks, wetlands, natural areas, and open space; or CMP funds are used to negotiate agreements, as in New Jersey, where a critical habitat used as a stopover for migrating shorebirds was acquired. In New Hampshire, the CMP contributed to the purchase of a parcel of land with bay frontage that was incorporated into the Estuarine Research Reserve. In North Carolina, funds have been used to acquire the state's largest remaining maritime forest and an island previously slated for development that is located in a key shellfishing area (and also included a vital archaeological site). In Puerto Rico, funds have been established by the Natural Heritage Program to acquire critical natural areas now in private ownership.

PUBLIC ACCESS TO COASTAL RESOURCES

Low Cost Construction

The CMPs of many states have improved public access to their coastlines by engaging in low cost construction projects. Amenities provided to the public include walkways, bicycle paths, viewing areas, interpretative trails, boat ramps and docks, picnic areas, as well as restrooms, showers, and parking lots. North Carolina used CZMA funds to more than double the size of its beach access program in 1985 through 1988, allowing the state to establish 138 public accessways by the end of 1988. Many states have made extensive use of Section 306A funds to implement land acquisition and construction of these projects. Often small-scale access projects open the area to further public and private investment. In Wisconsin, for instance, CMP seed money for a small harbor provided the impetus for a larger project, including a 900-slip marina, support facilities, a county park, and public boating facilities.

Zoning and Permitting for Access

Some CZMA participants have made use of zoning requirements and the permitting process to provide public access to the shoreline. In the Northern Marianas, the CMP has required developers to provide public access, such as bicycle/pedestrian paths, through permit conditions. Regulations adopted in Puerto Rico in 1983 require setbacks for any new coastal development, as well as limitations on uses in areas designated as public beaches, natural areas, reserve areas, and mangroves. Other states, such as Washington, provide technical assistance and workshop opportunities to local government officials for reviewing shoreline permits for public access. A handbook prepared by the North Carolina CMP informs local governments of techniques available for requiring public accessways. In Pennsylvania, the CMP has helped city governments develop comprehensive plans that encourage private developers to incorporate public access provisions into their development plans for urban waterfront areas. Under the New York City Local Waterfront Revitalization Program, the City has obtained approximately 30 miles of shoreline public access through development exactions.

Access Inventories

Several state CMPs have compiled inventories, and have made available to the public guidebooks and pamphlets that identify, locate and describe, often with maps and site photographs, natural features and developed facilities of state public access sites. These guides can help the public find recreation areas, and are also put to other purposes. The Washington guide aids in the selection of Sections 306 and 306A public access projects, while in Guam, a shoreline access study provides information used by land use planners as well as recreation seekers. In Hawaii, the

Kauai Beach Access inventory has provided a basis for maintaining public rights to accessways and easements and for protecting these accessways from encroaching development pressures. The inventory includes copies of assessment maps, deeds, and deed restrictions.

Acquisition

Many states have ensured permanent access to their coastal areas through the acquisition of shorefront property. In 1987, a $30 million Open Space Bond was passed in Massachusetts to continue coastal acquisition efforts. The Bond was passed largely as a result of the Massachusetts CMP's past successful acquisition efforts to obtain land for public access. Florida CMP funding helped one county develop a management plan that included a local bond referendum which generated local investment to acquire land for public access. In South Carolina, state and local governments are pursuing the Federal Emergency Management Agency's (FEMA) Section 1362 program to acquire hazard prone beachfront property following Hurricane Hugo.

URBAN WATERFRONT DEVELOPMENT

Types of Projects

A wide range of activities has been undertaken by coastal towns and cities in efforts to develop and redevelop their waterfront districts. Specific projects that have been carried out in several communities as a result of the implementation of revitalization plans include construction of marinas, docks, piers for commercial and recreational fishermen, boat ramps, retail, office, restaurant, and condominium complexes, and public access facilities. In Ponce and San Juan, Puerto Rico, docking facilities for cruise ships are being improved; while in Reedsport, Oregon, moorage for Antarctic research vessels has been designed.

CMP Assistance

Many state CMPs have contributed to local communities' urban waterfront development efforts through grants of financial and technical assistance. Some localities have joined with each other and with the state CMP in a collaborative effort to revitalize an entire waterfront area. In New York, the state has established the Horizon's Waterfront Commission to develop a regional waterfront development plan for the entire Erie County waterfront. Representing municipalities, the county, and the state, the Commission has bonding authority and eminent domain powers to implement its plan. All of the participating local governments are implementing or preparing local waterfront plans which will provide the basis for development and implementing the Horizon's Waterfront Plan.

Some projects have been carried out with the use of CZMA funding, including Sections 306 and 306A monies. In some areas, a combination of federal and state funding has resulted in a successful project, as in Houghton, Michigan, where a waterfront development plan was funded by the Michigan CMP, while financial assistance from the CMP allowed the City to do the purchasing and renovating of over a mile of shoreline in the downtown area.

Public Involvement

In Rhode Island, the public plays an important role in carrying out the Special Area Management Plan for Providence Harbor. The plan allows for extensive public review and discussion of important issues and problems facing the Harbor through a variety of forums.

Other states keep the public and local officials informed of waterfront development plans through the use of publications. The California Coastal Commission publishes a quarterly

magazine, "California Waterfront Age," to provide an evaluation of public and private initiatives for waterfront restoration. The Oregon State University Sea Grant uses 306 funds to publish a "Waterfront Revitalization Guide" for small communities that provides detailed instructions for implementing waterfront revitalization plans.

Growth in Revitalized Areas

Many states are reporting substantial private and public investment taking place in and around refurbished urban waterfronts. For instance, CMP funds were used in Kewaunee, Wisconsin to plan and construct a 150-slip marina and waterfront park; the development catalyzed significant private investment in the area, in addition to attracting over 100,000 tourists annually. In Jersey City, New Jersey, a waterfront park and pier project was recently completed, and $2 billion in new construction condominiums and retail shops now surround the new park. The Malaloa Bulkhead project in American Samoa has opened the door for four new marine dependent businesses operating adjacent to the bulkhead. Several waterfront redevelopment studies funded by the CMP resulted in the Philadelphia Waterfront Comprehensive Plan which catalyzed over $310 million in private investments and millions of dollars in tax revenue to the City of Philadelphia and Commonwealth of Pennsylvania. Connecticut CMP funds were critical in revitalizing the Norwalk waterfront, leading to the expenditure of over $26 million to implement a revitalization plan.

Public Education and Awareness

The states participating in the CZM program have implemented a variety of measures designed to protect the natural resources of their coastal areas. The vast majority of states have initiated some sort of public education and awareness program, often by issuing public service announcements on radio and television, or distributing videos and handbooks regarding issues such as wetland protection, shoreline pollution, and other environmental concerns. Many states urge citizens to get involved in protecting their natural resources by sponsoring "Coastweek" activities. Events during Coastweek in New Hampshire include education forums, harbor cruises, and walking tours; while Coastweek participants in American Samoa can go on reef walks, compete in sign and trash can painting contests, and join in beach clean-up projects.

Certain states' coastal agencies have also published and distributed guidebooks or manuals for use by developers, local governments, and citizen groups, as well as by the general public. For instance, Michigan issues a guidebook discussing the value of the state's wetlands, and explains the wetland review process; Alaska makes available a "How-to" booklet for conducting beach clean-up projects; Massachusetts issued a "Primer for Dredging in the Coastal Zone;" and the Northern Marianas has funded a guidebook on stormwater control for farmers and developers.

Integrating environmental education programs into the local public school curriculum is also a priority for many states' coastal programs, with some states, such as Florida, coordinating efforts with the state Department of Education. Many educational programs, such as that in Alabama, include training for teachers as well as instructional manuals and booklets on coastal awareness. American Samoa's Marine Awareness Program includes research competitions for school age children, and a Marine Symposium for high school students. While not a Section 306 activity, education programs developed under the CZMA's estuarine research reserve program have also been a part of some states' CMP.

## COASTAL HAZARDS MITIGATION

### Managing Development in Hazard Areas

Thirteen coastal states have adopted setback regulations to require that new development be located outside of the most hazardous coastal locations. Maine requires construction to be outside of areas subject to wave action in a 100-year storm. North Carolina, New York, Michigan, and South Carolina have adopted setbacks based on the extent of erosion risks. A number of states have adopted construction standards for development in hazardous areas, such as the Maine requirement for elevation of structures above flood levels and the California Bay Conservation and Development Commission's requirements that new infrastructure incorporate earthquake and sea level rise threats.

### Natural Hazard Mitigation Plans

Many coastal communities have addressed the problems caused by coastal storms and natural hazards through comprehensive natural hazard mitigation plans. Oregon has established state-wide land use planning goals which set specific standards for local communities to use for natural hazard planning in their coastal zones. These goals limit development in areas subject to natural disasters and hazards, coastal shorelands, and on beaches and dunes. A variety of techniques to regulate development has been implemented on the local level, including hazard overlay zoning, site-specific geologic report requirements, and density bonus awards to developers who avoid hazardous areas. A comprehensive hazard management program has been completed by the New York CMP to address the problems of chronic flooding and erosion along the south shore of Long Island. The program will spell out options, costs, and recommended actions needed to cope with continuing erosion, disjointed public and private responses, and sea level rise. In Puerto Rico, 16 area-specific flood hazard mitigation plans have been undertaken under the CZM program. Completion of some of the planning documents is waiting on the provision of computer-generated storm surge and wave height data being developed by the Sea Grant Program of the University of Puerto Rico at Mayaguez.

### Sea Level Rise

Several CMPs have concentrated on studying sea level rise and ways to mitigate its adverse affects on coastal areas. In Washington, a sea level rise task force is examining the interactions between sea level rise and vertical land movement, and is developing a citizen education program on sea level rise. In California, the Bay Conservation and Development Commission (BCDC) has taken the initiative to implement policies concerning the coastal impacts of sea level rise. Under these new policies, projects must incorporate sea level rise as a design criteria for development projects. The BCDC has sponsored a workshop for local governments to encourage and assist them in addressing the issue of sea level rise in their local plans and ordinances. And in New Jersey, the impact of potential global sea level rise is being studied to aid coastal planning. Shore retreat estimates will be determined using three different methodologies: trend analysis, Brunn Rule calculations, and numerically derived sediment budget computations.

### Coastal Erosion/Erosion Control Structures

The high cost of erosion along many coastlines is being addressed by most CMPs. In North Carolina, long-term erosion rates were determined by the CMP, and a permanent technical advisory committee on coastal erosion was established to ascertain the cause and extent of erosion and its impact on coastal development. The committee studies coastal erosion and reviews erosion abatement projects. Study topics include: the economic impacts of erosion, erosion response methods, and the cost and feasibility of relocating large structures threatened by erosion. A beach/

dune profiling system has been developed in New Jersey to monitor shoreline and beachfront conditions, including erosional trends. The system will be used to aid decision-making in beach design. Municipalities with significant erosion rates will be provided with large-scale mylar maps depicting local erosion conditions and predictions. The Shoreline Change Summary Map in Massachusetts identifies areas that are safe to build on or unsafe depending upon shoreline erosion rates.

Regulating erosion control structures is of concern in many state CMPs. For instance, the Connecticut legislature amended the state's regulatory boundary from the mean high water line to the high tide line to better regulate erosion control structures and to be concurrent with the Corps jurisdiction, eliminating a loophole that had allowed some developers to build structures just above the mean high water line to avoid state regulation. The Connecticut Coastal Management Act was also amended so that any structure which meets the statutory definition of a coastal flood and erosion control structure must be reviewed by municipalities for conformance with state coastal management policies and standards. Under the Maine Natural Resource Protection law, seawalls and other structures on or seaward of a frontal dune or in high hazard areas are prohibited; while regulations promulgated by the North Carolina CMP prohibit permanent erosion control structures such as bulkheads, seawalls, groins or jetties. The Maryland CMP conducted a non-structural erosion control training program for contractors interested in providing services to private shorefront property owners receiving grants to implement nonstructural shore protection.

Post Disaster Plans and Activities

Many state CMPs have attempted to prepare coastal communities to deal with the aftermath of a natural disaster. The CMP in Rhode Island has approved regulations that provide post hurricane and storm permitting procedures. Included is the authority to impose a 30-day moratorium on all development permits to allow time to assess damage and identify mitigation opportunities. The North Carolina CMP mandates that all local governments prepare post-storm rebuilding plans. The Florida CMP is providing a grant to the South Florida Regional Planning Council to prepare a model post-disaster redevelopment plan (PDRP). The PDRP will provide local communities as well as the state with guidelines for redevelopment after tropical storms and hurricanes.

Shortly after Hurricane Hugo, the South Carolina CMP assessed each beachfront structure (including houses, pools, and seawalls) to determine which could be rebuilt under the 1988 Beach Management Act. Also following Hugo, educational programs stressing coastal programs and rebuilding methods were held in each community. Citizens and landowners were informed about coastal hazards and the provisions of the Upton-Jones relocation program and Section 1362 of the Flood Insurance Act that can be used to reduce future property damage.

NATURAL RESOURCES DEVELOPMENT

The coastal states have engaged in a wide variety of activities in order to develop their natural resources, especially those resources that are endangered, are ecologically vital to the coastal region, or are of great importance to the states' economies. The Department of Natural Resources in Puerto Rico has taken a very comprehensive approach, using the CMP to protect and develop many different critical coastal resources, including beaches, mangroves, reefs, aquifers, sand deposits, and endangered species of flora and fauna. Special attention is being given to critical areas in Puerto Rico, such as beaches, that are vital for the continuing expansion of the island's tourism industry.

Aquatic Resources

The aquatic resources industry is a major source of revenue and jobs in many coastal states, and several CMPs are making efforts to protect and expand the industry. In Alaska CMP funds are being used to help identify sites for the development of mariculture, the cultivation of plants and animals in seawater. Commercial and recreational fishing are of particular importance in several states, as in New York, where the CMP has completed an economic study on the state's commercial fishing industry to identify trends affecting the industry and propose public and private solutions addressing adverse trends. In Massachusetts, approximately $7 million was spent to improve fish piers and other marine-related industry projects to enhance the state's fishing industry.

Shellfish are another important resource in coastal states. To protect and enhance soft-shell clam stock reserves, an important recreational commodity along New Hampshire's coast, the CMP provided funds to purchase and place nettings in selected clam flats to reduce clam spat mortality by protecting clams from predators. The Connecticut CMP maintains a close cooperative working relationship with the State Department of Agriculture, Aquaculture Division, to Ensure that coastal development does not adversely impact the shellfish resource or industry.

Energy Resource Development

Protecting the environment, while allowing for important oil, gas, and other energy resource development is a priority of many state CMPs. The California Coastal Commission has used the federal consistency process to ensure that 41 Outer Continental Shelf (OCS) oil and gas plans of exploration, development, and production have included the necessary provisions to protect the environment. The North Carolina CMP is also involved in a consistency review concerning plans by Mobil Oil to explore off the North Carolina coast. Meetings between Mobil, their contractors, and the state have been held concerning rules and regulations governing the activity. The Alabama CMP has studied the socioeconomic impact of energy-related construction to better prepare Alabama for future oil/gas exploration. And in Oregon, the CMP staff participated with other state agencies on the state-federal Marine Placer Mineral Task Force, which is investigating the economic and environmental aspects of exploration and recovery of marine placer mineral deposits off the coast of Oregon.

Wetlands Protection

Wetlands protection and enhancement is an important aspect of many state CMPs. In New Jersey, upland sites have been identified for future wetlands mitigation banking to restore the past loss of wetlands. Wetlands are restored at a rate of two acres created for each acre lost. In Louisiana, a geological review procedure that reduces wetlands loss is being applied to an increased number of energy exploration activities. The procedure has led to a decrease in the average oil and gas canal length.

Ports and Marinas

Many state CMPs, realizing the value of their states' ports, harbors, and marinas, have actively participated in efforts to create, preserve, and enhance these facilities. For instance, in California, where commercial fishing is a very important industry, a Coastal Commission permit for a marina was conditioned upon 80 percent of the marina's berths being reserved for commercial fishing vessels. Navigation in New York Harbor has been enhanced by the New York CMP, which has facilitated the development of the tidal guage system. Port users of New York Harbor will be able to obtain time data on actual tide levels, wind speed and direction from four stations

with this system. Port users will also be able to obtain this data via a telephone dial-up system linked to the users' computer.

CMP Assistance for Plans and Commissions

A frequent method by which state CMPs are involved in efforts to preserve ports and marinas is providing funds for the development of local management/development plans for harbor and marina facilities. The Guam CMP, for instance, helped fund a Master Plan for the Port of Guam, which addresses military and civilian commercial port needs, recruitment opportunities, and heavy industry opportunities. Oregon Port Division funding helped support the development of Strategic Business Plans by port districts. Each district must evaluate its marketing competitiveness to other ports in the region and set priorities for capital improvements and dredging projects. In New Jersey, CMP grants allow oceanfront communities to prepare harbor development plans, including a marina feasibility study and waterfront area design.

Some CMPs encourage the creation of local commissions to create and implement harbor programs. The Rhode Island Harbors Management Project recommended the establishment of a Harbor Management Plan (HMP) in each of Rhode Island's 21 coastal towns. The HMP calls for the development of a local commission, as well as public workshops and a database to establish a management program for harbors that is consistent with the goals of the Rhode Island CMP. The Harbor Management Act in Connecticut also encourages the creation of local commissions; the Act authorizes municipalities adjacent to navigable waters to establish special Harbor Commissions to prepare and enforce local harbor management plans under supervision of the state's Coastal Resources Management Division. A harbor management plan essentially becomes a map for the use and management of a town's harbor lands and water. Once a town's plan is approved, the state is committed to employ standards established in municipal plans when rendering permit and enforcement decisions.

Protecting Water Dependent Uses

Several state CMPs focus on the need to preserve the waterfront for water dependent uses. Connecticut has developed strong water dependent use standards in the country; municipal decision-makers must take into consideration future impacts on water dependency and disallow diminishment of water dependent uses. The CMP in Rhode Island has co-sponsored a New York/ New England Coastal Zone Task Force study that promotes the feasibility of regulations and policies for the protection and development of water dependent uses. In New Jersey, areas within New York Harbor are being identified for long-term water dependent uses while allowing for waterfront revitalization. In Massachusetts, the state's CMP Designated Port Area (DPA) Program has identified twelve DPAs. Under this Program, both filled and flowed tidelands are reserved exclusively for either current or future maritime industry use. The Department of State of New York has taken a leadership role to revive and increase maritime activity of New York City Harbor by creating a "Coastal Management Advisory Committee on the New York Harbor Maritime Industry." The goal of the Committee is to assure the availability of maritime facilities by monitoring residential and commercial waterfront development and assessing land needs for water dependent industry activity.

Marina Siting

Several states have issued guidelines for the siting of marinas along their coastlines. The Washington Department of Ecology is currently developing guidelines that include standards for siting marinas, as well as the design, renovation, or expansion of new and existing marinas. The State Port Authority in New Hampshire has completed a study on mooring placement; as a result of the study, an additional 165 moorings were sited within the study area.

In Puerto Rico, a Marina Siting Manual was prepared to provide information related to marina siting and operation and the required permits. In Florida, a marina siting plan is being developed using the computerized GIS. Data concerning shellfish harvesting areas and endangered species are examples of information that will be analyzed from the GIS.

Safety in Ports and Marinas

Safety in ports and marinas is another concern of many coastal states. In Florida, a marina evacuation study is being conducted by Metro-Dade County to generate evacuation plans for berthed boat owners. In an attempt to identify problems associated with overuse, the Michigan Department of Natural Resources initiated a boat use survey on one of the more heavily used lakes in the state to determine if maximum watercraft capacity has been reached and if the lake has become hazardous and unsafe for use. The report will be used to make future permit decisions on expansion of marinas, boat launches, and other facilities.

Concerns for Water Quality/Dredged Material

Several states have focused on measures for improving the water quality in harbors and marinas. The Rhode Island CMP is participating in a state-wide marine interest group, the Boat Sewage Management Task Force, that is developing recommendations for the improvement of water quality in the state's ports and harbors. The Task Force has identified sources of water pollution and measures for its improvement. In Maryland, studies have been conducted to identify suitable dredged material disposal sites both for the navigational channels to the Port of Baltimore and for the maintenance of channels to public and private marina facilities. The New York CMP participates in the New York Harbor Dredging Steering Committee. The current focus of the Committee concerns disposal methods for the 10 million cubic yards of dredged material generated annually.

INTERSTATE ACCOMPLISHMENTS

In addition to these programs activities conducted by individual states, many coastal states are making efforts to coordinate activities with their neighboring states with regard to common natural resources and geographically shared areas. A wide variety of issues of common concern have received attention using cooperative, interstate projects funded under Section 309 of the CZMA. For instance, all coastal states have contributed to a national study of the public trust doctrine, placing particular emphasis in its relation to today's coastal issues. The states of Massachusetts, Maine, Connecticut, Rhode Island, and New York have completed three separate studies designed to improve government decision-making concerning: 1) preservation and protection of water dependent uses of regional waters, particularly with regard to commercial and recreational boating facilities; 2) strengthening the public trust doctrine with regard to public access, and 3) the development of an interstate policy to improve the effectiveness of floodplain management.

New York and its sister Great Lakes coastal states have supported efforts by two Great Lakes states and Canadian provinces to cooperatively manage their shared water resources. These efforts have lead to the signing of the Great Lakes Charter and the development of formal consultation agreements regarding activities affecting the Great Lakes.

Issues of particular joint interest among coastal states include: 1) coastal water quality as exemplified by the cooperative effort of New York and New Jersey to improve the use of scientific information concerning pollution problems in the Bight, and by the Chesapeake Bay Agreement (supported by Maryland, Virginia, Pennsylvania, the District of Columbia, the Chesapeake Bay Commission, and the EPA) which involves recent interest grants funded under the CZMA

that focus on initiating a citizens' water quality monitoring network for each state surrounding the Bay and brings together leaders in various technical fields to develop toxicity assessment protocols; 2) dredged material disposal, as illustrated by the bi-state and federal agency agreement that will formalize the protocols for how and where open-water disposal of dredged material will be carried out in Long Island Sound; 3) management, as shown by the Gulf of Maine Working Group, which involves representatives from Canada and the U.S. working together to improve the management of the Gulf of Maine; and 4) hazard mitigation plans, such as the cooperative study carried out by Florida, Alabama, and Mississippi to develop a long-range strategy for hurricane loss and contingency planning for their tri-state area.

The distribution of federal grants under Sections 306 and 306A of the Coastal Zone Management Act (CZMA) reflects the diversity of the states participating in the national program and the changes in national priorities over time. Dollar figures referred to below were gathered through an extensive analysis of state program records maintained by the federal Office of Ocean and Coastal Resource Management (OCRM) and a review of the results of this analysis by state coastal management program personnel. Because grants under Sections 306 and 306A provided the bulk of federal funding for implementation of CZM (CZM) efforts, the analysis of these grants provides indications of the effects of the federal Coastal Zone Management Act (CZMA) upon state coastal management efforts. Another major source of federal funding to states, the Coastal Energy Impact Program, is discussed in Chapter 4 of this report.

The data resulting from this analysis should be interpreted in light of the nature of CZM efforts. This analysis categorizes state CZM efforts as falling into one of seven broad subject matter categories that are grounded in legislatively expressed areas of national interest. In reality, some of the efforts of state CZM programs are multidimensional, serving a number of areas of national interest. Still other program activities are not easily classified into one or another area of national interest. For these reasons, a good deal of judgement was involved in some of the categorizations of individual program activities. Thus, the comparative statistics presented below should be viewed as general indicators of CZM priorities and the ways in which those priorities were expressed in individual state programs rather than as a precise accounting of expenditures under the CZMA.

A year-by-year summary of the expenditure of state grants under Sections 306 and 306A of the Coastal Zone Management Act between 1982 and 1987 is contained in Table 1.[1] As Table 1 illustrates, two subject matter categories accounted for the bulk of CZMA expenditures. Over the period from 1982 to 1987, two thirds of the program's funds were devoted to improving governmental decision-making and better natural resource protection. Four other subjects—public access, urban waterfront development, hazards mitigation, and natural resource development—received a secondary level of attention. Each of these four subjects received between 5 and 15 percent of the funding in each year of the study period. Finally, the seventh subject area, ports and marinas, generally received 1-2 percent of the program's funds.

These data reveal a number of noteworthy trends that have emerged throughout the life of the CZMA. These trends are illustrated in Table 2. An important long-term trend evident in these data has been the relative decline of spending in the area of improving government decision-making. Expenditures in this area over the period 1982-1987 declined from 45.65 to 36.35 percent of total grants to states and territories. In general, this decline should be expected, as over time the structures necessary to administer CZM programs are developed and become more firmly established. Activity to streamline permit processing and develop detailed land use and other planning was accomplished during the earlier years of the program in many states, freeing resources to address other pressing problems.

It should be noted, however, that significant needs remain in this area. The actual amount spent annually for improving government decision-making did not decline over the study period. Rather, the amount spent remained relatively constant and, as overall program expenditures increased, additional funds were devoted to other subject areas. This confirms the proposition that a core of ongoing program activity is needed to maintain improvements in the governmental decision-making process.

[1]As Virginia's coastal program was only approved in 1986, expenditure data for Virginia were not included in this analysis.

TABLE 1

PROGRAM EXPENDITURES
BY
SUBJECT MATTER

| YEAR | | NATIONAL INTEREST AREAS: Improved Government Decisions | Natural Resource Protection | Public Access | Urban Waterfront Development | Hazards Mitigation | Natural Resource Development | Ports and Marinas | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1982 | Dollars | 15108075 | 7604515 | 2219712 | 2601890 | 2628828 | 2474713 | 455997 | 33093730 |
| | % of Total | 45.65% | 22.98% | 6.71% | 7.86% | 7.94% | 7.48% | 1.38% | 100.00% |
| 1983 | Dollars | 10233276 | 6125432 | 1471812 | 2096722 | 2143952 | 1582483 | 151584 | 23805260 |
| | % of Total | 42.99% | 25.73% | 6.18% | 8.81% | 9.01% | 6.65% | 0.64% | 100.00% |
| 1984 | Dollars | 11221738 | 7252165 | 1518781 | 2171692 | 1820319 | 1623565 | 300401 | 25908660 |
| | % of Total | 43.31% | 27.99% | 5.86% | 8.38% | 7.03% | 6.27% | 1.16% | 100.00% |
| 1985 | Dollars | 11672878 | 10709483 | 5669404 | 3224528 | 3473762 | 2178772 | 767470 | 37696297 |
| | % of Total | 30.97% | 28.41% | 15.04% | 8.55% | 9.22% | 5.78% | 2.04% | 100.00% |
| 1986 | Dollars | 15981545 | 12520625 | 6180348 | 2203998 | 2444043 | 2603201 | 901794 | 42835556 |
| | % of Total | 37.31% | 29.23% | 14.43% | 5.15% | 5.71% | 6.08% | 2.11% | 100.00% |
| 1987 | Dollars | 16474004 | 14022249 | 5237919 | 3272921 | 2717889 | 2563493 | 1027970 | 45316447 |
| | % of Total | 36.35% | 30.94% | 11.56% | 7.22% | 6.00% | 5.66% | 2.27% | 100.00% |
| Total | Dollars | 80691516 | 58234470 | 20826165 | 15571752 | 15228793 | 13026227 | 3605216 | 208655950 |
| | % of Total | 38.67% | 27.91% | 9.98% | 7.46% | 7.30% | 6.24% | 1.73% | 100.00% |
| Total | (1982 Dollars) | 73930076 | 52796776 | 20034997 | 14259697 | 13969763 | 11933415 | 3237976 | 190162700 |
| | % of Total | 38.88% | 27.76% | 10.54% | 7.50% | 7.35% | 6.28% | 1.70% | 100.00% |

* (Nominal and Real Dollar Totals)

TABLE 2

RELATIVE ALLOCATIONS BY STATE
1982-1987
(CONSTANT 1982 DOLLARS)

| STATE | NATIONAL INTEREST AREAS: Improved Government Decisions | Natural Resource Protection | Public Access | Urban Waterfront Development | Hazards Mitigation | Natural Resource Development | Ports and Marinas | Total |
|---|---|---|---|---|---|---|---|---|
| ALABAMA | 52.67% | 11.43% | 1.83% | 0.00% | 22.38% | 11.70% | 0.00% | 100.00% |
| ALASKA | 84.49% | 7.15% | 0.00% | 0.00% | 1.20% | 7.15% | 0.00% | 100.00% |
| AMERICAN SAMOA | 51.44% | 21.49% | 5.56% | 0.00% | 0.00% | 19.85% | 1.66% | 100.00% |
| CALIFORNIA | 58.71% | 21.44% | 4.32% | 2.84% | 1.55% | 11.14% | 0.00% | 100.00% |
| CONNECTICUT | 13.78% | 21.68% | 13.19% | 13.90% | 15.43% | 5.83% | 16.19% | 100.00% |
| DELAWARE | 11.33% | 56.38% | 5.81% | 11.33% | 3.81% | 11.33% | 0.00% | 100.00% |
| FLORIDA | 14.46% | 70.27% | 0.16% | 0.95% | 11.01% | 1.87% | 1.29% | 100.00% |
| GUAM | 72.74% | 17.04% | 5.00% | 0.88% | 1.40% | 2.93% | 0.00% | 100.00% |
| HAWAII | 59.01% | 27.68% | 3.90% | 0.00% | 5.53% | 3.88% | 0.00% | 100.00% |
| LOUISIANA | 62.27% | 29.19% | 3.37% | 0.00% | 1.87% | 3.30% | 0.00% | 100.00% |
| MAINE | 32.61% | 18.73% | 8.88% | 14.29% | 1.04% | 18.69% | 5.76% | 100.00% |
| MARYLAND | 20.75% | 47.55% | 12.85% | 0.90% | 8.66% | 5.03% | 4.24% | 100.00% |
| MASSACHUSETTS | 16.52% | 35.94% | 11.09% | 12.83% | 5.24% | 4.53% | 13.86% | 100.00% |
| MICHIGAN | 33.50% | 16.87% | 30.74% | 6.04% | 11.73% | 0.73% | 0.39% | 100.00% |
| MISSISSIPPI | 22.73% | 29.27% | 17.38% | 14.82% | 3.66% | 9.30% | 2.85% | 100.00% |
| NEW HAMPSHIRE | 49.93% | 28.28% | 12.96% | 2.06% | 4.03% | 2.29% | 0.46% | 100.00% |
| NEW JERSEY | 64.20% | 19.74% | 6.84% | 2.05% | 5.34% | 1.03% | 0.80% | 100.00% |
| NEW YORK | 39.09% | 8.31% | 5.45% | 29.88% | 10.17% | 7.11% | 0.00% | 100.00% |
| NORTH CAROLINA | 34.29% | 36.04% | 28.09% | 0.34% | 1.13% | 0.10% | 0.00% | 100.00% |
| NORTHERN MARIANA IS. | 51.79% | 29.77% | 2.18% | 0.00% | 3.00% | 13.26% | 0.00% | 100.00% |
| OREGON | 52.08% | 13.54% | 15.21% | 5.82% | 3.07% | 10.28% | 0.00% | 100.00% |
| PENNSYLVANIA | 29.98% | 21.92% | 40.33% | 4.09% | 3.68% | 0.00% | 0.00% | 100.00% |
| PUERTO RICO | 9.62% | 44.60% | 7.42% | 0.00% | 17.40% | 19.33% | 1.63% | 100.00% |
| RHODE ISLAND | 36.48% | 27.93% | 21.59% | 7.50% | 1.31% | 2.62% | 2.58% | 100.00% |
| SOUTH CAROLINA | 48.14% | 21.99% | 6.45% | 0.00% | 21.06% | 2.36% | 0.00% | 100.00% |
| VIRGIN ISLANDS | 83.53% | 16.04% | 0.00% | 0.00% | 0.00% | 0.00% | 0.43% | 100.00% |
| WASHINGTON | 10.53% | 39.58% | 19.68% | 12.98% | 1.29% | 15.66% | 0.28% | 100.00% |
| WISCONSIN | 15.64% | 27.94% | 16.21% | 19.73% | 16.29% | 4.20% | 0.00% | 100.00% |
| MAXIMUM PERCENTAGE | 84.49% | 70.27% | 40.33% | 29.88% | 22.38% | 19.85% | 16.19% | 100.00% |
| MINIMUM PERCENTAGE | 9.62% | 7.15% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 100.00% |
| MEAN PERCENTAGE | 40.44% | 27.42% | 10.95% | 5.83% | 6.51% | 6.98% | 1.87% | 100.00% |
| MEDIAN PERCENTAGE | 37.79% | 24.84% | 7.13% | 2.06% | 3.75% | 4.78% | 0.14% | 100.00% |

As the relative allocation of funding to improve government decision-making has declined, the allocation of funding to other subject areas has correspondingly increased. Perhaps the most dramatic increase in funding has been seen in the area of public access. In 1982 about 6.71 percent of grants to states and territories were spent on improving public access to coastal resources. This percentage declined slightly over the next 2 years, but increased to over 15 percent in 1985. This increase in public access expenditures can be accounted for by two factors. First, the CZMA was amended in 1980 to require the production of analyses of beach access needs and plans to meet those needs. More significantly, in 1985 funds became available under Section 306A to fund land acquisition and construction of low-cost improvements for public access projects (boardwalks, parking lots, restrooms, piers, docks, etc., costing no more than $50,000). Beginning in 1985, states began to receive one allocation from OCRM for basic program implementation (Section 306) and for these land acquisition and construction projects (Section 306A).

Other subject areas have also displayed discernable funding trends. Over the period from 1982 to 1987 natural resource protection increased its share of grants to states under the CZMA from 22.98 percent to 30.94 percent, paralleling growing public concern over the degradation of coastal ecosystems. Port and marina projects likewise claimed a greater share of grant funding, increasing from 1.38 percent of grant funding in 1982 to 2.27 percent of grant funding in 1987. The share of grant funding devoted to two other areas of national interest, natural resource development and hazards mitigation, declined slightly over the period from 1982 to 1987. Yet another area of national interest, urban waterfront development, exhibited year-to-year variations over the course of this period, but remained relatively stable in terms of its proportion of total grant funding.

While the figures found in Table 1 suggest shifts in priorities and needs throughout the years between 1982 and 1987, caution should be exercised in assuming from these data the existence of long term trends and extending the results of this analysis past 1987 and into the future. It is likely that spending priorities are somewhat cyclical in nature, and the appearance of a decline in spending in the short term may in fact be part of a long term pattern of rise and decline. In addition, spending in any given year is influenced by current needs and events that impose new demands on state CZM programs. For example, spending in the area of hazards mitigation might very well increase in the years following a season of especially severe coastal storms.

The changes in expenditure patterns described above illustrate an important strength of the CZMA: its ability to evolve as state CZM programs gain greater experience and to adapt to changing needs and public concerns. There is another aspect to this flexibility. While national trends in the expenditure of grants to states under the CZMA are worthy of consideration, the emphasis of individual CZM programs varies widely from state to state. Table 2 outlines the allocation of inflation adjusted Section 306 and 306A grant funding by state over the period between 1982 and 1987. These data illustrate that while CZM is indeed a national program with the ability to respond to changing national conditions and priorities, it is also a program with considerable flexibility to take adapt to local needs and demands.

One of the most striking findings contained in Table 2 is that in only two subject areas, natural resource protection and improved government decision-making, did every state or territorial government participating in the federal CZM program expend some portion of its grant funding. In the other five subject areas at least two, and in many cases a relatively large number, of state and territorial governments chose not to expend any of their funding under the CZMA. However, at least two states or territories devoted over 10 percent of their available grant funds to each of these five subject areas.

One cannot conclude from this variation that governments participating in the federal CZM program participate in only a narrow range of activities. Only two state or territorial governments

expended grant funds in fewer than five subject areas, and only nine state or territorial governments expended grant funds in fewer than six subject areas. Primarily represented among these nine governments are U.S. territories and those states with relatively small coastal programs or relatively homogeneous coastal areas.

Where states or territories choose to expend grant funding in one of the areas of national interest, there is a wide range in the degree of emphasis that these governments choose to place on that subject area. For example, the average state in the period from 1982 to 1987 expended 27.42 percent of its grant funds, adjusted for inflation, in the area of natural resource protection. Within this area, however, there is a wide range of spending. Two states, Alaska and New York, chose to spend less than 10 percent of their grant funds directly for natural resource protection between 1982 and 1987, while two other states, Delaware and Florida, spent more than 50 percent of their grant funds for this subject during the same period. Thus, average expenditure patterns across all participating governments do not tell the entire story of variety in the administration of coastal zone management.

Further, the differences between mean and median percentages of Sections 306 and 306A funds spent by states and territories in each area of national interest suggest that state and territorial spending does not follow a smooth, symmetrical distribution where spending by one state or territory, one or another area, lies at a point upon a continuum of similar coastal management programs. Understanding expenditures of grant funds under the CZMA thus requires more than a notion of the "average" state coastal management program. It also requires a recognition of the complexity and variety of the coastal zone and of the limitations of tabular data and broad categories in the characterization of state coastal programs.

The summaries of individual state programs in Chapter 8 provide a sense of the diversity of state and territorial coastal management programs. These summaries, prepared in conjunction with the collection of financial information discussed in this chapter, provide greater insight into the differences between states and territories and responsiveness to local conditions that is a vital part of the national CZM program.

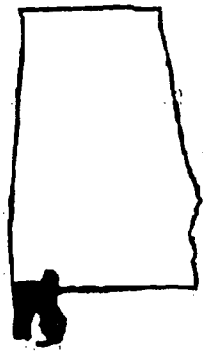
## INTRODUCTION

The state and territory summaries in this section provide a better sense of the diversity of individual state or territory coastal resources and management programs than can be gained from the statistical information presented in Chapter 7. Each state summary consists of a state map highlighting the coastal counties in that state and a brief table highlighting the state's coastal resources. As county divisions do not apply with regard to territories, maps are not presented for territories.

Also included for those states and territories with coastal programs approved by the federal Office of Ocean and Coastal Resource Management is a more detailed description of each state's coastal resources and coastal zone management program. This description includes information about management challenges facing the state or territory's coastal resources, the state or territory's coastal zone boundaries and coastal zone management program, and selected accomplishments of the state or territory's coastal program.

NOTE: The darkened portion of each state illustration indicates the coastal counties.

## ALABAMA



Date of Program Approval: 1979
Federal Program Support 1982-1989:
Coastal GNP (1985): $3.9 Billion (8.0% of state total)
Coastal Population (1985): 464,600 (11.6% of state total)
Shoreline Mileage: 607 miles
National Estuarine Research Reserves: Weeks Bay (3,028 acres)

COASTAL RESOURCE INFORMATION

Special/National Significance of Alabama's Coast

Alabama possesses extensive bays, estuarine waters and wetlands, many species of birds, a valuable commercial fishing industry and a growing tourism industry, in addition to the barrier islands located in the Gulf of Mexico.

Principal Coastal Threats and Emerging Challenges

- Effects of potential hurricanes on coastal real estate, especially in erosion hazard areas.
- Water pollution issues in Mobile Bay, Inter Coastal Waterways (ICWW), and Perdido Bay (Alabama/Florida).
- Restoration of shellfish beds, particularly oyster beds, which have declined in the past decade.
- Preservation of state's remaining wetland areas including monitoring and enforcement of Army Corp of Engineer (Corps) permits in wetlands, particularly permits requiring mitigation.
- Development of gas fields in Mobile Bay and state coastal waters.

COASTAL PROGRAM INFORMATION

Program Description:

Alabama's CZM activities are implemented by the Alabama Department of Environmental Management (ADEM) and the Alabama Department of Economic and Community Affairs (ADECA). Much of the permitting and inspection activities are carried out through contracts between the state and coastal counties and towns.

Defined Coastal Zone:

The Alabama coastal zone contains the lands and waters between a continuous 10-foot inland contour to the seaward limit of the state's territorial water, including the coastal islands. The coastal zone contains some 51 miles of Gulf Coast and 453 miles of brackish and freshwater shoreline.

Federal Program Support 1982-1989: $5.8 million

Major Program Accomplishments:

- The Weeks Bay National Estuarine Reserve, located in Mobile Bay, was designated in 1986. Many endangered species, such as the shovelnose sturgeon, Black pine snake, and Florida black bear are found within the Reserve.
- Alabama significantly increased public awareness of the state's coastal resources through its participation in the 1988 National Coastal Clean-up program.
- Authority has been delegated to Baldwin County and the Town of Gulf Shores to perform permit reviews, septic tank inspections, building inspections, and to provide permit information to citizens through permit information centers.
- A construction Control Line (CCL) used for setback development for Baldwin County, the town of Gulf Shores, and the major portion of Dauphin Island, was successfully completed.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- Alabama and Florida continue a coordinated joint research effort to analyze water quality problems in the Perdido Bay.
- Alabama's CZM program completed an Environmental Education Program that included training to teachers concerning coastal awareness issues, in addition to instructional manuals and booklets.
- In order to reduce waste loads to treatment plants and area streams, the feasibility of commercially marketing seafood waste has been studied.
- The Mobile-Tensaw River Delta, 289 square miles of water and wetlands, is classified as a geographical area of particular concern.
- Studies to determine the feasibility of reestablishing the submerged grassbeds in Mobile Bay continue.

Providing Public Access to Coastal Recreation

A Public Access and Recreational Areas pamphlet was prepared and distributed. In addition to this access booklet, more public access signs were install to better identify these recreational areas.

Improving Government Operations

- A Coastal Area Development Guide has been completed to provide citizens with guidelines for obtaining development permits.
- Permit information centers have remained available for persons who wish to obtain information regarding the permit process. Field offices are operating in Mobile and Montgomery. Also, permit information centers continue to operate in Baldwin County, the Town of Gulf Shores, and the Town of Orange Beach.
- Conflict resolution methods were developed to address development issues arising from competing water-dependent development interests.

Developing Natural Resources

- Alabama's Coastal Area Management Program (CMP) has studied the socio-economic impacts of energy-related construction to better prepare Alabama for future oil-gas exploration.
- Alabama's CMP identified critical spawning and early growth areas for certain commercially valuable species of fish.

Mitigating Coastal Storm Damage and Coastal Hazards

- The Dune Protection Program, instituted to prevent the destruction of Alabama's dunes and beaches, continues to be supported by the CMP. Part of the Dune Protection Program provides for daily patrolling (in a random pattern) of the beaches in order to detect unpermitted vehicular traffic, destruction of sea oats, and other violations.
- A shoreline monitoring program has been implemented to analyze shoreline changes in order to monitor beach erosion rates.

## ALASKA

Date of Program Approval: 1979
Federal Program Support 1982-1989:
Coastal GNP (1985): $5.9 Billion (53.5% of state total)
Coastal Population (1985): 392,600 (73.8% of state total)
Shoreline Mileage: 33,904 miles

### COASTAL RESOURCE INFORMATION

Special/National Significance of Alaska's Coast

Alaska's coastal resources contain vast, healthy ecosystems together with renewable and nonrenewable resources, especially energy resources. Three-quarters of the state's population lives in close proximity to the coast. Many of these people earn their living directly or indirectly from Alaska'a coastal resources.

Principal Coastal Threats and Emerging Challenges

- Effects of sea level rise on coastal resources, especially in erosion hazard areas.
- Effective management of the environmental impacts resulting from the extraction of fossil energy sources.
- The continued protection of commercial and subsistence resources, including Alaska's fish habitats and timber resources.
- Preservation of the state's wetlands.

### COASTAL PROGRAM INFORMATION

Program Description

The Alaska Coastal Management Act (ACMA) of 1977 is the basis for the Alaska Coastal Zone Management Program (ACMP). The Alaska Coastal Policy Council (CPC), the governing body of the ACMP, with representatives of seven state agencies and nine public members, administers the ACMP.

Defined Coastal Zone

Alaska's coastal zone is defined by a boundary system which assesses the relationships between the marine environment and the terrestrial environment. The boundary system contains three main elements: the inland boundary, the seaward boundary, and areas excluded from the coastal zone (i.e., federal lands).

Federal Program Support 1982-1989: $16.1 million.

Major Program Accomplishments

- The ACMP has a unified coastal consistency review process that streamlines and coordinates all state permits and leases in addition to the state's review of Federal actions that affect the coastal zone. This coordinated process provides a single-point of contact for project applicants and expedites the permit process. In 1988, for example, the ACMP review of oil and gas projects were completed in an average of 29 days. This review process also includes provisions for public involvement by local coastal districts and people living near a proposed project.
- The ACMP has provided local governments (cities and boroughs) and regional coastal resource service areas with funding and technical assistance to undertake planning and to develop local coastal programs. Through the ACMP, local communities and regions have been able to bring their priorities for coastal resource protection and development into state and federal decision making. In many of the smaller communities, the local coastal plan represents the first comprehensive planning effort.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- Alaska's CMP funds are being used to develop site design and rehabilitation measures to restore gravel mine sites in the North Slope oil fields.
- The Anchorage District Program has used CMP funding to develop a revegetation manual for restoring disturbed wetlands sites.
- Marine debris is becoming an increasingly serious problem in Alaska. CMP funds are being used to increase public awareness of the problem and public participation in its resolution through community beach clean-up events. In cooperation with Sea Grant, the ACMP has developed a how to booklet on conducting beach clean up.

Improving Government Operations

- Alaska's CMP held special workshops for coastal district staff to explain the consistency review process and to educate local governments about their role in this process. Training sessions for potential applicants were also conducted.
- Alaska's CMP is involved in an interagency effort to provide continuous on-site monitoring and enforcement for the North Slope Monitoring Project (oil and gas development activities).
- Alaska's CMP provides funding and technical assistance to coastal boroughs and districts to help implement and monitor local programs and to participate in the state consistency review process. To date, the ACMP have helped 31 localities develop local coastal programs.
- The ACMP is working with the state Division of Natural Resources (DNR) to develop a recreation management plan for the Nushagak and Mulchatna Rivers. This management plan should help resolve growing conflict between user groups (subsistence, sport, commercial, and recreation).
- The ACMP has coordinated a Marine Debris Task Force, established to increase public awareness of marine debris issues and galvanize local action through beach cleanups.

Developing Natural Resources

- Alaska's CMP funds are being used to help identify sites for the development of mariculture, the cultivation of plants and animals in seawater.
- As a result of Alaska's expedited permit process, the consistency review process for the Red Dog lead and zinc mine were completed in 43 days (compared with the 180 days allowed by Federal regulations.) This translates in a savings of $1.9 million in interest savings. Upon full operation, the Red Dog Mine will be the largest domestic zinc producer.

## AMERICAN SAMOA

Date of Program Approval: 1980
Lead Agency: Development Planning Office
Average Annual Federal Support 1982-1989: $.4 Million
Coastal GNP (1985): Not Available
Coastal Population (1985): 37,100 (100% of territory total)
Shoreline Mileage: 126 Miles

### COASTAL RESOURCE INFORMATION

Special/National Significance of American Samoa's Coast

The Territory of American Samoa, the only United States territory located south of the equator, consists of seven islands. The islands possess unique and valuable resources, such as the coral reefs that surround the islands and Pago Pago Harbor.

Principal Coastal Threats and Emerging Challenges

- Continuing efforts to improve the water quality of Pala Lagoon and inner Pago Pago Harbor. Pago Pago Harbor's water quality has been severely damaged from tuna canneries, boat refuse, and oil spills.
- Effects of sea level rise on coastal resources, especially in erosion hazard area.
- Continuing outreach efforts by the Development Planning Office (DPO) to work with village chiefs to understand the need for land use planning for protecting American Samoa's significant coastal resources. The American Samoan people mostly live on communally-owned land, headed by a matai or chief. The chief manages the village's land as well as the village's economic, political, legal and social affairs.
- Protecting the Territory's coral reefs from significant stress due to filling and sedimentation.
- Increasing enforcement of land use permit conditions and implementation of the stop work order provision, when necessary, for development projects.

### COASTAL PROGRAM INFORMATION

Program Description

Authority for the American Samoan Coastal Management Program (ASCMP) is provided by an Executive Order. The Executive Order contains sixteen objectives and policies concerning the coastal zone, as well as procedures for all permit reviews by the ASCMP. The Development Planning Office (DPO) is responsible for the implementation of the ASCMP. The DPO operates the permit process to assure consistency with the Federal Coastal Zone Management Act. A land use permit is required for all uses, developments, or activities that impact the coastal zone.

Defined Coastal Zone

The coastal zone includes all lands as well as Territory waters and submerged lands extending seaward 3 miles. Federal lands are excluded.

Federal Program Support 1982-1989: $3.5 million.

Major Program Accomplishments

- The ASCMP has led an ongoing interagency effort to cleanup the inner Pago Pago Harbor. Pago Pago Harbor is considered one of the finest natural harbors in the South Pacific. This cleanup effort led to an increase in public awareness and support for the Harbor.
- The ASCMP has developed a revised Project Notification and Review System (PNRS) that decreases permit approval time and coordinates interagency reviews. The revised permit system differentiates between major and minor permits. Minor permits currently take 1-3 days for approval compared to 3-5 weeks under the old process; major permit projects are now processed in 10-15 days compared to 2-3 months under the old system.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The ASCMP has been actively involved in cleaning up Pago Pago Harbor. CZMP funds have been used to contract with a local boat owner who has the authority to issue fines and citations to polluters and to patrol the harbor daily to remove debris. The boat's crew has also received training to clean up oil spills.
- The Marine Awareness Program, sponsored by the ASCMP, is a highly successful public awareness and education program. The Program includes a boat trip, as well as research competitions for school children. For example, over 5,600 eighth grade students have participated in boat trips around the island of Tutulia on various research and monitoring expeditions. Also, high school students participating in "Amerika Samoa Marine Symposium" conducted and presented research projects concerning the marine environment to scientists, teachers, peers, and the general public.
- Coast Week '88 activities provided additional public awareness for the ASCMP. Coast Week activities included reef walks, a sign and trash can painting competition, beach clean-up, and lectures on coastal resources.

Providing Public Access to Coastal Recreation

- The ASCMP has constructed an archaeological park to restore and maintain the Tafuna "Tia-Lupe" (star-mound) site for public use and to include the site in its registry of Historic Parks. The "Tia-Lupe" is located at the edge of a virgin lowland forest that is the last of its kind. Although the exact function of these rock formations is not known, it is hypothesized that they were used for ancient pigeon and dove hunting around 1300-1400 A.D.
- ASCMP funding has catalyzed efforts to increase public access towards the Fisheries dock. The Malaloa Bulkhead, which was constructed as part of the major Fagatogo Downtown Redevelopment Project, provides better water access and mooring for recreational and commercial fishing fleets.

Promoting Urban Waterfront Development

The Malaloa Bulkhead project has opened the door for four new marine dependent businesses operating adjacent to the bulkhead.

Improving Government Operations

- As part of the revised PNRS, an Interagency Review Committee has been established to aid the new permitting process. Under the revised system, an interview between the applicant and review agencies is required to determine what permits will be necessary for the project and to explain the

application procedures.

• The DPO undertook a local outreach program to the local village chiefs to gain the chief's support for the ASCMP and foster their participation in the Program.

• The ASCMP is working closely with the Department of Public Safety to stop the illegal mining of sand and coral rubble. Increased enforcement (routine beach patrols) as well as public outreach and education efforts are being implemented to control this problem.

Mitigating Coastal Storm Damage and Coastal Hazards

The ASCMP has commissioned a study of Landslide High Hazard Areas for the Territory, which will eventually result in upgraded construction standards and/or review criteria for construction within such zones.

## CALIFORNIA

Date of Program Approval: 1978
Federal Program Support 1982-1989: $18.6 Million
Coastal GNP (1985): $285.4 Billion (56.0% of state total)
Coastal Population (1985): 21,211,700 (80.5% of state total)
Shoreline Mileage: 3,427 miles
National Estuarine Research Reserves: Tijuana River (1,110,400 acres) and Elkhorn Slough (1,330 acres)

COASTAL RESOURCE INFORMATION

Special/National Significance of California's Coast

The California coast is an area of unsurpassed beauty containing rich and varied resources. The coastline includes mountain ranges, streams, rocky shores, beaches and islands, in addition to vast renewable and nonrenewable offshore resources. California also possesses one of the largest natural bay-estuary systems in the world—the San Francisco Bay.

Principal Coastal Threats and Emerging Challenges

• Increased and rapid residential and commercial development is reducing open space and encroaching on valuable wildlife habitats in the San Francisco Bay area and is degrading limited coastal resources in Southern California.

• Effects of sea level rise on coastal real estate and natural resources, especially in erosion hazard, wetlands and subsiding areas.

- Encouraging coast-dependent development over other development on the coast.
- Increased enforcement efforts to better monitor permitted projects and activities and detect and enforce unpermitted activities.

COASTAL PROGRAM INFORMATION

Program Description

California's Coastal Management Program (CMP) is administered by two separate agencies, the San Francisco Bay Conservation and Development Commission (BCDC) and the California Coastal Commission (CCC). The BCDC has responsibility for the San Francisco Bay area. Its activities are governed by the McAteer-Petris Act and the Suisun Marsh Preservation Act. The CCC has responsibility for the rest of the coast. The CCC was established by the California Coastal Act, which also requires all coastal cities and counties to prepare local coastal programs to implement the Coastal Act at the local level.

Defined Coastal Zone

California's coastal zone is made up of two segments; an ocean coastline segment and a San Francisco Bay segment. The ocean coastline segment extends 3 miles seaward and inland far enough to include important coastal estuarine habitat, and recreation areas. In rural areas, the coastal zone extends up to 5 miles inland. In developed urban areas, it extends as little as a few hundred feet. The San Francisco Bay segment of the coastal zone includes all of San Francisco Bay and the Suisun Marsh and extends inland 100 feet from the shoreline of San Francisco Bay.

Federal Program Support 1982-1989: $18.6 million.

Major Program Accomplishments

- CZM funds have been used to acquire public access, valuable coastal wetlands, and coastal areas of archeological significance.
- Obtaining public accessways along California's coast has been an important element of California's coastal management program. Both the BCDC and the CCC review all development projects for public access impacts. In the last 2 years, 44 miles of beach access have been opened along the California coast. Public access mitigation is frequently required as a permit condition.
- Since 1970, BCDC's permitting program has resulted in the creation of over 1,100 acres of new Bay surface.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- To help protect the San Francisco Bay area's decreased wetland and open space inventory, CZM funds were used to help purchase the Rush Ranch in Suisun Marsh in Solano County.
- CZM funds have been used by the California Coastal Conservancy to develop wetlands restoration and enhancement plans and habitat conservation plans for Federally endangered species.
- California contains two National Estuarine Research Reserve Programs, Elkhorn Slough and Tijuana River, which provide research and educational opportunities.

Providing Public Access to Coastal Recreation

- Since BCDC was established, over 96 miles of public access to the Bay Shoreline has been provided.
- Established prior to the CZMA, the BCDC has stimulated public interest and impetus to provide the framework for establishing the Golden Gate National Recreation Area. This national park hosts 25,000,000 visitors per year.

- Using the federal consistency provisions of the CZMA, the CCC was able to acquire an abandoned railroad corridor from the Southern Pacific Railroad. This corridor has been developed into a regional recreational trail that hosts a Monarch Butterfly forest, Fisherman's Wharf, Steinbeck's Cannery Row, and sea otter observation points in addition to other recreational amenities.
- Again, using the consistency review process, the CCC negotiated an agreement with the Air Force to permanently preserve 135 acres of land at White Point and create White Point Park, an important urban coastal park. The Department of Parks and Recreation estimates that when finished, the park will generate $600,000 in tourism generated revenue per year.

Promoting Urban Waterfront Development

The California Coastal Conservancy publishes a quarterly magazine, "California Waterfront Age", to provide an evaluation of private and public initiatives for waterfront restoration.

Preserving Ports and Marinas

CZM funds were used to help Sonoma County develop a plan to provide a badly needed marina for the state's commercial fishing industry. The Spuds Point Marina was developed to provide full-service facilities to the commercial fishing industry. The terms of the permit by the CCC determined that at least 80 percent of the marina's berths must be reserved for commercial fishing vessels. The marina also provides public fishing access along the breakwater.

Improving Government Operations

- The Design Review Board (DRB), a panel made up of eminent architects, landscape architects, engineers and site planners, advises the BCDC on whether the designs for projects proposed along the San Francisco Bay shoreline will provide public access. The BCDC uses the DRB's recommendations to assure that the public access in BCDC-approved projects will be effective and inviting.
- The BCDC has established an Engineering Criteria Review Board (ECRB), a panel consisting of geologists, civil engineers specializing in soils engineering, structural engineers, and architects, to review all major projects proposed to be built on new Bay fill so that appropriate safety measures are incorporated into the project designs. The independent engineering review provided by the ECRB has assured that the structures built on new Bay fill over the past two decades have been designed to reflect the latest information on seismic safety. As a result, the projects scrutinized by the ECRB suffered very little damage during the 1989 earthquake in the San Francisco Bay area.
- A total of 43 out of 71 Local Coastal Plans (LCP) have been certified by the CCC, including 12 out of 15 counties. Certification by the CCC results in the transfer of permitting responsibility to the local jurisdictions. In addition, the CCC is responsible for reviewing the LCPs every 5 years for consistency with the California Coastal Act.
- The CCC has an effective working relationship with many federal and state agencies. Particular efforts have been made over the last year to improve relations with other federal agencies. For example, the CCC and the Minerals Management Service are considering scheduling periodic meetings to discuss application or project status (of exploration activities), in addition to policy and consistency concerns.
- The BCDC is consolidating its three application forms into one form and has prepared easy-to-understand instructions for completing the form. The BCDC allowed applicants to use the new form on a trial basis for 5 months and revised the form and instructions to reflect the results of the trial. The application form can be used for federal consistency submittals as well as for permit applications.

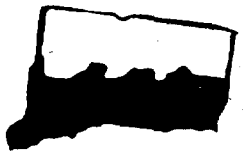
Developing Natural Resources

Using the federal consistency process, the CCC has worked to ensure that 41 OCS oil and gas plans of exploration, development and production have included the necessary provisions to protect the environment.

Mitigating Coastal Storm Damage and Coastal Hazards

The BCDC has taken the initiative to implement policies concerning the coastal impacts of sea level rise. Under these new policies, projects must incorporate sea level rise as a design criteria for development projects. The BCDC has sponsored a workshop for local governments to encourage and assist them in addressing the issue of sea level rise in their local plans and ordinances.

## CONNECTICUT



Date of Program Approval: 1980
Federal Program Support 1982-1989: $5.7 Million
Coastal GNP (1985): $25.6 Billion (33.8% of state total)
Coastal Population (1985): 1,973,900 (62.2% of state total)
Shoreline Mileage: 618 miles

### COASTAL RESOURCE INFORMATION

Special/National Significance of Connecticut's Coast

Connecticut contains the northern shoreline of Long Island Sound, which is a protected estuary commonly referred to as America's Mediterranean, comprised of extensive salt water tidal wetlands, shellfish beds, significant recreational boating facilities, and a nuclear submarine base.

Principal Coastal Threats and Emerging Challenges

- Water quality/nutrient enrichment in Long Island Sound.
- Restoration of diked or degraded coastal marshes (restoration potential for 8,000-10,000 acres).
- Balancing further expansion of recreational boating with the protection of sensitive coastal resources.
- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.

COASTAL PROGRAM INFORMATION

Program Description

Balancing the realistic need for coastal towns to grow economically with the responsibility to preserve and protect Connecticut's natural resources and marine heritage for future generations.

Description of Coastal Zone

The Connecticut coastal zone consists of all lands within the interior contour elevation of the 100-year frequency flood zone or a 1,000 foot setback from the mean high water mark or a 1,000 foot setback from the inland boundary of mapped tidal wetlands, whichever is farthest inland.

Federal Program Support 1982-1989: $5.8 million.

Major Program Accomplishments

- Municipal coastal programs provide municipalities with an effective way to identify specific resources, design long-range land use plans, and address coastal issues of particular local concern. To date, nearly every Connecticut coastal town has completed a municipal coastal program.
- As direct result of the statutorily-mandated coastal site plan review process, conditions on project approvals have been imposed providing over 8 miles of new public access which would otherwise not be available to the general public.
- The CZMA contains policies and standards for the protection of coastal resources. All federal and state activities and permits and local zoning decisions must conform with these policies and standards, which are highly protective of fragile natural resources, and more permissive for the less sensitive resources and developed waterfronts. As a result, allowable land uses all along the state's shoreline are based upon the ability of specific coastal resources to accommodate them without significantly degrading the environment.
- The Department of Environmental Protection used funding from a Coastal Energy Impact Program (CEIP) grant to establish a Mid-Coast/Lower Connecticut River Oil Spill Cooperative as well as three other, smaller cooperatives located in the Greenwich, Milford and Groton area. The funding covered the purchase of boats and oil spill containment equipment, the design of a training course for local officials and volunteer firefighters, and the development of Connecticut's Oil Spill Contingency Guide to identify and prioritize environmentally sensitive coastal resources and to outline specific emergency protection strategies in the event of a spill.
- Connecticut places high priority on wetland restoration and protection efforts. Over the past 10 years, some of the more significant efforts have included:

  the restoration of the Long Cove marsh in Guilford-restoring a channel across the beach and cleaing the ditches and creeks to reintroduce tidal flushing and control mosquitos in the mile-long marsh utilizing more modern, less environmentally damaging techniques;

  the development of a use and management plan for the 800-acre Bluff Point Coastal Reserve in Groton, placement of signs cautioning visitors about the location of fragile resources and nesting areas, and designation of a portion of the reserve as a wildlife sanctuary;

  the construction of the Great Creek flood control project in Milford-reintroducing significant tidal circulation in the marsh so that plant and animal habitat will be restored as well as relieving flooding problems in nearby homes during periods of heavy rain;

  and the development of a management strategy for the 380 acres of tidal wetlands at Barn Island in Stonington. Implementation is resulting in the reintroduction, after 40 years, of tidal flushing to sections of the upper marsh In conjunction with other planned marsh restoration activities, this will attract more waterfowl and shorebirds to the area and will increase recreational opportunities while returning diked sections of marsh to their natural state.

• The Connecticut Coastal Embayment Advisory Board was established by the legislature in response to a coastwide survey funded and supervised by the Coastal Management Program (CMP), which evaluated the environmental condition of the state's embayments. The board developed standards to evaluate the environmental quality of embayments, and then selected and supervised three cove improvement pilot projects along the coast. As a result of these efforts, a statewide embayment restoration program was established by the legislature in 1986.
• The Harbor Management Act authorizes, on a voluntary basis, towns adjacent to navigable waters to establish special harbor commissions and to prepare and enforce local harbor management plans under the supervision of the state's CMP.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources
• The CZMA requires that towns conduct coastal site plan reviews (CSPR) for all coastal development projects in the coastal boundary to determine their potential beneficial and adverse effects on coastal resources. Planning and zoning commissions and zoning boards of appeals conduct these reviews in conjunction with zoning and building permit reviews. Developers are required to assess the potential impacts of their projects and to demonstrate that the proposed activities are consistent with the policies and standards of the Act.
• The Department of Environmental Protection denied an expansion application for Cedar Island Marina in 1989 which would have resulted in the destruction of more than 16 acres of intertidal flats for 396 new slips. The Department determined that the applicant had not sufficiently demonstrated the acceptability of coastal resource impacts nor that no feasible and prudent alternatives exist. The CZMA provides specific policies and standards which require the preservation of intertidal resources, and this denial is consistent with these policies and standards.
• At Milford Point, a barrier beach located within Milford's high-velocity flood hazard area, proposed condominiums which would have destroyed coastal resources and posed a clear danger to life and property in the event of coastal flooding were denied based upon serious conflicts with the applicable coastal management standards and direct staff involvement during the coastal site plan review process. Ultimately, Milford Point was purchased and made a part of the Connecticut Coastal National Wildlife Refuge.
• Coastal Resources Management staff assisted in the designation of Connecticut's first coastal Natural Area Preserve at Hammonasset State Park in Madison and Clinton in 1985. As a result, special protection has been provided to over 400 acres of pristine salt marsh, beaches and critical habitat for coastal birds.
• As components of their municipal coastal programs, many coastal municipalities incorporated wetland setbacks into their zoning regulations, providing assurances that adjacent development will proceed in a manner which precludes adverse wetland impacts. Branford, Clinton, Darien, the City and Town of Groton, Old Lyme, Waterford, Westbrook and Westport are among those with the most protective regulations.
• A CEIP grant, combined with matching funds, allowed the City of New Haven to purchase tidal wetlands adjacent to the Quinnipiac River. This marsh is highly valued not only for its biological and habitat values, but for its aesthetic and historic significance as well.

Providing Public Access to Coastal Recreation
• Public access required during the mandated CSPR process has provided the general public with over 8 miles of walkways, parks and scenic viewpoints which would not otherwise have been available.
• Two of the more impressive accessways include a walkway nearly 2,000 feet in length in an urban port in Stamford and a combined effort by developers of adjacent properties in Westport which yielded a walkway approximately 1,500 feet long along the Saugatuck River.
• The Coastal Resources Management Division (CRMD) played a key role in the successful efforts to develop public access to Sheffield Island and its historic lighthouse off Norwalk by

improving the docking facilities on the island, allowing regular and safe transportation to the historic lighthouse via a small ferry for caretakers and the general public.

• Other innovative access projects funded by the CMP include a handicapped access ramp at New London's City Pier and improvements to foot bridges of an abandoned trolley trail known as the Branford Trolley Trail, which is now used as a wetland walkway and nature trail.

Promoting Urban Water Development

• The CRMD has worked closely with the City of New Haven toward the revitalization of the city's waterfront. First, the waterfront was rezoned as part of New Haven's Municipal Coastal Program, and a significant intertidal flat area was preserved. At the conclusion of a design competition, the city selected the Long Wharf Maritime Center project, a $250 million mixed use project featuring office, public access, retail, and marina development. The project is in phase two of development, and public access has been established across the entire waterfront at this large site.

• Norwalk's waterfront has undergone a dramatic transformation, which has been influenced significantly by Connecticut's coastal policies and standards. A CRMD grant enabled the city to look closely at redevelopment potential at the seaport area. One of the outcomes of this effort is the $26 million Maritime Center, which opened in 1988. Coastal management funds have also been used to plan for major improvements at the city's central waterfront park and new docking facilities at the Sheffield Island Lighthouse for public landings and access to this historic structure.

Preserving Ports and Marinas

• Connecticut has some of the strongest water dependent use standards in the country, requiring that municipal decision-makers take into consideration future impacts to water dependency and disallow diminishment of water dependent uses.

• The Harbor Management Act was implemented in response to increased coastwide pressures and competing demands for harbor use and development. The act authorizes municipalities adjacent to navigable waters to establish special harbor commissions to prepare and enforce local harbor management plans under the supervision of the state's Coastal Resources Management Division. A harbor management plan essentially becomes a map for the use and management of a town's harbor lands and waters. Once the state approves a town's plan, the state is committed to employ standards established in municipal plans when rendering permitting and enforcement decisions. Planning efforts have been initiated in many communities, including Bridgeport, Chester, Clinton, Darien, East Lyme, Essex, Fairfield, Fenwick, Groton, Guilford, Milford, Noank, Norwalk, Norwich, Old Lyme, Stonington, and Stratford. Stonington, Milford, and Norwalk now have state-approved plans.

Improving Government Operations

• In July of 1988, the CRMD assumed the direct responsibility for the permitting and enforcement of regulated coastal activities. Staff is focusing on providing environmentally sound and consistent decisions on applications, as well as attempting to streamline the permitting and enforcement processes to reduce the backlog of permit applications and pending violations.

• Using federal and state CMP funding, 36 eligible coastal communities have prepared municipal coastal programs to improve their ability to review coastal development projects and manage significant coastal resources. In addition, Stratford has recently completed a draft plan which has been state-approved. It will probably be locally adopted in 1990.

• In cooperation with the Corps, the CRMD has effectively reduced duplicative permit review and processing through the approval of Corps general permits for minor regulated activities. This eliminates the need for duplicative public notices for minor activities, but still ensures that they are carefully scrutinized by the CRMD. Additionally, the state and the Corps participate in monthly joint permit processing meetings.

• Through the federal coastal consistency process, the CRMD successfully resolved a conflict between Navy security interests and public access on the Thames River for public and commercial

fishing. Rejecting the Navy's original proposal, which would have precluded general public use, CRMD staff negotiated a compromise which improves security while allowing most public uses.

• Working with state coastal management staff, local officials are developing harbor management plans with competing resource user groups such as recreational boaters, marina owners/ operators and commercial shellfishing operators.

Developing Natural Resources

• Using federal coastal funding, Connecticut has developed a comprehensive fisheries management strategy. This strategy will better track marine environmental conditions, measure trends in shellfish and finfish yield, and identify emerging interstate fisheries issues and challenges.

• State coastal management officials have investigated the market potential for aquaculture development in Connecticut and the New England region. The CRMD also maintains a close cooperative working relationship with the State Department of Agriculture, Aquaculture Division, to ensure that coastal development does not adversely impact the shellfish resource or industry.

Mitigating Coastal Storm Damage and Coastal Hazards

• In 1987, the state legislature amended the state's regulatory boundry from the mean high water line to the high tide line in order to better regulate coastal erosion structures and to be concurrent with the Corps' jurisdiction. This eliminated a loophole which allowed some developers to build structures just above the mean high water line to avoid state regulation. Also, the CZMA was amended so that any structure which meets the statutory definition of a coastal flood and erosion control structure must be reviewed by municipalities for conformance with state coastal management policies and standards.

• In 1979, coastal management staff prepared and published the Shoreline Erosion Analysis and Recommended Planning Process as the foundation of a long-range strategy to identify and reduce the risks to lives and property in the coastal region. The book details historic shoreline changes in Connecticut from the 1700s to the present and shows the average rates of erosion and the direction of sand and sediment movement along the entire coastline. This information has been useful to both state and local officials in evaluating coastal development proposals.

INTERSTATE ACCOMPLISHMENTS

• A federal 309 grant was awarded to Connecticut, and Coastal Management Program staff are currently coordinating a study of the National Public Trust Doctrine with particular emphasis on its relation to today's coastal issues.

• A water dependent use study of the New York/New England region was completed in 1989. The results of this study verified that water-dependent uses can be profitable and protected at the same time. It also reafirmed the wisdom of policies which effectively preserve public trust tidelands and abutting waterfronts for water-dependent purposes.

• Another 309 grant awarded Connecticut involes the preparation of a Dredge Materials Management Plan for Long Island Sound. A bi-state and federal agency agreement (the interim plan) will, once revised, formalize the protocols for how and where open-water disposal of dredged materials will be carried out in Long Island Sound.

• Connecticut is also involved with another interstate effort with the state of Rhode Island which includes efforts to manage the Pawcatuck River basin which is geographically shared and regulated by the two states.

• Connecticut Coastal Management staff have been working with New York Coastal Management staff on the establishment of the "Bi-State Long Island Sound Marine Resources Committee" recently enacted jointly by the legislatures of both states to coordinate the management and cleanup of the Sound and propose any management-related legislation that may be necessary in each of the two states.

## DELAWARE

Date of Program Approval: 1979
Federal Program Support 1982-1989: $4.7 Million
Coastal GNP (1985): $7.0 Billion (51.9% of state total)
Coastal Population (1985): 622,100 (100% of state total)
Shoreline Mileage: 381 miles

### COASTAL RESOURCE INFORMATION

Special/National Significance of Delaware's Coast

Delaware's coast, tidal wetlands and inland bays offer both important habitats for birds, waterfowl, and fish and extensive recreational opportunities. Two federal national wildlife refuges, Bombay and Prime Hook, are located in the state.

Principal Coastal Threats and Emerging Challenges

- Intense recreational demands, in addition to second home and retirement home development pressures from nearby urban areas (Washington, D.C., Baltimore and Philadelphia).
- Degradation of the Inland Bays and other coastal waters due to poor agricultural practices and residential and marina development.
- Continued loss of freshwater wetlands; over 120,000 acres have already been lost.
- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.

### COASTAL PROGRAM INFORMATION

Program Description

Delaware's Coastal Management Program (CMP) relies primarily on four state laws, including the Beach Preservation Act, which controls use of beaches and dunes, and the Delaware Coastal Zone Act, which requires permits for industrial activity, including manufacturing, in the state's coastal areas.

Defined Coastal Zone

Delaware's coastal zone includes all of the state. The entire state is located less than 8 miles from coastal waters. The state's coastal beach strip is 24.5 miles in length.

Federal Program Support 1982-1989: $4.7 million.

Major Program Accomplishments

- Under the Inland Bays program, the state CMP has initiated an innovative nonpoint source pollution program designed to reduce erosion, septic tank pollution, stormwater flow, and agricultural runoff into coastal waters. Improved agricultural practices such as no-till planting and

poultry manure management are promoted through county conservation district programs (in Sussex, Kent, New Castle and the Murderkill River Corridor) and cost-sharing programs funded by the CMP. Additional work in the Inland Bays is being sponsored by the Environmental Protection Agency's (EPA) National Estuary Program.

- The state's Development Advisory Service (DAS), which is funded by the CMP, provides early advice to project developers regarding state permit requirements and reduces permit time for qualified projects. The DAS reviewed over 500 projects during 1987 and 1988, receiving a commendation from the Governor's Environmental Legacy report in 1988.
- New housing constructed in shoreline areas is protected from future storm damage through setback requirements.
- Delaware's CMP has played a key role in recent gubernatorial initiatives designed to strengthen state environmental protection, including the state's Environmental Legacy Report and Executive Order 56, which requires state agencies, where possible, to conserve and enhance freshwater wetlands. The CMP also supported development of a non-tidal wetlands report which outlines a freshwater wetland regulatory program.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- Delaware's CMP has catalyzed the purchase and acquisition of key additional park and natural areas, including 35 acres to Killens Pond State Park, 2 acres to Brandywine Creek State Park, 6.5 acres to the Murderkill River Nature Preserve, and 29 acres to the Delaware City Community Park District.
- State coastal officials have actively restored unique wetland habitats, including the Great Marsh, which is used by over 55 species of birds and waterfowl.•

The state CMP has aggressively used computer mapping and other surveying techniques to prevent new private building and other encroachments on the State owned extensive recreational, wildlife habitat, and natural areas.

Providing Public Access to Coastal Recreation

- The state CMP has constructed recreational accessways, including a new signing program designed to ensure that the public safely reach newly-designated surf fishing areas.
- The state CMP has also provided for the reconstruction of interpretative trails at Cape Henlopen and Delaware Seashores State Parks.

Improving Government Operations

- Conservation district coordinators have been funded by the CMP to promote local government cooperation and provide technical assistance to farmers in implementing the state's nonpoint source management program.
- Working with the Corps, Delaware's coastal management program has reduced duplicate development permit requirements. As a result, the Corps' General Permits are jointly processed with relevant state permit requirements.
- Delaware CMP officials led an effort to develop a new state fisheries law which has ended a multi-year dispute between the state's commercial and sport fishing industries.
- Delaware CMP officials were instrumental in mitigating a dispute between the Delaware Department of Transportation (DOT) and the EPA concerning the construction of a highway over a wetland area. Under the compromise that was reached, the DOT agreed to build 200 foot bridges over the area for $2 million instead of EPA's proposed bridge which would have cost the DOT $8 million.

Developing Natural Resources

Under the CMP-funded Conservation District program, state officials have developed a forestry management plan for 5,000 acres of state-owned woodlands in the New Castle District.

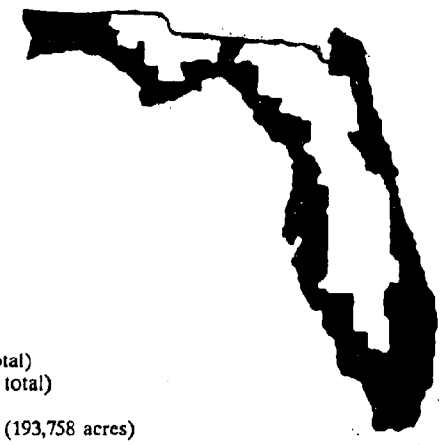
Mitigating Coastal Storm Damage and Coastal Hazards

• A Legacy Program report, "Beach 2000," identified beach erosion and mitigation and the management measures to correct this problem as one of Delaware's most significant environmental challenges. Delaware's CMP provides technical expertise to the Environmental Legacy Program.

• Delaware's coastal program has initiated a number of programs to protect and enhance the value of coastal real estate, though the institution of beach erosion controls, rebuilding of dunes after storms, and funding of beach restoration programs.

• Delaware's CMP has become a national leader in developing innovative open marsh water management techniques, using mosquito control methods which minimize the use of pesticides.

## FLORIDA



Date of Program Approval: 1981
Federal Program Support 1982-1989: $18.8 Million
Coastal GNP (1985): $98.1 Billion (62.1% of state total)
Coastal Population (1985): 9,246,800 (81.3% of state total)
Shoreline Mileage: 8,426 Miles
National Estuarine Research Reserves: Apalachicola (193,758 acres) and Rookery Bay (9,400 acres)

COASTAL RESOURCE INFORMATION

Special/National Significance of Florida's Coast

Florida's coastal region is the state's most important asset. The state possesses extensive wetlands, estuarine systems and bays, in addition to major industrial centers and military bases. Tourism is the state's leading industry, and its beaches are the state's major tourist attraction.

Principal Coastal Threats and Emerging Challenges

• Uncontrolled and extensive development along Florida's coastline has caused deterioration in the water quality of the state's marine and estuarine systems.

• Preserving the quality and quantity of Florida's ground water supply to be used as drinking water. Competition for groundwater between agriculture and industry have produced shortages of

potable water.

- The destruction of primary sand dunes as a result of improper development has caused erosion of Florida's beaches. This has resulted in decreased recreational and aesthetic value of the beaches, in addition to loss of life and property.
- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.
- Preservation of Florida's remaining wetlands and mangrove areas.

COASTAL PROGRAM INFORMATION

Program Description

The Florida Coastal Management Program (FCMP) is based on existing laws and regulations. Although the entire state lies within the coastal zone, local governments eligible for CZM funds are confined to those Gulf and Atlantic coastal cities and counties which are contiguous to State water that contains marine species and vegetation. Also only projects within the coastal counties are generally reviewed for consistency. The Department of Environmental Regulation (DER) is the agency designated to implement the FCMP, although the DER works closely with the Departments of Natural Resources and Community Affairs and the Governor's Office of Planning and Budget.

Defined Coastal Zone

The entire state, including its territorial waters are part of Florida's coastal zone.

Federal Program Support 1982-1989: $18.8 million.

Major Program Accomplishments

- The Henderson Wetlands Protection Act was approved in November 1988 as an amendment to the FCMP. The Act will provide better protection of wetlands through a more comprehensive statute.
- As a result of CZM grants, ten coastal counties in Apalachicola and West Florida were able to accelerate the preparation of hurricane evacuation plans. These plans were completed just before two major hurricanes, Elena and Kate, hit the Florida coast. All affected counties were successfully evacuated as a result of these evacuation plans.
- Florida contains two National Estuarine Research Reserve Systems, Apalachicola and Rookery Bay. The Apalachicola Reserve is the largest of all the National reserves, encompassing 193,758 acres of land and water. Rookery Bay Reserve contains mangrove forests, marshes and open waters, in addition to endangered species, such as the pelican and bald eagle.
- The FCMP is involved in an interagency effort to provide improved policy direction, management and protection of the State's estuarine systems. A current major effort of this program is to assist in basin-wide, coordinated management techniques in priority estuarine systems.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The FCMP has focused its efforts to develop a statewide perspective of estuarine pollution and to develop an overall estuarine management policy. This includes the development of long-term goals to monitor changes in estuaries from pollution and to prevent declines in water quality. The initiative has focused on four watershed systems, Lower Mantanzas River, Little Manatee River and Turkey Creek Watershed and the Mayakka River watershed.
- The FCMP is coordinating efforts with the Department of Education to integrate an environmental education program (that includes coastal awareness) into the public school curriculum.
- Funding provided by the Coastal Management Program has allowed Florida's Aquatic Preserve Program to develop a management plan for many of the state's aquatic preserves. Management plans are needed to protect these important resources from degradation due to the extensive

population growth that has occurred in Florida over the last several decades.

• The FCMP is helping to fund a project to develop a database on rare and endangered species. The database will aid the state and local decision making process concerning land use planning and will provide habitat protection for endangered species.

Providing Public Access to Coastal Recreation

With the help of FCMP funding, Martin County was able to develop a management plan for Hutchinson Island. The plan included a local bond referendum which generated local investment to acquire land for public access.

Preserving Ports and Marinas

• A marina evacuation study is being conducted by Metro-Dade County to generate evacuation plans for berthed boat owners. Potential boating evacuation patterns will be analyzed (from a survey of boat owners) in order to recommend alternative evacuation programs and policies.

• The East Central Florida Regional Planning Council is developing a marina siting plan using the computerized Geographic Information System (GIS). Data concerning shellfish harvesting areas and endangered species are examples of information that will be analyzed from the GIS. The purpose of this study is to protect the water quality of the Halifax River and Indian River Lagoon estuary systems from degradation due to human factors such as poor marina siting criteria.

Improving Government Operations

• The state legislature has enacted several major laws concerning the management of Florida's coastal resources. Examples of these are: 1) the Apalachicola Bay Protection Act which addresses water quality, fisheries and estuarine issues along the Bay; 2) The 1985 Coastal Zone Protection Act which imposes strict construction standards in sensitive portions of the coastal area, and 3) the Henderson Wetlands Protection Act, which provides increased protection to Florida's wetland areas.

• Florida's CMP is coordinating its estuarine initiative with national estuarine management programs within NOAA and the EPA.

• Under the Wetlands Act, a system to monitor and inventory wetlands has been established. The program monitors wetland losses that have resulted from permitting activities as well as wetland acreage that has been restored due to mitigation or permit conditions. The inventory also includes wetlands lost to unpermitted activities.

Mitigating Coastal Storm Damage and Coastal Hazards

• As a result of CZM funding, much needed hurricane evacuation plans for Apalachicola and West Florida were completed in a timely manner. Successful evacuation during hurricane Elena resulted in the largest peacetime evacuation in America (1.25 million people).

• The CZM is providing a grant to the South Florida Regional Planning Council to prepare a model post-disaster redevelopment plan (PDRP). This PDRP will provide local communitites as well as the state with guidelines for redevelopment after tropical storms and hurricanes. For example, the study will provide instructions for decision making concerning the repair and relocation of damaged structures.

INTERSTATE ACCOMPLISHMENTS

• Florida and Alabama continue a coordinated joint research effort to analyze water quality problems in the Perdido Bay.

• The states of Florida, Alabama and Mississippi have completed a cooperative study to develop a long-range strategy for hurricance loss and contigency planning for their tri-state area.

## GUAM

Date of Program Approval: 1979
Federal Program Support 1982-1989: $3.7 Million
Coastal GNP (1985): $0.4 Billion (100% of territory total)
Coastal Population (1985): 124,000 (100% of territory total)
Shoreline Mileage: 110 Miles

### COASTAL RESOURCE INFORMATION

Special/National Significance of Guam's Coast

The Territory of Guam, which is the southernmost and largest island in the Mariana's Chain, possesses unique and valuable resources including estuaries, fringing reefs, barrier reefs, patch reefs, barrier reef channels, fringing reef channels, mangroves, seagrass beds, cut benches and submarine cliffs and ravine forest. Guam's limestone forests are unique natural areas that provide wildlife habitat for many rare and endangered species, and collection areas for medicinal plants and edible animal life such as the coconut crab.

Principal Coastal Threats and Emerging Challenges

- Resort and residential development threatens certain ecological communities.
- Point source pollution from sewer outfalls and storm drains has created serious problems in Pago Bay, Sleepy Lagoon, Ylig River and nonpoint pollution from solid waste land fill into Pago River and other areas. Nonpoint source pollution from septic tanks and inadequate septic systems threatens groundwater resources in the northern part of the island.
- Periodic typhoons with wind strength attaining 200 mph and associated storm surge.
- Effects of sea level rise on coastal resources, especially in erosion hazard areas.

### COASTAL PROGRAM INFORMATION

Program Description

The Guam Coastal Management Program (GCMP) is a networked program with the Guam Bureau of Planning (BPO) as the lead agency. The Program is implemented through various executive orders, the Comprehensive Planning Enabling Legislation, Zoning Law, Subdivision Law, Territorial Beach Act, and the Territorial Seashore Protection Act. Land use decisions are made by the Territorial Land Use Commission (formerly the Territorial Planning Commission) and the Territorial Seashore Protection Commission; all other coastal resource and development decisions are made by the Guam Environmental Protection Agency, Public Utility Agency, and the Departments of Public Works, Land Management, Parks and Recreation, Public Health and Social Services, and Agriculture.

Defined Coastal Zone

The entire island, including the surrounding sea to the 3-mile territorial limit, is included under the GCMP's jurisdiction.

Federal Program Support 1982-1989: $3.7 million.

Major Program Accomplishments

- The Bureau of Planning (BOP) has strengthened its role as intermediary for all natural resource issues and reviews all plans and proposed legislation for the Governor. This emphasis on natural resource issues will ensure the GCMP that the implementation of its coastal policy goals will be met.
- The BOP and the Land Use Permit Task Force worked together to obtain a moratorium on new public land leases over the northern water lens area.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The GCMP has begun to work closely with the Historic Preservation Officer (HPO) to increase public awareness concerning the protection of historic and pre-historic sites from destruction as a result of development activities. The GCMP is supporting the HPO to produce posters to increase public awareness, a handbook for developers detailing their responsibilities regarding historic materials found at their development site and any new legislation and regulations that may be necessary to increase the protection of this valuable resource.
- A land use training video was developed to be used as an educational and public awareness tool. The video will be aired on local television stations and in school classrooms.
- Environmental educational materials were prepared for grammar school-aged children to increase their public awareness of coastal issues.

Providing Public Access to Coastal Recreation

- The completed Public Access to Shoreline Study identifies public access sites for residents seeking recreation as well as public access sites for land use planners. The pamphlet lists all public access points and facilities and includes a map of all these facilities.
- Using CZM funds, construction improvements at a newly acquired public park at Cocos Island have attracted 47,000 visitor days per year compared to zero visitors before the improvements were made. CZM money was used to build facilities such as restrooms and showers.

Preserving Ports and Marinas

The GCMP helped fund the Master Plan for the Port of Guam, which addresses military and civilian commercial port needs, recruitment opportunities and heavy industry opportunities.

Improving Government Operations

- The GCMP has taken the lead as a coordinator in resolving conflicts between various users of the nearshore waters (mechanized water craft users, windsurfers, snorklers, swimmers, surfers, and other recreational users) and environmental concerns. This effort has resulted in an approved plan which confines mechanized vehicles to specific locations and will conclude with the adoption of permanent rules and regulations. GCMP coordinated the views of all government agencies and private citizens through a series of working meetings and public hearings.
- In June 1986, the "Guide to Land-Use Decision Making For Territorial Planning Commission/ Territorial Seashore Protection Commission Members" was completed. The book is used as a decision making and informational tool. As a result of this book, several national objectives have been promoted, including natural resource protection, coastal development management and construction, and simplified government decisionmaking procedures.
- The GCMP has produced guidelines for federal consistency, including a simple "fill in the

blank" form.

• The GCMP developed two products for government personnel charged with inspecting and enforcing the varius land-use laws of Guam. These books, Training and Reference Guide for Building Inspectors on Zoning and Land-Use Laws and Regulations, and Inspectors Fieldbook, are designed to assist in training inspectors and in providing a handy reference document to be carried in the field.

Mitigating Coastal Storm Damage and Coastal Hazards

The GCMP was intrumental in the development of flood hazard rules and regulations for review of projects in defined floodplain or flood hazard areas.

## HAWAII

Date of Program Approval: 1978
Federal Program Support 1982-1989: $5.6 Million
Coastal GNP (1985): $11.6 Billion (85.8% of state total)
Coastal Population (1985): 1,053,500 (100% of state total)
Shoreline Mileage: 1,052 Miles
National Estuarine Research Reserves: Waimanu Valley (3,600 acres)

### COASTAL RESOURCE INFORMATION

Special/National Significance of Hawaii's Coast

Hawaii's coastal area contains resources of great recreation, scenic, historic, and scientific value. The state, which consists of 8 major and 116 minor islands, provides critical habitat areas for the islands' unique wetland birds, strand plants, and maritime and freshwater aquatic species, in addition to strategically located military bases. Tourism is the state's largest industry, and the coastline is the state's largest tourist attraction.

Principal Coastal Threats and Emerging Challenges

• Improvement of the regulatory processes for development activities.

• Development of a comprehensive management plan to address issues of emerging development pressures (i.e., marina and tourism development) on Hawaii's resources.

• Increased efforts by the Hawaii Coastal Zone Management (CZM) program to expand public

awareness about the state's coastal program.
- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.

COASTAL PROGRAM INFORMATION

Program Description

Hawaii's CZM program is based on seven objectives with supporting policies. A permit system to assure that developments comply with the objectives and special management areas (SMA) in the shoreline areas, the counties administer the Hawaii CZM program (i.e., protecting coastal ecosystems, reducing hazards, etc.)

Defined Coastal Zone

The coastal zone includes the waters from the shoreline to the seaward limit of the state's jurisdiction and all land areas excluding those lands designated as state forest reserves.

Federal Program Support 1982-1989: $5.6 million.

Major Program Accomplishments

- As a result of a public access initiative by the Hawaii CZM program from 1984-1986, the Hawaii Legislature appropriated $644,000 to continue the work of the public access program. This statewide public access program included an inventory of existing public access sites, and recommendations to acquire additional sites.
- The Hawaii CZM program has helped developers better understand and participate in the regulatory process through the Consolidated Permit Application Process (CAP). This applicant-initiated procedure is particularly advantageous when multiple permits are involved and reduces the time for permit processing. A brochure explaining the CAP has been mailed to development and other professional organizations to encourage their use of the process.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The Kauai Historic Preservation Commission has played a significant role in preserving the County's archaeological and historical resources. The Commission developed the Kauai Historic Resources Management Plan which provides the framework for the preservation efforts. The plan includes a record of local historic resources, site survey criteria and standards for permit reviews.
- The Hawaii CZM program is helping to create a database of rare and endangered plants and animals to help the counties and other agencies develop natural resource protection plans and development review strategies.

Providing Public Access to Coastal Recreation

- "Adopt-an-access" project, implemented by the County of Maui, was a highly successful volunteer program that alleviated the pressure to use county funds to maintain access projects. The county recruited individuals and organizations to help maintain selected accessways.
- The County of Maui also improved public shoreline accesses by installing signs identifying access areas and by organizing onsite cleanup efforts at these access areas.
- The Kauai Beach Access Inventory has provided the county with a basis for maintaining public rights to accessways and easements and for protecting these accessways from encroaching development and redevelopment pressures. The inventory includes copies of assessor's maps, deeds, and deed restrictions.
- A Honolulu Coastal View Study has successfully addressed the issue of public coastal view protection. Proposed development on Oahu has raised concern over the impact that these developments might have on the County's important public views. This study will provide policy guidelines to developers and the public concerned with this issue.

Mitigating Coastal Storm Damage and Coastal Hazards

• The Hawaii CZM program is developing a management program to address the problem of erosion. The goals of the program are to maintain beaches for recreation uses, maintain coastal water quality, reduce hazard to life and property, and preserve Hawaii's biological diversity.

• The Kauai Beach Warning Program has significantly increased the safety of offshore swimming for residents and visitors in the county. A brochure prominently displays Beach Safety Tips, which include an emergency call number and water safety signs to identify dangerous swimming conditions and tips for safer swimming. This brochure has been distributed throughout the County.

## LOUISIANA

Date of Program Approval: 1980
Federal Program Support 1982-1989: $17.1 Million
Coastal GNP (1985): $26.4 Million (45.1% of state total)
Coastal Population (1985): 3,467,800, (77.3% of state total)
Shoreline Mileage: 7,721

COASTAL RESOURCE INFORMATION

Special/National Significance of Louisiana's Coast

Louisiana's diverse coastal resources contain 40 percent of the nation's coastal wetlands. The state's vast estuarine systems and bays provide 28 percent of the nation's fishery harvest and much of the country's sugar and rice. Louisiana also provides the largest individual state contribution of oil and gas from its petroleum and natural gas reserves.

Principal Coastal Threats and Emerging Challenges

• Large-scale restoration projects as well as better management techniques are needed to preserve Louisiana's remaining wetlands. Significant wetland loss and coastal erosion (40-60 sq. mi./yr.) is a result of natural and man-induced factors, such as relative sea-level rise, leveeing of the Mississippi River for flood control, channelization of waterways, and direct and indirect impacts from energy development activities.

- The creation of better administrative procedures, such as a fine and/or penalty system to effectively deal with permit violations
- Effects of relative sea level rise on coastal real estate, especially in erosion hazard areas.
- The degradation of water quality from point and nonpoint source pollution in the state's estuarine systems such as Lake Pontchartrain, Barataria Basin, and the Mermentau River.

COASTAL PROGRAM INFORMATION

Program Description

The Louisiana Coastal Resources Program (LCRP) is based on the State and Local Coastal Resources Management Act of 1978 in addition to other pre-existing state laws which are incorporated into the program. The LCRP is implemented primarily by the Coastal Management Division/Department of Natural Resources (CMD/DNR) through a permit program and coordination with pre-existing state permits. Local governments may assume responsibility for the permitting of certain uses of local concern by developing a local coastal program.

Defined Coastal Zone

The inland boundary of the coastal zone includes all or part of 19 parishes; the seaward boundary extends to the outer limit of the United States territorial seas. Federal lands are excluded.

Federal Program Support 1982-1989: $17.1 million.

Major Program Accomplishments

- The Louisiana Coastal Management Program has developed two general permits that simultaneously expedite energy exploration activities and minimizes the loss of wetlands. The new permit procedures, in concert with a required geologic review process, have decreased the destruction of wetlands for the average oil and gas canal from 5.5 acres in 1983 to 2.5 acres in 1988 while saving the oil and gas industry over $1 million (from decreased permit processing time). The applicant must prove for each permit that there are no less damaging alternative sites or access to the site.
- Since 1983 the LCRP and the U.S. Corps have issued joint public notices for permitting activities that fall within the domain of New Orleans district and the Louisiana Coastal Zone. This joint notification policy has decreased the permit review time, and has resulted in an annual savings $5.3 million to the oil and gas industry.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The LCRP is continuing to evaluate the effectiveness of marsh management planning as a technique for preserving wetlands. The LCRP has provided funding for a contract with the U.S. Soil Conservation Service to develop a manual to be used as a policy guideline for marsh management. The LCRP has also identified wetlands that should receive priority attention for federal and state acquisition.
- The LCRP has developed a Geographic Information System (GIS) which facilitates the permit review process as well as allowing the state to conduct analysis such as monitoring wetlands loss.
- The LCRP is developing a special area management plan (SAMP) to improve the water quality for Lake Ponchartrain. Urban runoff and sewage discharge has significantly decreased the water quality of this heavily used lake.
- Public awareness of LCRP activities and coastal issues has increased in recent years because the state Coastal Management Division (CMD) has taken an active role in public outreach and education. This outreach program has involved speaking to environmental, civic and industrial organizations, as well as providing educational materials to schoolteachers.

• To address the problem of coastal debris and trash, the LCRP has compiled a pictorial inventory of unauthorized trash and litter sites located in the coastal zone. These pictures were used during Coast Week '88 to increase public awareness to this problem.

Improving Government Operations

• The LCRP has increased its efforts to provide technical assistance to local parishes to develop local coastal programs (LCPs). To date, the LCRP has approved eight LCPs and is currently working with four additional parishes to develop plans for a local coastal program.

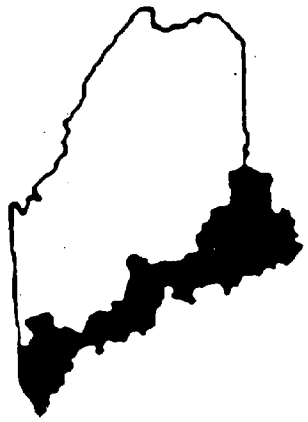
• To improve consistency between state agencies, a LCRP staff member is serving as a liaison between the CMD and the Department of Environmental Quality's (DEQ) Office of Water Resources on two water quality programs. The staff member will participate on committees, comment on documents for the CMD and coordinate CMD activities with the DEQ to avoid duplicative efforts between the two agencies. Also, the consistency staff member will review the present oil contingency plan for potential environmental effects and adequacy of procedure.

Developing Natural Resources

A geological review procedure that decreases wetland loss is being applied to an increased number of energy exploration activities. Formerly, oil and gas canals of 500 feet or less in length or oil field roads of 1,500 feet of less in length (threshold lengths) in wetlands did not have to undergo a geological review. However, recent research has shown that these threshold lengths are not justifiable; therefore, all proposed exploration sites involving wetlands modification must undergo this procedure. This geological review has led to a decrease in the average oil and gas canal length.

## MAINE

Date of Program Approval: 1978
Federal Program Support 1982-1989: $12 Million
Coastal GNP (1985): $5.0 Billion (34.3% of state total)
Coastal Population (1985): 831,900 (71.4% of state total)
Shoreline Mileage: 3,478 Miles
National Estuarine Research Reserves: Wells (1,600 acres)



### COASTAL RESOURCE INFORMATION

Special/National Significance of Maine's Coast

Maine's coast is a diverse and complex combination of human and natural resources. It includes urban regions such as Portland, fishing villages, remote island communities, and wild timberland areas without local governments, in addition to sandy beaches, mountains, islands, large marshes, and rocky, highly indented shorelines.

Principal Coastal Threats and Emerging Challenges

- Cumulative impact of incremental development on coastal peninsulas and bays.
- Protecting and managing the Gulf of Maine in concert with the other states and provinces that border the Gulf.
- Expanding coastal access opportunities.
- Effects of sea level rise on coastal real estate, especially in erosion prone areas.

### COASTAL PROGRAM INFORMATION

Program Description

Maine's Coastal Management Program (MeCMP) is based on thirteen core laws administered by the state and local governments. The State Planning Office (SPO) is the lead agency for implementing the MeCMP. The Departments of Environmental Protection (DEP), Conservation (DOC) and Marine Resources (DMR) have primary responsibility along with some local agencies for administering the core laws of the MeCMP.

Defined Coastal Zone

Maine's coastal zone consists of all coastal towns and townships on tidal waters, all coastal islands, and its territorial seas to the extent of the state's territorial limit.

Federal Program Support 1982-1989: $12 million.

Major Program Accomplishments

- An $11 million bond referendum to construct new fish piers and other support facilities was the result of a MeCMP funded study that analyzed and identified inadequacies in the infrastructure of

the fishing industry. Additional local and federal investment resulted in new or rehabilitated fish piers in Stonington, Portland, Eastport, Kennebunkport, Saco, Rockland, and a fish processing plant in Vinalhaven. Later, a new fishing boat facility and fresh fish auction was constructed in Portland.

- The Wells National Estuarine Research Reserve, located in the southern part of Maine, was designated in 1984. The Reserve contains approximately 1,600 acres of undeveloped marsh and upland fields and forests, in addition to endangered species—the bald eagle and the peregrine falcon.
- CZM funded Waterfront Action Grants have helped communities provide 1) improved public access to beaches and shoreland areas, 2) port and waterfront redevelopment activities, and 3) preservation and restoration of shoreland and other nationally significant resources.
- Two new laws, Maine's Coastal Management Act and Maine's Comprehensive Planning and Land Use Regulation Act ,provide a basis for municipalities to establish comprehensive land use plans to address natural resource management and land use and development issues brought on by the recent growth and development of Maine's coast.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The state has increased protection for natural areas through the enactment of the Critical Areas Program. More than 600 areas have been designated by the SPO and more than half of these are located along the coast.
- The Department of Environmental Protection (DEP)'s Marine Monitoring Program, initially funded through the state's coastal program, is providing a dataset concerning toxic chemicals in Maine's marine environment. This database will help the DEP and MeCMP plan pollution mitigation projects to improve water quality.
- The DEP's administration and implementation of Maine's Sand Dune Law has been improved through the generation of computerized maps. These maps include barrier beaches, wetlands, salt marshes and tidal flats and have been developed to assure that DEP permit decisions are consistent and are based on sound geological criteria.

Providing Public Access to Coastal Recreation

- Three interpretive overlooks were built at Wells National Estuarine Research Reserve with a CZM grant. These overlooks increase public awareness and education concerning the marshland ecosystem.
- In 1989, the MeCMP has helped increase public access to shoreland areas through the funding of coastal acquisition projects. For example, coastal funding provided $50,000 for the acquisition of the $2.35 million Dodge Point property in Newcastle; $35,000 in CZM funds helped acquire Shackford Head in Eastport. These two acquisition projects open a total of 4 miles of coastline to the public.
- The City of South Portland's Spring Point Shoreway project provides 4 miles of walkway along urban shoreline. This project was supported by $130,000 from MeCMP and $700,000 in state and local funds.
- The rehabilitation of the Town Wharf in York Harbor, funded by a Waterfront Action Grant, has improved public access to the water for both recreational boaters and commercial fishermen.

Promoting Urban Waterfront Development

- The expansion of Augusta's Waterfront Park along the Kennebec River is part of a plan to rehabilitate the River's deteriorated waterfront. This expansion project, which included placing granite steps for access to the water and adding benches in the upland areas, was funded by a Waterfront Action Grant.
- CZM funds were used to help the town of Bucksport continue its waterfront revitalization efforts. A Waterfront Action Grant was employed to rehabilitate the Town Dock, improve the

access road to the dock and complete a walkway path to the dock.

Preserving Ports and Marinas

Gilkey's Harbor, located on the island of Islesboro, underwent facility improvements that enhanced year-round access to the island and also increased Harbor safety. Facility improvements included rehabilitation of the town pier and boat ramp.

Improving Government Operations

- The Comprehensive Planning and Land Use Regulation Act of 1988 requires that coastal communities plan for the future and protect coastal resources. This Act establishes the following goals: 1) to provide direction and consistency for localities and state agencies planning regulatory action that affect natural resource protection and land use development; 2) to establish technical and financial assistance programs to help municipalities develop growth management programs, and 3) to establish a review process for local growth management programs to ensure consistency with the requirements of the Act.
- The Permit by Rule regulation, which was established to save time and expense for certain development activities in addition to providing standards for how these activities should be carried out, became effective on February 15, 1989. This Rule establishes that certain activities that do not significantly affect wetlands and water bodies (e.g., the placement of water-monitoring devices or moorings) require only a notice to be filed with the Maine DEP.
- The Shoreland Zoning Act Amendments of 1989 empower municipalities to adopt, administer, and enforce improved shoreland zoning ordinances for their jurisdictions. The amendments strengthen both the administrative and environmental standards of the Shoreland Zoning Act of 1971.
- A formal training program and certification procedure for local code enforcement officers has been instituted. Certified code enforcement officers are now able to testify in district court, consequently improving enforcement of local zoning and environmental laws.

Developing Natural Resources

To help communities protect against loss of water-dependant activities and structures that support marine industries, the SPO and DECD have prepared Protection of Prime Sites for Water Dependent Use. This publication describes the regulatory and non-regulatory options that are available to communities to resolve conflicts between marine industries that require a waterfront location and new residential or commercial development plans that do not require a waterfront location.

Mitigating Coastal Storm Damage and Coastal Hazards

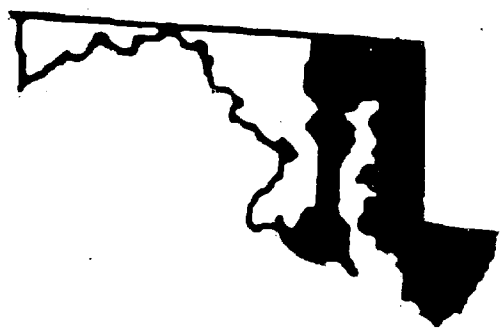
- The state has addressed sea level rise and other coastal hazards through new regulatory provisions under its Natural Resources Protection law. Under the law, seawalls and other structures on or seaward of a frontal dune or in high hazard areas are prohibited. Elevation and area requirements for buildings are included along with a provision for relocating structures encroached on by a coastal wetland.
- The state completed its first "Statewide Hazard Mitigation Plan" in December 1987. The Plan discusses hurricanes and other coastal hazards, identifies areas in need of improved management and contains draft language for legislative changes to address the management issues identified.

INTERSTATE ACCOMPLISHMENTS

- Maine's SPO has taken the lead role in establishing the international Gulf of Maine Initiative. This Initiative, which contains representatives from Canada as well as the United States, was formed to improve the management of the Gulf of Maine. The goals of the working group are to improve communication on Gulf related issues and to develop recommendations to protect the Gulf's natural resources.
- The states of Massachusetts, Maine, Connecticut, Rhode Island, and New York have completed

three separate studies designed to improve government decision making concerning: 1) the preservation and protection of water-dependent uses of regional waters, particularly with regard to commercial and recreational boating facilities; 2) the strengthening the public trust doctrine with regard to public access, and 3) the development of an interstate policy to improve the effectiveness of floodplain management.

## MARYLAND



Date of Program Approval: 1978
Federal Program Support 1982-1989: $12 Million
Coastal GNP: $25.9 Billion (35.8% of state total)
Coastal Population (1985): 3,159,900 (72.0% of state total)
Shoreline Mileage: 3,190 Miles
National Estuarine Research Reserves: Chesapeake Bay (3,400 miles)

### COASTAL RESOURCE INFORMATION

Special/National Significance of Maryland's Coast

Maryland's coastal area contains two distinct regions; the Atlantic Coast shoreline and the Chesapeake Bay area. The Atlantic Coast, bounded by barrier islands backed by coastal bays, is the site of extensive recreational activities and vast areas of cord grass dominated salt marshes. The majority of the state's shoreline borders the nation's largest and most productive estuary—the Chesapeake Bay and its tributaries, including the Potomac to Washington, D.C. The Bay is the center of this country's largest oyster and crab producing region as well as the location of extensive fin fish, waterborne commerce, and petroleum activities. More importantly, the Chesapeake Bay provides an important habitat for thousands of water dependent species.

Principal Coastal Threats and Emerging Challenges

- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.
- Continued support for the Chesapeake Bay Initiative and related programs to ensure continued

improvement in the water quality of the Bay and its tributaries.

- The management of point and nonpoint source pollution, especially in the Chesapeake Bay and its tributaries.
- The management of the rapidly increasing development and resource depletion in the Chesapeake Bay region.
- Preservation of the state's remaining wetlands.

COASTAL PROGRAM INFORMATION

Program Description

The Maryland Coastal Zone Management Program (MCZMP) is administered by the Maryland Department of Natural Resources (DNR). Within the DNR, the Coastal Resources Division (CRD) is responsible for coordinating and monitoring the implementations of the MCZMP. In addition, the Coastal Resources Advisory Committee (CRAC) represents all participants in the MCZMP, including representatives from each coastal county government, the five regional citizens advisory groups, and interest groups. The CRAC provides a forum where participants in coastal activities are informed of Program actions and where they can present their views on Program activities.

Defined Coastal Zone

Maryland's coastal zone is defined as the inland boundary of the counties bordering the Atlantic Ocean, Chesapeake Bay, and the Potomac River, as far as the municipal limits of Washington, D.C. In addition, an area of management focus is identified coincident with the boundaries of the Chesapeake Bay Critical Area in land lying within 1,000 feet of tidal waters and tidal wetlands.

Federal Program Support 1982-1989: $12 million.

Major Program Accomplishments

- A $60,000 CZM funded study that analyzed and recommended solutions to Ocean City's erosion problems, played a major role in the decision by state and local governments to commit over $12 million to renourish the state's most heavily utilized beach. The total property value protected by this renourishment project is $2 billion.
- Maryland's Chesapeake Bay Critical Areas Protection Act is recognized as one of the most progressive state actions to deal with development and pollution problems in an environmentally sensitive coastal area. This Act required local governments to develop land use management programs in accordance with state regulations that strictly control development within 1,000 feet of all tidal waters and tidal wetlands associated with the Chesapeake Bay and it tributaries. The concept for the Chesapeake Bay Critical Area Program originated from several CZM studies.
- The Chesapeake Bay National Estuarine Research Reserve was in 1981. The Reserve contains salt marshes and islands of swamp pine forests extending over four tributary creeks and provide habitats for aquatic populations that require a salinity half the strength of sea water. The Reserve also contains a variety of resident and migratory birds, such as the bald eagle and peregrine falcon, and is home to the red fox, gray fox, river otter, mink, and white-tailed deer.
- The Coastal Resources Division funded the Maryland Natural Heritage to identify important plant and wildlife habitat areas in the state's coastal zone and to develop long-term management programs to protect these areas.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The Maryland Critical Areas Program helps to protect Chesapeake Bay fisheries, which generated $56.5 million in revenue in 1986 with CZM funds instrumental in their development.

- As part of the state's Chesapeake Bay Initiatives, management programs have been developed to protect nontidal wetlands and to promote the use of nonstructural vegetative shore erosion control measures.
- The Maryland Environmental Trust has been effective in securing conservation easements in the state, especially along the Chesapeake Bay and its tributaries.
- In accordance with the objectives of the Chesapeake Bay Program, the MCZMP plays a lead role in the Submerged Aquatic Vegetation (SAV) program. This Program focuses on the research, monitoring and management activities associated with revegetating the state's wetlands.

Providing Public Access to Coastal Recreation

Maryland has made extensive use of Section 306A of the CZMA. These low cost construction projects provide improvement for public access to the state's shoreline. Examples of these are the Northside Park Wetlands Walk in Ocean City, the acquisition and improvements of a boat ramp and dock at Indian Head, the construction of nature walks and picnic areas in Leight Park, and the construction of the Rock Hall Waterfront Park.

Promoting Urban Waterfront Development

Chesapeake Beach, such as Snow Hill, Betterton, and several of the state's smaller waterfront communities, has developed and implemented waterfront rehabilitation plans.

Preserving Ports and Marinas

Several studies have been undertaken to identify suitable dredged material disposal sites both for the navigational channels to the Port of Baltimore and for the maintenance of channels to public and private marina facilities.

Improving Government Operations

- Under the MCZMP, the CRD/DNR is required to ensure consistency of state actions with coastal policies. This is especially important because the MCZMP is a networked program that relies on existing regulations that are implemented through other state agencies.
- The CRD has conducted a number of workshops on issues of coastal zone management concerns, e.g., recreational boating workshops for the public to address the issues of boating safety, excessive noise, and shoreline erosion caused by boat wakes.

Mitigating Coastal Storm Damage and Coastal Hazards

- The MCZMP will update its historical shoreline and erosion rate maps using state-of-the-art techniques such as imagery processing and computerization.
- The MCZMP conducted a nonstructural erosion control training program for contractors interested in providing services to private shorefront property owners receiving CZM grants to implement nonstructural shore erosion control techniques.
- The state used CZM funding to undertake several studies which formed the basis for the implementation of the state's Hurricane Protection/Beach Nourishment Protection for the Ocean City area.

INTERSTATE ACCOMPLISHMENTS

The states of Maryland, Virginia, Pennsylvania, the District of Columbia, the Chesapeake Bay Commission, and the EPA support the Chesapeake Bay Agreement. Recent interstate grants, funded by CZM, focused on initiating a citizens water quality monitoring network for each state surrounding the Bay (Maryland, Virginia, and Pennsylvania) and bringing together leaders in various technical fields to develop toxicity assessment protocols.

## MASSACHUSETTS

Date of Program Approval: 1978
Federal Program Support 1982-1989: $11.6 Million
Coastal GNP (1985): $70.7 Billion (53.3% of state total)
Coastal Population (1985): 4,373,600 (75.1% of state total)
Shoreline Mileage: 1,519 Miles
National Estuarine Research Reserves: Waquoit Bay (2,199 acres)

### COASTAL RESOURCE INFORMATION

Special/National Significance of Massachusetts's Coast

The Massachusetts's coast is of historic, scenic, economic, and recreational importance. The Commonwealth's coast consists of 1,200 miles of rocky shoreline, sandy beaches, salt marshes, estuaries, large urban harbors, tidal flats, and dozens of small islands. Migratory birds, particularly waterfowl and shorebirds, are dependent upon the salt marshes, tidal flats, and protected waters of Massachusetts for feeding and nesting areas. In addition, it is estimated that 70 percent of the commercially important fish catch spends a part of its cycle in Massachusetts' estuarine waters.

Principal Coastal Threats and Emerging Challenges

- Preservation of the state's remaining wetlands.
- Continued efforts to protect and improve coastal water quality.
- Encouraging the acquisition of undeveloped hazard prone areas for conservation or recreation use, and providing technical assistance for hazard area zoning and mitigation.
- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.

### COASTAL PROGRAM INFORMATION

Program Description

The Executive Office of Environmental Affairs (EOEA) is the designated lead agency for implementing the Massachusetts Coastal Zone Management Program (MCZMP). Within the EOEA, two major offices are involved in the program: 1) the Office of Coastal Zone Management advises the Secretary on coastal zone planning and policy formulation and reviews activities for consistency with the regulatory provisions of the MCZMP, and 2) the Environmental Impact Review Section evaluates and monitors state environmental impact statements.

Defined Coastal Zone

The Massachusetts coastal zone includes the land and waters within the area defined by the seaward limit of the state's territorial sea extending from the Massachusetts-New Hampshire border south to the Massachusetts-Rhode Island border, and landward to 100 feet inland of specified major roads, rail lines, or other visible rights-of-way. The coastal zone includes all of

Cape Cod, Martha's Vineyard, and Nantuckett. Federal lands are excluded.

Federal Program Support 1982-1989: $11.6 million.

Major Program Accomplishments

- The Waquoit Bay National Estuarine Research Reserve, located on the south side of Cape Cod, was designated in 1988. The Reserve contains 2,199 acres of marsh, open water, upland fields and forest, in addition to areas which are relatively untouched by human activities.
- The MCZMP was instrumental in obtaining legislative backing for an $18 million bond to support the Coastal Facilities Improvement Program (CFIP). The CFIP has revitalized coastal facilities which support commercial fisheries and recreational use in the coastal area.
- The MCZMP has been instrumental in acquiring 1,636 acres of prime coastal real estate for public access. This was accomplished by working with private donors, the state appropriations process and federal agencies.
- The MCZMP is working in cooperation with the EOEA to implement the coastal Areas of Critical Environmental Concern (ACEC), a state program for identification, designation, and protection of critical areas. Eleven of the 14 ACEC sites designated since 1974 are located in the coastal zone.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The Wetlands Restriction Program addresses the cumulative impacts in wetlands and bars certain activities in these environmentally sensitive areas. This rogram, which acts as a zoning overlay, identifies and restricts activities on a town-by-town basis, in addition to providing these towns with wetland area maps.
- The MCZMP has been directly involved in the planning of a long-term solution to the pollution problems of the Boston Harbor. The MCZMP has provided staff support for the various task forces involved in the Boston Harbor cleanup, coordinated projects, and initiated innovative efforts to solve short-term and chronic problems associated with the Harbor.
- The handbook Primer for Dredging in the Coastal Zone of Massachusetts addresses such topics as dredging technologies, disposal alternatives, environmental impacts, regulatory framework, and environmental testing.
- The Southeast CZM regional coordinator is working with federal, state, and local officials to update the regional oil spill contingency plans for Buzzards Bay and Mount Hope Bay.

Providing Public Access to Coastal Recreation

In 1987, Massachusetts voters provided the state with a $30 million Open Space Bond to continue its coastal acquisition efforts. This bond was passed largely as a result of the MCZMP's past, successful acquisition efforts to obtain land for public access.

Preserving Ports and Marinas

- One million dollars in CFIP reauthorization money has been allocated for the development of harbor management plans.
- The MCZMP Designated Port Area (DPA) program has identified 12 DPAs. Under this program, both filled and flowed tidelands are reserved exclusively for either current or future maritime industry use.

Improving Government Operations

- In May 1988, the DEP won a major victory restricting construction in wetlands. The Massachusetts' Appeals Court ruled that the DEP may place restrictions on the siting of a home in coastal wetlands, while allowing the site to be used for other purposes, such as refreshment booths, certain farm activities, wharves, and fish and shellfish businesses.

- In accordance with the Chapter 91 amendments, the MCZMP provides comprehensive project reviews that frequently lead to modifications in project designs. For example, the Rowe's Wharf development project was altered to provide better access to the harbor. Other development projects that would have adversely affected water dependency, water quality or fisheries were also altered according to MCZMP specifications (i.e., Heritage Towers, Pines River Condominium, and Harborside Landing).
- The Community Assistance Grant Program, administered by the MCZMP, awarded money to local governments to help pay for coastal related projects such as port and harbor development and waterfront renewal plans, preliminary engineering studies, applied science investigations, recreation plans, and coastal hazard mitigation studies.

Developing Natural Resources

Under the CFIP, Massachusetts spent approximately $7 million to improve fish piers and other marine-related industry projects. These improvements have enhanced the state's commercial fishery industry, one of the nation's highest producers of fish pounds landed, and the value of the landing.

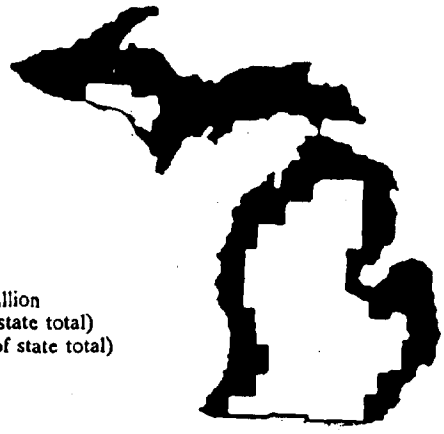
Mitigating Coastal Storm Damage and Coastal Hazards

- The Shoreline Change Summary Map, generated as a result of the Shoreline Change Project, identifies areas that are either safe to build on or unsafe depending upon shoreline erosion rates. Suggestions concerning property protection are provided to real estate owners.
- The MCZMP has developed a draft policy document on sea level rise. This document, Passive Retreat of Massachusetts Coastal Upland Due to Relative Sea-Level Rise is the result of a recently completed Massachusetts Coastal Submergence Study. The draft policy is currently being implemented on a site-specific basis (i.e., Buzzards Bay).

INTERSTATE ACCOMPLISHMENTS

The states of Massachusetts, Maine, Connecticut, Rhode Island and New York have completed three separate studies designed to improve government decision making concerning: 1) the preservation and protection of water-dependent uses of regional waters, particularly with regard to commercial and recreational boating facilities; 2) the strengthening the public trust doctrine with regard to public access, and 3) the development of an interstate policy to improve the effectiveness of floodplain management.

## MICHIGAN



Date of Program Approval: 1978
Federal Program Support 1982-1989: $12.8 Million
Coastal GNP (1985): $39.5 Billion (23.4% of state total)
Coastal Population (1985): 4,851,200 (53.4% of state total)
Shoreline Mileage: 3,224 Miles

### COASTAL RESOURCE INFORMATION

Special/National Significance of Michigan's Coast

Michigan's coastal zone, bordering Lakes Michigan, Huron, Superior, Erie, and Lake St. Clair gives the state the longest freshwater coastline in the world. A unique mix of shore geography is found on each of the Great Lakes' shoreline. These include clay bluffs, white sandy beaches, sandstone cliffs, rock bluffs, rock beaches, low plains, and freshwater wetlands. Some of the largest sand dunes in the world are found in Michigan's coastal zone. Although the majority of Michigan's shoreline is privately owned, approximately 30 percent of Michigan's shoreline is held in public ownership, and the bottomlands of the Great Lakes are held in public trust. The coastal region provides an important habitat and nursery area for many commercial and sport fisheries, migratory birds and furbearing animals. Coastal waters supply municipal drinking water, recreational boating opportunities, and the transport of over 200,000,000 tons of industrial and agricultural materials through the Great Lakes commercial shipping industry.

Principal Coastal Threats and Emerging Challenges

- Effects of lake level fluctuation on coastal real estate, especially in erosion hazard and flood risk areas.
- Implementing shoreline and sand dune protection programs that manage and minimize the effects of intense recreational use, development and sand extraction activities.
- Regulation of shore erosion control techniques to minimize the adverse effects on natural systems and avoid damage to adjacent property owners.
- Minimize the impacts of increased development in coastal areas and over-crowding in coastal lakes, harbors and drowned river mouths.
- Preservation and enhancement of the state's remaining coastal wetlands.

### COASTAL PROGRAM INFORMATION

Program Description

The Department of Natural Resources (DNR) is the lead agency for the Michigan Coastal Management Program (MCMP). The major legislation under which the MCMP is administered are the Shorelands Protection and Management Act, the Great Lakes Submerged Lands Act, the Sand Dunes Protection and Management Act, the Goemaere-Anderson Wetlands Protection Act,

the Inland Lakes and Streams Act, and the Michigan Environmental Protection Act. The Natural Resources Commission (NRC), a seven member body appointed by the Governor, establishes policy guidelines for the DNR.

Defined Coastal Zone

Michigan's coastal boundary includes all waters and submerged lands of the Great Lakes to the international boundary in the middle of the lakes. The state's landward boundary is defined as the jurisdictional border that Michigan shares with Ontario, Canada and the states of Minnesota, Wisconsin, Illinois, Indiana, and Ohio. The coastal zone includes all islands, drowned river mouths, and coastal lakes. The inland boundary extends a minimum of 1,000 feet from the ordinary high water mark or further inland to include designated wetland, flood risk, sand dune, high risk erosion areas, and coastal state parks.

Federal Program Support 1982-1989: $12.8 million.

Major Program Accomplishments

- Waterfront planning under the MCMP has catalyzed extensive waterfront revitalization efforts in many of the state's 300 coastal cities, including Detroit, Houghton, and the Saginaw Bay area.
- The Saginaw Bay Area Initiative is an integrated management plan for the Bay that targets DNR development priorities and resources in a joint effort with local interests. The goal of this project is to pool resources from the DNR, local government, and private investors to develop new economic growth opportunities for this area while protecting sensitive areas and avoiding hazardous areas.
- Protection of historical and archaeological underwater resources through legislation designating seven Great Lakes Bottomland Preserves. The Preserves, which comprise nearly 5 percent of Michigan's Great Lakes' bottomlands, provide protection to many of the 3,000 shipwrecks that have gone down in Michigan waters.
- Passage of amendments to the Sand Dunes Protection and Management Act that strengthen the ability of the statute to protect designated sand dunes by establishing standards for development and use. The statute provides an opportunity for local communities to assume regulatory authority of the act.
- Michigan was the first and only demonstration state that used federal CZM funds for low cost construction projects. Due to the success of this pilot program, all participating coastal states may now apply for Section 306A low cost construction project funds to enhance public access to their states' shoreline. Local officials state that the impacts of these low cost projects usually have a greater than expected economic benefit, particularly in attracting private investment.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- Michigan is the only state to have received authority from the EPA to administer the federal Water Pollution Control Act's Section 404 Program. Michigan's assumption of 404 program authority relied on the existence of state legislation that established regulation over the discharge of dredge and fill materials into state waters. Michigan recently adopted administrative rules under the Wetlands Protection Act to strengthen the enforcement of permitted activities.
- Several guidebooks describing the value of wetlands and explaining the wetland permitting process were made available to the public by the MCMP. These are: 1) the Wetland Protection Guidebook; 2) Michigan Wetlands: A Guide for Property Owners and homebuilders, and 3) Manual for Wetland Evaluation Techniques.
- The Michigan DNR reviews and issues project permits under a consolidated permit process that currently encompasses a total of nine state statutes and four federal programs.
- The Great Lakes Information System (GLIS), funded in part by the MCMP, is a computerized geographical information system designed to consolidate Great Lakes resource data. This

information system emphasizes environmentally sensitive areas and critical habitats. The GLIS compliments the Michigan Resource Inventory Program, a land-based statewide geographical information system.

Providing Public Access to Coastal Recreation

- Since 1978 Michigan has passed through more than half of its grant for 306A low-cost construction projects. Improvements for public access to the state's shoreline is provided by funding the construction or reconstruction of access structures and the enhancement, preservation or restoration of public access at existing sites. Other projects have involved directing public access to control indiscriminate use thereby preventing shoreline erosion problems.
- Forty-two of Michigan's 94 State Parks are located along the Great Lakes or on coastal lakes within Michigan's coastal zone. These parks provide public access to over 115 miles of prime shorelands.

Promoting Urban Waterfront Development

- The revitalization of Detroit's deteriorated waterfront was initiated by a CZM funded "Linked Riverfront Parks Master Plan". This linked park system has stimulated millions of dollars in private investment and has created an estimated 1,200 new jobs. The project is designed to create several parks along the Detroit River that are linked by a bike path system.
- The revitalization of Houghton's waterfront in Michigan's Upper Peninsula has resulted in substantial private and public investment for the cities of Houghton and Hancock (Houghton's sister city). Redevelopment of the waterfront resulted from a waterfront development plan funded by the MCMP. With the assistance of CZM funding the City of Houghton has purchased, renovated and opened to the public all but 200 feet of the 1.25 miles of shoreline in the downtown area.

Preserving Ports and Marinas

- CZM has funded a number of port development studies to examine the feasibility of creating, repairing and expanding existing port facilities in the cities of Escanaba, Monroe, St. Joseph, Ludington, and Sault Ste. Marie.
- In an attempt to identify the problems associated with overuse, the DNR has initiated a boat use survey on one of the more heavily used lakes in the state. The survey is an attempt to determine if maximum watercraft capacity has been reached and if the lake has become hazardous and unsafe for use. When completed, this report will be used to make future permit decision on expansion of marinas, boat launches and other facilities.

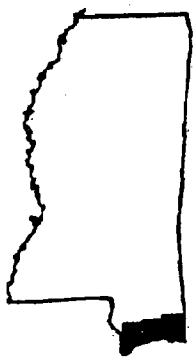
Improving Government Operations

- The MCMP plays a key role in administering Michigan's coastal statutes. CZM funded field staff conduct site visits to evaluate the impacts of proposed projects, monitor development and to enforce the Department's regulatory statutes and permit conditions.
- Michigan has a Memorandum of Agreement with the Corps that provides for the issuance of joint public notices and allows the use of one permit application which is shared by both agencies for statutes regulating the land and water interface, including Section 10 of the Rivers and Harbors Act and 404 of the Clean Water Act, Michigan's Wetlands Protection Act, the Inland Lakes and Streams Act, and the Submerged Lands Act.
- The MDNR has developed a Coastal and Inland Waters Permit Information System (CIWPIS) for permit processing. CIWPIS is a computerized data base management tool that allows all permit applications to be efficiently processed and tracked, and all information relative to permit applications to be available to all Division staff. The CIWPIS system can identify a wide variety of parameters and is very useful in identifying areas of special interest or concern.

Mitigating Coastal Storm Damage and Coastal Hazards

- The Michigan Shorelands Protection and Management Act requires a permit for: 1) any dredging, filling, alteration of drainage or vegetation or construction of a structure within a designated environmental (wetland) area; 2) construction of any permanent structure requiring a setback from the bluff within a designated High Risk Erosion Area, and 3) any construction of a permanent structure within a designated flood risk area.
- As a result of record high water levels experienced in the Great Lakes during the mid 1980s, a record number of permits to construct shore protection structures were applied for. As a result of this increase in permit applications, the MCMP was involved in a program to subsidize loans to move homes away from the state's eroding shoreline.

## MISSISSIPPI



Date of Program Approval: 1980
Federal Program Support 1982-1989: $4.6 Million
Coastal GNP (1985): $1.6 Billion (6.7% of state total)
Coastal Population (1985): 327,900 (12.5% of state total)
Shoreline Mileage: 359 Miles

COASTAL RESOURCE INFORMATION

Special/National Significance of Mississippi's Coast

The Mississippi coastal zone contains barrier islands, sandy beaches, salt marshes, and extensive freshwater bottomlands, in addition to several nationally strategic defense installations. Major shipbuilding facilities and ports, some of which access the Mississippi Sound, are also located along the coast.

Principal Coastal Threats and Emerging Challenges

- Minimizing the need for new industrial waterfront sites by completely utilizing waterfront areas currently set aside for industrial use.

- Continued efforts to ensure that dredging and the disposal of dredged material minimizes adverse effects on water quality, physical processes, marine habitat and productivity, and public health.
- Conservation of the state's remaining wetlands.

COASTAL PROGRAM INFORMATION

Program Description

The Mississippi Commission Wildlife, Fisheries and Parks (MWFP) is the responsible agency for implementing the Mississippi Coastal Program (MCP). The MWFP executes the MCP through the Bureau of Marine Resources (BMR), which receives and administers the program's federal funding. The BMR and the Bureau of Pollution Control and Land and Water Resources (BPC), both in the Department of Environmental Quality and the Department of Archives and History (DAH), administers the regulatory permits that are required for activities affecting the coastal zone. The BMR coordinates the activities of the various state agencies through their consistency review.

Defined Coastal Zone

The Mississippi coastal zone consists of Hancock, Harrison, and Jackson Counties, the barrier islands and all the waters to the extent of the 3-mile limit.

Federal Program Support 1982-1989: $4.6 million.

Major Program Accomplishments

- A SAMP for the Port of Pascagoula was developed and implemented to address the conflicting resource development and protection issues of the Port and its surrounding area. The Plan identified both areas that were appropriate for water-use development and areas that needed to be protected and left in their natural state (i.e., wetlands).
- The Biloxi Waterfront Master Plan initiated the redevelopment of 45 acres of deteriorated waterfront (abandoned fish pier facilities and several vacant land-locked parcels). The completed Waterfront also contains a marine education center.
- The CZM funded Harrison/Hancock County Beach Study provides recommendations for beach management and recreational improvements. These recommendations have been adopted by Harrison and Hancock Counties and five municipalities located along the beach.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The MCP is incorporating the 1989 Marine Litter Law into its program. This Law prohibits the discharge of litter in both ocean and nearshore coastal waters and includes standards and guidelines for litter disposal and fines for violators. This is the first state to adopt those recommendations from the MARPOL (an international treaty dealing with marine pollution) conference.
- The MCP provides funds for the Southern Mississippi Planning and Development District (SMPDD) to implement Harrison and Hancock County's Sand Beach Master Plans. The goals of the Plan include developing erosion control practices, general maintenance programs, user and vendor regulations for beach use and summaries of the plans for public distribution.
- The MCP is helping municipalities analyze how they can dispose of their dredged material while ensuring the integrity of the environment. A study commissioned by the BMR recommended over 1,000 acres of upland sites to handle the anticipated dredged disposal needs for the next 30 years. This is because upland disposal is preferable to disposal in environmentally sensitive wetland areas.
- A 100 foot bulkhead was constructed at Moss Point to help stabilize portions of bluff on the

Pascagoula River. Due to wave action caused by commercial and recreational boating, the bluff was eroding at a rate of 3 feet per year.

Providing Public Access to Coastal Recreation

- Round Island (110 acres) was given to the City of Pascagoula to be used as a public park. A 7-year plan for the Island recommends stabilizing the beach erosion rates, restoring the 130-year-old lighthouse, and developing dune walkways, walking trails, and a primitive camping area.
- Numerous low cost construction projects, funded by the MCP, are used to renovate and construct piers, pavilions, boardwalks, parking and picnic areas to increased public access to the state's coastal areas. Examples of these are the Bayou Caddy and McInnis Bayou Boat Launches, the Ulman Avenue Park Pier, and the Choctaw Marina Pier Renovation.
- The BMR contracted and completed a State Waters Access Site Study that inventoried and assessed the public access needs in coastal Mississippi.

Promoting Urban Waterfront Development

- Redevelopment efforts to the Biloxi waterfront area (catalyzed by the MCP) include the modernization of a seafood industry museum, acquisition of 17 acres of land, and the construction of a $5.4 million, 300-slip marina and fuel dock. Festivals and other activities on the waterfront have attracted a large number of visitors to the area each year.
- Waterfront improvement studies for Moss Point, the City of Waveland, and The City of Bay St. Louis were carried out with MCP and federal CZM funds. The studies recommend development strategies for public and private investment, and address the need to encourage appropriate land and water uses in these areas.

Preserving Ports and Marinas

- The Port of Pascagoula development plan expedited the permit approval time for the Navy Homeport project for Pascagoula at Singing River Island. This project helped to create 2,200 new jobs and $100 million in economic growth in the Pascagoula area. The Plan was developed within the framework of a CZM sponsored multi-agency SAMP for the Port.
- A study assessing future marina needs on the Mississippi Gulf Coast was commissioned by the BMR using MCP funds. This study findings included an update of BMR's marina inventory on the Gulf Coast and interviews with owners/managers of recreation and commercial boat marinas and seafood processing plants. The study conclusions contained recommendations for changes in the agency's marina guidelines to protect and conserve the State's public trust wetlands and fisheries habitats.

Improving Government Operations

- The MCP assists the state clearinghouse in reviewing projects and activities that may have an impact on coastal resources.
- Monitoring and enforcement are an important part of the Mississippi's Wetlands Law. The MCP's monitoring process includes an inspection of areas within a 2-mile radius of all applicant properties before a permit is issued. In addition, when violations of the Wetlands Law significantly damages or destroys wetlands, restoration orders are issued. Examples of the orders include the removal of fill from wetlands and filling dead-end canals or boatslips that cause water quality problems.

Developing Natural Resources

A Mississippi Coastal Zone Regional Permit is required for minor projects such as building piers, bulkheads, and minor dredging. The BMR has worked with the Mobile and Vicksburg districts of the Corps to establish this regional permit which reduces the applicant's waiting period for both BMR and Corps authorizations.

Mitigating Coastal Storm Damage and Coastal Hazards

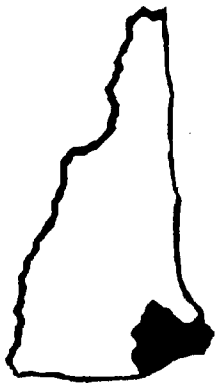
- The MCP is funding a workshop concerning sea level rise. At this workshop, federal and state agency people as well as academics will address long-term planning efforts to minimize the adverse effects from this problem.
- Additional efforts funded by the MCP include enhancing educational efforts addressing coastal flooding and other natural hazards.

INTERSTATE ACCOMPLISHMENTS

Mississippi participated in a "Tri-State Hurricane Property Loss and Contingency Planning Study, Phase I" with Alabama and Florida. The objective of the study is to develop hurricane recovery plans by estimating the property damage that could occur from hurricanes striking the most vulnerable areas of the central gulf coast.

## NEW HAMPSHIRE

Date of Program Approval: 1982 (Ocean and Harbor Segment), 1988 (Remainder)
Federal Program Support 1982-1989: $6.3 Million
Coastal GNP (1985): $2.1 Billion (11.6% of state total)
Coastal Population (1985): 306,700 (30.7% of state total)
Shoreline Mileage: 131 Miles
National Estuarine Research Reserves: Great Bay (800 acres)



COASTAL RESOURCE INFORMATION

Special/National Significance of New Hampshire's Coast

New Hampshire's coast is composed of three distinct areas: 1) the Atlantic coast, which offers public beachfront and a rocky shoreline; 2) the Portsmouth Harbor and Piscataqua River, a revitalized urban waterfront, which offers a mixture of tourism and water-dependent industry, and 3) the Great Bay estuary, a relatively undeveloped area inhabited by significant wildlife and marine species.

Principal Coastal Threats and Emerging Challenges

- Effective water quality management (including the control of point source pollution) to

preserve New Hampshire's coastal ecosystem and fish and shellfish industry.

- Pressure from increasing demands for access to New Hampshire's limited coastline (18 miles) and submerged lands has created conflict between private land owners and the state. An important issue that needs to be addressed is the impact of shoreline development (through private ownership) on public access and water quality.
- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.
- Preservation of state's wetland areas.

COASTAL PROGRAM INFORMATION

Program Description

The New Hampshire Coastal Management Program (CMP), is implemented under a segmented approach through the Office of State Planning. For example, the ocean and harbor segment was approved in 1982 and the Great Bay segment was approved in 1988. The CMP coordinates all operating state agency coastal activities. federal funds are also provided to local agencies as well as state agencies to improve the management of coastal resources and development. Local participation in the state's CMP is voluntary.

Defined Coastal Zone

New Hampshire's coastal zone includes all coastal waters to the seaward limits of state jurisdiction and all land along the state's Atlantic Ocean shoreline from Seabrook to the Portsmouth/Newington town line, extending inland 1,000 feet from the mean high water, or to the limits of the Wetland Board's jurisdiction over tidal waters, whichever is further inland. The boundary around Great Bay extends inland to identifiable features such as roads, which in most cases are more than 1,000 feet from the shoreline to the limits of the Wetlands Board's jurisdiction along estuarine rivers.

Federal Program Support 1982-1989: $6.3 million.

Major Program Accomplishments

- The Great Bay National Estuarine Research Reserve, designated in October 1989, contains over 800 acres of salt marsh, bluffs, rocky shores, woodlands, open fields, and 4,500 acres of tidal waters.
- The town of Seabrook purchased and, therefore, protected rare sand dunes (53 acres) with the help of New Hampshire's coastal program. The CMP's work, which was supported by the Seabrook Conservation Commission, documented the sand dune's value and investigated the possibility of its purchase. The state's Wetland Law was subsequently amended to incorporate the sand dunes into its jurisdiction.
- The New Hampshire CMP is supporting the development of Harbor Management Plans (HMPs) through the State Port Authority to address the issue of rapid growth in the coastal population during the past several years and the increased pressure that this growth has caused on the state's coastal resources. The HMPs are designed to address the interests of both local communities and the State. HMPs will be completed for several communities, including a plan for Newmarket and the Lamprey River.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- Coastal wetlands protection has been increased as a result of an expanded pre-application review process conducted by wetland inspectors who operate out of the Coastal Program Office in Portsmouth.
- New Hampshire's CMP has made informal recommendations to the Portsmouth Harbor Oil Spill Committee to develop a comprehensive, coordinated oil spill contingency plan for the oil

terminals located on the Piscataqua River. In response to these recommendations, oil industry representatives have agreed to purchase equipment needed to properly respond to oil spills.

- New Hampshire's CMP takes an active role in Coast Week, a public coastal awareness program. Activities include educational forums, harbor cruises, and walking tours.
- Using CZM funding, the New Hampshire Coastal Program contributed $50,000 to the purchase of a 40 acre parcel of land in the town of Greenland with 3,000 feet of frontage on Great Bay. This parcel will be included in the Great Bay Estuarine Research Reserve and is home to several rare/endangered species.
- Using CZM funds, the state completed and distributed wetland maps for several towns. The maps provide updated information for both the local and state regulatory agencies responsible for making permit and other resource management decisions.

Providing Public Access to Coastal Recreation

- Grants awarded by the federal CMP have catalyzed water-dependent public access initiatives such as a boat launch project on the Lamprey River in Newmarket and boat ramp improvements for Rye Harbor.
- Another public access project includes improvements to Prescott Park, a major waterfront park, located in Portsmouth. The CMP helped fund the construction of park facilities, such as sidewalks, handicap ramps, and improved lighting to the waterfront area of the park.
- With CMP funding, a development plan for Odiorne Point State Park was produced. The plan emphasized the protection and interpretation of New Hampshire's natural resources and multi-season operation. The recommendations of this plan resulted in funds from the legislature to build a new visitors center.

Promoting Urban Waterfront Development

The New Hampshire CMP funded a study for the Department of Resources and Economic Development to outline future use alternatives for the former Seabrook Barge facility. DRED constructed a commercial fishing pier at the barge facility which minimizes conflicts and problems between commercial and recreational boaters at the town harbor.

Preserving Ports and Marinas

- The State Port Authority completed a study on mooring placement. As a result of this study, an additional 165 moorings were sited within the study area.
- Using a grant from New Hampshire's CMP, the State Port Authority was able to determine whether increased moorings could be made available by improving the alignment in Little Harbor. As a result of this study, 73 additional moorings were accommodated, generating approximately $98,000 in revenue, in addition to an increase in public recreation and access.

Improving Government Operations

- Hapag-Lloyd, the only ocean carrier feeder service in the Port of Portsmouth, reversed its decision to cease operations at the Port. New Hampshire's Port Authority staff, funded by the CMP, played an integral role in Hapag-Lloyd's decision to continue operations at the Port.
- The authority of New Hampshire's CMP is provided by the permit programs of the Wetlands Board, the Water Supply and Pollution Control Division, the Fish and Game Department, the Port Authority, and the Energy Facilities Siting Committee.
- Field office operations are a strong part of the New Hampshire's CMP. The monitoring and enforcement activities of the Wetlands Board and the Water Pollution Supply Control Division have been improved as a result of the Portsmouth field office.

Developing Natural Resources

In order to protect and enhance soft-shell clam stock reserves, an important recreational commodity along New Hampshire's coast, the State CMP provided funding to purchase and place nettings in selected clam flats to reduce clam spat mortality by protecting clams from predators.

Mitigating Coastal Storm Damage and Coastal Hazards

- To help control erosion and sedimentation of New Hampshire's coastline, a regulation model for erosion control was developed along with a document that explains the problems of erosion. This document was given to coastal communities in an effort to educate them on this important issue.
- The New Hampshire CMP funded a study to evaluate the potential effects of sea level rise on the coastal area. The completed study, titled Rise in Sea Level and Coastal Zone Planning has been distributed to all coastal communities and regional planning agencies.

INTERSTATE ACCOMPLISHMENTS

- The New Hampshire CMP is a member of the Gulf of Maine Working Group. This working Group, which contains representatives from Canada as well as the United States, was formed to improve the management of the Gulf of Maine.
- New Hampshire CMP, through its membership on the New York/New England Coastal Zone Task Force, participated in a regional project which focused on preserving water dependent uses. The end result of this project was a two volume guidebook on managing the shoreline for water dependent uses. The report was widely distributed throughout the study area.

## NEW JERSEY

Date of Program Approval: 1978 (Bay and Ocean Shore), 1980 (Remainder)
Federal Program Support 1982-1989: $15.9 Million
Coastal GNP (1985): $79.6 Billion (51.0% of state total)
Coastal Population (1985): 5,972,800 (78.9% of state total)
Shoreline Mileage: 1,792

COASTAL RESOURCE INFORMATION

Special/National Significance of New Jersey's Coast

Many competing resources share New Jersey's coastline, including beaches, sand dunes, and shellfish, as well as tankers and power plants. In addition to these resources, New Jersey's coastline accounts for one of its largest industries—tourism.

Principal Coastal Threats and Emerging Challenges

- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.
- Beach and dune restoration and preservation are needed to maintain New Jersey's thriving tourist industry.
- Preservation of New Jersey's remaining wetlands.
- Effective water quality management, including stormwater management and the control of nonpoint source pollution, to preserve New Jersey's coastal ecosystem, residents, and fish and shellfish industry.
- Public access remains a challenge as competing interests escalate for use of New Jersey's finite shoreline, and public costs for providing and insuring quality access continue to rise.

COASTAL PROGRAM INFORMATION

Program Description:

New Jersey's Coastal Management Program (CMP), administered through the Department of Environmental Protection (DEP), utilizes the direct state control approach to manage its coastal resources. The CMP relies on existing laws and statutes; the Coastal Area Facility Review Act (CAFRA), the Wetlands Act, the Waterfront Development Act, and the Riparian Statutes.

Defined Coastal Zone

New Jersey's coastal zone extends 1) up to the first road or property line from the mean high water north of the Raritan Bay, 2) the area under the jurisdiction of the Hackensack Meadowlands Development Commission, 3) an area extending from the Raritan Bay south along the Atlantic shoreline up to the Delaware Memorial Bridge which varies from one-half mile inland up to 21 miles inland, and 4) an area north along the Delaware River to Trenton, extending inland to the first road inclusive of all coastal wetlands.

Federal Program Support 1982-1989: $15.9 million.

Major Program Accomplishment

- In 1985, New Jersey's Emergency Beach and Dune Restoration Program provided a framework to implement emergency funds to localities to repair dunes and beaches damaged by hurricanes.
- Waterfront planning under the CMP has catalyzed extensive waterfront revitalization efforts in the state's coastal cities, for example, Jersey's City's Exchange Place.
- New Jersey's coastal permit program has been consolidated. It is now organized on a regional basis instead of a statute basis.
- In July 1988, the Freshwater Wetlands Act went into effect. The Act provides for a buffer zone of 50-150 feet adjacent to wetlands.
- The destruction of coastal wetlands has been reduced from an average of 1,500 acres per year to less than 10 acres per year.
- Development has been successfully directed out of important coastal resources and concentrated on upland areas of existing development.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- New Jersey's Coastal Program obtained funds to acquire a critical habitat along the Atlantic Flyway that is used as a stopover for migrating shore birds. Scientists have identified this site on the Flyway as the most important spring habitat for these birds. CZM funding was used to help negotiate this wetland mitigation agreement.
- The New Jersey CMP continues to screen and identify suitable dredge material disposal sites that will help preserve the integrity of New Jersey's coastal environment.
- Coastal wetlands losses have been reduced significantly.

- Several habitats have been identified and protected through the regulatory program.

Providing Public Access to Coastal Recreation

- The Hudson River Walkway Plan and design guideline have been completed. The Walkway will be a continuous public access waterfront walkway along the length of the Hudson River from the George Washington Bridge to the Bayonne Bridge. New Jersey's CMP provided funding for the development of planning and design guidelines for this walkway.
- Improved public access to New Jersey's oceanfront is provided through local grant awards. For example, funding from New Jersey's CMP helped the City of Asbury Park produce a Beachfront Revitalization Plan to increase waterfront recreation and public access and develop a linkage between the city's transportation center and its beachfront.

Promoting Urban Waterfront Development

- A Waterfront Park and pier was recently completed at Exchange Place in Jersey City. Two billion dollars in new construction, condominiums and retail shops surround the new Park. This waterfront revitalization plan was developed with the help of a CZM grant.
- Local waterfront development plans are catalyzed by grants awarded to beach and bayfront communities to prepare waterfront revitalization plans. For example, Point Pleasant Beach was given a grant to design a waterfront park and conservation plan for the development.

Preserving Ports and Marinas

- Using grants awarded from New Jersey's CMP, oceanfront communities are able to prepare harbor development plans. For example, Penns Grove in Salem County conducted a marina feasibility study and waterfront area design in conjunction with the Green Acres acquisition project.
- Areas within the New York Harbor are being identified for long-term water dependent uses while allowing for waterfront revitalization.

Improving Government Operations

- Three permit programs, established under the Coastal Area Facility Review Act (CAFRA), the Wetlands Act, and the Waterfront Development Act, provide authority to New Jersey's coastal management program.
- New Jersey's CMP has continued to analyze and refine state policy concerning issues addressed under CAFRA, the Wetlands Act, and the Waterfront Development Act. Current issues being addressed are nonpoint source pollution, regional air quality, and shellfish management.
- New Jersey's CMP continues to improve coordination between its state agencies in order to improve the management of the state's coastal resources and to promote the CMP's coastal objectives.
- Local grants, administered through New Jersey's shore protection program, are conditioned to comply with the DEP's rules on coastal resources and development pertaining to public access to shorefront, beaches, dunes and erosion hazard areas. Local governments must demonstrate that their shore protection plans comply with these rules.
- New Jersey's CMP is working with the State Office of Planning to incorporate coastal management policies into the state's statewide Development and Redevelopment Plan.

Developing Natural Resources

- A hard clam spawner sanctuary program has been developed to increase clam stocks and revitalize this important industry.
- Upland sites have been identified for future wetlands mitigation banking to restore the past loss of wetlands. Wetlands restoration is restored at a rate of 2 acres created for each acre lost.

Mitigating Coastal Storm Damage and Coastal Hazards

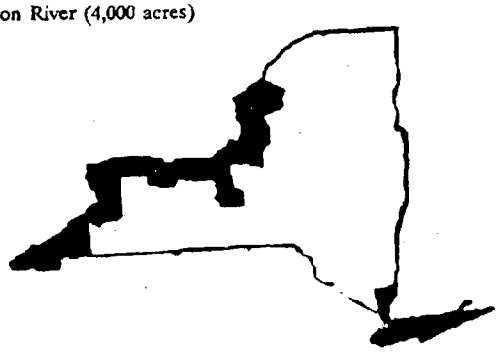
- The impact of potential global sea level rise is being studied to aid coastal planning. Shore

retreat estimates will be determined using three different methodologies; trend analysis, Bruun Rule calculations and numerically derived sediment budget computations.

- A beach/dune profiling system has been developed to monitor general shoreline and beachface conditions, including erosional trends. This profiling system will be used to aid decision making in beach design.
- As a result, of the aforementioned beach/dune profiling system, municipalities with significant erosion rates will be provided with large-scale mylar maps depicting local erosion conditions and predictions.
- A state Shore Protection Master Plan has been prepared to identify the most cost effective methods of shore protection for specific geomorphic units.

## NEW YORK

Date of Program Approval: 1982
Federal Program Support 1982-1989: $20.1 Million
Coastal GNP (1985): $230.2 Billion (62.5% of state total)
Coastal Population (1985): 14,887,100 (83.8% of state total)
Shoreline Mileage: 2,625 Miles
National Estuarine Research Reserves: Hudson River (4,000 acres)



COASTAL RESOURCE INFORMATION

Special/National Significance of New York's Coast:

New York's coastal zone is unique among coastal states in the extent and diversity of marine and freshwater coastal resources. The coast is readily divided into five distinct regions: 1) the Great Lakes, including portions of lakes Erie and Ontario, and the Niagara and St. Lawrence Rivers, a vast freshwater region whose lakes, streams and estuaries constitute one of the nation's most valuable sports fisheries; 2) the Hudson River estuary, extending 150 miles inland from New York Harbor and providing invaluable spawning and breeding areas for a wealth of sport and commercial fish species and an important link in the state's transportation system; 3) New York Harbor, a major international port with a highly varied combination and intensity of land and water uses; 4) Long Island Sound, a national estuary bordered by New York and Connecticut and

home to 10 percent of the nation's population, and 5) the Atlantic coast of Long Island, containing an extensive barrier island complex and some of the largest East Coast beaches.

Principal Coastal Threats and Emerging Challenges

- Continuing to improve state and local government management of coastal growth and development.
- Developing management plans for designated coastal habitats and scenic areas.
- Preservation of the state's coastal wetlands.
- Managing the use and development of coastal areas recognizing the possible effects of sea level rise, particularly in coastal hazard areas.
- Improving ocean and near shore coastal water quality.
- Interstate coastal management issues involving the New York Bight (NY/NJ), Long Island Sound (NY/CT), and the Great Lakes (NY/PA/OH/IN/IL/MN/MI/WI and Canada).
- Ocean management involving coastal states and the federal government.

COASTAL PROGRAM INFORMATION

Program Description

New York's Coastal Management Program (NYCMP) is based primarily on the State Waterfront Revitalization and Coastal Resources Act (WRCRA). The WRCRA provides the legal authority for the NYCMP and establishes policies, coastal boundaries, a process for coordinating state activities in the coastal zone, and a program for managing coastal growth and development in partnership with local governments. Program implementation is administered by the Department of State and through the coordination of federal and state resource management and environmental laws and programs.

Defined Coastal Zone

New York's coastal inland boundary is 1,000 feet from the shoreline, plus all identified geographic area of particular concern. In urbanized areas and other developed locations along the coast, the boundary is approximately 500 feet from the shoreline or less than 500 feet at locations where a major roadway or railway line runs parallel to the shoreline. The coastal boundary includes major state-owned lands and facilities and electric power generation facilities that abut the shoreline.

Federal Program Support 1982-1989: $20.1 million.

Major Program Accomplishments

- Managing coastal land use and development is a major component of the NYCMP. Since New York local governments have principal jurisdiction for regulating land use and development, the NYCMP enables coastal communities to prepare Local Waterfront Revitalization Programs (LWRPs) as a component of the state CMP. To date, 115 coastal municipalities are preparing or implementing State approved LWRPs. These municipalities have jurisdiction over more than 70 percent of the 3,200 miles of coastline and account for over 90 percent of the state's coastal population.
- The LWRP component of the NYCMP provides planning, preconstruction, small scale construction, and land acquisition funds on a competitive basis to coastal communities seeking to revitalize deteriorated and under utilized waterfronts and manage critical coastal resources. Since 1982, $4.1 million in CMP funds have been awarded to coastal communities.
- The NYCMP provides a framework for ensuring the public's right to access and use coastal resources. In conducting federal and state consistency reviews, public access is often required as a condition of approval. In other ways the program is seeking solutions to physical barriers to the coast, water quality impacts, and innovative ways to accommodate mixed public and private use of the coast. Coastal communities preparing LWRP's are also instituting both management

techniques and capital investment programs to meet local and, in turn, statewide public access needs.

- Protecting lives and property from the threats of coastal flooding and erosion is an on-going focus of the NYCMP. Under the Coastal Erosion Hazard Areas Act, New York has developed building setbacks for coastal development in coastal hazard areas. The NYCMP has also begun to develop regional management strategies to coordinate and focus current federal, state and local government actions in hazard areas.
- Preserving critical coastal resources is a major focus of the NYCMP. Under the program over 200 significant coastal fish and wildlife habitats have been designated and scenic areas of statewide significance in the Hudson River Valley are currently being evaluated for designation. These two programs for the first time provide for comprehensive regulation and management of significant coastal habitats and scenic resources. Moreover, local governments preparing LWRPs are developing land use standards to augment State protection of these critical coastal resources.
- The NYCMP and LWRPs seek ways to maintain, promote and enhance the water dependent uses of the coast in ways consistent with the economic and environmental productivity of the coast. The programs attempt to reserve the waterfront for activities that are truly water dependent.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The goal of the Richmond Creek watershed study is to provide resource protection for the Fresh Kills fish and wildlife habitat. The project will study the viability of the watershed and make recommendations for enhancement and restoration.
- The DOS is working with several public and private organizations to develop plans to improve the management and the quality of the New York Bight, a valuable coastal area located by New York City, Long Island, and New Jersey. The Bight has been seriously degraded from point and nonpoint source pollution.
- Over 200 significant coastal fish and wildlife habitats have been designated by the DOS and given protection under the NYCMP.
- DOS is currently completing the designation of Scenic Areas of Statewide significance for the Hudson River Coastal region which will provide regulatory protection to such areas under the NYCMP.

Providing Public Access to Coastal Recreation

- Low cost construction and acquisition projects funded under Section 306A of the CZMA provide for public access to New York's coastal areas. Examples of these projects are sand dune construction in Long Beach, wetlands restoration in the City of Glen Cove, and redevelopment of a public waterfront open space in the Village of Sackets Harbor.
- Virtually every local government preparing an LWRP is developing land use standards to require public access as a condition of development.
- Under the New York City Local Waterfront Revitalization Program, the City has obtained approximately 30 miles of shoreline public access through development exactions.
- Working with other state agencies the DOS has been developing public access strategies for various coastal areas, including plans to increase public access in the Hudson River Valley and manage public use in sensitive coastal areas.
- The DOS has completed a review of existing state and local laws and enabling statutes for providing public access. This study will provide the basis for new legislation to improve public use of and access to the coast.
- The waterfront revitalization program for a former Coast Guard Base on Staten Island, which is adjacent to the Staten Island Ferry terminal, will provide access to waterfront recreation for resident, tourists, and workers in the area.

Promoting Urban Waterfront Development

- Under the New York City Waterfront Revitalization Program, the City of New York is preparing waterfront development strategies for its five boroughs.
- The NYCMP provides financial and technical assistance for the development of LWRPs by coastal communities. Of particular note is that all of the State's 26 coastal cities, save two, are preparing waterfront programs which not only protect coastal resources but provide for wise development and redevelopment of waterfront areas.
- The State has established the Horizon's Waterfront Commission to develop a regional waterfront development plan for the entire Erie County waterfront. Representing municipalities, Erie County and the State, the Commission has bonding authority and eminent domain powers to implement its plan. All of the participating local governments are implementing or preparing LWRPs which will provide the basis for developing and implementing the Horizon's Waterfront Plan.

Preserving Ports and Marinas

- The NYCMP has initiated the development of the tidal gauge system, a service for navigation. Port users of the New York Harbor will be able to obtain time data on actual tide levels, wind speed and direction from four stations with this system. Port users will also be able to obtain this data via a telephone dial-up system linked to the users' computer.
- The NYCMP participates in the New York Harbor Dredging Steering Committee. The current focus of this Committee concerns the disposal methods for the 10 million cubic yards of dredged material generated annually.
- The DOS has taken a leadership role to revive and increase maritime activities of the New York City Harbor by creating a "Coastal Management Advisory Committee on the New York Harbor Maritime Industry". The goal of the Committee is to assure the availability of maritime facilities by monitoring residential and commercial waterfront development and assessing land needs for water-dependent industry activities.

Improving Government Operations

- The NYCMP aggressively implemented its federal consistency provisions provided by the CZMA and protected significant wetland destruction in Suffolk County. When the General Services Administration (GSA) ignored the NYCMP's objections to the GSA's intent to sell the former Montauk Air Force Base, the NYCMP successfully initiated legal proceedings to protect the property.
- The Department of State met with several Suffolk County representatives and property owners to resolve a conflict regarding the dredging of the Shinnecock Canal. Dredging the canal would have impacted the waterfront properties downstream. After several meetings, the County agreed to establish a sand by-passing system to minimize the downdrift effects of the project.
- The NYCMP has routinely taken a firm stand in favor of water dependency in reviewing projects involving construction in or over public trust waters. In cases involving residential, commercial, and governmental projects, the DOS has consistently objected to such projects as being inconsistent with the program's water dependent use policies. On appeal to the U.S. Secretary of Commerce, these decisions have been upheld.
- The Corps developed an extensive erosion control project for Westhampton Beach on the South Shore of Long Island that the DOS has found inconsistent with the NYCMP. The project, estimated to cost over $70 million, involved the development of massive jetties and routine sand replenishment to address chronic erosion problems. The DOS determined the public cost of the Corps' approach outweighed the public benefit of the project, and that the proposal would likely not relieve existing erosion problems and exacerbate erosion in downdrift areas. The DOS has recommended an alternative approach that would afford appropriate erosion control, result in increased public access to coastal waters, and mitigate downdrift affects, all at a cost to the public estimated at $35 million—one half of the Corps' original proposal.

Developing Natural Resources

The NYCMP has initiated a number of actions aimed at expanding the aquatic resources industry. Most recently, the NYCMP has completed an economic study on New York's commercial fishing industry to identify trends affecting the industry and propose public and private solutions addressing adverse trends.

Mitigating Coastal Storm Damage and Coastal Hazards

To address the problems of chronic flooding and erosion along the South Shore of Long Island, the NYCMP has completed a comprehensive hazard management program. The South Shore Hazard Management Program (SSHMP) will spell out options, costs, and recommended actions needed to cope with continuing erosion, disjointed public and private responses, and sea level rise.

INTERSTATE ACCOMPLISHMENTS

- New York and New Jersey are working together to improve the use of scientific information concerning policy decisions concerning the pollution problems in the Bight.
- Federal coastal grants support new efforts by Connecticut and New York to study regional environmental alternatives for the disposal of dredge spoil into Long Island Sound.
- New York and its sister Great Lakes coastal states have supported efforts by the Great lakes states and Canadian provinces to cooperatively manage their shared water resources. These efforts have led to the signing of the Great Lakes Charter and the development of formal consultation agreements regarding activities affecting the Great Lakes.
- New York and the New England coastal states have undertaken joint studies to assess trends affecting water dependent uses of the coastal zone and the projected affects of sea level rise on the northeastern seaboard.
- New York, together with all other coastal states, has contributed to a national study of the Public Trust Doctrine.

## NORTH CAROLINA

Date of Program Approval: 1978
Federal Program Support 1982-1989: $14.7 Million
Coastal GNP (1985): $3.5 Billion (3.8% of state total)
Coastal Population (1985): 655,800 (10.5% of state total)
Shoreline Mileage: 3,375 Miles
National Estuarine Research Reserves: Currituck Banks (964 acres), Masonboro Island (5,046 acres), Rachel Carson (2,625 acres) and Zeke's Island (1,165 acres)

### COASTAL RESOURCE INFORMATION

Special/National Significance of North Carolina's Coast

North Carolina's coastline contains vast estuarine and wetland resources, as well as major port facilities and military installations. The state's wetlands provide one of the East Coast's major commercial and sport fisheries' spawning and nursery areas as well as valuable waterfowl and wildlife habitats. The beaches of the state provide recreational benefits that are the cornerstone of the state tourism economy.

Principal Coastal Threats and Emerging Challenges

- Effects of nonpoint source coastal pollution due to increased development and marinas.
- Maintaining natural beach and dune systems.
- The preservation and protection of the state's maritime forests and wetlands.
- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.
- Protecting primary fish nursery areas and areas of significant shellfish production.

### COASTAL PROGRAM INFORMATION

Program Description

The Coastal Area Management Act (CAMA) and the State Dredge and Fill Act form the basis for the North Carolina Coastal Management Program (NCCMP). The lead agency is the Department of Environmental Health and Natural Resources. Within the EHNR the Division of Coastal Management (DCM) implements the NCCMP. The Coastal Resources Commission formulates policy and regulations to implement the Program. Development within the Areas of Environmental Concern (AEC) require a CAMA permit. AECs are critical resource areas. Major development permits are handled at the state level and minor permits are administered through local governments with state overview. In addition, a citizen's Coastal Resource Advisory Council (CRAC) provides assistance to state agencies regarding coastal issues.

Defined Coastal Zone

North Carolina's coastal zone consists of the 20 counties that lie within the Tidewater region of the state. The inland boundaries are defined as the inland limits of a sound or tributary river under normal conditions (low stream flow or high tide). The seaward boundary extends to the state's jurisdictional limits.

Federal Program Support 1982-1989: $14.7 million.

Major Program Accomplishments

- An important element of the NCCMP is its Public Access Program. Through this program, over 130 new public access sites were obtained and/or developed with state, local and federal monies, including environmentally sensitive areas, such as Permuda Island and Buxton Woods.
- The North Carolina Estuarine Research Reserve, designated in 1982, is comprised of Zeke's Island, Rachael Carson, Masonboro Island, and Currituck Banks. The Reserve contains maritime forests, marshes, tidal creeks and grassy flats, as well as endangered species such as the American Loggerhead turtle, the eastern brown pelican, and the southern bald eagle.
- The time necessary to obtain coastal permits has been reduced through the establishment of a general permit process for routine activities and a joint permitting process with the Corps.
- The NCCMP was one of the first states to establish coastal construction setbacks based on erosion rates. Every 5 years the NCCMP updates the annual erosion rates along the state's Atlantic shoreline. Residential structures must be constructed at least 30 times the annual erosion rate landward of the first line of vegetation. Commercial structures must be setback 60 times the annual erosion rate.
- Local land use plans are an integral part of the NCCMP. These plans are designed to protect natural resources and avoid environmental crisis. They are also used as a guide for planning, permitting and funding decisions. The CRC requires these plans to be updated every 5 years.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- Some of North Carolina's maritime forests are being protected through acquisition and county ordinances. An example of protection measures is the acquisition of 337 acres of Buxton Woods on Hatteras Island and extending the original Buxton Woods well field AEC designation to include the entire Buxton Woods freshwater well field.
- Development activities in Areas of Environmental Concern (AEC) require a CAMA permit from the DCM. The state AEC's cover a major portion of the coastal resources. In 1989, the NCCMP increased its authority under the estuarine shoreline AEC from 75 feet landward of the mean high water mark to 575 feet in areas adjacent to outstanding resource waters.
- The Albemarle-Pamlico Sound Estuarine Study was established in 1987 to evaluate water quality for the Sound and to develop management strategies for the area. Although the Study was sponsored by the EPA, the DCM was active in the initial selection and continues to play a major role in the study.

Providing Public Access to Coastal Recreation

- From 1981 to 1988, a total of 138 public access sites were provided through the coastal access program using federal and state funds. These sites serve neighborhoods, localities and specific regions along the 3,500 miles of North Carolina's ocean and estuarine shoreline.
- Beach access workshops, sponsored by the NCCMP, inform local governments of techniques available for requiring developer dedication of public accessways.
- The towns of Elizabeth City and Plymouth acquired urban waterfront properties to enhance pedestrian and visual access to their shorelines.

Promoting Urban Waterfront Development

Wilmington's waterfront revitalization plan resulted in a riverfront park extension, a boat launch and parking facilities, the refurbishment of an old rail house into an inn, a conference center, shops and offices, and the restoration of 10 buildings. An annual waterfront festival attracts thousands of people to the area each year.

Preserving Ports and Marinas

Marina standards, adopted in June 1986, define the amount of public trust waters that can be used for residential marinas and specify design guidelines to protect estuarine reserves. These standards also provide guidelines for constructing piers in man-made canals. The regulations apply to both new marinas or the expansion of existing marinas.

Improving Government Operations

- Through modifications of the federal consistency review process, the state has made provisions for earlier involvement of the DCM staff in the evaluation of development projects. This earlier involvement will allow more time for DCM field staff to identify potential problems and make recommendations.
- A Handbook for Development in North Carolina's Coastal Area was prepared to help developers understand the development standards and permit procedures of the NCCMP. The handbook describes the permit program and its procedures and the AEC's and the Commission's guidelines for development. Other public information activities include The 1986 and 1987 Annual Reports and the CAMA Quarterly, a magazine discussing current activities of the Program.

Developing Natural Resources

The NCCMP is involved in a consistency review concerning a Mobil Oil exploration plan. Mobil Oil is proposing to drill an exploration well for natural gas approximately 40 miles off the coast of North Carolina. Meetings between Mobil, their contractors and the State have been held concerning the rules and regulations governing the activities.

Mitigating Coastal Storm Damage and Coastal Hazards

- In 1985, the NCCMP promulgated regulations prohibiting the hardening of the ocean shoreline. Property and structure may not be protected by any hard structures.
- The DCM has been designated by FEMA as the agency responsible for evaluating the condition of oceanfront buildings that may be in danger of collapse due to coastal erosion. Owners of threatened buildings are eligible for FEMA funds that allow them to move, reconstruct or demolish the building.
- A permanent technical advisory committee on coastal erosion was established to ascertain the cause and extent of erosion and its impact on coastal development. The committee studies coastal erosion and reviews erosion abatement projects. Study topics include the economic impacts of erosion, erosion response methods, and the cost and feasibility of relocating large structures threatened by erosion.

## NORTHERN MARIANA ISLANDS

Date of Program Approval: 1980
Federal Program Support 1982-1989: $3.8 Million
Coastal GNP (1985): Not Available
Coastal Population (1985): 19,600 (100% of territory total)
Shoreline Mileage: 206 Miles

### COASTAL RESOURCE INFORMATION

Special/National Significance of the Northern Marianas' Coast

The Commonwealth of the Northern Mariana Islands (CNMI) contains fourteen Pacific islands, located 1,500 miles east of the Philippines. Several of the Islands are uninhabited. Each island possesses a fragile coastal ecosystem in which small changes in land use activities can have profound impacts. The Islands contain many diverse resources such as, steep cliffs, serene beaches, lagoons, brackish ponds and wetlands, coral reefs, limestone plateaus, sea level lakes, narrow peninsulas, and active volcanos. Some species, the Marianas Mallard, presumed extinct, for example, are indigenous only to this 400 mile archipelago. The tourist and garment factories are vital to the CNMI economy.

Principal Coastal Threats and Emerging Challenges

- Protecting and enhancing the coastal resources on which the tourist industry relies; specifically maintaining the quality of beaches, lagoons, and natural habitats, and improving access to beaches and boat launches for deep sea fishing.
- Controlling the impact of tourists on fragile lagoon ecosystems; specifically, the amount of gasoline leaked from motorboats, and the amount of coral removed from reefs by divers and snorklers which reduces sediment from land clearings and impacts coral growth.
- Protecting and improving the fisheries for both subsistence level and commercial fishing by minimizing point and nonpoint source pollution and improving harvesting methods.
- Effects of sea level rise on coastal resources, especially in erosion hazard areas.
- Protecting wetlands from intense development pressures.

### COASTAL PROGRAM INFORMATION

Program Description

The authority for the CNMI Coastal Resources Management Program (CRMP) was originally established through a Gubernatorial Executive Order and subsequently embodied in statute through the Coastal Resources Management Act of 1983 and the implementing regulations. The statute and regulations set forth policies for issuing permits. Coastal permits are issued by a Board of Commonwealth Agency Directors, including the Coastal Resources Management Office (CRMO). Individual agencies retain the authority to issue other permits, like earthmoving and

water quality permits. The CRMP has also designated "Areas of Particular Concern (APC).". These are: Shoreline APC, Lagoon and Reef APC, Wetlands and Mangroves APC, and Port and Industrial APC.

Defined Coastal Zone

The coastal zone includes all lands as well as Commonwealth waters and submerged lands extending seaward 3 miles. Federal lands are excluded.

Federal Program Support 1982-1989: $3.8 million.

Major Program Accomplishments

- Through the coastal permit process, the CRMO has been able to negotiate with developers to require infrastructure improvements as a condition of the development. For example, the CRMP used the coastal permit process to negotiate an agreement with a developer for Japan Airlines to build a sewer line to the closest wastewater treatment plant on an undeveloped portion of Saipan Island. The sewer line was oversized to allow small villages to hook up to it. This sewer line was needed to serve a 320-room hotel. The originally proposed sewage treatment methods would have polluted the nearby Saipan Lagoon.
- A Marine Water Quality Monitoring Program has been instituted by the CRMO in cooperation with the Division of Environmental Quality. This strategy was developed to survey and monitor the ambient water quality and marine life in the Commonwealth, particularly in areas where there is agricultural or industrial activity. Under this Program, a "Suspended Sediment Load Study at Saipan Lagoon and Laulau Bay" has been completed.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The CRMO funded a Stormwater Control Handbook which provides site-specific information of CNMI soils, drainage, vegetation and technical specifications to help developers and farmers identify , plan and implement stormwater control systems.
- An "Adopt-A-Beach" campaign was instituted at local schools. This campaign involved a sign competition for "Don't Litter" and "Don't Take Sand" and a beach cleaning competition.

Providing Public Access to Coastal Recreation

Through permit conditions, the CRMP has required developers to provide public access. For example, several developers are currently constructing a bike/pedestrian path along the Saipan Lagoon.

Improving Government Operations

- The CRMO produced a video to promote the concepts of zoning and community design. This video was presented to the legislature and was shown on television.
- The CRMO, with the assistance of a consultant, has put land use and natural resource data onto a GIS. This information will be used in a cooperative effort with the Marianas Public Land Corporation to update the CNMI plan for public land use.

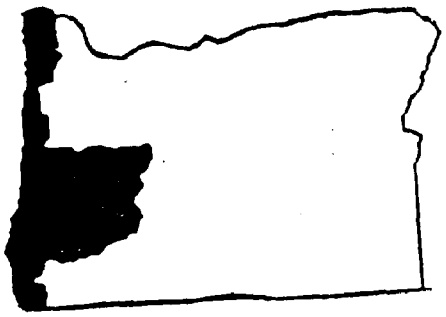
Developing Natural Resources

- The CRMO, in cooperation with the Mariana Visitors Bureau, completed a tourism impact study for the Mariana Islands.
- The CRMO has funded a geological study to identify alternative sand sources (surface and subsurface). The use of these alternative sand sources should alleviate pressures of illegal sand mining from beaches. Sand is used to make concrete, the primary building material in the CNMI.

Mitigating Coastal Storm Damage and Coastal Hazards

- The CRMO played a key role in the implementation of a "State Hazard Mitigation Plan" instituted by the Governor following Supertyphoon Kim.
- The CRMO co-sponsored erosion control workshops in Saipan, Rota, and Tinian. These workshops were attended by farmers, consultants, builders and agency personnel.
- The CRMO has a 150 foot shoreline setback zone where vertical building is generally prohibited.

## OREGON



Date of Program Approval: 1977
Federal Program Support 1982-1989: $9 Million
Coastal GNP (1985): $13.1 Billion (34.7% of state total)
Coastal Population (1985): 1,125,600 (41.9% of state total)
Shoreline Mileage: 1,410
National Estuarine Research Reserves: South Slough (4,400 acres)

COASTAL RESOURCE INFORMATION

Special/National Significance of Oregon's Coast

The Oregon coastal zone consisting primarily of the coastal mountain range watershed, contains many unique wildlife habitats and areas of great natural beauty. These include rainforests, estuarine systems, tidal marsh and wetlands, wilderness areas, beaches and dunes, and scenic rivers. A great percentage of the coastal zone remains undeveloped.

Principal Coastal Threats and Emerging Challenges

- Cooperative management with federal government on states ocean resources.
- Managing rapid population growth occurring in small urban areas along the coast.
- Preservation of the state's remaining wetlands.
- Review of development plans with wetland permit procedures to prevent further wetland loss.

- Development of a comprehensive plan to address the problem of erosion of parts of Oregon's coastline.
- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.

COASTAL PROGRAM INFORMATION

Program Description

Oregon's legislative base is not exclusively coastal as in many other states. Oregon's coastal program is based the Land Conservation and Development Commission (LCDC) and the Department of Land Conservation and Development (DLCD). The forty-one local coastal jurisdictions use the statewide planning goals and guidelines mandated by the LCDC and the DLCD to develop land use plans and ordinances. Other state agencies assist the LCDC in implementing the Oregon Coastal Management Program (OCMP).

Defined Coastal Zone

Oregon's designated coastal boundary is the watershed from the crest of the coastal mountain range to the 3-mile jurisdictional seaward boundary and includes all of the coastal counties.

Federal Program Support 1982-1989: $9 million.

Major Program Accomplishments

- The South Slough National Estuarine Research Reserve, designated in 1980, consists of 4,400 acres in the Coos Bay Estuary. The Reserve contains an upland forest of hemlock, spruce and cedar trees, a freshwater and saltwater marsh, openwaters, and at least 30 species of marine and estuarine fish.
- Comprehensive management plans have been developed and adopted for each of Oregon's 22 major estuaries including the Columbia River estuary and all of its minor estuaries.
- A 38-acre wetlands mitigation bank was established in 1986 to facilitate the process of siting development projects that require mitigation in the Lower Columbia Estuary. State wetlands mitigation rules require one-for-one mitigation with a preference for like-kind mitigation.
- The Oregon Ocean Resources Act of 1987 was approved by the state legislature. The Act calls for an Ocean Resources Management Plan for Oregon's territorial waters and includes management recommendations for the federal Exclusive Economic Zone (EEZ).

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- A computerized Geographic Information System (GIS) program is helping to provide base maps showing tidal wetland fill and mitigation sites. The system will be expanded to contain detailed information on estuarine habitat, land use, and zoning.
- A new Wetlands Management Act revises and updates the regulation of wetlands and provides the Division of State Lands a networking OCMP Agency with authority to adopt "wetland conservation plans". These plans will be jointly implemented by DSL and affected local governments.
- The Oregon Oceanbook provides information concerning the Oregon coastline and its marine resources. This publication is used by primary and secondary school teachers to educate schoolchildren about the state's coastal resources.
- The Dune Management Study for Nedonna Beach provided an economical and ecologically effective areawide dune management program that can also be applied to other shoreline areas.

Providing Public Access to Coastal Recreation

- A field guide to Oregon's public access sites was prepared and made available to the public. The guide includes a location map, facilities map and description, a site photograph and project

costs for all of Oregon's Section 306A projects. The guide is revised periodically with the addition of new sites.

- DLCD and the Oregon Department of Transportation has published an inventory of all public accessways to coastal lakes, estuaries, and ocean beaches. This inventory has been distributed to local governments and libraries.
- A visual access plan for Highway 101 has identified important coastal views and reduced negative visual effects along the coastal highway.

Promoting Urban Waterfront Development

- An increase in tourism and retiree settlements in many of Oregon's coastal towns prompted the publication of a Waterfront Revitalization Guide for small communities. Detailed instructions for implementing waterfront revitalization plans are provided in the guide. The guidebook is published by The Oregon State University Sea Grant using Section 306 funds.
- Approximately 1 mile of Astoria's urban waterfront is the site for a landscape architecture and waterfront access design plan. Included in this area is the Columbia Estuary Maritime Museum or a previous public access and pier redevelopment project. The state has used Section 306A funds to construct pier redevelopment and public access projects.
- A preliminary design for Reedsport's waterfront revitalization project along the Umpqua River was completed in the winter of 1989-90. With the objective of attracting tourists to the area, the project consists of an interpretive center, recreational boat ramp, picnic and parking facilities, and moorage for the Antarctic research vessels, the Hero and the Glacier.

Preserving Ports and Marinas

Port Division funding helps support the development of Strategic Business Plans by port districts. Each district is forced to realistically evaluate its marketing competitiveness to other ports in the region, and to set priorities for capital improvements and dredging projects. Plans have been developed for Coos Bay, Newport, and Astoria.

Improving Government Operations

- The Municipal and Industrial Ocean Effluent Study was supported by the DLCD to ensure that the results will be useful to resource managers.
- Monthly Statewide Interagency Meetings (SWIM) between project applicants and state agency representatives help to facilitate the permit review process. A coastal permit specialist attends the meeting as well to provide input on projects in the coastal zone.
- A users guide to streamlining the permit process: PERMIT AEROBICS: Getting your Process in Shape was published to help local officials who implement the land development and permitting procedure. The guide presents various techniques for jurisdictions to use to organize and maintain an efficient and effective permitting system.
- The DLCD will work with the Division of State Lands (DSL) and affected local governments and interest groups to improve coordination between comprehensive plans and wetland permitting procedures. This will be accomplished through the development of a notice system by which local governments can obtain assistance from the DSL in identifying wetlands subject to regulatory jurisdiction.

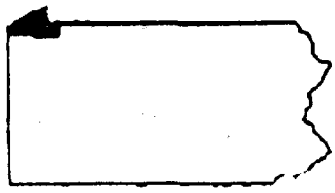
Developing Natural Resources

- The DLCD staff participate with other state agencies on the state-federal Marine Placer Mineral Task Force. This Task Force is investigating the economic and environmental aspects of exploration and recovery of marine placer mineral deposits off the Oregon coast.
- DLCD also staffs the "Oregon portion" of the OCS Task Force between Oregon, Washington and USDI/MMS. The Task Force oversees environmental studies and other policy issues associated with OCS oil and gas development offshore Oregon and Washington.

Mitigating Coastal Storm Damage and Coastal Hazards

- Statewide land use planning goals set specific standards for local communities to use for natural hazard planning in the coastal zone. These goals limit development in areas subject to natural disasters and hazards, coastal shorelands and on beaches and dunes. A variety of techniques to regulate development have been implemented on the local level including hazard overlay zoning, site-specific geologic report requirements, and density bonus awards to developers who avoid hazardous areas.
- Coastal erosion is a problem along parts of the Oregon coastline. The DLCD will complete a preliminary assessment of the potential coastal erosion sites in Oregon, and of the ability of state and local policies to manage development in these erosion-prone areas.

## PENNSYLVANIA



Date of Program Approval: 1980
Federal Program Support 1982-1989: $6.2 Million
Coastal GNP (1985): $36.2 Billion (18.5% of state total)
Coastal Population (1985): 3,004,100 (25.3% of state total)
Shoreline Mileage: 140 Miles

COASTAL RESOURCE INFORMATION

Special/National Significance of Pennsylvania's Coast

Pennsylvania's coastal zone is comprised of two distinct regions, the Lake Erie shoreline and the tidal Delaware River. The most outstanding feature of the Lake Erie shoreline is the 7-mile long Presque Isle Peninsula. Presque Isle, which attracts three to four million recreational visitors each year, is also an important habitat for fish and wildlife. The industrialized Delaware River segment contains mostly manufacturing or transportational facilities. The Delaware River estuary system provides an important habitat for migratory fish and birds.

Principal Coastal Threats and Emerging Challenges

- Preservation of the state's wetlands through improved cumulative impact review and mitigation

policies.
- Effects of lake level fluctuation on coastal areas, especially in erosion hazard areas.
- Developing dredging and spoil disposal activities that do not cause water quality degradation or the loss of valuable wildlife habitat.
- Need for recreational opportunities.
- Need for economic/urban waterfront revitalization.

COASTAL PROGRAM INFORMATION

Program Description

An Executive Order provides the administrative authority to network existing laws into the Pennsylvania Coastal Zone Management Program (PCZMP). All regulatory policies included in the program are executed by the Department of Environmental Resources (DER). The other Commonwealth agencies responsible for implementing the encouragement policies included in PCZMP have entered into a Memoranda of Understanding with DER.

Defined Coastal Zone

The boundary of the Lake Erie coastal zone extends to the international boundary with Canada in Lake Erie, and on land and water to the borders of Ohio and New York. This area extends from 900 feet to over 3 miles inland from the shoreline. The eastward boundary of the Delaware Estuary coastal zone extends east to the New Jersey boundary of the Delaware River, north to the upper extent of the tidal influenced near Morrisville, Pennsylvania, and south to the Delaware state boundary. The coastal area also includes all tributaries to the Delaware border.

Federal Program Support 1982-1989: $6.2 million.

Major Program Accomplishments
- The Pennsylvania CZMP provides technical assistance to lakeshore property owners in the Lake Erie Coastal Zone concerning bluff stabilization and shore protection methods. This service includes a site visit from the coastal program staff as well as other permitting employees.
- Public access planning by the PCZMP catalyzed the construction of fishing and boating facilities for the city of Chester, Pennsylvania. The facility is now visited by 30,000 boaters and shore fishermen per year. Chester, an economically depressed city, has reported a modest increase in business investment and sales since the opening of the facility.
- Waterfront planning in Pennsylvania's coastal cities, Erie and Philadelphia, has catalyzed extensive revitalization efforts which have generated millions of dollars in private investment and in city and state tax revenues.
- A joint permit application between the Corps and DER has been developed to enable applicants to apply simultaneously for a CORPS and DER permits. This simultaneous review process provides a time and cost savings to the applicant as well as the permitting agency. In 1987, the CORPS and the DER collectively published and distributed the Joint Permit Application with an instructional booklet for the applicants and agencies to use.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources
- The PCZMP has developed a new system to monitor and protect Pennsylvania's coastal wetlands. The new monitoring system has been developed in conjunction with the Bureau of Dams and Waterways Management (BDWM) and the U.S. Fish and Wildlife Service (USFWS). Included in these efforts are aerial photography, digitized mapping, and field verification to evaluate the amount of wetland loss or gain.
- The use of helicopter overflights has proven to be an effective method for the PCZMP to monitor its coastal zone for potential violations. In addition, the PCZMP's computerized system

can provide status reports and better tracking of enforcement actions.

- A Resource Management Plan for Presque Isle State Park is being implemented to protect the resources of this fragile ecosystem from the impact of tourism.

Providing Public Access to Coastal Recreation

- The PCZMP has helped city governments develop comprehensive plans that encourage private developers to incorporate public access provisions into their development plans for urban waterfront areas. For example, the City of Erie has made public access provisions a requirement for developers to address as part of comprehensive planning efforts.
- Low cost construction projects provided public access to the state's shoreline. Two examples of these are: the East Avenue Boat Launch Parking Facility, a roadway and parking lot to provide access between the beach and boat ramp in Erie, Pennsylvania; and the Commodore Barry Bridge Access Site, located in Chester, Pennsylvania. This facility includes four boat ramps, two permanent piers, two floating docks, and parking for approximately 150 cars and trailers.
- The PCZMP has developed a long-term plan to turn Elk Creek, in Erie County, into a major public recreational facility. The plan includes the acquisition of approximately 60 acres of land and appurtenances and the construction of a small boat harbor.

Promoting Urban Waterfront Development

- Several waterfront redevelopment studies funded by the CZMP resulted in the Philadelphia Waterfront Comprehensive Plan. This development plan catalyzed over $3.10 million in private investments and millions of dollars in tax revenue to the City of Philadelphia and the Commonwealth.
- A CZM grant helped the city of Erie develop a revitalization plan for its waterfront area. Efforts are now underway to secure capital to carry out the plan.

Improving Government Operations

- The PCZMP has streamlined its administrative process through computerization. This has resulted in a substantial time and cost savings to the program. For example, a grant application can now be prepared in 5-7 days compared to 3-4 weeks before computerization. This computer system is also used to track grant tasks and reviews, and has improved the management of grants and projects.
- The PCZMP actively solicits public participation in coastal issues decision making through workshops, meetings, and conferences. For example, the citizens of Erie were encouraged to discuss their concerns about public access regarding the Erie Waterfront Comprehensive Plan.
- The Urban Waterfront Action Group (UWAG), which the PCZMP initiated and administers, helps to expedite the permit processing time for proposed waterfront development projects. The UWAG, made up of various federal, state, regional, county and local permitting agencies, meets on a monthly basis. Its main purpose is to review proposed waterfront projects while they are still in the early planning stages and to offer suggestions to the developer that would make the project more acceptable to the permitting agency, thus increasing the likelihood of permit issuance.

Developing Natural Resources

The PCZMP managed the Norfolk Moraine Fisheries Baseline Study in Lake Erie to determine whether fish in the lake would be adversely affected by sand and gravel extraction activities.

Mitigating Coastal Storm Damage and Coastal Hazards

The PCZMP administers the Bluff Recession and Setback Act. A provision of the Act is for municipalities to provide recommendations to the PCZMP concerning the administration of the setback regulations. Several municipalities have already participated in the administration of these regulations, including the borough of Lake City and the townships of Fairview, Girard, Harborcreek, Lawrence Park, Millcreek, North East and Springfield.

## PUERTO RICO

Date of Program Approval: 1978
Federal Program Support 1982-1989: $8.3 Million
Coastal GNP (1985): $12.9 Billion (100% of commonwealth total)
Coastal Population (1985): 3,293,000 (100% of commonwealth total)
Shoreline Mileage: 700
National Estuarine Research Reserves: Jobos Bay (2,800 acres)

### COASTAL RESOURCES INFORMATION

Special/National Significance of Puerto Rico Coast

The Commonwealth of Puerto Rico encompasses the smallest and easternmost island of the Greater Antilles. The coastal area contains rocky cliffs, sand dunes, beaches, fresh and salt water lagoons, forests, mangroves, swamps, and flood plains and coral reefs. Agriculture has been supplanted by manufacturing, wholesale and retail trade, business and personal services, and tourism in the island's economy. The coastal area is vital for Puerto Rico's tourism and local recreation.

Principal Coastal Threats and Emerging Challenges

- Effects of sea level rise on coastal resources, especially in areas prone to erosion and storm surges.
- DNR leadership role, particularly with respect to monitoring and enforcement, concerning the resolution of coastal environmental problems, such as at La Parguera and Culebra.
- Preservation of Puerto Rico's mangroves, coral reefs, bays and other valuable natural resources in the face of the ever-present threat of oil spills due to the passage of tankers through the waters around the island.

### COASTAL PROGRAM INFORMATION

Program Description

The Puerto Rico Coastal Management Program (PRCMP) is an element of the island-wide land use plan established by the Puerto Rico Planning Board and adopted by the Governor in 1977. Although the Department of Natural Resources (DNR) is the designated agency for administration of the PRCMP, other major agencies, such as the Puerto Rico Planning Board (PB), the Regulations and Permits Administration (RPA), and the Environmental Quality Board (EQB) ,participate in program implementation. Puerto Rico's 78 municipal governments do not regulate local planning, zoning, or construction activity.

Defined Coastal Zone

The boundary of Puerto Rico's coastal zone extends inland 1,000 meters from the shoreline and farther inland in places where it is necessary to include critical drainage basins, plus all offshore islands and waters within the 3-mile limit.

Federal Program Support 1982-1989: $8.3 million.

Major Program Accomplishments

- As a result of a Puerto Rico Flood Hazard Mitigation Plan recommendation (prepared under a CZM task), an island-wide flash flood warning system has been installed. This warning system serves approximately one million people or about one-third of Puerto Rico's population.
- Another aspect of the Puerto Rico Flood Hazard Mitigation Plan provided area-specific guidance for flood mitigation planning in the Rio Grand de Loiza Valley. As a result of the Plan, the Legislature appropriated $51 million to clear the floodway, restore or build new protective dikes, improve flood drainage in areas along the river, and relocate about 1,300 families.
- The Jobos Bay National Estuarine Research Reserve, located in the southern coastal plain in Puerto Rico, was designated in 1981. This Reserve contains diverse resources such as mangrove fringes, tear-shaped inlets that interact with seagrass beds, mangroves, and coral reefs.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- Under the Coastal Program, the DNR has prepared a Management Plan for La Parguera, one of the Commonwealth's most beautiful areas. Some of the natural resource protection actions taken by the DNR to protect this area include reforestation, increased enforcement activities, refuse collection, and working with the Corps to solve problems, such as pollution of coastal waters and the use of houseboats.
- The Natural Reserve (NR) Designation Program, implemented by the DNR and PB, provides protection to some of Puerto Rico's valuable coastal resources. The PB has formally designated 18 of the 28 natural reserves recommended in the PRCMP. For example, the PB approved the designation of the Vieques Bioluminiscent Bay Natural Reserve (NR) in 1989. This NR classification was the result of a Critical Area Management Plan prepared by the DNR.
- A model mangrove management plan for selected mangrove areas was generated to be used as a basis for development of an island-wide management plan. The goals of the plan were to design protective measures and to develop recommendations for specific land use that are compatible with the ecology of the area.
- Public environmental education is an important element of the PRCMP. Activities under this program include brochures, television programs (i.e., documentaries), newspaper articles, and Coast Week projects.
- The Natural Heritage Program established a fund for acquiring critical natural areas that are now in private ownership. Some sites designated by the program are critical areas protected by SAMPs. For example, a SAMP being prepared for Torrecilla Alta-Vana Talega area, has certified more than 100 sites of archaeological value.

Providing Public Access to Coastal Recreation

- The PB adopted a regulation in 1983 to implement policies of the PRCMP with respect to zoning districts in coastal areas and access to the shore. These include setback requirements for any new coastal development, as well as limitations on uses in areas designated as public beaches, natural reserve areas, and mangroves.
- A 1986 law regulates the use of recreational boats in the vicinity of public beaches. The PB is charged with identifying the beaches most frequently used by bathers, and DNR must then place and maintain marker buoys to separate boats from bathing areas. DNR is charged with the registration of recreational boats, and the purchaser of every recreational boat is required to take the boating safety course offered by DNR's Commissioner of Navigation on a regular basis.

Promoting Urban Waterfront Development

Port zones are regulated by the Puerto Rico Port Authority (PA). The PA is working with the municipalities of San Juan and Ponce to improve their waterfront areas, especially for the enhancement of the piers for cruise ships.

Preserving Ports and Marinas

A Marina Siting Manual was prepared to provide information related to marina siting and operations and the required permits. This manual was developed to respond to the increasing public demand for marina sites, as well as a need to provide public access and facilities for launching small recreational boats.

Improving Government Operations

- The DNR is making surveys of the maritime zone and property boundaries of the lands in Culebra that were conveyed by the Federal Government to the Commonwealth. Once the survey is completed, the DNR will be able to prosecute the people living in Culebra illegally. DNR and the Culebra Conservation and Development Authority cooperate with the U.S. Fish and Wildlife Service to patrol and maintain the transferred lands, especially the beaches that are nesting areas for endangered sea turtles.
- The DNR is developing new maritime zone regulations. Other regulations already prohibit sandmining at beaches and dunes and the taking of coral.

Developing Natural Resources

DNR uses the CZM program to protect and develop critical coastal resources, including beaches, mangroves, reefs, aquifers, sand deposits, and endangered species of flora and fauna. Special attention is being given to critical areas, such as beaches, that are vital for the continuing expansion of the island's tourism industry. The development of alternative sources of sand for construction also serves to protect beaches and dunes that were once the primary source of such material. A dune restoration manual has been prepared to guide DNR in regulating sand extraction.

Mitigating Coastal Storm Damage and Coastal Hazards

- The unit established within DNR to deal with coastal hazards under the PRCMP has been institutionalized by legislative action, and its charge has been expanded to cover all natural hazards and the entire island. The work of the unit now must be coordinated with the Governor's Earthquake Safety Commission, the State Civil Defense Agency, and FEMA. The unit is now responsible for actions related to hazard mitigation after Hurricane Hugo, including a new hazard mitigation plan, and participation in the new Section 404 Hazard Mitigation Grant Program.
- Sixteen area-specific flood hazard mitigation plans have been undertaken under the CZM program. The first priority project (Rio Grande de Loiza) has been completed at a cost of $51 million in local funds. The second (Rio de la Plata) is awaiting legislative authorization. Completion of the other planning documents is waiting on the provision of computer-generated storm surge and wave height data being developed by the Sea Grant Program of the University of Puerto Rico at Mayaguez.
- The flash flood warning system designed with the help of the National Weather Service subsequent to Hurricane David in 1979 has been expanded twice, using local funds. The addition of another 10 automatic reporting rain gages will complete the basic system. A complementary system of stream-flow sensors has been initiated under a cooperative program involving DNR and the USGS Water Division. The stream-flow sensors will permit the extrapolation of rainfall data into rapid projections of flash floods, accelerating warning time and giving critical additional minutes to evacuate threatened areas.

## RHODE ISLAND

Date of Program Approval: 1978
Federal Program Support 1982-1989: $5.2 Million
Coastal GNP (1985): $9.1 Billion (57.5% of state total)
Coastal Population (1985): 966,800 (100% of state total)
Shoreline Mileage: 384 Miles

### COASTAL RESOURCE INFORMATION

Special/National Significance of Rhode Island's Coast

Although Rhode Island is the smallest state in the nation, it contains over 400 miles of shoreline and vast saltwater resources. The Narragansett Bay, famed for its beauty, contains several harbors and a large fish and shellfish population. Barrier beaches and a string of unique lagoons, known as the salt ponds, lie to the east and west of the Bay.

Principal Coastal Threats and Emerging Challenges

- The development of a broader public awareness program is needed to help the Rhode Island Coastal Management Program (RICMP) implement and enforce the goals.
- Improved development and management of the state's right-of-ways (ROW).
- Although major construction projects are underway, the insufficient number of sewage treatment plants and combined sewage outfall continues to keep the upper Narragansett Bay closed for swimming and fishing.
- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.
- Preservation of the state's remaining wetlands, including the salt ponds.

### COASTAL PROGRAM INFORMATION

Program Description

The Rhode Island Coastal Management Program (RICMP) is based on the Rhode Island Coastal Resources Management Act of 1971. The Office of the Governor administers the RICMP's funds and the Coastal Resources Management Council (CRMC) implements the Program. The CRMC has direct permitting authority in all the state's coastal waters, tidal wetlands and contiguous lands.

Defined Coastal Zone

The coastal boundary for the state extends 200 feet inland of a defined coastal feature. Certain activities which occur throughout the state and may impact the coastal zone are also regulated. For federal consistency review, the boundary of the coastal program extends inland to the first town boundary.

Federal Program Support 1982-1989: $5.2 million.

Major Program Accomplishments

- The Narragansett Bay National Estuarine Research Reserve, designated in 1980, contains diverse aquatic and terrestrial habitats and nesting sites for many species of birds.
- The RICMP developed a Salt Pond Management Plan to protect this fragile ecosystem from the impacts of development. This highly successful Plan, which was adopted in 1984, requires development to be set back at least 200 feet from the ponds, reduces the amount of housing and boat docks, requires septic tank inspection, and a coordinated permit review process between the federal, state, and local agencies.
- Obtaining public accessways along Rhode Island's coast has been an important element of the RICMP. The RICMP, which issues all development permits within 200 feet from the coastline, reviews all development proposals for public access impacts.
- Despite the substantial increase in category A assents, the CRMC continues to process these applications in an average of 4-6 weeks.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The CRMC has established a SAMP for the Narrow River and its watershed. The SAMP provided a plan to deal with point source runoff, water quality, dredging issues, plant and animal habitat, failing septic systems, and other matters of concern to the state's Coastal Resource Management Council and the local citizens.
- The CRMC is participating with the DEM to develop a nonpoint source pollution management plan.
- In order to protect critical habitats and/or required buffer zones, CRMC has imposed mitigation measures in many subdivision and condominium proposals, as well as smaller projects which occur close to the required buffer. Measures call for a demarcation structure, often a fence, to be erected at the inland edge of the buffer zone.
- Stricter nonpoint source pollution controls are implemented by the CRMC in its request that subdivision proposals provide a mitigation and control plan for potential stormwater runoff induced by the activity. In addition, stipulations are made that disallow certain lawn care pesticides and fertilizers in areas of concern.
- The CRMC has prohibited new or expanded infrastructure or utilities on all barrier beaches. While this policy does not pertain to individual, on-site water supply systems, individual sewage disposal systems, or gas lines, it further enables the CRMC to protect and restore barrier beaches to act as natural storm buffer systems and remain sensitive conservation areas.
- The CRMC has expanded setback provisions based on average annual erosion rates in Critical Erosion Areas that reflect recent changes in the National Flood Insurance Act.
- Conservation easements as a deed restriction have been incorporated by the CRMC for activities that impose additional development concerns to pollution such as runoff to ensure that buffer areas are integrated within the project area.
- Some development activities that propose to tie into a municipal sewage treatment plant (STP) have been granted conditional approval by the CRMC for a portion of the proposed activity while the STP was being upgraded to provide secondary treatment. The Council grants this approval since the proposed activity's additional expected sewage load may overwork the treatment plants' capacity to handle the additional sewage.

Providing Public Access to Coastal Recreation

- An important feature of the RICMP is its ROW designation program. The CRMC Subcommittee on Rights-of-Way is delegated the task of discovering ROWs to tidal areas and designating them. To date, 170 ROWs have been designated.
- The Shoreline Access Program (SAP), which is being carried out as a cooperative agreement

with the DEM, makes available funds to localities for shoreline improvements. The aim of the SAP is to increase public awareness of public access sites by marking and mapping sites, encouraging policies at the local level to maintain and manage the sites, and encouraging efforts at the local level to upgrade sites that are currently unsuitable but have the potential to be a safe, environmentally sound shoreline access location.

• Local municipalities have been participating in a cooperative public access (right-of-way) designation program with the CRMC. Municipalities research and determine the legal status of local ROWs in preparation for CRMC designation of those ROWs as public access sites. The program will facilitate the development of a Public Access Guide identifying all public ROWs in the state.

• The CRMC has instituted a policy where it may reduce fees for certain activities based on the amount of proposed public access, the potential use by the pubic of this access, or other relevant considerations.

Promoting Urban Waterfront Development

• Waterfront planning under the RICMP's Community Coastal Assistance Program (CCAP) has catalyzed waterfront revitalization efforts in the several of the state's coastal cities. Examples of these are the Rockwell and Town Docks at Bristol and the Carousel Park Pier Piling Removal Project in East Providence.

• The CRMC has developed a SAMP for Providence Harbor. The SAMP provides strategies to balance shoreline uses, improve water quality, increase recreational and public access opportunities, and plan for a coordinated port development effort. It also allows for extensive public review and discussion of important issues and problems facing Providence Harbor through a variety of forums.

Preserving Ports and Marinas

• The Rhode Island Harbors Management Project, initiated by the CRMC, recommended the establishment of a Harbor Management Plan (HMP) in each of Rhode Island's 21 coastal towns. The HMP calls for the development of a local commission, public workshops, and the generation of a database to establish a management program for a harbor that is consistent with the goals the RICMP. These goals include public access, control of nonpoint source pollution, and prioritizing water-dependent uses over non-water dependent uses. To date, 16 communities have either received approval of their HMP or are developing an HMP. The remaining five communities have all expressed their willingness to develop a HMP in the near future.

• The CRMC is participating in a state-wide marine interest group that is developing recommendations for the improvement of the water quality of the state's ports and harbors. This group of marine interests, the Boat Sewage Management Task Force, has identified sources of water pollution and measures for its improvement, especially as it related to water dependent uses found in the states ports and harbors.

• The CRMC has co-sponsored a New York/New England Coastal Zone Task Force Study which promotes the feasibility of regulations and policies for the protection and development of water dependent uses.

Improving Government Operations

• The CRMC has expanded its permit review process for subdivision developments to include input from the towns where the development project is occurring. Under this approach, the town has the benefit of receiving technical expertise from the CRMC: the projects' developer's have the benefit of receiving the town's input early int he project. A pilot program was begun with the town of Jamestown which has now extended to include two additional towns with four other towns wishing to develop similar agreements.

• The CRMC is attempting to expand its permit review process for all substantial impact projects to include local review and comment. This project would be a coordinated review effort by the CRMC and the town to concurrently review projects that meet both local requirements and state

coastal policy. The town of Westerly has asked to be the pilot town for this endeavor.

- The CRMC has developed, with the assistance of the University of Rhode Island's Coastal Resources Center, an interactive setback computer program for activities located within the coastal zone. Based on average annual erosion rates, and anticipated sea level rise for a given area, the program estimates the impacts of sea level rise on the area.

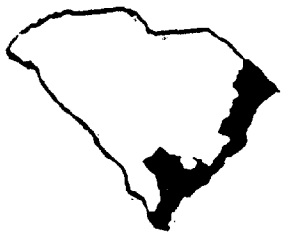
Mitigating Coastal Storm Damage and Coastal Hazards

- The CRMC has approved regulations that provide post hurricane and storm permitting procedures. Included is the authority to impose a 30-day moratorium on all development permits to allow time to assess damages and identify mitigation opportunities.
- The CRMC has adopted a Post Hurricane Recovery and Mitigation Plan for the Salt Pond Region. The Plan provides guidelines for resolving conflicts between recovery and mitigation actions, coordinates state and municipal plans and actions for post hurricane recovery and mitigation, and identifies mitigation actions, which represent special opportunities for reducing future hurricane caused damages, to be undertaken with recovery actions.

INTERSTATE ACCOMPLISHMENTS

The RICMP, in conjunction with the Connecticut Department of Environmental Protection, will prepare an SAMP for the Pawcatuck River Estuary and the Little Narragansett Bay. The goal of the SAMP is to develop a management plan that will protect as well as develop the resources of this water body that is shared by both states.

## SOUTH CAROLINA



Date of Program Approval: 1979
Federal Program Support 1982-1989: $9.9 Million
Coastal GNP (1985): $5.6 Billion (13.1% of state total)
Coastal Population (1985): 817,700 (24.5% of state total)
Shoreline Mileage: 2,876 Miles

### COASTAL RESOURCE INFORMATION

Special/National Significance of South Carolina's Coast

South Carolina's coastal zone is an area of great cultural, historical, and ecological significance. The state, home to one of the richest and most unique habitats in this country, contains over one-half million acres of coastal marsh and two unique ecosystems, the Pocosins and the Carolina Bays. The coastal area also contains several national defense installations. The beaches of the state provide recreational benefits that are the cornerstone of the state tourism economy.

Principal Coastal Threats and Emerging Challenges

- Ensuring an equitable regulatory approach regarding the reconstruction of homes that were destroyed by Hurricane Hugo. The 1988 Beach Management Act prohibits building or reconstruction in a no-construction zone in all areas and forces new construction and reconstruction far landward as possible within 40-year setback area.
- Preservation of the states remaining fresh water coastal wetlands.
- Nonpoint sources of coastal pollution and stormwater runoff for a development in place prior to stormwater regulations adopted in 1985.
- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.
- Promotion of a comprehensive local government beach management plan that includes an assessment of shoreline erosion effects, the study and evaluation of methods to control, or lessen erosion's impacts, and the restoration of areas adversely affected by erosion.
- Development of a long-term management objective and program to protect Charleston Harbor, the South Carolina Coastal Council (SCCC) will begin to develop a SAMP to address development in the Charleston harbor region. This effort will include federal, state, and local government.

### COASTAL PROGRAM INFORMATION

Program Description

The South Carolina Coastal Council (SCCC), established by the South Carolina Coastal Management Act of 1977 (SCMMA) and 1988 amendments, implements the South Carolina Coastal Zone Management Program (SCC-LMP). Two types of management authority are granted to the SCCC: 1) direct permitting authority over the critical areas, and 2) indirect management and certification authority throughout the eight county coastal zone. The critical areas are

defined as coastal waters, tidelands, beaches, and the oceanfront 40-year setback area. In addition, the SCCMA directs the SCCC to review all state and federal permits in coastal counties for consistency with the SCCMP and approve, conditionally approve or deny these certifications.

Defined Coastal Zone

The South Carolina coastal zone is defined as all the coastal waters and submerged lands seaward to the state's jurisdictional limits and all lands and waters in the eight counties of the state which contain one or more of the critical areas.

Federal Program Support 1982-1989: $9.9 million.

Major Program Accomplishments

- The South Carolina Beach Management Act was enacted in 1988. The goals of this act are to protect and restore the beach dune system and permit it to erode and accrete naturally and to improve beach access for the public. Local beach management plans will be developed and enforced by ordinances. The law prohibits new environmental structures and significantly restricts the rebuilding of pre-existing erosion control structures rendered nonfunctional.
- From 1985 to 1987, the SCCC assisted towns in the development of shorefront management plans. These plans regulate setback controls, beach renourishment, and erosion control projects for 65 percent of the State's developed shoreline. The Corps has used these plans as a basis for their Storm Damage Reduction Reports.
- The SCCC developed guidelines to control nonpoint source pollution and stormwater runoff. These regulations protect water quality along 2,876 miles of shoreline, by mitigating the detrimental effects of stormwater in sensitive coastal waters.
- No net loss policies for all control of alteration of all freshwater wetlands under 404 jurisdiction.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- Over 35 miles of wetlands and waterways adjacent to Savannah River Navigation Project are protected by an agreement between the SCCC and the Corps' Savannah District that modifies the Corps dredged spoil disposal operations. These changes affect the practice of open water disposal and call for diking all spoil areas in the state for Corps projects such as the Savannah Harbor project. This policy also applies statewide to all dredging activity.
- Guidelines controlling nonpoint pollution and stormwater runoff are a major consideration in the processing of over 1,400 federal consistency reviews each year. The 1988 revisions to the guidelines require both a pollution control system and assurances that the system will be maintained.
- An ecological and physical characterization of Charleston Harbor was initiated in 1987 with the aid of a special award authorized by Congress. This comprehensive study is a cooperative effort by several agencies and institutions, including the SCCC. The project will determine the ecological effects of the Harbor by the redivertion of the Cooper River into the Santee River.
- SAMPs have been developed for Hilton Head Island, Folly Island, the Shem Creek area of Charleston Harbor, and Trenchard's Inlet in Beaufort County. These plans address the effects of treated sewage and stormwater on water quality, alterations of natural land drainage patterns and land forms, creation of artificial lagoons and reservoirs, the indiscriminate dredging and filling of freshwater wetlands and beach erosion, and threats to prehistoric and archaeological sites.

Providing Public Access to Coastal Recreation

- The 1988 Beach Management Act requires a provision in local government beachfront plans for the protection, enhancement, and improvement of access opportunities. Public access criteria for state funded beach renourishment projects have increased the public access potential in

Beaufort, Colleton, and Charleston Counties.

- State and local governments are pursuing FEMA's Section 1362 program to acquire hazard prone beachfront property following Hurricane Hugo. Such acquisition will increase public access in areas such as Folly Beach, Garden City, and North Myrtle Beach.

Improving Government Operations

- In the wake of Hurricane Hugo, the SCCC issued a series of emergency orders and general permits to facilitate reconstruction of damaged properties not located in severe erosion areas. During the 60 days following the storm, all nonessential permitting was suspended to allow the Council to address important rebuilding requests.
- Full staffing and provision of support for the agency's law enforcement division has helped to strengthen the SCCC permit enforcement program. Attorneys work on behalf of the SCCC by coordinating magistrate court proceedings that concern ticketed violations and are present in the court to assist the enforcement officers.
- A citizen's creek and beach watch program both informs the public about coastal management and provides the council with greater assistance in detecting and prosecuting violations.

Mitigting Coastal Storm Damage and Coastal Hazards

- Shortly after Hurricane Hugo, the SCCC assessed each beachfront structure (including houses, pools, and seawalls) to determine which could be rebuilt under the 1988 Beach Management Act.
- Following Hugo, education programs stressing coastal programs and rebuilding methods were held in each community. Citizens and landowners were informed about coastal hazards and the provisions of the Upton-Jones Program and Section 1362 Flood Insurance Act that can be used to reduce property damages.
- The 1988 Beach Management Act requires that setback provisions be strictly enforced locally and by the state as a means to minimize future storm losses.

## VIRGIN ISLANDS

Date of Program Approval: 1979
Federal Program Support 1982-1989: $3.5 Million
Coastal GNP (1985): $0.9 Billion (100% of territory total)
Coastal Population (1985): 109,000 (100% of territory total)
Shoreline Mileage: 175 Miles

### COASTAL RESOURCE INFORMATION

Special/National Significance of the Virgin Islands' Coast

The U.S. Virgin Islands consists of three main islands, St. Croix, St. Thomas, and St. John, and more than 60 smaller islands and cays. Although the three main islands are in close proximity to each other, each is physically distinct. The Virgin Islands' coastal zone is the Territory's most essential resource, providing sites for petroleum refining and major port activities, as well as breeding grounds for many endangered species. Also, the Islands' excellent scuba diving, fishing and sailing provide an important recreational and economic resource to the Territory.

Principal Coastal Threats and Emerging Challenges

- Current efforts of the CZM program has been directed toward rehabilitation of the Virgin Islands' resources and hurricane contingency planning. Hurricane Hugo, which struck the Virgin Islands in September, 1989, caused severe and extensive damage throughout the Territory.
- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.
- An increase in permitting and enforcement personnel is needed to maintain the present level of enforcement efforts and to replace lost personnel.
- Improvement of the regulatory criteria or guidance needed to provide more effective processing of major and minor permits, including an increase in permit fees (this fee increase is currently pending).

### COASTAL PROGRAM INFORMATION

Program Description

The Virgin Islands Coastal Zone Management Program (VICZMP) is based on the 1978 Virgin Islands Coastal Zone Management Act. The Act established the Department of Conservation and Cultural Affairs (DCCA) as the lead administrative agency for the VICZMP and created a Coastal Zone Management Commission to act as decision-maker for major permits. The Virgin Islands Planning Office (VIPO) and the Public Works Department assist in implementing the VICZMP. After a major reorganization in 1987, the DCCA and the VIPO became part of the Department of Planning and Natural Resources (DPNR).

Defined Coastal Zone

The Virgin Islands coastal zone consists of all of St. Thomas, St. John, and St. Croix islands, all offshore islands and cays, and the territorial sea. CZM permits are required within the "first tier", established by the legislature, to identify the most critical lands in proximity to the coastal zone.

Federal Program Support 1982-1989: $3.5 million.

Major Program Accomplishments

- Reorganization of the Territory's government resulted in the merging of the DCCA into the DPNR. This increased the efficiency of the planning, managing and permitting process of the VICZMP.
- Due to increasing pressure to develop coastal property for hotels and condominiums, the DPNR has undertaken a survey of the Islands' natural resources and is developing a comprehensive land and water use plan for the Islands. This survey will be used to improve the permitting process and reduce the cumulative impacts of development.
- New civil fine regulations, established by the DPNR, have improved the efficiency and enforcement of CZM permit violations. Enforcement of the fines have resulted in increased requests for permit modifications, favorable press coverage, and more administrative time spent on enforcement.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- Development of a management plan for the 18 "Areas of Particular Concern" (APC) will improve the predictability in the decision making process for granting permits in these areas and determine which areas should not be developed at all. Included in the development of each plan will be an analysis of the potential impacts of activities that may be allowed within the APC.
- Coast Week activities included a poster contest for students in the Virgin Islands Public Schools. Posters depicted some aspect of the Territory's coast line. The winning poster was reproduced and distributed throughout the Islands.

Providing Public Access to Coastal Recreation

A boat ramp for use by recreational boaters and fishermen was constructed in Coral Bay, St. John.

Improving Government Operations

- A new voluntary permit pre-application meeting provides major permit applicants with an opportunity to confer with VICZMP staff about the necessary requirements for a permit application. These meetings ensure applicants a greater amount of predictability concerning the time frame necessary to process their permit and creates a more manageable workload for the DPNR staff.
- A procedure to inform adjacent tenants of CZM authorized development activities was implemented, as well as a procedure to assure the review of archaeological and cultural resources prior to development.
- CZM analysts patrol the islands with the Bureau of Environmental Enforcement (BEE) officers to monitor permit compliance and violations and to perform follow-up inspections.
- A seminar for developers was held to distribute the Developer's Handbook describing permit procedures and to provide a forum for discussion on the weaknesses of the permit process. Also presentations on the CZM program were made at the Board of Realtor's Exam.

Mitigating Coastal Storm Damage and Coastal Hazards

The DPNR's response to the aftermath of Hurricane Hugo has been significant. Despite great difficulties of staff turnover and logistic problems with basic services, DPNR personnel have been professionally attending to the permit, monitoring and planning duties of the current year.

## VIRGINIA

Date of Program Approval: 1986
Federal Program Support 1982-1989: $7.7 Million
Coastal GNP (1985): $32.6 Billion (38.1% of state total)
Coastal Population (1985): 3,103,100 (54.4% of state total)
Shoreline Mileage: 3,315 Miles

### COASTAL RESOURCE INFORMATION

Special/National Significance of Virginia's Coast

Virginia possesses extensive estuarine wetlands, in addition to its Atlantic Ocean coastline. Approximately 25,000 acres of tidal wetlands serve as a buffer for flooding and storm damage. Tidewater Virginia (29 percent of the state) contains level and fertile soil for agricultural and forest production. Its rivers are important for transportation and its beaches provide great recreational and economic opportunities. Virginia's coastal zone also contains barrier islands, significant mineral deposits, and wildlife habitats.

Principal Coastal Threats and Emerging Challenges

- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.
- Continued support for the Chesapeake Bay Initiative and related programs to ensure continued improvement in the water quality of the Bay.
- The management of point and nonpoint source pollution, especially in the Chesapeake Bay.
- Maintaining natural beach and dune systems.
- Managing growth pressures in Northern and Tidewater Virginia and preserving wetlands.

### COASTAL PROGRAM INFORMATION

Program Description

The Virginia Coastal Resources Management Program (VCRMP) was approved in 1986. The program is based on a networking of existing regulatory programs. The Council on the Environment, Virginia's lead agency for the VCRMP, implements the program through monitoring and coordination with state agencies and local governments.

Defined Coastal Zone

Virginia's coastal zone includes the 28 counties that border on its tidal waters and 18 separate cities. The seaward boundary is the 3-mile jurisdictional limit.

Federal Program Support 1982-1989: $7.7 million.

SPECIFIC ACCOMPLISHMENTS

Protecting Natural Resources

- The Middle Penninsula Planning District's coastal coordinator assisted local representatives of King and Queen County and Gloucester County to develop the Dragon Run Conservation District. Dragon Run is an undeveloped river noted for its scenic quality, wetlands value, and recreational use.
- The VCRMP is providing funds to the State Water Quality Board (SWQB) to increase the accuracy of instream water quality monitoring and data analysis performed by the SWQB. This improved monitoring system will help the SWQB better regulate wastewater discharges, particularly in the Chesapeake Bay.
- Comprehensive plans have been produced in Charles City, Gloucester, Isle of Wight, King George, King and Queen, New Kent, Northampton and Prince William Counties and the towns of Cape Charles, Exmore, Urbanna and Wachapreague. These plans have had particular emphasis on coastal resources protection.
- Stormwater management plans were developed in Caroline, King George and Stafford Counties. In addition a regional plan was developed for the seven cities of Hampton Roads.
- Eight localities have adopted new or revised zoning ordinances or development regulations aimed at improved protection of coastal resources.
- Four localities are involved in Natural Heritage Inventories. These inventories identify the least disturbed natural habitats within the locality so that they may be protected.
- A recently completed project evaluated wetlands compensation mitigation as a management tool for use within Virginia's shoreline permit program.
- A recent project developed a set of three reports on shoreland management options. Volume I looked at practices nationwide, Volume II was a survey of local practices within the state, and Volume III provided an evaluation of various techniques. These documents have been widely distributed.

Providing Public Access to Coastal Recreation

- A comprehensive guide to public access in the Chesapeake Bay area was produced and distributed.
- Access to the beach at Chippokes State Park has been provided.
- A shoreline access plan has been developed in Mathews County.

Preserving Ports and Marinas

The Towns of Quantico and Wachapreague have completed plans to upgrade their marinas. Both marina sites are in a state of deterioration.

Improving Government Operations

- VCRMP is providing partial support to Virginia's developing EcoMaps program, a comprehensive computer-based natural resource inventory and geographic information system which will be used by state and local governments in making environmental management decisions.
- The Council's Local Assistance unit has to date provided land use planning and development review expertise to local government officials from 36 localities in Tidewater Virginia. One hundred forty two projects were reviewed and improved in the past 1-3/4 years.

Developing Natural Resources

The city of Norfolk created 5 acres of wetlands as part of a mitigation study program.

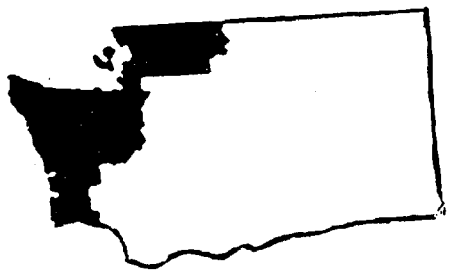
Mitigating Coastal Storm Damage and Coastal Hazards

The City of Virginia Beach undertook a study of erosion and restoration options for both the Atlantic Ocean and the Chesapeake Bay portions of its shoreline.

INTERSTATE ACCOMPLISHMENTS

The states of Maryland, Virginia, Pennsylvania, the District of Columbia, the Chesapeake Bay Commission, and the EPA support the Chesapeake Bay Agreement. Recent interstate grants, funded by VCRMP, have focused on implementation of that Agreement. Projects have included a citizens water quality monitoring network for each of the states (Maryland, Virginia, and Pennsylvania); a workshop to bring together leaders in various technical fields to develop toxicity assessment protocols; and a current project developing a guide to assist localities in locating, developing and funding public access sites.

WASHINGTON



Date of Program Approval: 1976
Federal Program Support 1982-1989: $13 Million
Coastal GNP (1985): $31.3 Billion (46.9% of state total)
Coastal Population (1985): 3,291,400 (74.7% of state total)
Shoreline Mileage: 3,026 Miles
National Estuarine Research Reserves: Padilla Bay (7,500 acres)

COASTAL RESOURCE INFORMATION

Special/National Significance of Washington's Coast

Washington's shoreline contains vast diverse resources such as Olympic National Park, the San Juan Islands, Puget Sound, and Willapa Bay. Nutrient rich estuaries and streams support both local sport and commercial fisheries, in addition to providing propagating waters for salmon which are important to national and international fisheries. Although the state's coastal zone contains only 29 percent of the state land, two-thirds of the state population lives there.

Principal Coastal Threats and Emerging Challenges

- Effects of sea level rise on coastal real estate, especially in erosion hazard areas.
- Preservation of the state's remaining wetlands.
- The implementation of a comprehensive plan to clean up Puget Sound, which has been contaminated from both point and nonpoint source pollution.

## COASTAL PROGRAM INFORMATION

### Program Description

Washington's Coastal Zone Management Program (WCZMP) is based on the Washington Shoreline Management Act. The Act established the Department of Ecology (DOE) as the lead agency for the WCZMP; however, several state agencies, 15 counties and 36 cities are also involved in the implementation of the Coastal Program. These participating counties and cities are guided by locally-developed, state-approved Shoreline Master Programs (SMP) and have the authority to issue or deny permits within the first tier management area (see Defined Coastal Zone). Under the SMA and other state laws, the WCZMP is also authorized to protect coastal resources from adverse impacts associated with development in the second tier management area.

### Defined Coastal Zone

Washington's coastal zone consists of the entirety of the 15 counties with saltwater shoreline. It is divided into two tiers. The first or primary tier contains all the state's marine, estuarine, and fresh waters and their associated wetlands, including at a minimum all upland area 200 feet landward from the ordinary high water mark. Local governments have the option of including the 100-year floodplain within shoreline jurisdiction. The second tier is composed of the area outside the first tier, but within the 15 coastal counties which front on saltwater.

Federal Program Support 1982-1989: $13 million.

### Major Program Accomplishments

- The Grays Harbor Estuary Management Plan, adopted by the relevant local governments, was initiated to protect the entire estuary from uncontrolled, piecemeal development, including Bowerman Basin, an important site for migratory shorebirds.
- The Padilla Bay National Estuarine Research Reserve, located in Skagit County, was designated in 1980. This 10,000 acre reserve contains eelgrass meadows, subtidal sand and mud, as well as grassland and forest. Padilla Bay contains the largest contiguous seagrass meadow in the Pacific Northwest, which is a nursery for salmon and Dungeness crab. Harbor seals also live and pup in the reserve.
- Wetlands along the margins of the Greater Puget Sound were the focus of a WCZMP study designed to identify sites that support native vegetation and provide important fisheries and wildlife habitat. As a result of the study, over 1,000 acres of these wetlands have been acquired and are protected by the state or nonprofit organizations.
- The Nisqually River Basin Management Plan, undertaken by the Nisqually River Council, include neighborhood water quality monitoring, sensitive area mapping, public access planning, and a citizen's basin watch.

## SPECIFIC ACCOMPLISHMENTS

### Protecting Natural Resources

- In order to protect commercial shellfish beds, the WCZMP developed a Shellfish Protection Strategy and undertook a pilot water quality investigation in Burley Lagoon and Minter Bay. The initial project, undertaken in 1983, was the model for later work on shellfish beds under the 1987 Puget Sound Water Quality Management Plan.
- The Puget Sound Water Quality Management Plan, which was developed by the Puget Sound Water Quality Authority, aims to assure, among other goals, that the most important wetlands in the Puget Sound Basin are preserved and that degradation of other wetlands in the Basin are minimized. This goal is achieved through the identification of critical wetlands and through guidelines developed by the DOE to help local governments establish wetland management programs. The final plan will be completed in 1991.

• Public service announcements concerning wetlands protection were developed and distributed to network television stations for airing. Also, a teacher's curriculum on wetlands consisting of booklets, videos, and wetlands displays was developed and distributed to 45 different schools and public and private organizations.
• Four coastal counties, King, Snohomish, Pierce, and Thurston, are conducting research on the effects of urban stormwater on wetlands ecosystem functioning. Results of the study will be used to develop or modify local shoreline plans, zoning, and wetlands ordinances.
• In 1989, the Ocean Resources Management Act was passed. This Act designates financial responsibility for vessels that spill oil in state waters and establishes guidelines for the management of Washington's coast.

Providing Public Access to Coastal Recreation
• A guidebook to public saltwater shoreline access sites in Washington's coastal zone was completed in 1986. Public Shore Guide: Marine Waters identifies, locates, and describes the natural features and developed facilities of state public access sites, and is an aid in the selection of Section 306A public access projects.
• The DOE staff provides technical assistance for reviewing shoreline permits for public access. For example, over 100 local government officials attended a workshop on "Public Access and Zoning Impacts on Private Lands".
• Low-cost construction projects provide improvement for public access to the state's shoreline. Examples of these are a bicycle/pedestrian pathway along Bayview Edison Road in Skagit County, the LaConner public access float, and the Seattle Aquarium floating dock.

Promoting Urban Waterfront Development
• The implementation of the City of Hoquiam Downtown Waterfront Redevelopment Plan has resulted in a park pavilion and a river walkway.
• An urban renewal plan for the City of Bremerton in Kitsap County has resulted in commitments to build a naval museum, a remodeled restaurant, a recreational marina, and a new ferry terminal.

Preserving Ports and Marinas
The DOE is currently developing guidelines that include specific standards for the siting, design, renovation, or expansion of new and existing marinas.

Improving Government Operations
• The Shoreline Management Act (SMA) provided authority to the WCZMP and is implemented with state oversight through a local permit system. To determine whether or not applicants are adhering to permit conditions, the DOE undertakes an in-depth review of the local master programs and provides recommendations concerning the implementation and enforcement capabilities of the local programs.
• The 1987 amendments to the SMA provide local governments with the authority to institute a civil fine procedure to deal with SMA violations. The DOE provides basic policy guidance and recommendations to local governments on how to construct procedures for fines, penalties and liens.

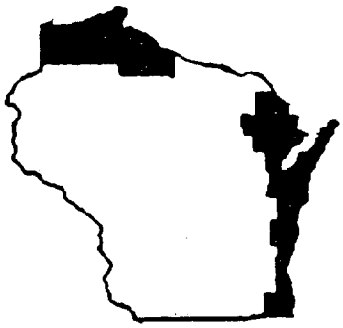
Developing Natural Resources
• The Aquaculture Use Conflict Report addresses four issues in the area of salmon pen siting. These issues include commercial fishing, recreational fishing, the use of aquaculture in different environments, and visual impact control. The DOE also worked with the Washington Department of Fisheries to develop a programmatic Environmental Impact Statement (EIS) for salmon pen siting.
• Commercial shellfish beds produce up to 80,000 pounds of food per acre annually at a statewide value of approximately $95 million. The Shellfish Protection Strategy also protects

recreational shellfish resources. In 1987, recreational shellfishing produced 11 million pounds of clams and a $250,000 oyster harvest.

Mitigating Coastal Storm Damage and Coastal Hazards

A Sea Level Rise Task Force has been developed to examine the problems associated with sea level rise. The Task Force is examining the interaction between sea level rise and vertical land movement, and is also developing a citizen education program.

## WISCONSIN



Date of Program Approval: 1978
Federal Program Support 1982-1989: $6.5 Million
Coastal GNP (1985): $18.7 Billion (24.8% of state total)
Coastal Population (1985): 1,865,800 (39.1% of state total)
Shoreline Mileage: 820 Miles

### COASTAL RESOURCE INFORMATION

Special/National Significance of Wisconsin's Coast

Wisconsin's shoreline borders Lake Superior, Lake Michigan, and Green Bay. Most of the state's coastal land consists of unconsolidated glacial material that is prone to erosion. Wisconsin possesses few remaining coastal wetlands; therefore, the state's coastal region has proven to be an excellent resource for industrial, residential, and agricultural activity.

Principal Coastal Threats and Emerging Challenges

- Effects of lake level fluctuation on coastal real estate, especially in erosion hazard areas.
- Finding alternatives to the disposal of maintenance dredged material.
- Maintaining water quality in the state's lakes and bays for human consumption and recreation.
- Promoting the use of shoreline erosion control techniques that provide long-term protection, minimize the adverse effects on natural systems, and avoid damage to adjacent property owners.
- Improvement of monitoring and enforcement activities, especially in the state's wetlands.

## COASTAL PROGRAM INFORMATION

### Program Description

The Bureau of Coastal Management, located within the Department of Administration, is the lead agency for implementing the Wisconsin Coastal Management Program (WCMP). Regulatory responsibilities for the WCMP are carried out through the Departments of Natural Resources, Transportation and the Public Service Commission and counties (shoreland zoning). Consistency is provided by executive orders and memorandas of understanding. A gubernatorially appointed Wisconsin Coastal Management Council, consisting of representatives from the legislature, state agencies, local officials, tribal governments, citizens, and the University, oversees program implementation and advises the Governor on state policies affecting the Great Lakes.

### Defined Coastal Zone

Wisconsin's inland coastal boundary consists of the 15 coastal counties. The seaward boundary extends to the state's jurisdictional limits.

Federal Program Support 1982-1989: $6.5 million.

### Major Program Accomplishments

- Wisconsin's Waterfront Redevelopment Program is an important element to the WCMP. Under this program, funding is provided to muncipalities to revitalize abandoned or deteriorated waterfronts and to improve public access.
- The Wisconsin Coastal Program provided a grant to help the City of Superior reconstruct a general cargo facility. As a result of this, the state appropriated $1.7 million to make the cargo port operable again. Today, the cargo port handles approximately 35,000 tons of cargo annually.
- The Chiwaukee Prairie-Carol Beach Land Use Plan (funded by the WCMP) provides for the management and protection for remnant prairie habitat. This habitat, which is located between Chicago and Milwaukee, was being impacted by increased urban development.

## SPECIFIC ACCOMPLISHMENTS

### Protecting Natural Resources

- The WCMP is sponsoring public education and awareness activities to stimulate and enhance citizen involvement concerning the clean up of the Sheboygan and Green Bays. The WCMP will use innovative educational techniques to help find appropriate solutions for cleaning up the state's contaminated harbors.
- Technical studies to solve the contamination problems associated with the Great Lakes are being funded by the WCMP. These studies include Potential Detoxification of Sheboygan Harbor PCB's, and Background Levels of Sediments Contaminants.
- The WCMP has helped fund a project to map and update a portion of Wisconsin's coastal wetlands. This data will be incorporated into a Geographical Information System (GIS) of coastal wetlands that will ultimately be used for water regulation permitting.

### Providing Public Access to Coastal Recreation

- A small boat harbor in Racine was built using CZM funds. As a result of this project, a larger project was then implemented—the Racine Festival Project Site, which includes a 900-slip marina, support facilities, a 17-acre county park, and a public boating facility. Local officials credit the original seed CZM funding for providing the impetus for this larger project.
- Low-cost construction projects provide improvement for public access to the state's shoreline. Examples of these are the Manitowoc pedestrian walkway along the City's waterfront, a parkway and walkway for Green Bay, a walkway and viewing area at Sturgeon Bay, a coastal trail and visitor center for the Village of Ephraim, and a floating dock at the Kewaunee Marina.

Promoting Urban Waterfront Development

CZM funds were used to plan and construct a 150-slip marina and waterfront park on abandoned land in the City of Kewaunee. The development of this waterfront site catalyzed significant private investment, in addition to attracting over 100,000 tourists annually.

Improving Government Operations

- The WCMP played a key role in the passage of the great Lakes Charter, the Wisconsin Water Diversion Act, and revisions to the State policies and regulations on dredged material disposal and wetlands.
- The WCMP is evaluating the accuracy and completeness of the permit data received from the Corps and others to be filed into a WCMP permit database. The WCMP will make recommendations accordingly to improve the quality of this database.

Mitigating Coastal Storm Damage and Coastal Hazards

- The WCMP provides assistance to local governments to improve their land use management practices in erosion prone areas. The WCMP provided recommendations for land use control to prevent damage to future development, and to improve existing development through structural and nonstructural means.
- A Coastal Hazards Information Database was assembled by the coastal Regional Planning Commissions. The database contains a bibliography on various aspects of coastal hazard management. The WCMP is in the process of updating this database.
- The DNR developed the Floodplain and Shoreland Management Guidebook to provide an overview of state mandated zoning requirements and to assist local zoning officials and the DNR staff concerning zoning programs.

## Nonparticipating States

### Georgia

Coastal GNP (1985): $3.1 Billion (3.3% of state total)
Coastal Population (1985):376,400 (6.3% state total)
Shoreline Mileage: 2,344 miles
National Estuarine Research Reserves: (5,905 acres)

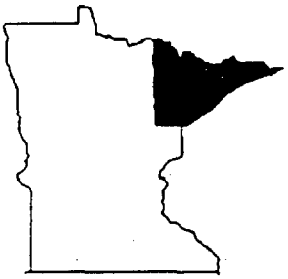
### Illinois

Coastal GNP (1985): $85.5 Billion (39% of state total)
Coastal Population (1985): 5,763,500
(50.0% state total)
Shoreline Mileage: 63 miles

### Indiana

Coastal GNP (1985): $5.6 Billion (6.4% of state total)
Coastal Population (1985):726,300 (13.2% state total)
Shoreline Mileage: 45 miles

### Minnesota



Coastal GNP (1985): $2.8 Billion (3.6% of state total)
Coastal Population (1985):217,700 (5.2% state total)
Shoreline Mileage: 189 miles

### Ohio

Coastal GNP (1985): $31.3 Billion
(16.6% of state total)
Coastal Population (1985): 2,796,000 (26% state total)
Shoreline Mileage: 312 miles
National Estuarine Research Reserves:
Old Woman Creek (543 acres)

### Texas

Coastal GNP (1985): $61.1 Billion (27.7% state total)
Coastal Population (1985): 4,438,000 (27.1% state total)
Shoreline Mileage: 3,359 miles

## INTRODUCTION

This chapter addresses two questions of importance to coastal zone planners and policy-makers: *what is the economic value of the coastal zone*? and, *what is the relationship between spending on coastal zone management activities and the economic value of the coastal zone*? The first of these questions is addressed in Section A that follows, and the second, in Section B.

## A. THE ECONOMIC VALUE OF THE COASTAL ZONE

Proponents of coastal zone protection legislation typically claim that special action is needed to preserve the "value" of the coastal zone. Yet, only a few researchers have attempted to quantify that "value." That quantification is necessary to establish a baseline for further benefit-cost analysis of coastal protection activities.

This section provides a methodology for estimating the economic value of the coastal zone. That methodology is used to construct estimates of "GNP-originating" in the coastal zone, in aggregate, and as a percent of individual coastal states' and national Gross National Product (GNP). The results are quite dramatic: in 1985, GNP-originating in the coastal zone totalled approximately $1.5 trillion, or some 31 percent of U.S. GNP. These figures are sensitive to the way the coastal zone and coastal value are defined.

The section is divided into four subsections. Section A-1 presents the definitions of "coastal zone" and "coastal value." Section A-2 reviews some of the earlier work on the topic. Section A-3 explains how the methodology used for this report differs from those earlier studies and presents estimates for 2 years (1978 and 1985), for 30 states and three territories. Finally, Section A-4 contains a summary and implications for policy.

### A-1 The Coastal Zone and Coastal Zone Value

#### A-1.1 The Coastal Zone

The coastal zone is defined as the 413 counties in 30 states and five territories that are either adjacent to or within 50 miles of the oceans, bays or Great Lakes, or lie within an estuarine region.[1] This designation of coastal zone counties is strictly objective, based on the coastal/estuarine proximity criterion and an examination of detailed maps. All but 24 of the coastal zone counties are also within the coastal zone, as defined by the Office of Ocean and Coastal Resource Management (OCRM). All but 10 of the coastal counties are within the coastal zones defined by their respective states. Appendix Table A1 contains a complete list of the counties that have been designated.

An entire county was included in the coastal zone if it is adjacent to an ocean, bay, or Great Lake. Those parts of non-adjacent counties that lie within a 50 mile radius of the coast were also included in the coastal zone. In addition, all parts of the five U.S. territories (American Samoa, Guam, Northern Mariana Islands, Puerto Rico, and the Virgin Islands) were included.

#### A-1..2 Coastal Zone Value

The value of the economic activity and natural resources found along the 95,000 miles in the U.S. bordering the Atlantic and Pacific oceans, estuaries, the Gulf of Mexico and the Great Lakes, has two components: the current market value of all goods and services that are produced directly and indirectly from coastal resources and coast-related activities (which is equivalent to the gross national product-originating in the coastal zone, or "coastal GNP" for short), and, the intangible value of recreation and other activities and resources that people enjoy, but for which they do not

pay directly (termed "nonmarket" values). Sections A-2 and A-3 discuss these more fully.

A-2 Literature

Economists have attempted to measure both the market and nonmarket value of coastal resources and coast-related activity. A representative sample of that literature is reviewed here, with a discussion of its limitations.

A-2.1 Measuring the Market Value of the Coast

The earliest studies of coastal value, in the 1960s and early 1970s, added up the market value of the goods and services produced by coast-related industries. Gosselink, Odum and Pope (1974) claimed that those studies understated the true value of the coastal environment. Those authors proceeded, instead, to convert the "total embodied energy of the environment" including solar energy and human-made fuel based systems, to dollar equivalents. Using that approach, they estimated unaltered wetlands to be worth $82,000 per acre. Shabman and Batie (1978), among others, criticized Gosselink, Odum and Pope's technique because [it] "failed to recognize the nature of the process by which economic values are determined and made an illegitimate marriage of the principles of systems ecology and economic theory." If the Gosselink, Odum and Pope estimate was correct, total coastal wetland value would have been approximately $715 billion in 1974.[2] Total coastal value would have been even higher.

Other published studies from the 1970s (for example, Urban Land Institute (1976) and U.S. Department of Commerce (1974)) continued to base "value" on the jobs and payroll created in industries that require proximity to the coast. Those "coast-dependent" industries included commercial and sport fisheries, coastal recreation and tourism, mineral extraction, and ports.

Even this limited definition generates large coastal values. For example, fishing contributed more than $30 billion to the U.S. economy in 1987, and recreation and tourism added more than $8 billion to the economy.[3] In addition, more than 12 percent of U.S. oil production, and 25 percent of natural gas production, took place in coastal counties in 1987, accounting for at least $20 billion more in value.[4]

More recent studies, by Pontecorvo (1988) and Pontecorvo, et al. (1980), expand the definition of "coast-dependent," and consequently provide higher estimates of coastal value. Those studies focus on the entire "ocean sector" rather than on selected industries. Pontecorvo's "ocean sector product" equals

> the value added by those establishments within 66 GPO [Gross Product Originating] sectors...that either utilize an ocean resource in the production process or exist because the demand for the establishments' final output is due to some attribute of the ocean sector. (Pontecorvo, 1988, p. 9)

His estimate of "ocean sector originating" for 1987 was $109 billion, or 2.6 percent of GNP.

A-2.2 Measuring the Non-Market Value of the Coast

Economic analyses, like those summarized above, use the price paid for a product, or the sum of input prices, as measures of its value. Unfortunately, not all economic resources or commodities carry a market-determined price. Consider, for example, the preservation of endangered species and scenic beauty. The importance, or worth of these goods cannot be denied. Yet, one cannot ascertain easily the value of these goods in dollar terms.[5] But those values are needed in order to decide whether giving up some amount of clean water (for example) for some quantity of a marketed good is beneficial or wasteful. Much of economics, therefore, concerns the

development and use of methods to determine the value placed on nonmarketed commodities by the consuming public.

Economists, including those studying the coastal zone, have identified five basic techniques to determine the value of nonmarketed commodities: 1) travel cost methods, 2) alternative source costs methods, 3) consumer and producer surplus methods, 4) survey or contingent value methods, and 5) hedonic price methods.[6]

Travel cost methods have been used to value coastal resources such as beaches and fishing and hunting grounds. The central assumption is that the value a marginal individual places on these opportunities can be approximated by the costs he incurs to travel to that location-specific activity. Raphael and Jaworski (1979) use this approach, for example, to estimate the value of fish, wildlife and recreation in Michigan's coastal wetlands to be $489.69 per acre, or $51.8 million.

Alternative source cost methods could be used to value wetlands' contribution to flood control and pollution abatement. That value is approximated by the cost of reducing flood danger or pollution by the least expensive alternative technology. For example, if a particular wetland area serves to reduce the probability of a flood in a given place by 10 percent, and the alternative way to achieve that outcome is to build a $10 million levee, the value of the wetlands is assumed to be $10 million (see Shabman and Batie, 1982).

Consumer surplus methods equate value with the welfare enjoyed by the buyer due to his ability to obtain the good (or coastal amenity) for a price less than he would have been willing to pay. Similarly, producer surplus methods equate value with the welfare to sellers from receiving more in payment for a good or resource than he would have been willing to accept.

Both Lynne, Conroy and Prochaska (1981) and Freeman (1988) use these approaches to place value on wetlands. Lynne, Conroy and Prochaska relate crab yield in salt-marshes to fishermen's effort and biological variables such as biomass, biotic potential, and acreage. The authors recognize explicitly that the important policy variable is the value of the last (marginal) acre of marshlands in use. If the additional value produced by that acre of wetlands is less than it would be in some other use, then economic efficiency requires that the acre be given over to that alternative use; if it is not, then the acre should remain as wetlands. The authors find that the value of the marginal acre of wetlands, in terms of blue crab production in Florida, is about $3.00. Note the dramatic difference between this and the $82,000 per acre estimate by Gosselink, Odum and Pope (1974).[7]

The paper by Freeman points out the importance of the assumptions in performing analyses like that of Lynne, Conroy and Prochaska. His specific concern is the organization of the market for the resource being valued. For example, the usual assumption that markets are perfectly competitive is made implicitly by Lynne, Conroy and Prochaska. Perfect competition means the price one pays for the use of the last unit of input is equal to the value of the additional output produced using that input. But for a resource such as wetlands, or fishing beds, such an assumption is often not valid. Coastal wetlands are a "common property resource," meaning that no individual economic actor owns the right of exclusive use. In such a case, the resource is used more than if it were exchanged in the marketplace. Freeman's point is that the presence of this common property resource problem in conjunction with the assumption to the contrary, perfect competition, leads to incorrect valuation of the nontraded commodity. If, however, regulations exist which (one assumes) lead to the efficient use of the nonmarketed resource, then the valuation is done correctly.

Freeman also shows that the value of additional wetlands may rise or fall as the quantity of wetlands is reduced, depending on the responsiveness of the demand for the final good to changes in price. Consequently, the value of additional wetlands depends upon the value people place on the additional goods produced on the wetlands. If people place very low value on the additional crabs caught as a result of increasing wetlands, then the value of increasing wetlands is low. If, on the other hand, people place a very high value on the extra shellfish then the value of increased wetlands is high.

The contingent valuation method is a survey-based approach to valuation. Individuals are asked to state their willingness-to-pay for some amenity. Lindsey and Tupper (1989), Silberman and Klock (1988), and Bell and Leeworthy (1986) have used this method to ascertain beach-goers' willingness-to-pay for the "beach experience," to use the beach for a day, and, to have the beach restored to some uneroded or unlittered condition, respectively. The different values the authors obtain come, in part, from the different wording in their questions.

The study by Lindsey and Tupper is the least sophisticated of the three in that it simply uses respondents' answers to their questions to compare mean willingness-to-pay for a variety of subgroups of the sample. For example, they compare the average willingness-to-pay at different beaches, the average willingness-to-pay of local residents to that of visitors, and the willingness-to-pay of property owners to nonproperty owners. Lindsey and Tupper found the mean willingness-to-pay for the beach experience to be $47. Both Bell and Leeworthy, and Silberman and Klock, use the respondents' answers to estimate a willingness-to-pay function. Silberman and Klock alone take account of potential biases in the contingent valuation method. Nonetheless, both studies find mean willingness-to-pay in the same range, $1-$5, or less than one-tenth the Lindsey and Tupper estimate.[8]

The final method discussed here is the hedonic price technique. Essentially, the method assumes that the total price one pays for real property and improvements depends upon the characteristics of the property and of the surrounding area. The price is assumed to vary with changes in the characteristics of the property, and one can determine the value of a unit of some characteristic by observing the prices paid for two properties whose only difference is the amount of some attribute. For example, two houses identical except for the number of bedrooms will sell for different prices. The difference in the prices is the value of the additional bedroom(s).

Elizabeth Wilman (1981) used the hedonic method to estimate the recreational value of beaches. She hypothesized that the rent paid for a summer cottage and the number and duration of rentals by an individual will depend on the distance to, and the quality of, nearby beaches. Data limitations forced Wilman to characterize each cottage by its number of rooms, the existence of a telephone, distance to the nearest beach, distance to the nearest urban area, and whether or not debris was found on the beach. All of Wilman's explanatory variables except distance to an urban area were significantly different from zero with the correct sign. That is, greater distance to the beach and presence of trash on the beach imply a lower rental price for the cottage, whereas more rooms and the presence of a telephone result in a higher price for the cottage.

Anderson and Edwards (1986) performed an hedonic price analysis that related the value of a house and its lot to characteristics of the house, such as square footage, number of bathrooms, and age, the size of the lot, and the following coastal zone characteristics: distance to a salt pond or the ocean, frontage on a salt pond or ocean, the presence of a view of the pond or ocean from the property. Each of these characteristics were significantly different from zero with the correct sign in the regressions, indicating that proximity to, and a view of, the ocean or pond add value to the property. The regression results suggest that a foot of water frontage was valued between $11 and $102, and that a view of the water ranged in value from $4275 to $20,000. The broad range of values for a foot of frontage or of a view is a result of cross-relationships. So, a property with

more bathrooms and a larger lot than its neighbor, for example, will also be associated with a higher value for a foot of waterfront or a view of the ocean.

Two further examples of the hedonic technique are by Brown and Pollakowski (1977) and Terich and Gabriel (1987). Brown and Pollakowski estimate the value of 1) proximity to a body of water, and 2) the size of the setback from the water, for residences around three lakes within the Seattle city limits. Terich and Gabriel estimate the effect of coastal erosion on the value of nearby property, in Washington state. Despite considerable differences in technical detail, both find that greater distance from the water reduced the value of property. Brown and Pollakowski also find that the greater the setback, the higher the value of property.[9]

A-2.3 Summary of the Literature

Economists have measured coastal value in different ways: by focusing on market and nonmarket values, and by estimating the importance of the coast for the nation as a whole and for specific places and types of activities or coastal resources.

The studies that have been reviewed provide different estimates for the economic value of the coast, or its components. These are reviewed in Table A-1.

Table A-1 Estimates of Coastal "Value"

| Methodology suggested by: | Estimate | Year; scope |
|---|---|---|
| Gosselink, Odum and Pope (1974) | $715 bil | 1974; all coastal wetlands |
| Urban Land Institute (1976)<br>U.S. Dept of Commerce (1974 | $58 bil | 1987; fishing, recreation and tourism, )off-shore and related oil and gas |
| Pontecorvo (1988) | $109 bil | 1987; "ocean sector-originating" |
| Raphael and Jaworski (1979) | $51.8 mil | 1978; fish, wildlife and recreation in Michigan's coastal wetlands |
| Lynne, Conroy and Prochaska (1981) | $3/acre | Florida wetlands based on blue crab production |
| Lindsey and Tupper (1989) | $47 | mean willingness-to-pay for a one-time beach experience |
| Bell and Leeworthy (1986)<br>Silberman and Klock (1988) | $1-5 | willingness-to-pay for one-time beach use or to have beach restored |
| Anderson and Edwards (1986) | $11-102 | value of a foot of water frontage (additional rent) |
| Anderson and Edwards (1986) | $4,275-20,000 | asset value of a view |

These estimates have one common interpretation: regardless of how one measures coastal value, it is sizable. Looking at current market values of goods and services produced by just three coast-related industrial sectors, the value was $58 billion in 1987. When the list of sectors is expanded to some 60 industries, the estimate of coastal value doubles. When coastal value is measured in terms of the market value of the embodied energy at the coast, rather than in terms of standard transactions, the value is still higher. As high as these figures are, they still may understate the full value of the coast since they exclude the consumer surplus that is created by people's willingness-to-pay for beach access, coastal proximity, and coastal views in excess to what they are actually charged.

A-3 Estimates

This section provides estimates of the economic value of the coast. An approach similar to Pontecorvo (1980, 1988) was adopted. The travel cost, alternative source cost, consumer and producer surplus, contingent valuation, or hedonic price methods described above, were not employed because the task at hand was to generate a national estimate for all coastal activities and resources. The nonmarket based techniques require data from particular places for particular components of the coastal zone. Conceptually, those micro-estimates could be aggregated into a national total, but the data needs to do that are unrealistic. In short, to use those approaches for our purposes would require us to conduct thousands of data-intensive studies.

The approach used by Pontecorvo (1988) and Pontecorvo, et al. (1980), sacrifices the rich detail of the micro-based studies, but achieves the broad coverage most useful for national policy-making purposes. Moreover, Pontecorvo's approach is well-placed within an economics literature on "national income accounting."[10]

Pontecorvo's approach was not fully adopted because his definition of "ocean sector" was judged to be too narrow. "Coastal zone" activities include more than those endeavors that relate directly to the ocean.

Three types of economic activities were identified that create value in the coastal zone: 1) economic activities, located in the coastal zone, that are locationally dependent on coastal resources, specifically, the ocean, bays, great lakes, and estuaries, and their contents; 2) economic activities that use the ocean, bays, great lakes and estuaries, and their contents, in the production process, or that produce intermediate inputs for coast-related activities, but are not necessarily in the coastal zone, and 3) economic activities, not included in (1), that are located in the coastal zone and provide service to residents and visitors to the coastal zone.

The first set of activities (*coast-dependent*) includes, for example, fisheries, yacht clubs, off-shore energy production, beach-related recreation, marine research, and ocean transport and shipping. These can only be performed in the coastal zone.

The second set of activities (*coast-linked*) includes, for instance, fish processing and packing, and the production of fishing and other equipment used in the ocean, bay, or estuary. These do not have to be located within the coastal zone, but are likely to be nearby. They would not exist if there were no coastal zone.

The third set of activities (*coastal services*) includes real estate, wholesale and retail operations, non-ocean-related recreation, and business and professional services. The viability of these depends on the size and income of the coastal population and the success of other coast-related economic activity. In economic terms, the study included these to capture some of the multiplier effects of coast-dependent activities. They create additional income that is likely to stay in the coastal zone.

The sum of the value produced by these three types of activities can be considered to be the *gross* economic value of the coastal zone. That is not meant to suggest that U.S. GNP would be lower by the full amount of the total. Clearly, if there were no coast, people would go elsewhere in the U.S. for recreation, for example, to lakes and mountain areas. The level of economic activity would be higher in those places than it is now, then. However, a change in the venue for recreation from a person's first-best, utility-maximizing choice (the beach), to his/her second-best choice (lakes or mountains), entails a loss in welfare. Moreover, some activities—especially those that are co*ast-dependent* and *coast-linked* —do not have substitutes elsewhere in the U.S. And, it is likely that some tourists would not substitute other forms of recreation for coastal recreation. If no coastal areas were available in the U.S., or the quality of coastal areas deteriorated, that group is likely to spend their dollars in foreign coastal locations. That happens in Europe, where German, Austrian, Dutch, Swiss and others without access to domestic coastal areas vacation in Italy, southern France, Greece, and Spain.

One could define the economic value of the coastal zone even more broadly than has been done above, as the sum of all economic activity in the coastal zone (including exporting industries that do not use coastal resources), plus what was called *coast-linked* economic activity above. This definition is based on geographic location as well as on the characteristics of industries. This alternative is included in the analysis for comparison purposes.

Whatever the definition of coastal zone value, it is interpreted to be the "value at risk." Some of that value could be moved inland if the coast were threatened or degraded, but even then, there would be considerable transaction costs and leakage.

The raw measures of "economic activity" that were used are employment and payroll (P), largely because of data availability. GNP was assumed to be a relatively space-invariant multiple of those variables in order to approximate GNP-originating. Thus, if $P_{US}/GNP_{US}$ = constant, then $GNP_{CZ} = P_{CZ}/\text{constant}$.[11]

Industries were classified into *coast-dependent, coast-linked*, and *coastal service* activities based on information provided in the Census Bureau's SIC Classification Manual. In some cases employment and payroll amounts were available at the 3-digit level only. In those instances the employment or payroll value was multiplied by the proportion of "qualifying" 4-digit industries to 3-digit industries. The list of industries included in co*ast-dependent, coast-linked*, and *coastal service* activities is in Appendix Table A2.

In 1985, 779,000 workers were employed in coas*t-dependent* activities (requiring proximity to the coast), with a payroll of approximately $15.8 billion. Another 239,000 workers were employed in *coast-dependent* economic activities (backward- and forward-linked businesses not necessarily in the coastal zone), with a payroll of $4.59 billion. The *coastal service* activities (located in the coastal zone, providing services to residents and visitors) is the largest of the three categories, with 27.3 million workers and $459.5 billion in payroll.

These employment and payroll totals have increased since 1978. In 1978, 445,500 workers were employed in *coast-dependent* activities, 174,600 in *coast-linked* activities, and 21,390,000 workers in *coastal service* activities. 1978 GNP-originating was $15.05 billion, $7.46 billion and $597.7 billion for each of the activity types. The largest increases have been in *coast-dependent* and *coast-linked* activities.

Table A-2 shows these employment and payroll figures, as well as the "coastal GNP" originating from each of the activity types. The sum of "GNP-originating" for co*ast-dependent* and *coast-linked* activities is $54.17 billion, or approximately 1.1 percent of the U.S. total. Pontecorvo's definition of "ocean sector" is roughly similar to the sum of *coast-dependent* plus

*coast-linked* activities. He estimates that 2.6 percent of U.S. economic activity originates in the ocean sector, which is the same order of magnitude as the estimate presented above (Pontecorvo, 1988, p. 7).

When the economic value of the coastal zone is defined to originate from all activity in coastal counties, it is higher than the figures shown in Table A-2. In 1985, 37.7 million workers were employed in coastal counties, or 46.4 percent of the U.S. total. That represented $747 billion in payroll. Coastal counties accounted for almost $2 trillion in GNP in 1985, or 49.4 percent of the U.S. total. (These percentages correspond to the population share of coastal counties, as they have been defined.)

The most inclusive definition of coastal zone-related economic activity is the sum of all activity within coastal counties and *coast-linked* economic activity.[12] By that definition, the coastal zone accounted for approximately 38 million jobs and $752 billion in payroll. These estimates are only slightly higher than those from the definition used in the preceding paragraph.

Table A-2
Employment, Payroll and GNP-Originating in Coastal Zone, 1985 and 1978

| | coast-dependent | coast-linked | coastal services |
|---|---|---|---|
| **1985** | | | |
| Employment | 779,000 | 239,000 | 27,304,700 |
| Payroll | $15.8 bil | $4.59 bil | $459.5 bil |
| GNP-originating | $42 bil | $12.17 bil | 1.27 tril |
| Percent of U.S. GNP | 1.05 | 0.034 | 30.36 |
| **1978** | | | |
| Employment | 445,500 | 174,600 | 21,390,000 |
| Payroll | $6 bil | $2.98 bil | $238.4 bil |
| GNP-originating | $15.05 bil | $7.46 bil | $597.7 bil |
| Percent of U.S. GNP | 0.7 | 0.035 | 28.36 |

Note: GNP-originating is based on payroll. The values using employment are similar.

The Appendix contains four tables that show the breakdown of coast-related employment and payroll, by state, for 1985 and 1978 (Tables A3 to A6). The last column in each of the tables indicates how much of each state's total economic activity occurs in the state's coastal counties. The percentages depend on the states' particular geography, the definition of coastal zone that is employed, and whether employment or payroll was used. Using the preferred definition of coastal zone value (coast-de*pendent, coast-linked*, plus *coastal service* activities), and payroll, one can see that nine of the 30 coastal states depend on coastal counties for at least half their GNP. Seventeen states have at least one-third of their economic activity originating in coastal counties. These patterns are shown graphically in the Appendix maps. States are aggregated into geographic regions or subregions and ranges are shown for the "coast contribution to GNP."

A-4 Summary and Implications for Policy

This section contains estimates of the economic value of the coastal zone that is "at risk." Economic "value" can be defined in any number of ways. Here, a macro-economic definition was used that is related to the value of goods and services generated in the U.S. that may not otherwise have been produced if there were no coastal zone. Conceptually, this is consistent with one widely-cited recent study, but goes further than that earlier work by including economic activity from coast-based services. The number of jobs and amount of payroll created by coast-related economic activity was shown, and "GNP-originating" was approximated in absolute terms and relative to total state and national GNP.

The estimates that are presented indicate that the coastal zone is a key economic sector that contributes more than 30 percent of the national GNP. Most of this value comes from the service sector, but even without that type of economic activity, the coastal zone accounted for some $55 billion in 1985. The estimates demonstrate, as well, that the coastal zone has become more important over time, growing from 30.1 percent of GNP in 1978 to 31.4 percent in 1985. Finally, the estimates suggest that the coastal zone is critical to the economies of many coastal states and federal territories.

States and territories are reported to have received $33.4 million from the federal government under the Coastal Zone Management Act in 1988. Those grants have been used to manage almost 4000 times their value in economic output, using the preferred measure of "coastal GNP." Even when the states' required matches are included, the ratio of CZMA spending to coastal GNP is almost 1:2000. Given the fragility of the coastal environment and its considerable importance to the U.S. economy, those ratios seem quite favorable. Section B of this volume explores more fully the relationship between CZMA spending and coastal GNP.

B. THE RELATIONSHIP BETWEEN CZM SPENDING AND COASTAL GNP

In Section A, data on employment and payrolls in three types of coast-related activities were used to estimate what was defined as "coastal GNP." This section attempts to establish a relationship between Section 306 spending and the growth of coastal GNP.

There is little precedent in the literature for relating CZM spending and economic outcomes in the coastal zone, despite the fact that a firm conceptual basis exists for such a relationship. The dearth of empirical work is likely a consequence of some knotty practical problems.

Section B-1 provides the conceptual framework for the work that follows. Section B-2 contains a review of the relevant literature. Section B-3 describes the research design and reports the results. Section B-4 discusses an alternative approach that could have been used to relate CZM spending and coastal GNP, if appropriate data were available. Finally, Section B-5 summarizes the key points from this section and discusses their policy implications.

B-1 Conceptual Basis

The CZMA is not expressly intended to enhance the economy of the coastal zone. Rather, its stated goal is "to preserve, protect, develop and where possible to restore or enhance the resources of the nation's coastal zone for this and succeeding generations."[13] These goals have been pursued by states through six types of activities: the provision of public beach access, the protection of natural resources, the development of natural resources, the mitigation of hazards, the development of ports and marinas, and the redevelopment of urban waterfronts.[14]

Improvements in beach access, resource development and protection, hazards reduction, port and marina development and urban waterfront development, all can be converted to economic benefits, or "welfare," in several ways. Conceptually, the question is this: *how do those activities enhance the "value" of the coast*? To the extent that they make coastal counties more desirable locations for coast-dependent and coastal service activities, they will be related to increases in economic activity on the coast, and to higher coastal GNP.

B-2 Relevant Literature

None of the literature that was reviewed attempts to relate CZMA spending to property values. Some explanations for that are provided in Section B-4. Moreover, no studies were found that relate spending on CZMA activities to any economic outcome directly, or even attempt to infer the effect.

Two articles summarized in Section A can be used to illustrate the possibility of inferring the effect of CZMA activities on economic outcomes. First, the Lynne, Conroy and Prochaska (1981) study attached a value of $3.00 per acre to wetlands in Florida, in terms of blue crab production. If the number of wetland acres purchased by Florida with CZMA funds were known, it would be straightforward to estimate the benefits of the CZMA for the blue crab fishing industry. Further, input-output analysis could be used to trace the effect of that wetland purchase on related economic sectors. As another example, consider Bell and Leeworthy's (1986) estimate of $1.00-$4.88 for the value of a beach-day to a visitor to the beach. If there were independent information on the number of beach-goers that were allowed access to the beach for the first time as a result of CZMA spending, the resulting welfare gain could be calculated.

No studies of this type exist, for two reasons: 1) until now, a centralized and systematic national database on CZMA spending patterns did not exist, and 2) the "independent information" referred to above is either unavailable or suspect, casting the accuracy of inferred effects in doubt.

Several of the studies reviewed in Section A relate hypothetical or general policy actions (not specifically CZMA-related actions) to economic value. For example, Freeman (1988) found that the optimal regulation of (Gulf coast blue crab) fisheries would raise welfare by between $1 and $1.5 million.[15] That indicates by how much we are made worse-off by open-access fishing rather than optimal use of the fishing areas. It suggests that an important regulatory function of the CZMA may be to limit the use of common property coastal resources.

A second study that was reviewed, by Anderson and Edwards (1986), used the contingent valuation method to estimate the value of changes in water quality from any number of public policies. For an improvement from boatable to swimmable water, respondents stated willingness to pay ranging from $1 to $2,000, with a mean response of $87.

Anderson and Edwards (1986) also evaluated the down-zoning of properties in the salt ponds region of Rhode Island. Such down-zoning is often part of a state's CZM plan. They found that down-zoning would provide a net present value of benefits of approximately $3.1 million. These figures are not without qualifications. Different functional forms for the regressions or inappropriate assumptions about how the down-zoning will be implemented would alter the benefit calculation, perhaps substantially.

Finally, Brown and Pollakowski (1977) used an hedonic model to estimate the value of setbacks from the water for residences around three lakes within the Seattle city limits. They found that the greater the setback, the higher the value of property fronting on the water. The reason for this is that there is more open space around the property in question; that is, the effect of urban congestion is reduced for these properties. Setbacks also are often part of CZM plans.

This latter group of studies is interesting, but of limited use for the purpose of this study. First, they do not focus closely enough on CZMA activities. Second, they do not provide a national perspective, but rather, a set of disaggregated context-specific estimates.

B-3 Research Design and Results

Table B-3 motivates the formal statistical tests that are reported in this section. That table ranks the states participating in the CZM program according to different measures of coastal GNP change from 1978 to 1985, and real spending on CZMA activities (Section 306) from 1982 to 1985. The first column reports the absolute change in coastal GNP in billions of 1982 dollars.

The third column is the percentage change in coastal GNP between 1978 and 1985. The last two columns report changes in coastal GNP on an average annual basis. Note that the top five states in terms of growth received an average of $8.8 million in CZM spending, whereas the bottom five states received only $2.8 million, on average. Additionally, only one state ranked in the top five in coastal GNP growth received less in CZM funding than any state ranked in the bottom five. Nonparticipating states have average growth ($4.97 billion), more like the low CZM recipient states ($.12 billion) than like the high CZM recipient states ($42.42 billion); and no nonparticipating state had greater growth than any of the five states with the fastest growth. Table B-3 also shows that both total and annual average growth rates were higher for the top five states than for the bottom five and the non-participants.[16]

Tables B-4 and B-5 report results of two types of correlation tests—simple Pearson correlations and Spearman's rank-order correlations. In Table B-4 the CZM spending data from column two of Table B-3 are correlated with the change in coastal GNP data from the first column of Table B-3. In Table B-5 the data in column three of Table B-3 are used instead of the data in column one from that table. In both tables five measures of output change are employed. The first three are the components of coastal GNP (based on payroll data), discussed at length in Section A. The fourth output measure is total coastal GNP, also based on payroll data (that is, the sum of the data used for columns one through three). The fifth measure is a broader definition of coastal GNP which includes all economic activity in coastal counties. This range of definitions is used to ensure the robustness of the results.[17] All correlation coefficients are calculated using data from participating states alone.

Four of the five Pearson coefficients in Table B-4 are positive and statistically significant at a P value of 0.05 (the exception is *coast-linked* GNP, which is positive but not significant). The values of the significant coefficients range from 0.5017 to 0.575. Three of the five rank-order correlations reported in Table B-4 are statistically significant, ranging in value from 0.4338 to 0.4901.

The results in Table B-5 are uniformly different. There, none of the coefficients is significant at P=0.05.[18]

The question that arises following an examination of Tables III-4 and III-5 is: why *do states with large absolute increases in coastal GNP also have large total CZM spending, while states with large percentage increases in coastal GNP do not (and vice-versa)*? The answer lies partly in the law of small base numbers and partly in the formula by which federal funds are allocated. The law of small base numbers implies that small states tend to have high growth rates and large states tend to have slow growth rates, all else equal. The fact that large states appear to experience large total CZM spending would seem to imply that they have an advantage in obtaining funding over their smaller counterparts partly because the formula for CZM allocations uses population. To account for that fact, population should be a control variable in the regression analysis.

Table B-3 Changes in Coastal GNP and Total CZM Spending

| | CHANGE IN COASTAL GNP $B 1982 | REAL CZM SPENDING 1982-85 TOTAL | PERCENT CHANGE IN COASTAL GNP | AVERAGE ANNUAL CHANGE IN COASTAL GNP | AVG ANNUAL PERCENT CHANGE IN COASTAL GNP |
|---|---|---|---|---|---|
| CALIFORNIA | 75.83 | 7441733 | 41.78 | 10.83 | 5.97 |
| NEW YORK | 58.69 | 11495533 | 39.42 | 8.38 | 5.63 |
| FLORIDA | 31.52 | 9741115 | 55.34 | 4.50 | 7.91 |
| NEW JERSEY | 23.07 | 11852102 | 47.32 | 3.30 | 6.76 |
| MASSACHUSETTS | 22.97 | 3415294 | 56.34 | 3.28 | 8.05 |
| AVERAGE | 2.42 | 8789156 | 48.04 | 6.06 | 6.86 |
| CONNECTICUT | 7.88 | 2995482 | 51.69 | 1.13 | 7.38 |
| PENNSYLVANIA | 6.30 | 2987297 | 23.91 | 0.90 | 3.42 |
| WASHINGTON | 3.31 | 4633961 | 13.24 | 0.47 | 1.89 |
| LOUISIANA | 3.17 | 5431040 | 15.38 | 0.45 | 2.20 |
| MICHIGAN | 2.57 | 594502 | 7.78 | 0.37 | 1.11 |
| HAWAII | 2.30 | 2199707 | 28.24 | 0.33 | 4.03 |
| DELAWARE | 1.84 | 2489671 | 41.37 | 0.26 | 5.91 |
| S.CAROLINA | 1.77 | 5287512 | 53.35 | 0.25 | 7.62 |
| RHODE ISLAND | 1.66 | 2284465 | 25.56 | 0.24 | 3.65 |
| ALASKA | 1.63 | 10620566 | 44.38 | 0.23 | 6.34 |
| MARYLAND | 1.52 | 6426590 | 6.97 | 0.22 | 1.00 |
| WISCONSIN | 1.15 | 3620111 | 7.33 | 0.16 | 1.05 |
| N. CAROLINA | 0.68 | 4466936 | 27.28 | 0.10 | 3.90 |
| ALABAMA | 0.62 | 1517070 | 21.47 | 0.09 | 3.07 |
| NEW HAMPSHIRE | 0.35 | 3207561 | 23.42 | 0.05 | 3.35 |
| MISSISSIPPI | 0.11 | 2290427 | 8.19 | 0.02 | 1.17 |
| MAINE | -0.17 | 3641904 | -3.54 | -0.02 | -0.51 |
| OREGON | -0.31 | 3222699 | -2.59 | -0.04 | -0.37 |
| AVERAGE | 0.12 | 2775932 | 9.39 | 0.02 | 1.34 |
| NON-PARTICIPATING STATES | | | | | |
| TEXAS | 13.56 | | 32.62 | 1.94 | 4.66 |
| VIRGINIA | 10.73 | | 57.54 | 1.53 | 8.22 |
| ILLINOIS | 8.64 | | 12.63 | 1.23 | 1.80 |
| OHIO | 1.28 | | 4.77 | 0.18 | 0.68 |
| MINNESOTA | 0.65 | | 34.78 | 0.09 | 4.97 |
| GEORGIA | 0.58 | | 25.87 | 0.08 | 3.70 |
| INDIANA | -0.66 | | -11.62 | -0.09 | -1.66 |
| AVERAGE | 4.97 | | 22.37 | 0.71 | 3.20 |

Table B-4
Correlations between Absolute Real Output Change and CZM Expenditures

| | COMPONENTS OF GNP-1 | | | | |
|---|---|---|---|---|---|
| | Coast-dependent | Coast-linked | Coastal services | TOTAL GNP-1 | GNP-2 |
| PEARSON | 0.5294 | 0.3408 | 0.575 | 0.5733 | 0.5017 |
| P VALUE | 0.0094 | 0.1116 | 0.0041 | 0.0042 | 0.0147 |
| SPEARMAN | 0.4901 | 0.3824 | 0.3577 | 0.4546 | 0.4338 |
| P VALUE | 0.0176 | 0.0717 | 0.0938 | 0.0293 | 0.0386 |

NOTE: GNP-1 is coastal GNP based on payroll data. GNP-2 is GNP-originating in all activities in coastal counties.

Table B-5
Correlations between Percentage Change in Real Output and CZM Expenditures

| | COMPONENTS OF GNP-1 | | | | |
|---|---|---|---|---|---|
| | Coast-dependent | Coast-linked | Coastal services | TOTAL GNP-1 | GNP-2 |
| PEARSON | 0.3914 | 0.3868 | 0.3979 | 0.404 | 0.3973 |
| P VALUE | 0.0648 | 0.0683 | 0.0601 | 0.0559 | 0.0605 |
| SPEARMAN | 0.2974 | 0.3409 | 0.2095 | 0.2095 | 0.2994 |
| P VALUE | 0.1681 | 0.1114 | 0.3374 | 0.3374 | 0.1652 |

NOTE: GNP-1 is coastal GNP based on payroll data. GNP-2 is GNP-originating in all activities in coastal counties.

In addition to running correlations, a series of ordinary least squares (OLS) regressions were estimated, with average annual growth in coastal GNP as the dependent variable. These regressions relate the measure of output to the level of real CZM spending averaged over the years for which data are available, population, and a series of dummy (or indicator) variables. The dummy variables identify the region of the country in which the state is located and whether or not the state was a participant in the program.[19] Results from these regressions are generally consistent with the simple correlation analysis reported above.

The full regression results are presented in Appendix Tables A7 to A11. The Appendix also contains a table of variable names, a table of descriptive statistics from the model, and an accounting of dummy variables.

Three basic conclusions come out of the regression analysis. First, CZM program expenditures are never both statistically significant and negatively related to the growth in coastal GNP. This implies, at least, that CZM spending does not have deleterious effects on state economies. In fact, under many specifications, CZM spending is statistically significant and positively related to coastal output growth.

The second general conclusion that can be drawn from the regression analysis is that the control variable for population affects the magnitude of the coefficient of CZM spending, and sometimes the significance. However, the policy variable still appears positive and significant in most models.[20]

The third general conclusion is that the dummy variables do not play a significant role in explaining the economic growth of the coastal zone. The participation dummy is never significant by itself, and it is individually significant in the presence of the regional dummies in only one of the models: for coast-*linked* activity without AVGPOP. All the dummies are jointly significant only in the case of *coast-linked* activity. In other words, the null hypothesis that all the dummy coefficients are zero can be rejected only for the case of *coast-linked* activity. This result suggests that *coast-dependent* activity, *coastal services*, and aggregations of the three components of coastal GNP all grow at a similar rate regardless of the region or of participation in the CZM program. It also suggests that the regions are not growing in the same way with respect to *coast-linked* activity.[21]

The fact that there is not a significant relationship between CZM spending and *coast-linked* GNP should not be surprising. Recall that *coast-linked* activities are those that use products from *coast-dependent* industries in their production processes, or produce intermediate inputs for *coast-dependent* businesses. Much of the *coast-linked* activity is located in noncoastal counties. Since CZM spending is concentrated in coastal counties, its stimulative effect cannot be expected to be felt where most of the *coast-linked* activity takes place. There are input-output relationships between *coast-dependent* and *coast-linked* businesses, but those apparently are not strong enough to transmit the effect of CZM spending that is felt by the *coast-dependent* activities.

Table B-6 summarizes the coefficient estimates for the CZM spending variable. The values in the first three rows of the table indicate the degree to which a one dollar increase in CZM spending is associated with increases in coastal payroll. The last two rows show the relationship between changes in CZM spending and alternative measures of coastal GNP. Models 3 and 4 correspond with the regressions using a population control variable..

These results indicate that a dollar of CZMA spending from federal government sources is associated with more than an $11 increase in payroll deriving from *coast-dependent* activity (or, approximately $30 in GNP), and at least a $262 increase in payroll due to *coastal services* (or some $700 in GNP). At the same time, CZM spending is shown to have little statistical association with *coast-linked* economic activity.[22] For all sectors aggregated together (GNP1), a dollar of CZMA spending from federal sources is related to at least an $822 increase in coastal GNP.

Table B-6
Dollar Increase in Coastal Output Associated with a Dollar of CZM Spending

| | AVERAGE ANNUAL GROWTH | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| Coast-dependent | 25.70 | 36.50 | | 31.90 31.90 | 16.03 | 11.65 |
| Coast-linked | 1.22 0 | 1.40 | 1.47 | 1.47 | 0.96 | 0.61 |
| Coastal services | 482 | 650 | 551 | 551 | 339 | 262 |
| GNP1 | 1527 | 2092 | 1782 | 1782 | 1052 | 822 |
| GNP2 | 1911 | 2605 | 2239 | 2240 | 1236 | 755 |

NOTE: GNP1 is coastal GNP based on payroll data. GNP2 is GNP-originating in all activities in coastal counties. Values above the dotted line are dollars of payroll, and below the line are dollars of GNP.

The values in Table B-6 must be interpreted with some care. They do not indicate the amount of economic activity induced by CZMA spending, for two reasons. First, the regression models developed here are too crude to be used to test causality. The significant statistical relationships that are shown to exist between CZMA spending and economic activity are consistent with the view that coastal protection enhances demand for coast-related goods and services, and hence, the value of the ocean sector. But to conclude with certainty that a one-way relationship exists would require a more completely-specified model and finer data than are available.[23] Second, the federal CZM program leverages other spending on coastal protection, from states and local governments. The coefficients estimated in a model that included this other spending would be lower than what has been estimated using federal outlays alone.

The failure to account for state-local coastal spending does not invalidate what has been done in this study. To a large degree, state spending is a fixed percentage of federal spending, because states are required to "match" each $0.80 in federal monies with an additional $0.20. Thus, it is straightforward to rescale the coefficient estimates in Appendix Tables A7 to A11 to account for the match. The bias of our estimates would not increase. The estimates were not rescaled because the principal concern in this report is with the relationship between federal spending and economic outcomes. Local supplements to federal-state CZMA funds are not necessarily in proportion to federal outlays, and therefore, could change the properties of the estimators if included in the analysis. Unfortunately, data on local supplements were not available.

Finally, critics might argue that models such as the one used here simply show the relationship between state population and coastal GNP growth, because population is included in the Section 306 allocation formula. That is not a problem for two reasons. First, a reasonable proxy for coastal area population is used in Models 5 and 6.[24] Second, states do not necessarily receive the amount of 306 funds to which they are entitled. States do not apply for all the funds that are available, and sometimes turn back unused amounts.[25]

## B-4 AN ALTERNATIVE RESEARCH DESIGN FOR MEASURING THE EFFECT OF CZMA SPENDING ON THE COASTAL ECONOMY

Rather than relating CZM spending and coastal GNP as we did in the previous section, we could simply ask how much more people were willing to pay to live, work, or recreate on the coast

as a result of CZMA-induced improvements. Stated in this way, a good "dependent" or outcome variable would be property values, since, under normal economic assumptions, they reflect changes in demand for property near the coast relative to supply.

This section describes the assumptions and methodology for measuring benefits using changes in property values. However, because adequate data are not yet available at the national level, a full analysis using this approach is not presented.

B-4.1 Property values as a measure of economic welfare

The economic theory of capitalization forms the basis for using property values as a measure of the benefits of public policy or the value of environmental amenities. This section explains the intuition behind the theory of capitalization. It shows how changes in policy in a given region, or differences in policy across regions, will show up as differences in property values. The magnitude of the difference in property values is, all other things equal, the value of the policy difference.

Fundamentally, the theory of capitalization is a means of explaining how the willingness to pay of the purchaser is altered by events beyond her/his control. For example, if people found out that an apple a day really did make them healthier, they would likely be willing to pay more for apples than previously. On the other hand, someone who has lost his/her driver's license is not likely to be willing to pay as much for an automobile as when s/he was allowed to drive.

Consider now the case of a residence. People purchase a house based on the value of the services the house will provide. A house with more space, a larger lot, more bedrooms and bathrooms, a finished basement and so on, provides more services than a house with fewer of those attributes. Therefore, one should expect the larger house to sell for a higher price. On the other hand, two identical houses in different communities may not sell for the same price. One community may have better schools, a lower crime rate, lower taxes and better access to shopping and workplaces than the other. If people value those community characteristics, then it is reasonable to expect that houses in such a community would sell for more than identical properties in the alternative area.

Finally, suppose that no person in either community is willing to pay the necessary price to live in the alternative. People in the high public service-low tax community are unwilling to give up the services they get in order to pay less for an otherwise identical house, and people in the low public service town are unwilling to pay more for a house to get a greater quantity of public services. After an increase in the public services in the high public service community, some people from the low service community may find it beneficial to purchase a house in the high service community. But people in the high service community are no longer willing to sell for the same price as before the level of services changed, for they too value the increase in services. Therefore, for houses to change hands, the buyers must pay a higher price than previously to induce the current occupants to sell. The rise in the price of the houses in the high service community reflects the benefits of the increased public services in that town. This change in price is the capitalization of the benefits into the value of the property.

The benefits of the CZMA are distributed unevenly across counties within states and among the states. The logic of the previous paragraph suggests that a comparison of property values across counties participating in the program ought to show how the program benefits those areas. It is this reasoning which supports the use of property values as a measure of CZMA-induced benefits.

It is important to remember that the explanation given above hinges on having information on specific properties. Of course, if the program raises the value of some properties in a county, all other things constant, it must raise the average property value in the county. Some work has used aggregate data successfully, for census tracts or townships, to estimate the effect of public policies or environmental amenities on property values. However, if the rise occurs on only a small proportion of the houses within the county, then the effects of the program on the average property value may be too small to show up. Moreover, other attributes of the houses must be accounted for in both the individual and the average property value analyses. The effect of an additional square foot of space in a given house is more likely to carry information than is the effect of an increase by one of the average square footage in the community. Hence, the aggregation of the data necessary to carry out the analysis may obscure important information.

Two further caveats are necessary. First, the intuition described above does not suggest when the capitalization of benefits will occur. In particular, it may be that the announcement of the policy change sets off the movement in the property values, or it might be that property values do not respond until the policy produces tangible results. It may also be the case that discussion of a possible policy change leads people to alter behavior, and hence affects property values prior to the adoption of any policy. Therefore, by looking at the property values after the expenditures have been made may be like closing the barn door after the cows are out; all the effects of the policy on property values may already have occurred prior to the expenditure of any funds. The second additional warning that must be given concerns the possibility that the policy effects do not accrue entirely to property values. For example, it may be that cleaning up the beaches along some stretch of coast does not raise the possible selling price of the ocean front property, but rather shortens the time that any piece of land is on the market before it sells. If such is the case, property values will not reflect the benefits of the policy change.

B-4.2 Modelling the relationship between CZMA spending and property values

The effect of CZMA spending on property values can be modelled using the hedonic pricing approach (Rosen, 1974, and Section A, above). The hedonic model is one of economic equilibrium in the market for some highly differentiated commodity. Houses, for example, are not all alike. Each house has its own set of attributes (e.g., square footage, the number of bathrooms and bedrooms, and the presence of a fireplace). The attributes of a house, however, need not be restricted to these obvious possibilities. Rather, as was argued above, they also can include environmental amenities, such as proximity to a body of water, or local public policies whose benefits accrue to residents of a restricted geographic or political area.

The price of the house is determined by the interaction of sellers and buyers in the market place, and hence, reflects characteristics of both. In particular, the costs of producing the attributes of the house and the tastes and incomes of the buyers are combined in the market price. Formally, the hedonic price model attempts to extract from the market price the implicit price for each of the attributes of the house. In other words, since houses are not standard, the hedonic method attempts to determine the value of a unit of each of the house's attributes.

For each property the price and characteristics are known and related in the following way:

$$P = F(Z)$$

where P is the price, Z is a vector whose elements are the attributes of the house, including any environmental amenities and the public service-tax package associated with it, and F is the relationship. Differentiating F(Z) with respect to the ith element of Z results in the marginal implicit price of that characteristic. Hence, if $Z_i$ is the number of bedrooms in the house, then $\partial P/\partial Z_i \equiv$ the implicit price of an additional bedroom. If $Z_i$ is the distance in feet from the shore to

the house, for a waterfront property, then the derivative is the implicit price of an additional foot of setback.

A regression model can be used to determine the size and sign of the derivatives $\partial P/\partial Z_i$. The general formulation written above suggests, however, that the form of the relationship is arbitrary or unknown. Much economic literature has been devoted to determining theoretically and empirically the appropriate form of the regression equation. A linear regression equation, for example, forces on the estimation the restrictions that 1) the implicit price of an attribute does not depend on the other characteristics of the property, and 2) the price of an attribute must be constant with respect to changes in the quantity of the attribute. The first restriction causes, for example, one to value a swimming pool the same whether or not one has ocean front property, or whether or not one has easy and cheap access to public swimming pools. The second restriction forces the value of an additional bedroom to be the same in a two bedroom house as in a five bedroom house. While both conditions may be true, it is better to let the data so indicate than to force the data to fit into a wrong relationship. Freeman (1979) discusses several functional forms and their implications from a theoretical standpoint. Cropper, Deck, and McConnell (1988), on the other hand, perform simulations on various functional forms to test their empirical properties. The simulations suggest that linear regressions perform best in estimating the implicit prices when proxy variables are necessary or the true set of regressors is unknown.

As was done by Cropper, Deck, and McConnell (1988), the linear regression model could have been used to explore the relationship between average property values and the expenditures made for coastal management purposes, specifically, as allowed under Section 306 of the CZMA. Additional steps then could have been taken to address several potential technical criticisms of the analysis which are not discussed above, including the possible simultaneity of property values with several of the regressors and heteroskedasticity of the error terms.As described above, the model is designed to ascertain the size and direction of the relationship between a group of explanatory variables, a list of which appears below, and the average property value in a county. Formally, the model is:

$$APV=f(\underset{+}{CZM}, \underset{+}{INC}, \underset{+}{LPS}, \underset{-}{CRIME}, \underset{-}{TAXCAP}, \underset{+}{DENS})$$

where APV is the average property value in the county, CZM is coastal zone management expenditures in the county, INC is the median income, LPS is expenditure on other local public services such as schools, and police and fire protection, CRIME is the county-wide crime rate, TAXCAP is taxes per capita paid to the county, and DENS is the population density. The expected signs of the relationship are indicated below the explanatory variables. In words, the greater the expenditures on CZM activities, the greater the median income, the greater the expenditure on other public goods, the lower the crime rate, the lower the taxes per capita, and the greater the population density of the county, the higher the average residential property value in the county.

The equation to be estimated using this approach is:

$$APV = \alpha_0 + \alpha_1 CZM + \alpha_2 INC + \alpha_3 LPS + \alpha_4 CRIME + \alpha_5 TAXCAP + \alpha_6 DENS + \sum_{i=1}^{6} \beta_i D_i + \mu$$

where the $D_i$ are dummy variables which take on a value of one if the county is in region i and take on a value of zero otherwise, and $\mu$ is an independent and identically distributed random disturbance term with mean zero.

B-4.3 Practical limitations to this alternative approach

Two problems made the preferred method for relating CZMA spending to economic benefits infeasible. First, data on county property values are available for only a small number of states, and those data are not generally comparable across states. Moreover, much of the data that are available are from nonparticipating states.

Second, as already noted, the degree of aggregation is too great. Consequently, when test regressions similar in form to the equation above were run, weak results were obtained. Variables that ordinarily are found to play a significant role in the determination of property values show up as statistically insignificant or, worse, significant but with the wrong sign. Some of this difficulty may stem from the shortcomings of the linear model alluded to above, but the small number of observations and the number of variables available restrict the ability to address these issues.

As a result of the data problems, the alternative approach described in Section B-2 was employed to relate CZM expenditures and program benefits. That approach is more tractable, but less satisfying theoretically.

B-5 SUMMARY AND IMPLICATIONS FOR POLICY

The purpose of this section was to relate formally program spending on CZM-related activities, specifically in the seven national interest areas contained in the Act, to changes in coastal GNP. The review of the literature and original statistical work both indicated that a strong relationship exists.

First, the existing literature does not address the relationship between CZM spending and coastal GNP directly. However, several studies relate coastal regulatory activities that may be supported by CZM program funds with gains in economic welfare. For example, Freeman (1988) found that optimal regulation of fisheries would raise blue crab yields by $1-$1.5 million in the Gulf of Mexico; Anderson and Edwards (1986) found that individuals would realize $87 in benefits, on average, by improvements that would make boatable water swimmable, and that the down-zoning of properties in the salt ponds region of Rhode Island would create a welfare gain of approximately $3.1 million.

Correlations were performed and OLS regressions were run that used absolute and relative changes in coastal GNP, in total and by activity type, and CZM expenditures. Absolute real output change and CZM spending were found to be correlated positively for each of the components of coastal GNP. For most specifications of the OLS model, a dollar increase of CZM spending also was found to be associated with greater than a dollar increase in coastal output, particularly from coast-*dependent* and *coastal service* activities. The magnitude of the association, moreover, is sizable for all definitions of coastal GNP except *coast-linked*.

Admittedly, the evidence is sketchy and the original statistical tests are somewhat crude. But, at least circumstantially, there is compelling evidence that CZMA monies have been well spent in a benefit-cost sense. These results suggest that if the level of CZM spending were reduced, the level of coastal (and, hence, national) GNP would fall, as well.

ENDNOTES

[1]The 50-mile radius is also used by federal agencies in defining coastal counties. Land within this radius can be expected to have land uses that relate to the coast. Admittedly, there is no specific basis for choosing 50 miles, as opposed to 30 or 60 miles, or some other distance.

[2]This figure is based on an estimate of 8.5 million acres of coastal wetlands in the mid-1970s by Gosselink and Baumann (1980), as reported in U.S. Department of the Interior (1984), p. 36.

[3]U.S. Department of Commerce, Bureau of the Census, Census of Manufacturers, 1987 (Washington D.C.: U.S. Government Printing Office, 1989).

[4]U.S. Department of the Interior (1984). The $20 billion estimate from oil and gas production comes from 1983 estimates of the value of oil and gas production in U.S. Department of Commerce (1984).

[5]Money values are used because they are easily compared. For example, suppose one has a choice between growing and selling a bushel of apples and a bushel of oranges. Which top choose is impossible to say without knowing prices of oranges, apples, and the inputs used in their production.

[6]We do not explain these methods here, except in passing. Leonard Shabman and Sandra Batic (1978, 1980, 1982) describe the techniques in intuitive terms in articles that are geared toward individuals interested in coastal management issues. More detailed treatments can be found in economics textbooks on applied welfare analysis or environmental economics (for example, Freeman, 1979, and Just, Heuth, and Schmitz, 1982).

[7]Before any wetlands can be converted to other uses, however, one must determine the value of the marginal acre of wetlands in all its functions. Clearly, the same acre that produces #3 of additional blue crab value produces value in other fish production, as a wildlife habitat, as a pollution control mechanism, for recreation, and for other purposes.

[8]A disturbing aspect of the Silberman and Klock study is that variables included in the regression analysis to control for various potential biases from the contingent valuation method explain a large fraction of the variation in the willingness-to-pay. Bell and Leeworthy do not make such corrections. Unfortunately, the equations reported are sufficiently different as to make coefficient comparisons impossible; that is, they have no identical variables, and only one, an index of beach quality, is even remotely similar.

[9]The four papers cited here are not isolated cases in which the hedonic method has been used. Rather, the technique is used widely in the literature on environmental externalities and public goods, as well as in the labor literature on the structure of wages. Freeman (1979) contains a review of several early studies which employ the hedonic method in the analysis of air and water pollution.

[10]It is important to note an important limitation of this approach, as well: GNP is but one of several measures of economic welfare. There are other, social indicators of welfare, and values that do not occur in the marketplace, that are not captured by GNP. In addition, we could argue from a strict environmental perspective that an increase in economic activity, as measured by GNP, has a negative long-run effect on environmental quality at the coast, which may or may not result in lower coastal GNP.

[11]See Pontecorvo, et al. (1980). On the factor input side of the GNP equation,

$$GNP = S_i(P_i + \pi_i + X_i + + D_i)$$

where i is the relevant industry, P = payroll, $\pi$ = profits, r = interest payments, X = indirect business taxes, and D = total capital consumption allowance.

[12]These estimates are biased upwards due to some double counting. We did not have enough data to separate *coast-linked* activities into those occurring outside vs inside coastal counties. We feel certain, however, that most of the *coast-linked* activity is in noncoastal counties, so the bias should not be large.

[13]Coastal Zone Management Act of 1972 (86 Stat, 1280, 16 U.S.C. 1451-1464).

[14]These, plus government relations, are the seven national interest areas that are specified in the CZMA.

[15]Freeman suggests that producers would gain at the expense of consumers, but that the net gain to society would be positive.

[16]Note, however, that several states in the middle range and in the nonparticipating group have faster growth rates than individual states in the top five. This suggests that correlations between CZM spending and dollar growth are likely to be stronger than correlations between CZM spending and growth rates.

[17]If results are "robust" they are not particularly sensitive to the coastal GNP definition that is used.

[18]The inference in note 16 that the correlation would be weaker between CZM spending and the percentage change in output than that between spending and the dollar change in output has been borne out by the formal statistical tests.

[19]Note that participation is a choice variable of the states and hence is endogenous. If the choice to participate is correlated with the OLS regression error, then the coefficients are biased and inconsistent. Formally correct methods require that one used an instrumental variables technique to remove any such correlation. Such a method was not employed due to the lack of data to serve as instruments in estimating the participation decision.

[20]Other models, not reported here, were run that included other state and local government spending as explanatory variables. We conclude from those models that CZM spending has the same effect on state economies as any other state government spending. Note that in those regressions in which CZM spending and local spending both appear, CZM spending is never statistically significant. However, in those equations in which CZM spending appears but local spending does not, CZM spending is significant.

[21]We do not believe that multicollinearity is a serious problem in our models 5 and 6. Almost all multivariate models have some collinearity among the explanatory variables. The textbook question is whether that multicollinearity is a problem insofar as it leads to instability in the coefficient estimates, or inflates the coefficient of determination when none of the individual variables is statistically significant.

For model 5, the answer is easy because there are only two explanatory variables (plus an intercept). Therefore, we can use the correlation coefficient between those variables as an indicator of collinearity. Of course, we did that and found that coefficient to have a value of 0.22, with a p-value of 0.24, indicating that the correlation is not significant. Even if the bi-variate correlation

were higher, we would not be particularly concerned since the variables are shown to be individually significant in the tables of results.

Model 6 has more than two explanatory variables, so it is a bit more difficult to conclude whether multicollinearity is a problem. We could conduct a series of tests, but in our judgment they are not necessary. (Judgment is important here; G.S. Maddala, Econometrics (New York; McGraw Hill, 1977) p. 186, says: "In summary, there are only some rough rules of thumb by which we can judge whether multicollinearity is serious or not. One has to use one's judgment in any particular problem.") First, the fact that significant correlation was not found in model 5 is informative. Second, as in model 5, the coefficients on the population variable in all runs of model 6 are significant, indicating that multicollinearity (if it exists) is not biasing our interpretation of the results. Third, there is really no reason to suspect sizable multicollinearity to begin with. One reason we used state population rather than coastal county population was to avoid unnecessary multicollinearity in the first place, considering the fact that our CZM variable was affected by coastal county population. And, as we state in the text, there is a difference between what a state is supposed to receive in CZM monies and what it actually gets and spends.

The increase in the adjusted R-squared statistic when population is added as an explanatory variable does not necessarily indicate multicollinearity. The addition of a new right-hand side variable increases the coefficient of determination because we are able to explain more of the previously unexplained variation in the dependent variable. We lose one degree of freedom by the addition of a population variable, but gain a lot of explanatory power.

[22]Bear in mind that for *coast-linked* activities, the CZM variable was not significantly different from zero. However, using the estimated coefficient produces the increase in *coast-linked* activity present in the table. A closer examination of Appendix Table A8 containing the full regression results for *coast-linked* activity provides further insights. The third column of Table A8 presents the coefficients from the regression of average annual growth in *coast-linked* activity with average CZM expenditure and the dummy variables (not controlling for population). The fourth column replaces the Pacific dummy with the multiple region dummy. In both of these cases, one can reject the null hypothesis that the dummy variables jointly have no effect on the growth in coastal activity. Note that the coefficient on average CZM expenditures is significant and positive while the coefficient on the participation dummy is significant and negative. This suggests that each dollar of CZM spending is associated with increased growth in *coast-linked* activity, but that participation in the program reduces growth of *coast-linked* activity. Evaluating at the sample means, the net effect of participation and spending for CZM programs is negative; the reduction in *coast-linked* activity is $1.1678 million in average growth, or $11.178 million in total growth. If this result is valid, the CZM program could be criticized for reducing growth in *coast-linked* activities. We should note, however, that when state population is controlled for, the PART coefficient loses its significance. Similarly, neither participation nor the other dummy variables are statistically significant in any other regressions. Moreover, when all coastal activity is aggregated into GNP1 and GNP 2 in Tables A-10 and A-11, the reduction in *coast-linked* activity is swamped by the increase in *coast-dependent* and *coastal service* activity. In other words, there is associated with CZM spending a social net gain though there is also some general equilibrium redistribution of income.

[23]For example, it may also be true—at least in the long-run—that faster GNP growth induces more spending on coastal protection, not only because federal CZMA funds are disbursed according to a formula that includes population, but also because policy-makers may perceive there to be more "at risk."

[24]State population is used in the regressions, but that is highly correlated with coastal area population. We used state population rather than coastal county population for several reasons.

The first relates to our concern that we would get multicollinearity if we used coastal population as an explanatory variable along with CZM spending, which also is affected by coastal population, by formula. In addition, we wanted to control not only for the population component of the CZMA formula, but also for scale factors that depend on state population, since the state offices of CZM apply for the funds (we discuss this in the text). Finally, there is a high correlation between state and coastal zone population, so the magnitude and significance of our estimated coefficients probably would be similar if we had used coastal population.

[25]This statement is based on observations of state CZM managers who were interviewed for this project. We did not collect data on turnbacks ourselves.

REFERENCES

Anderson, G. D.; Edwards, S.F. Protecting Rhode Island's Salt Ponds: An Economic Assessment of Downzoning. Coastal Zone Management Journal 14:67-91; 1986.

Bell, F.W.; Leeworthy, V.R. An Economic Analysis of the Importance of Saltwater Beaches in Florida. Report Number 82. Tallahassee, FL: Florida Sea Grant College. 1986.

Brown, G.E., Jr.; Pollakowski, H.O. Economic Valuation of Shoreline. Review of Economics and Statistics 59(3):272-278; 1977.

Cropper, M; Deck, L.; McConnell, K.E. On the Choice of Functional Form for Hedonic Price Functions. Review of Economics and Statistics: 668-675; 1988.

Freeman, A.M. The Benefits of Environmental Improvement: Theory and Practice. Baltimore, Md.: Johns Hopkins University Press; 1979.

Freeman, A.M. Valuing Environmental Resources Under Alternative Management Regimes. Resources for the Future, Discussion Paper QE89-04; 1988.

Gosselink, J.G.; Baumann, R.H. Wetland Inventories: Wetland Loss Along the U.S. Coast. Z. Geomorph N.F. Suppl. Bd. 34:173-187; 1980.

Gosselink, J.G.; Odum, E.P.; Pope, R.M. The Value of the Tidal Marsh, Publication LSU-SG-74-03. Baton Rouge, LA: Center for Wetland Resources, Louisiana State University; 1974.

Just, R.E.; Hueth, D.L.; Schmitz, A. Applied Welfare Economics and Public Policy. Englewood Cliffs, N.J.: Prentice-Hall, Inc.; 1982.

Lindsey, B.E.; Tupper, H.C. Demand for Beach Protection and Use in Maine and New Hampshire: A Contingent Valuation Approach. Proceedings of Coastal Zone '89; 1989.

Lynne, G.D.; Conroy, P.; Prochaska, F.J. Economic Valuation of Marsh Areas for Marine Production Processes. J. Environmental Economics and Management 8(175-186); 1981.

Maddala, G. S. Econometrics. New York: McGraw-Hill; 1977.

Pontecorvo, G.M. Contribution of the Ocean Sector to the United States Economy: Estimated Values for 1987 — A Technical Note. MTS Journal 23(2):7-14; 1988.

Pontecorvo, G.M., et al. Contribution of the Ocean Sector to the U.S. Economy. Science 30; May 1980.

Raphael, C.N.; Jaworski, E. Economic Value of Fish, Wildlife and Recreation in Michigan's Coastal Wetlands. Coastal Zone Management Journal 5:181-194; 1979.

Rosen, S. Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. Journal of Political Economy 82:34-55; 1974.

Shabman, L.A.; Batie, S.S. Economic Valuation of Natural Coastal Wetlands: A Critique. Coastal Zone Management Journal 4(3):231-247; 1978.

Shabman, L.A.; Batie, S.S. Estimating the Economic Value of Coastal Wetlands: Conceptual Issues and Research Needs. Estuarine Perspectives:3-15; 1980.

Shabman, L.A.; Batie, S.S. Estimating the Economic Value of Wetlands: Principles, Methods, and Limitations. Coastal Zone Management Journal 10(3):255-278; 1982.

Silberman, J.; Klock, M. The Recreation Benefits of Beach Renourishment. Ocean and Shoreline Management 11:73-90; 1988.

Terich, T.A.; Gabriel, A.D. The Effect of Erosion on Coastal Property Values. Proceedings of Coastal Zone '87. 1987.

U.S. Department of Commerce, Bureau of the Census. Census of Manufactures, 1987. Washington, D.C.: U.S. Government Printing Office. 1989.

U.S. Department of Commerce, Bureau of the Census. Census of Mineral Industries, 1984. Washington, D.C.: U.S. Government Printing Office. 1984.

U.S. Department of Commerce, Bureau of the Census. SIC Classification Manual. Washington, D.C.: U.S. Government Printing Office. 1986.

U.S. Department of Commerce. The Economic Value of Ocean Resources to the United States. Washington, D.C.: U.S. Government Printing Office. 1974.

U.S. Department of the Interior, Fish and Wildlife Service. Wetlands of the United States: Current Status and Recent Trends. (National Wetlands Inventory.) Washington, D.C.: U.S. Government Printing Office. March 1984.

Urban Land Institute, Research Division. The Economic Benefits of Coastal Zone Management: An Overview. Washington, D.C.: The Urban Land Institute. March 1976.

Wilman, E.A. Hedonic Prices and Beach Recreational Values. Advances in Applied Microeconomics 1:77-103; 1981.

# APPENDIX

## TABLE A1. COUNTY LIST

| FIPSCODE | STATE | COUNTY | POP85 | ADJACENT |
|---|---|---|---|---|
| 01003 | AL | Baldwin | 89.9 | y |
| 01097 | AL | Mobile | 374.7 | y |
| 02010 | AK | Aleutian | 7.2 | y |
| 02020 | AK | Anchorage | 232.3 | y |
| 02050 | AK | Bethel | 11.9 | y |
| 02060 | AK | Bristal B | 1.2 | y |
| 02070 | AK | Dillingha | 5.3 | y |
| 02100 | AK | Haines | 1.7 | y |
| 02110 | AK | Juneau | 24.9 | y |
| 02122 | AK | Kenai Pen | 41.3 | y |
| 02140 | AK | Kobuk | 5.5 | y |
| 02150 | AK | Kodiak Is | 13.7 | y |
| 02180 | AK | Nome | 7.3 | y |
| 02185 | AK | North Slo | 4.8 | y |
| 02201 | AK | Prince of | 4.8 | y |
| 02220 | AK | Sitka | 7.7 | y |
| 02231 | AK | Skagway | 3.4 | y |
| 02261 | AK | Valdez-co | 8.6 | y |
| 02270 | AK | Wade Hamp | 4.7 | y |
| 02280 | AK | Wrangell- | 6.3 | y |
| 06001 | CA | Alameda | 1194.9 | y |
| 06013 | CA | Contra co | 715.2 | y |
| 06015 | CA | Del Norte | 18.7 | y |
| 06023 | CA | Humboldt | 111.9 | y |
| 06037 | CA | Los Angel | 8130.8 | y |
| 06041 | CA | Marin | 224.9 | y |
| 06045 | CA | Mendocino | 73.2 | y |
| 06053 | CA | Monterey | 320.0 | y |
| 06055 | CA | Napa | 103.3 | 30 |
| 06059 | CA | Orange | 2127.0 | y |
| 06067 | CA | Sacrament | 890.0 | y |
| 06073 | CA | San Diago | 2201.3 | y |
| 06075 | CA | San Frans | 730.3 | y |
| 06077 | CA | San Joagu | 416.0 | y |
| 06079 | CA | San Luis | 188.1 | y |
| 06081 | CA | San Mateo | 615.3 | y |
| 06083 | CA | Santa Bar | 331.2 | y |
| 06085 | CA | Santa Cla | 1397.4 | y |
| 06087 | CA | Santa Cru | 212.8 | y |

| FIPSCODE | STATE | COUNTY | POP85 | ADJACENT |
|---|---|---|---|---|
| 06095 | CA | Solano | 274.6 | y |
| 06097 | CA | Sonoma | 334.1 | y |
| 06111 | CA | Ventura | 600.7 | y |
| 09001 | CT | Fairfield | 820.3 | y |
| 09007 | CT | Middlesex | 134.9 | y |
| 09009 | CT | New Haven | 773.2 | y |
| 09011 | CT | New Londo | 245.5 | y |
| 10001 | DE | Kent | 103.0 | y |
| 10003 | DE | New Castl | 412.4 | y |
| 10005 | DE | Sussex | 106.7 | y |
| 12005 | FL | Bay | 114.6 | y |
| 12009 | FL | Brevard | 347.6 | y |
| 12011 | FL | Broward | 1120.2 | y |
| 12013 | FL | Pinellas | 9.7 | y |
| 12015 | FL | Charlotte | 79.5 | y |
| 12017 | FL | Citrus | 77.5 | y |
| 12019 | FL | Clay | 87.6 | 30 |
| 12021 | FL | Colier | 117.1 | y |
| 12025 | FL | Dade | 1744.5 | y |
| 12027 | FL | De Soto | 21.4 | y |
| 12029 | FL | Dixie | 9.3 | y |
| 12031 | FL | Duval | 630.1 | y |
| 12033 | FL | Escambia | 262.9 | y |
| 12035 | FL | Flagler | 16.9 | y |
| 12037 | FL | Franklin | 8.3 | y |
| 12045 | FL | Gulf | 11.8 | y |
| 12053 | FL | Hernando | 74.8 | y |
| 12057 | FL | Hillsboro | 754.7 | y |
| 12061 | FL | India Riv | 77.7 | y |
| 12065 | FL | Jefferson | 11.6 | y |
| 12067 | FL | Lafayette | 4.5 | 30 |
| 12071 | FL | Lee | 266.8 | y |
| 12073 | FL | Leon | 169.8 | 30 |
| 12075 | FL | Levy | 24.2 | y |
| 12077 | FL | Liberty | 4.5 | 30 |
| 12081 | FL | Manatee | 174.6 | y |
| 12085 | FL | Martin | 82.9 | y |
| 12087 | FL | Monroe | 71.1 | y |
| 12089 | FL | Nassau | 39.8 | y |
| 12091 | FL | Okaloosa | 135.1 | y |
| 12099 | FL | Palm beac | 724.3 | y |
| 12101 | FL | Pasco | 237.2 | y |
| 12103 | FL | Pinellas | 815.1 | y |
| 12107 | FL | Putman | 58.7 | 30 |
| 12109 | FL | St Johns | 67.9 | y |

| FIPSCODE | STATE | COUNTY | POP85 | ADJACENT |
|---|---|---|---|---|
| 12111 | FL | St. Luici | 115.7 | y |
| 12113 | FL | Santa Ros | 65.3 | y |
| 12115 | FL | Sarasota | 243.5 | y |
| 12123 | FL | Taylor | 18.2 | y |
| 12127 | FL | Volusia | 310.8 | y |
| 12129 | FL | Wakulia | 13.1 | y |
| 12131 | FL | Walton | 25.9 | y |
| 13029 | GA | Bryan | 12.3 | y |
| 13039 | GA | Camden | 17.9 | y |
| 13051 | GA | Chatham | 215.7 | y |
| 13103 | GA | Effingham | 21.3 | 30 |
| 13127 | GA | Glynn | 59.1 | y |
| 13179 | GA | Liberty | 42.1 | y |
| 13191 | GA | McIntosh | 8.0 | y |
| 15001 | HA | Hawaii | 109.5 | y |
| 15003 | HA | Honolulu | 811.1 | y |
| 15007 | HA | Kauai | 45.4 | y |
| 15009 | HA | Maui | 87.5 | y |
| 17031 | IL | Cook | 5294.9 | y |
| 17097 | IL | Lake | 468.6 | y |
| 18089 | IN | Lake | 496.9 | y |
| 18091 | IN | Laporte | 106.5 | y |
| 18127 | IN | Porter | 122.9 | y |
| 22001 | LA | Acadia | 759.6 | y |
| 22005 | LA | Ascension | 58.0 | 30 |
| 22007 | LA | Assumptio | 23.5 | y |
| 22019 | LA | Calcasieu | 174.3 | 30 |
| 22023 | LA | Cameron | 9.9 | y |
| 22033 | LA | E. Baton | 392.3 | 30 |
| 22045 | LA | Iberia | 68.6 | y |
| 22047 | LA | Iberville | 33.4 | 30 |
| 22051 | LA | Jefferson | 478.5 | y |
| 22053 | LA | Jeferson | 33.3 | 30 |
| 22057 | LA | Lafourche | 87.5 | y |
| 22063 | LA | Livingsto | 71.6 | 30 |
| 22071 | LA | Orleans | 559.0 | y |
| 22075 | LA | Plaquemin | 26.6 | y |
| 22087 | LA | St. Berna | 68.3 | y |
| 22089 | LA | St. Charl | 42.7 | y |
| 22093 | LA | St. James | 22.4 | y |
| 22095 | LA | St. John | 40.5 | y |
| 22099 | LA | St. Matin | 45.6 | y |
| 22101 | LA | St. Mary | 64.7 | y |
| 22103 | LA | St.Tamman | 140.8 | y |

| FIPSCODE | STATE | COUNTY | POP85 | ADJACENT |
|---|---|---|---|---|
| 22105 | LA | Tangipaho | 91.0 | y |
| 22109 | LA | Terrebonn | 101.6 | y |
| 22113 | LA | Vermilion | 53.2 | y |
| 22121 | LA | W. Baton | 20.9 | 30 |
| 23005 | ME | Cumberlan | 226.4 | y |
| 23009 | ME | Hancock | 43.6 | y |
| 23011 | ME | Kennebec | 112 | y |
| 23013 | ME | Knox | 34.8 | y |
| 23015 | ME | Lincoln | 27.9 | y |
| 23019 | ME | Penobscot | 138.2 | y |
| 23023 | ME | Sagadahoc | 30.9 | y |
| 23027 | ME | Waldo | 29.8 | y |
| 23029 | ME | Washingto | 34.0 | y |
| 23031 | ME | York | 154.8 | y |
| 24003 | MD | Anne arun | 397.8 | y |
| 24005 | MD | Baltimore | 665.1 | y |
| 24009 | MD | Calvert | 41.5 | y |
| 24011 | MD | Caroline | 23.9 | 30 |
| 24015 | MD | Cecil | 65.6 | y |
| 24017 | MD | Charles | 85.5 | y |
| 24019 | MD | Dochester | 29.8 | y |
| 24025 | MD | Harford | 153.3 | y |
| 24029 | MD | Kent | 16.8 | y |
| 24033 | MD | Prince Ge | 681.4 | y |
| 24035 | MD | Queen Ann | 28.7 | y |
| 24037 | MD | St. Mary' | 65.7 | y |
| 24039 | MD | Somerset | 19.1 | y |
| 24041 | MD | Talbot | 26.9 | y |
| 24045 | MD | Wicomico | 68.2 | y |
| 24047 | MD | Worcester | 35.1 | y |
| 24510 | MD | Baltimore | 755.5 | y |
| 25001 | MA | Barnstabl | 165.4 | y |
| 25005 | MA | Bristol | 480.5 | y |
| 25007 | MA | Dukes | 10.6 | y |
| 25009 | MA | Essex | 648.5 | y |
| 25017 | MA | Middlesex | 1373.7 | y |
| 25019 | MA | Nantucket | 6.0 | y |
| 25021 | MA | Norfolk | 602.2 | y |
| 25023 | MA | Plymouth | 418.7 | y |
| 25025 | MA | Suffolk | 668.0 | y |
| 26001 | MI | Alcona | 10.1 | y |
| 26003 | MI | Alger | 8.8 | y |
| 26005 | MI | Allegan | 85.2 | y |
| 26007 | MI | Alpena | 30.9 | y |

| FIPSCODE | STATE | COUNTY | POP85 | ADJACENT |
|---|---|---|---|---|
| 26009 | MI | Antrim | 16.8 | y |
| 26011 | MI | Arenac | 15.0 | y |
| 26013 | MI | Baraga | 8.2 | y |
| 26017 | MI | Bay | 115.0 | y |
| 26019 | MI | Benzia | 11.2 | y |
| 26021 | MI | Berrien | 162.7 | y |
| 26029 | MI | Charlevoi | 19.7 | y |
| 26031 | MI | Cheboygan | 20.7 | y |
| 26033 | MI | Chippewa | 29.1 | y |
| 26041 | MI | Delta | 38.6 | y |
| 26047 | MI | Emmet | 23.7 | y |
| 26053 | MI | Gogebic | 18.8 | y |
| 26055 | MI | Grand tra | 58.1 | y |
| 26061 | MI | Houghton | 36.9 | y |
| 26063 | MI | Huron | 36.4 | y |
| 26069 | MI | Iosco | 30.0 | y |
| 26083 | MI | Keweenaw | 2.1 | y |
| 26089 | MI | Leelanau | 14.6 | y |
| 26095 | MI | Luce | 5.8 | y |
| 26097 | MI | Mackinac | 10.2 | y |
| 26099 | MI | Macomb | 693.2 | y |
| 26101 | MI | Manistee | 22.2 | y |
| 26103 | MI | Marqyette | 71.4 | y |
| 26105 | MI | Mason | 26.2 | y |
| 26109 | MI | Menominee | 25.8 | y |
| 26115 | MI | Monrroe | 130.8 | y |
| 26121 | MI | Muskegon | 156.9 | y |
| 26127 | MI | Oceana | 22.6 | y |
| 26131 | MI | Ontonagon | 9.1 | y |
| 26139 | MI | Ottawa | 167.1 | y |
| 26141 | MI | Presque i | 13.9 | y |
| 26145 | MI | Saginaw | 217.4 | 30 |
| 26147 | MI | St. Clair | 138.5 | y |
| 26151 | MI | Sanilac | 39.8 | y |
| 26153 | MI | Schoolcra | 8.3 | y |
| 26157 | MI | Tuscola | 55.2 | y |
| 26159 | MI | Van Buren | 66.4 | y |
| 26163 | MI | Wayne | 2177.8 | y |
| 27031 | MN | Cook | 4.1 | y |
| 27075 | MN | lake | 11.6 | y |
| 27137 | MN | St. Louis | 202.0 | y |
| 28045 | MS | Hancock | 30.6 | y |
| 28047 | MS | Harrison | 170.5 | y |
| 28059 | MS | Jackson | 126.8 | y |

| FIPSCODE | STATE | COUNTY | POP85 | ADJACENT |
|---|---|---|---|---|
| 33015 | NH | Rockingha | 212.7 | y |
| 33017 | NH | Strafford | 94.0 | y |
| 34001 | NJ | Atlantic | 203.4 | y |
| 34003 | NJ | Bergen | 839.9 | y |
| 34005 | NJ | Burlingto | 379.8 | y |
| 34007 | NJ | Camden | 487.2 | y |
| 34009 | NJ | Cape may | 90.3 | y |
| 34011 | NJ | Cumberlan | 134.8 | y |
| 34013 | NJ | Essex | 843.9 | y |
| 34015 | NJ | Glouceste | 208.4 | y |
| 34017 | NJ | Hudson | 557.0 | y |
| 34021 | NJ | Mercer | 340 | y |
| 34023 | NJ | Middlesex | 626.8 | y |
| 34025 | NJ | Monmouth | 531.9 | y |
| 34029 | NJ | Ocean | 380.8 | y |
| 34033 | NJ | Salem | 65.4 | y |
| 34039 | NJ | Union | 505.8 | y |
| 36001 | NY | Albany | 283.4 | y |
| 36005 | NY | Bronx | 1190.6 | y |
| 36011 | NY | Cayuga | 79.4 | y |
| 36013 | NY | Chautauqu | 143.7 | y |
| 36021 | NY | Columbia | 60.7 | y |
| 36027 | NY | Dutchess | 254.3 | y |
| 36029 | NY | Erie | 968.1 | y |
| 36039 | NY | Greene | 42.1 | y |
| 36045 | NY | Jefferson | 88.7 | y |
| 36047 | NY | Kings | 2291.1 | y |
| 36055 | NY | Monroe | 701.0 | y |
| 36059 | NY | Nassau | 1324.3 | y |
| 36061 | NY | New york | 1477.7 | y |
| 36063 | NY | Niagara | 216.8 | y |
| 36071 | NY | Orange | 276.0 | 30 |
| 36073 | NY | Orleans | 38.7 | y |
| 36075 | NY | Oswego | 118.6 | y |
| 36079 | NY | Putnam | 80.5 | y |
| 36081 | NY | Queens | 1930.8 | y |
| 36083 | NY | Rensselae | 151.7 | y |
| 36085 | NY | Richmond | 370.7 | y |
| 36087 | NY | Rockland | 264.5 | 30 |
| 36089 | NY | St. Lawre | 112.7 | y |
| 36103 | NY | Suffolk | 1305.3 | y |
| 36111 | NY | Ulster | 162.8 | y |
| 36117 | NY | Wayne | 86.6 | y |
| 36119 | NY | Westchest | 866.3 | y |

| FIPSCODE | STATE | COUNTY | POP85 | ADJACENT |
|---|---|---|---|---|
| 37013 | NC | Beauford | 43.3 | y |
| 37015 | NC | Bertie | 21.4 | y |
| 37019 | NC | Brunswick | 45.6 | y |
| 37029 | NC | Camden | 5.8 | y |
| 37031 | NC | Carteret | 48.8 | y |
| 37041 | NC | Chowan | 13.2 | y |
| 37049 | NC | Craven | 79.4 | y |
| 37053 | NC | Currituck | 12.9 | y |
| 37055 | NC | Dare | 17.3 | y |
| 37073 | NC | Gates | 9.4 | y |
| 37091 | NC | Hertford | 23.9 | y |
| 37095 | NC | Hyde | 6.0 | y |
| 37129 | NC | New Hanov | 112.3 | y |
| 37133 | NC | Onslow | 122.7 | y |
| 37137 | NC | Pamlico | 11.0 | y |
| 37139 | NC | Pasquotan | 29.4 | y |
| 37141 | NC | Pender | 24.4 | y |
| 37143 | NC | Perquiman | 10.3 | y |
| 37177 | NC | Tyrrell | 4.1 | y |
| 37187 | NC | Washingto | 14.6 | y |
| 39007 | OH | Ashtabula | 101.5 | y |
| 39035 | OH | Cuyahoga | 1453.9 | y |
| 39043 | OH | Erie | 77.4 | y |
| 39085 | OH | Lake | 212.5 | y |
| 39093 | OH | Lorain | 270.3 | y |
| 39095 | OH | Lucas | 462.6 | y |
| 39103 | OH | Medina | 115.9 | 30 |
| 39123 | OH | Ottawa | 39.8 | y |
| 39143 | OH | Sandisky | 62.1 | y |
| 41007 | OR | Clatsop | 32.7 | y |
| 41009 | OR | Columbia | 36.8 | y |
| 41011 | OR | Coos | 60.6 | y |
| 41015 | OR | Curry | 16.7 | y |
| 41019 | OR | Douglas | 93.1 | y |
| 41039 | OR | Lane | 263.9 | y |
| 41041 | OR | Lincoln | 36.6 | y |
| 41051 | OR | Multnomah | 563.9 | 30 |
| 41057 | OR | Tilamook | 21.3 | y |
| 42017 | PA | Bucks | 522 | y |
| 42045 | PA | Delaware | 555.7 | 30 |
| 42049 | PA | Erie | 278.8 | y |
| 42101 | PA | Philasnel | 1647.6 | 30 |
| 44001 | RI | Bristol | 47.3 | y |
| 44003 | RI | Kent | 157.9 | y |

| FIPSCODE | STATE | COUNTY | POP85 | ADJACENT |
|---|---|---|---|---|
| 44005 | RI | Newprot | 84.1 | y |
| 44007 | RI | Providenc | 578.7 | y |
| 44009 | RI | Washingto | 98.8 | y |
| 45013 | SC | Beaufort | 80.4 | y |
| 45015 | SC | Berkeley | 118.3 | y |
| 45019 | SC | Charlesto | 285.8 | y |
| 45029 | SC | Colleton | 34.1 | y |
| 45035 | SC | Dorcheste | 72.9 | 30 |
| 45043 | SC | Georgetow | 46.2 | y |
| 45051 | SC | Horry | 126.5 | y |
| 45053 | SC | Jasper | 14.9 | y |
| 45089 | SC | Williamsb | 38.6 | 30 |
| 48007 | TX | Aransas | 17.6 | y |
| 48039 | TX | Braxoria | 187.1 | y |
| 48057 | TX | Calhoun | 21.6 | y |
| 48061 | TX | Cameron | 252.0 | y |
| 48071 | TX | Chambers | 19.6 | y |
| 48167 | TX | Galveston | 213.8 | y |
| 48201 | TX | Harris | 2784.0 | y |
| 48239 | TX | Jackson | 13.5 | y |
| 48245 | TX | Jefferson | 253.3 | y |
| 48261 | TX | Kenedy | 0.6 | y |
| 48273 | TX | Kleberg | 34.4 | y |
| 48291 | TX | Liberty | 54.0 | 30 |
| 48321 | TX | Hatagorda | 40.3 | y |
| 48355 | TX | Nueces | 298.6 | y |
| 48361 | TX | Orange | 83.6 | y |
| 48391 | TX | Refogio | 8.6 | y |
| 48409 | TX | San Partr | 61.2 | y |
| 48469 | TX | Victoria | 75.3 | y |
| 48489 | TX | Willacy | 18.9 | y |
| 51001 | VA | Accomack | 31.2 | y |
| 51033 | VA | Caroline | 18.8 | 30 |
| 51036 | VA | Charles C | 6.5 | y |
| 51041 | VA | Chester F | 164.6 | y |
| 51057 | VA | Essex | 8.9 | y |
| 51059 | VA | Fairfax | 710.5 | y |
| 51073 | VA | Glouceste | 26.4 | y |
| 51087 | VA | Henrico | 194.1 | 30 |
| 51093 | VA | Isle of w | 23.7 | y |
| 51095 | VA | James Cit | 26.6 | y |
| 51097 | VA | King and | 6.2 | y |
| 51099 | VA | King Geor | 11.5 | y |
| 51101 | VA | King Will | 10.0 | y |

| FIPSCODE | STATE | COUNTY | POP85 | ADJACENT |
|---|---|---|---|---|
| 51103 | VA | Lancaster | 10.9 | y |
| 51115 | VA | Mathew | 8.6 | y |
| 51119 | VA | Middlesex | 8.5 | y |
| 51127 | VA | New Kent | 10.1 | y |
| 51131 | VA | Norhtampt | 14.2 | y |
| 51133 | VA | Northumbe | 10.0 | y |
| 51149 | VA | Prince Ge | 26.2 | y |
| 51153 | VA | Prince wi | 175.4 | y |
| 51159 | VA | Richmond | 7.0 | y |
| 51177 | VA | Spotsylva | 34.4 | y |
| 51179 | VA | Stafford | 49.0 | y |
| 51181 | VA | Surry | 6.2 | y |
| 51193 | VA | Westmorel | 14.3 | y |
| 51199 | VA | Yrok | 40.4 | y |
| 51550 | VA | Chesapeak | 130.5 | y |
| 51650 | VA | Hampton | 125.3 | y |
| 51670 | VA | Hopewell | 24.1 | y |
| 51700 | VA | Newport N | 157.7 | y |
| 51710 | VA | Norfolk | 274.8 | y |
| 51730 | VA | Petersbur | 39.8 | y |
| 51740 | VA | Portsmout | 110.5 | y |
| 51760 | VA | Richmond | 217.7 | y |
| 51800 | VA | Suffolk | 50.2 | y |
| 51810 | VA | Virginia | 318.3 | y |
| 53009 | WA | Clallam | 52.8 | y |
| 53011 | WA | Clark | 211.3 | y |
| 53015 | WA | Cowlitz | 79.3 | y |
| 53027 | WA | Grays Har | 63.0 | y |
| 53029 | WA | Island | 48.6 | y |
| 53031 | WA | Jefferson | 17.8 | y |
| 53033 | WA | King | 1348.5 | y |
| 53035 | WA | Kitsap | 167.0 | y |
| 53045 | WA | Mason | 35.3 | y |
| 53049 | WA | Pacific | 17.5 | y |
| 53053 | WA | Pierce | 525.8 | y |
| 53055 | WA | San juan | 8.9 | y |
| 53057 | WA | Skagit | 68.6 | y |
| 53061 | WA | Snohomish | 388.8 | y |
| 53067 | WA | Thurston | 141.9 | y |
| 53069 | WA | Wahkiakum | 3.6 | y |
| 53073 | WA | Whatcom | 112.7 | y |
| 55003 | WI | Ashland | 16.9 | y |
| 55007 | WI | Bayfield | 14.3 | y |
| 55009 | WI | Brown | 185.1 | y |

| FIPSCODE | STATE | COUNTY | POP85 | ADJACENT |
|---|---|---|---|---|
| 55029 | WI | Door | 26.2 | y |
| 55031 | WI | Douglas | 42.2 | y |
| 55051 | WI | Iron | 6.2 | y |
| 55059 | WI | Kenosha | 121.1 | y |
| 55061 | WI | Kewaunee | 20.0 | y |
| 55071 | WI | Manitowoc | 82.6 | y |
| 55075 | WI | Marinette | 41.0 | y |
| 55079 | WI | Milwaukee | 937.5 | y |
| 55083 | WI | Oconto | 30.0 | y |
| 55089 | WI | Ozaukee | 68.4 | y |
| 55101 | WI | Racine | 171.6 | y |
| 55117 | WI | Sheboygan | 102.7 | y |
| TERRY | | P. Rico | 3293 | y |
| TERRY | | Guam | 124 | y |
| TERRY | | Virgin Is | 109 | y |
| TERYY | | N. Marian | 19.6 | y |
| TERRY | | Am. Samoa | 37.1 | y |

# TABLE A2
# INDUSTRY-COMPOSITION OF ACTIVITY TYPES

| SIC | SECTOR DIFINITION | SUBSECT | PARTIAL | % | % estimated by | data sources |
|---|---|---|---|---|---|---|
| 1. Coast-dependent | | | | | | |
| 0273 | animal aquaculture | 1 | y | 80 | guess by sic | |
| 0279 | animal specialties, nec(alligator) | 1 | y | 15 | g | |
| 091 | commercial fishing | 1 | n | | | fish stat(3) |
| 092 | fish hatcheries and preserves | 1 | n | | | fish stat |
| 2048 | prepared feeds(fish foods, oyster shell,etc) | 1 | y | 10 | shipment value | asm(4) |
| 2077 | animal and marine fats and oils | 1 | y | 20 | s | asm |
| 2091 | canned and cured seafoods | 1 | n | | | asm |
| 2092 | fresh or frozen pachaged fish | 1 | n | | | asm |
| 2819 | industrial inorganic chemicals,nec(salt cake) | 1 | y | 2 | s | asm |
| 2833 | medic_chemicals/botanical prodts(fish liver oils,agar-ag | 1 | y | 2 | s | asm |
| 2843 | surface active agents,etc(cod oil,sulfonated, ect.) | 1 | y | 5 | s | asm |
| 2899 | chemicals/chemical preparation,nec(salt) | 1 | y | 6 | s | asm |
| 373 | ship and boat building and repairing | 1 | n | | | asm |
| 3799 | transportation equipment,nec(boat trialers) | 1 | y | 15 | g | asm |
| 442 | deep sea domestic transportation of freight | 1 | n | | | |
| 443 | freight transportation on great lakes | 1 | n | | | |
| 446 | water transportation services | 1 | n | | | |
| 448 | water transportation of passengers | 1 | n | | | |
| 449 | services incidental to water transportation | 1 | n | | | |
| 79 | amusement and recreation services* | 1 | y | | | |
| 84 | museums, botanical, zoological gardens* | 1 | y | | | |
| 2. Coast-linked | | | | | | |
| 221 | weaving mills, cotton(nets, sailcloth,etc) | 2 | y | 3 | s | asm |
| 2298 | cordage and twine(fishnets,lines, seines, ect.) | 2 | y | 5 | g | asm |
| 2329 | men's and boy's clothing,nec(bathing suit, swimsuits) | 2 | y | 10 | s | asm |
| 2339 | women's, misses'outwear,nec(bathing suits, swimsuits) | 2 | y | 10 | s | asm |
| 2369 | girls', childern's and infants' outwear,nec(bath) | 2 | y | 3 | g | asm |
| 2394 | canvas and related products(sails) | 2 | y | 10 | s | asm |
| 2599 | furniture and fixtures,nec(ship furniture) | 2 | y | 5 | g | asm |
| 285 | paints,vanishes,lacquers,enamels(marine paints,etc.) | 2 | y | 5 | g | asm |
| 3357 | drawing and insulating of nonferrous wire(shipboard cabl | 2 | y | 5 | g | asm |
| 3362 | brass, bronze, copper foundries(propellers, ship, screw) | 2 | y | 5 | g | asm |
| 3429 | hardware,nec(marine hardware) | 2 | y | 2 | s | asm |
| 3441 | fabricated structural metal(ship sections) | 2 | y | 15 | s | asm |
| 3443 | fabricated plate work ( buoys etc.) | 2 | y | 10 | s | asm |
| 3448 | prefabricated metal buildings and component(docks) | 2 | y | 15 | g | asm |
| 3462 | iron and steel forgings(anchors etc.) | 2 | y | 5 | g | asm |
| 3483 | ammunition(fin assembles, fuses, etc.) | 2 | y | 3 | g | asm |
| 3489 | ordance and accessory,nec(antisubmarine projectors, etc) | 2 | y | 5 | g | asm |
| 3496 | miscellaneous fabricated wire(antisubmarine/torpedo net) | 2 | y | 5 | g | asm |
| 3499 | fabricated metal products,nec(aquarium acsories,etc) | 2 | y | 2 | g | asm |
| 3519 | internal combustion eng.,nec(marine engine, etc) | 2 | y | 30 | s | asm |
| 3531 | construction machinery(shipcranes/derricks, winches) | 2 | y | 5 | g | asm |
| 3536 | overhead traveling .hoists(boat hoists) | 2 | y | 10 | g | asm |
| 3537 | industrial trucks, tractors(boat cradles,docks,etc) | 2 | y | 5 | s | asm |
| 3551 | food product machine(shell/fish processing machinery) | 2 | y | 2 | s | asm |
| 3561 | pumps and pumping mach/equipment(hydroject marine engine | 2 | y | 7 | s | asm |
| 3622 | industrial controls(marine and navy auxiliary) | 2 | y | 5 | g | asm |
| 3647 | vehicular lighting equipment(boat and ship lighting fix | 2 | y | 10 | s | asm |
| 3662 | radio/TV communication equipment(marine radio communicat | 2 | y | 5 | s | asm |
| 381 | ingeering and scientific instruments | 2 | y | 45 | s | asm |
| 3949 | sporting and athletic goods,nec(fishing tackle,aloat,etc | 2 | y | 7 | s | asm |
| 3999 | manufacture indus,nec(beach umbrellas, etc) | 2 | y | 2 | s | asm |
| 82 | educational service* | 2 | y | 5 | g | cbp(6) |

3. Coastal services

| | | | | |
|---|---|---|---|---|
| 078 | landscape and hortcultural services | 3 | n | |
| 131 | crude oil and natural gas extraction | 3 | n | cbp |
| 138 | oil and gas field services | 3 | n | cbp |
| 1442 | construction sand and gravel | 3 | y | cbp |
| 1446 | industrial sand | 3 | y | cbp |
| 1479 | chemical and fertilizer mining,nec. (salt mining etc.) | 3 | y | cbp |
| 15 | general constractors and operative builders | 3 | n | cbp |
| 16 | heavy construction contractors | 3 | n | cbp |
| 17 | special trade contractors | 3 | n | cbp |
| 271 | newspaper, publishing/printing | 3 | n | cbp |
| 41 | local and interurban passenger transit | 3 | n | cbp |
| 42 | trucking and warehousing | 3 | n | cbp |
| 47 | transprotation services | 3 | n | cbp |
| 48 | communications | 3 | n | cbp |
| 49 | electric, gas and sanitary services | 3 | n | cbp |
| 50 | wholesale trade-durable goods | 3 | n | cbp |
| 51 | wholesale trade-nondurable goods | 3 | n | cbp |
| 52 | retail-building materials, hardware | 3 | n | cbp |
| 53 | retail-general merchandise stores | 3 | n | cbp |
| 54 | food stores | 3 | n | cbp |
| 55 | automobile dealers and gasline services | 3 | n | cbp |
| 56 | apparel and accessory stores | 3 | n | cbp |
| 57 | home furniture, furnishing equipment | 3 | n | cbp |
| 58 | eating and drinking places | 3 | n | cbp |
| 59 | retail-miscelaneous | 3 | n | cbp |
| 60 | depository institutions | 3 | n | cbp |
| 61 | nondepository credit institutions | 3 | n | cbp |
| 62 | security and commodity brookers, dealers, exchanges, ser | 3 | n | cbp |
| 63 | insurance carries | 3 | n | cbp |
| 64 | insurance agents, brokers and services | 3 | n | cbp |
| 65 | real estate | 3 | n | cbp |
| 67 | holding and other investment offices | 3 | n | cbp |
| 70 | hotels, rooming housing and other lodging places | 3 | n | cbp |
| 72 | personal services | 3 | n | cbp |
| 73 | business services | 3 | n | cbp |
| 75 | automotive repair services | 3 | n | cbp |
| 76 | miscelaneous repair services | 3 | n | cbp |
| 782 | motion picture distribution and allied services | 3 | n | cbp |
| 783 | motion pictures theaters | 3 | n | cbp |
| 784 | video tape rental | 3 | n | cbp |
| 79 | amusement and recreational services* | 3 | n | cbp |
| 80 | health services | 3 | n | cbp |
| 81 | legal services | 3 | n | cbp |
| 82 | educational services* | 3 | n | cbp |
| 83 | social services | 3 | n | cbp |
| 84 | museums, botanical, zoological gardens* | 3 | n | cbp |
| 86 | membership organizations | 3 | n | cbp |
| 89 | miscelaneous services | 3 | n | cbp |

4. Located in Coastal Zone, all else: Total for Subsector 3.

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* This industry is allocated to two subsectors. Data for it will be collected at twolevels, county and nation.

1. In some cases 5-7 digit sic data will be available. In others, we will have to adjust 4-digit data using estimats of the ratio between relevant 5-7 digit sectors and 4-digit totals.

2. For the activities classified in subsector 1 and 2, national level data will be collected. For subsector 3, county level data will be collected.

3. 'fish stat': fishery statistics of the United States.

4. 'asm': Annual Survey of Manufacture, which has data on value added by manufacturing' payroll, and employment for most four digit level sectors.

5. 'stat abst': Statistical Abstract, published annually.

6. "cbp': County Business Pattern, which has data on employment and payroll for up to four digit industries for county, if applicable. But it does not take into account public enterprises.

# TABLE A3
## COASTAL GNP, EMPLOYMENT-BASED, 1978

EMPLOYMENT (THOUSAND) AND GNP ($BILLION) 1978

| STATE | NO. OF COUNTIES | POPULATION | SUBSECTORS 1 | 2 | 3 | COASTAL COUNTIES ALL ACTIVITIES | ALL COUNTIES | COASTAL GENERATED TOTAL (5+7) | STATE COASTAL EMPL (4+5+6) | STATE COASTAL GNP** | STATE COASTAL GNP*** | PERCENT OF CONTRIBUTION OF COAST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 9 | 10 | 11 | 12 | 13 | 14 |
| ALABAMA | 2 | 4347.0 | 1.7 | 3.1 | 84.4 | 121.8 | 1029.0 | 124.9 | 89.1 | 2.7 | 3.7 | 8.7%- 12.1% |
| ALASKA | 18 | 2207.0 | 1.1 | 0.3 | 61.7 | 78.6 | 105.6 | 78.9 | 63.1 | 1.9 | 2.4 | 59.7%- 74.7% |
| CALIFORNIA | 22 | 187093.0 | 89.1 | 21.9 | 4344.7 | 6477.8 | 7380.6 | 6499.7 | 4455.7 | 133.6 | 194.9 | 60.4%- 88.1% |
| CONNECTICUT | 4 | 19291.0 | 9.6 | 3.4 | 403.8 | 694.5 | 1152.4 | 697.9 | 416.8 | 12.5 | 20.9 | 36.2%- 60.6% |
| DELAWARE | 3 | 5982.0 | 2.8 | 0.6 | 125.4 | 200.8 | 200.8 | 201.4 | 128.8 | 3.9 | 6.0 | 64.1%-100.3% |
| FLORIDA | 42 | 74609.0 | 32.7 | 7.7 | 1726.8 | 2373.5 | 2609.8 | 2381.2 | 1767.2 | 53.0 | 71.4 | 67.7%- 91.2% |
| GEORGIA | 7 | 3320.0 | 1.3 | 4.8 | 64.8 | 91.5 | 1620.4 | 96.3 | 70.9 | 2.1 | 2.9 | 4.4%- 5.9% |
| HAWAII | 4 | 8629.0 | 3.9 | 0.8 | 237.0 | 281.8 | 281.8 | 282.6 | 241.7 | 7.2 | 8.5 | 85.8%-100.3% |
| ILLINOIS | 2 | 57748.0 | 33.2 | 12.2 | 1509.5 | 2415.6 | 4127.2 | 2427.8 | 1555.0 | 46.6 | 72.8 | 37.7%- 58.8% |
| INDIANA | 3 | 7526.0 | 3.6 | 5.3 | 136.7 | 259.9 | 1798.9 | 265.2 | 145.6 | 4.4 | 8.0 | 8.1%- 14.7% |
| LOUISIANA | 25 | 25023.0 | 10.7 | 3.5 | 581.8 | 779.5 | 1169.1 | 783.0 | 596.0 | 17.9 | 23.5 | 51.0%- 67.0% |
| MAINE | 10 | 7857.0 | 3.0 | 0.9 | 144.8 | 220.4 | 308.0 | 221.3 | 148.7 | 4.5 | 6.6 | 48.3%- 71.9% |
| MARYLAND | 17 | 30960.0 | 11.6 | 3.5 | 609.2 | 842.7 | 1187.9 | 846.2 | 624.3 | 18.7 | 25.4 | 52.6%- 71.2% |
| MASS | 9 | 43015.0 | 22.3 | 6.2 | 1094.9 | 1620.9 | 2104.8 | 1627.1 | 1123.4 | 33.7 | 48.8 | 53.4%- 77.3% |
| MICHIGAN | 42 | 50512.0 | 21.4 | 8.7 | 837.1 | 1555.8 | 2921.6 | 1564.5 | 867.2 | 26.0 | 46.9 | 29.7%- 53.5% |
| MINESSODA | 3 | 2369.0 | 1.0 | 4.1 | 46.9 | 71.1 | 1383.4 | 75.2 | 52.0 | 1.6 | 2.3 | 3.8%- 5.4% |
| MISSISSIPPI | 3 | 2967.0 | 1.1 | 1.8 | 45.1 | 80.1 | 602.3 | 81.9 | 48.0 | 1.4 | 2.5 | 8.0%- 13.6% |
| NEW HAMPSHIRE | 2 | 2668.0 | 1.0 | 0.9 | 44.4 | 71.4 | 289.6 | 72.3 | 46.2 | 1.4 | 2.2 | 16.0%- 25.0% |
| NEW JERSEY | 15 | 60245.0 | 26.1 | 7.1 | 1221.4 | 1900.7 | 2389.7 | 1907.8 | 1254.6 | 37.6 | 57.2 | 52.5%- 79.8% |
| NEW YORK | 27 | 148301.0 | 68.6 | 17.1 | 3443.2 | 4989.5 | 5770.1 | 5006.6 | 3529.0 | 105.8 | 150.1 | 61.2%- 86.8% |
| N. CAROLINA | 20 | 5925.0 | 1.6 | 5.5 | 77.1 | 117.3 | 1860.5 | 122.8 | 84.2 | 2.5 | 3.7 | 4.5%- 6.6% |
| OHIO | 9 | 28888.0 | 15.4 | 10.9 | 663.5 | 1118.1 | 3676.5 | 1129.0 | 689.8 | 20.7 | 33.9 | 18.8%- 30.7% |
| OREGON | 9 | 10989.0 | 5.9 | 2.4 | 308.7 | 430.2 | 798.5 | 432.6 | 317.0 | 9.5 | 13.0 | 39.7%- 54.2% |
| PENNSYLVINIA | 4 | 30347.0 | 14.1 | 11.6 | 681.3 | 1024.2 | 3922.5 | 1035.8 | 707.0 | 21.2 | 31.1 | 18.0%- 26.4% |
| RHODE ISLAND | 5 | 9572.0 | 4.5 | 1.0 | 186.9 | 329.2 | 329.2 | 330.2 | 192.4 | 5.8 | 9.9 | 58.4%-100.3% |
| S.CAROLINA | 9 | 7039.0 | 2.2 | 2.7 | 112.1 | 158.9 | 911.5 | 161.6 | 117.0 | 3.5 | 4.8 | 12.8%- 17.7% |
| TEXAS | 19 | 37061.0 | 19.3 | 13.1 | 1018.7 | 1404.4 | 4400.5 | 1417.5 | 1051.1 | 31.5 | 42.5 | 23.9%- 32.2% |
| VIRGINIA | 37 | 18494.0 | 9.9 | 4.3 | 534.1 | 721.6 | 1463.2 | 725.9 | 548.4 | 16.4 | 21.8 | 37.5%- 49.6% |
| WASHINGTON | 17 | 28517.0 | 12.1 | 3.4 | 608.9 | 879.3 | 1149.2 | 882.7 | 624.4 | 18.7 | 26.5 | 54.3%- 76.8% |
| WISCONSIN | 15 | 18804.0 | 10.3 | 4.6 | 435.0 | 745.7 | 1557.2 | 750.3 | 449.9 | 13.5 | 22.5 | 28.9%- 48.2% |
| PUERTO RICO | | 3122 | 8.2 | 0.9 | 289.7 | 298.8 | 298.8 | 298.8 | 298.8 | 9.0 | 9.0 | 100.0%-100.0% |
| GUAM | | 101.5 | | | 10.7 | 10.7 | 10.7 | 10.7 | 10.7 | 0.3 | 0.3 | 100.0%-100.0% |
| VIRGIN ISLAND | | 88.4 | | | 15.8 | 15.8 | 15.8 | 15.8 | 15.8 | 0.5 | 0.5 | 100.0%-100.0% |
| N. MARIANA | | 15.8 | | | | | | | | | | |
| AMERICAN SAMOA | | 31.2 | | | | | | | | | | |
| US | 404 | 943663.9 | 445.5 | 174.6 | 21390.0 | 32382.2 | 58827.1 | 32556.8 | 22010.1 | 659.8 | 976.0 | |

| | | | |
|---|---|---|---|
| US SUBSECTORS' TOTAL | 22010.1 | US COASTAL GNP** | 660.0 |
| US ALL ACTIVITIES | 70289.2 | COAST GNP MODIF*** | 976.2 |
| US GNP($BILLION) | 2107.6 | % CONTR OF COAST | 31.3--46.3**** |

*DATA NOT AVAILABLE OR CALCULATION NOT DEFINED FOR BLANK PLACES
**COASTAL GNP = (SUBSETORS 1+2+3) x (US GNP) / (US ALL ACTIVITIES)
**GNP MODIFIED = (COAST GENERATED) x (US GNP) / (US ALL ACITIVIES)
****THE BOTTOM OF RANGE IS FROM US COASTAL GNP, THE TOP IS FROM COASTAL GNP MODIFIED

# TABLE A4
## COASTAL GNP, EMPLOYMENT-BASED, 1985

EMPLOYMENT (THOUSAND) AND GNP ($BILLION),1985

| STATE | NO. OF COUNTIES | POPULATION | SUBSECTORS 1 | 2 | 3 | COASTAL COUNTIES ALL ACTIVITIES | ALL COUNTIES | COASTAL GENERATED TOTAL (5+7) | STATE COASTAL EMPL (4+5+6) | STATE COASTAL GNP** | STATE COASTAL GNP*** | PERCENT OF CONTRIBUTION OF COAST TO STATE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 9 | 10 | 11 | 12 | 13 | 14 |
| ALABAMA | 2 | 464.6 | 2.7 | 3.9 | 102.9 | 130.4 | 1126.3 | 134.4 | 109.5 | 5.4 | 6.6 | 9.7%- 11.9% |
| ALASKA | 18 | 392.6 | 2.4 | 0.5 | 98.9 | 116.6 | 149.6 | 117.1 | 101.8 | 5.0 | 5.8 | 68.0%- 78.3% |
| CALIFORNIA | 22 | 21211.7 | 169.6 | 32.8 | 5660.4 | 8201.6 | 9368.8 | 8234.4 | 5862.8 | 289.8 | 407.1 | 62.6%- 87.9% |
| CONNECTICUT | 4 | 1973.9 | 17.3 | 4.8 | 550.6 | 838.6 | 1378.0 | 843.4 | 572.7 | 28.3 | 41.7 | 41.6%- 61.2% |
| DELAWARE | 3 | 622.1 | 5.1 | 0.9 | 166.6 | 246.8 | 247.0 | 247.7 | 172.5 | 8.5 | 12.2 | 69.9%-100.3% |
| FLORIDA | 42 | 9246.8 | 63.4 | 13.1 | 2532.5 | 3064.9 | 3734.8 | 3078.0 | 2609.0 | 129.0 | 152.2 | 69.9%- 82.4% |
| GEORGIA | 7 | 376.4 | 2.3 | 7.3 | 84.0 | 112.5 | 2086.3 | 119.8 | 93.6 | 4.6 | 5.9 | 4.5%- 5.7% |
| HAWAII | 4 | 1053.5 | 6.8 | 1.2 | 289.0 | 327.3 | 328.4 | 328.4 | 296.9 | 14.7 | 16.2 | 90.4%-100.0% |
| ILLINOIS | 2 | 5763.5 | 48.4 | 14.3 | 1659.1 | 2342.8 | 4088.0 | 2357.1 | 1721.9 | 85.1 | 116.5 | 42.1%- 57.7% |
| INDIANA | 3 | 726.3 | 4.4 | 6.3 | 132.1 | 212.7 | 1804.8 | 219.0 | 142.8 | 7.1 | 10.8 | 7.9%- 12.1% |
| LOUISIANA | 25 | 3467.8 | 17.2 | 4.5 | 653.3 | 829.8 | 1272.6 | 834.3 | 674.9 | 33.4 | 41.2 | 53.0%- 65.6% |
| MAINE | 10 | 831.9 | 3.8 | 1.2 | 132.2 | 183.7 | 355.6 | 184.9 | 137.3 | 6.8 | 9.1 | 38.6%- 52.0% |
| MARYLAND | 17 | 3159.9 | 21.7 | 5.3 | 768.5 | 1048.1 | 1507.3 | 1053.4 | 795.4 | 39.3 | 52.1 | 52.8%- 69.9% |
| MASS | 9 | 4373.6 | 43.4 | 9.2 | 1501.1 | 2099.6 | 2636.1 | 2108.8 | 1553.8 | 76.8 | 104.3 | 58.9%- 80.0% |
| MICHIGAN | 42 | 4851.2 | 29.9 | 10.4 | 916.1 | 1445.6 | 2953.6 | 1456.0 | 956.3 | 47.3 | 72.0 | 32.4%- 49.3% |
| MINESSODA | 3 | 217.7 | 1.2 | 5.5 | 35.6 | 59.4 | 1571.5 | 64.9 | 42.3 | 2.1 | 3.2 | 2.7%- 4.1% |
| MISSISSIPPI | 3 | 327.9 | 1.6 | 2.2 | 51.7 | 77.4 | 635.9 | 79.6 | 55.6 | 2.7 | 3.9 | 8.7%- 12.5% |
| NEW HAMPSHIRE | 2 | 306.7 | 2.0 | 1.4 | 73.4 | 96.3 | 390.4 | 97.7 | 76.7 | 3.8 | 4.8 | 19.7%- 25.0% |
| NEW JERSEY | 15 | 5972.8 | 47.8 | 10.1 | 1648.0 | 2311.8 | 2886.2 | 2321.9 | 1705.9 | 84.3 | 114.8 | 59.1%- 80.4% |
| NEW YORK | 27 | 14887.1 | 116.8 | 22.8 | 4187.4 | 5648.0 | 6505.0 | 5670.8 | 4326.9 | 213.9 | 280.3 | 66.5%- 87.2% |
| N. CAROLINA | 20 | 655.8 | 3.3 | 7.8 | 113.6 | 161.9 | 2220.0 | 169.7 | 124.7 | 6.2 | 8.4 | 5.6%- 7.6% |
| OHIO | 9 | 2796.0 | 22.2 | 12.9 | 733.7 | 1074.6 | 3677.0 | 1087.5 | 768.8 | 38.0 | 53.8 | 20.9%- 29.6% |
| OREGON | 9 | 1125.6 | 8.6 | 2.9 | 320.6 | 417.5 | 830.5 | 420.4 | 332.1 | 16.4 | 20.8 | 40.0%- 50.6% |
| PENNSYLVINIA | 4 | 3004.1 | 21.7 | 14.3 | 788.8 | 1049.5 | 4066.3 | 1063.7 | 824.8 | 40.8 | 52.6 | 20.3%- 26.2% |
| RHODE ISLAND | 5 | 966.8 | 7.6 | 1.3 | 239.8 | 366.3 | 367.6 | 367.6 | 248.7 | 12.3 | 18.2 | 67.6%-100.0% |
| S.CAROLINA | 9 | 817.7 | 4.4 | 3.7 | 169.5 | 214.5 | 1047.5 | 218.1 | 177.6 | 8.8 | 10.8 | 17.0%- 20.8% |
| TEXAS | 19 | 4438.0 | 34.3 | 19.7 | 1268.2 | 1661.0 | 5625.1 | 1680.7 | 1322.3 | 65.4 | 83.1 | 23.5%- 29.9% |
| VIRGINIA | 37 | 3103.1 | 24.4 | 6.5 | 782.3 | 1177.8 | 1858.7 | 1184.3 | 813.2 | 40.2 | 58.6 | 43.7%- 63.7% |
| WASHINGTON | 17 | 3291.4 | 19.8 | 4.7 | 707.2 | 958.6 | 1336.7 | 963.3 | 731.7 | 36.2 | 47.6 | 54.7%- 72.1% |
| WISCONSIN | 15 | 1865.8 | 14.9 | 5.7 | 480.3 | 721.2 | 1624.7 | 726.9 | 500.9 | 24.8 | 35.9 | 30.8%- 44.7% |
| PUERTO RICO | | 3293 | 18.2 | 1.5 | 422.3 | 442 | 442 | 442 | 442 | 21.9 | 21.9 | 100.0%-100.0% |
| GUAM | | 124 | | | 12.9 | 12.9 | 12.9 | 12.9 | 12.9 | 0.6 | 0.6 | 100.0%-100.0% |
| VIRGIN ISLAND | | 109 | | | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 1.1 | 1.1 | 100.0%-100.0% |
| *N. MARIANA* | | 19.6 | | | | | | | | | | |
| AMERICAN SAMOA | | 37.1 | | | | | | | | | | |
| US | 404 | 105875 | 779.0 | 238.9 | 27304.7 | 37673.9 | 68157.4 | 37912.8 | 28322.6 | 1400.2 | 1850.6 | |

| | | | |
|---|---|---|---|
| US SUBSECTORS' TOTAL | 28322.55 | US COASTAL GNP** | 1400.2 |
| US ALL ACTIVITIES | 81119.3 | GNP MODIF*** | 1874.3 |
| US GNP(SBILLION) | 4010.3 | % CONTR OF COAST | 34.3--46.1**** |

*DATA NOT AVAILABLE OR CALCULATION NOT DEFINED FOR BLANK PLACES
**COASTAL GNP = (SUBSETORS 1+2+3) x (US GNP) / (US ALL ACTIVITIES)
**GNP MODIFIED = (COAST GENERATED) x (US GNP) / (US ALL ACITIVIES)
****THE BOTTOM OF RANGE IS FROM US COASTAL GNP, THE TOP IS FROM COASTAL GNP MODIFIED

# TABLE A5
# COASTAL GNP, PAYROLL-BASED, 1978

PAYROLL(MILLION DOLLARS) AND GNP (BILLION DOLLARS) 1978

| STATE | NO. OF COUNTI | SUBSECTORS 1 | 2 | 3 | COASTAL COUNTIES ALL ACTIVITIES | STATE TOTAL (ALL COUNTIES) | COASTAL GENERATED TOTAL (6+4) | STATE COASTAL PAY (3+4+5) | STATE COASTAL GNP** | STATE COASTAL GNP*** |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 9 | 10 |
| ALABAMA | 2 | 18.6 | 44.8 | 766.1 | 1261.4 | 10751.4 | 1306.2 | 829.5 | 2.1 | 3.3 |
| ALASKA | 18 | 21.1 | 8.2 | 1026.2 | 1434.1 | 1975.7 | 1442.3 | 1055.5 | 2.6 | 3.6 |
| CALIFORNIA | 22 | 1244.6 | 393.7 | 50627.9 | 84605.7 | 94499.8 | 84999.4 | 52266.2 | 131.0 | 213.1 |
| CONNECTICUT | 4 | 129.2 | 60.7 | 4198.4 | 8781.4 | 14565.5 | 8842.1 | 4388.3 | 11.0 | 22.2 |
| DELAWARE | 3 | 40.1 | 11.4 | 1231.6 | 2727.8 | 2727.8 | 2739.2 | 1283.1 | 3.2 | 6.9 |
| FLORIDA | 41 | 348.0 | 108.0 | 15950.6 | 23658.8 | 25911.6 | 23766.8 | 16406.6 | 41.1 | 59.6 |
| GEORGIA | 7 | 13.2 | 71.2 | 565.4 | 895.1 | 17085.1 | 966.3 | 649.8 | 1.6 | 2.4 |
| HAWAII | 4 | 43.6 | 12.3 | 2287.9 | 2961.1 | 2961.1 | 2973.4 | 2343.8 | 5.9 | 7.5 |
| ILLINOIS | 2 | 491.0 | 226.7 | 18986.9 | 33378.7 | 54419.7 | 33605.4 | 19704.7 | 49.4 | 84.2 |
| INDIANA | 3 | 58.3 | 93.9 | 1481.5 | 3965.2 | 22547.1 | 4059.1 | 1633.8 | 4.1 | 10.2 |
| LOUISIANA | 25 | 130.5 | 54.9 | 5761.2 | 8873.7 | 13181.5 | 8928.6 | 5946.7 | 14.9 | 22.4 |
| MAINE | 10 | 32.4 | 12.5 | 1307.1 | 2199.4 | 3004.2 | 2211.9 | 1352.0 | 3.4 | 5.5 |
| MARYLAND | 17 | 143.4 | 58.0 | 6077.2 | 9745.2 | 13915.0 | 9803.2 | 6278.5 | 15.7 | 24.6 |
| MASS | 9 | 279.1 | 100.8 | 11360.7 | 18974.9 | 24193.0 | 19075.7 | 11740.6 | 29.4 | 47.8 |
| MICHIGAN | 42 | 346.0 | 178.8 | 8998.6 | 23519.3 | 42910.2 | 23698.1 | 9523.4 | 23.9 | 59.4 |
| MINESSODA | 3 | 12.6 | 66.8 | 459.8 | 859.5 | 16027.0 | 926.3 | 539.2 | 1.4 | 2.3 |
| MISSISSIPPI | 3 | 11.9 | 23.1 | 357.8 | 807.8 | 5534.0 | 830.9 | 392.7 | 1.0 | 2.1 |
| NEW HAMPSHIR | 2 | 10.3 | 12.3 | 408.9 | 698.0 | 2960.9 | 710.3 | 431.5 | 1.1 | 1.8 |
| NEW JERSEY | 15 | 362.0 | 128.9 | 13549.5 | 24607.3 | 30924.5 | 24736.2 | 14040.3 | 35.2 | 62.0 |
| NEW YORK | 27 | 967.0 | 319.5 | 41593.6 | 65733.0 | 76684.4 | 66052.5 | 42880.1 | 107.5 | 165.6 |
| N. CAROLINA | 20 | 14.9 | 77.2 | 627.8 | 1012.9 | 18517.0 | 1090.1 | 719.9 | 1.8 | 2.7 |
| OHIO | 9 | 227.5 | 200.1 | 7322.5 | 15467.4 | 48023.7 | 15667.5 | 7750.1 | 19.4 | 39.3 |
| OREGON | 9 | 77.3 | 39.0 | 3370.7 | 5258.0 | 9349.2 | 5297.0 | 3487.0 | 8.7 | 13.3 |
| PENNSYLVINIA | 4 | 183.7 | 197.7 | 7209.8 | 12487.6 | 47437.4 | 12685.3 | 7591.2 | 19.0 | 31.8 |
| RHODE ISLAND | 5 | 50.2 | 14.2 | 1807.9 | 3414.4 | 3414.4 | 3428.6 | 1872.4 | 4.7 | 8.6 |
| S.CAROLINA | 9 | 20.6 | 37.8 | 895.4 | 1402.6 | 9076.6 | 1440.4 | 953.9 | 2.4 | 3.6 |
| TEXAS | 19 | 266.1 | 210.7 | 11491.2 | 18091.0 | 50572.8 | 18301.7 | 11968.0 | 30.0 | 45.9 |
| VIRGINIA | 40 | 114.1 | 64.7 | 5192.7 | 7759.7 | 15517.0 | 7824.4 | 5371.5 | 13.5 | 19.6 |
| WASHINGTON | 15 | 172.4 | 61.7 | 6955.2 | 11718.1 | 14815.3 | 11779.8 | 7189.3 | 18.0 | 29.5 |
| WISCONSIN | 15 | 137.2 | 76.0 | 4303.4 | 9327.1 | 18241.7 | 9403.1 | 4516.6 | 11.3 | 23.6 |
| PUERTO RICO | | 93.0 | 8.9 | 2031.7 | 2133.6 | 2133.6 | 2133.6 | 2133.6 | 5.3 | 5.3 |
| GUAM | | | | 81.1 | 81.1 | 81.1 | 81.1 | 81.1 | 0.2 | 0.2 |
| VIRGIN ISLAND | | | | 136.2 | 136.2 | 136.2 | 136.2 | 136.2 | 0.3 | 0.3 |
| N. MARIANA | | | | | | | | | | |
| AMERICAN SAMOA | | | | | | | | | | |
| UNITED STATE | 404 | 6001.5 | 2975.4 | 238422.5 | 407977.1 | 714095.5 | 410952.5 | 247456.9 | 774.6 | 1030.2 |

US ALL ACTIVITIES 840.7
US GNP 2107.6

COASTAL GNP** 620.2
C GNP MODIFIED*** 1030.2
% CONTR OF COAST 29.2--48.6****

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*DATA NOT AVAILABLE OR CALCULATION NOT DEFINED FOR BLANK PLACES
**COASTAL GNP = (SUBSETORS 1+2+3) x (US GNP) / (US ALL ACTIVITIES)

# TABLE A6
# COASTAL GNP, PAYROLL-BASED, 1985

PAYROLL(MILLION DOLLARS) AND GNP (BILLION DOLLARS).1985

| STATE | NO. OF COUNTI | SUBSECTORS 1 | 2 | 3 | COASTAL COUNTIES ALL ACTIVITIES | STATE TOTAL (ALL COUNTIES) | COASTAL GENERATED TOTAL (6+4) | STATE COASTAL PAY (3+4+5) | STATE COASTAL GNP** | STATE COASTAL GNP*** |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| ALABAMA | 2 | 44.3 | 64.9 | 1354.7 | 2086.4 | 18245.3 | 2151.2 | 1463.8 | 3.9 | 5.7 |
| ALASKA | 18 | 66.9 | 14.7 | 2132.5 | 3156.0 | 4141.5 | 3170.7 | 2214.1 | 5.9 | 8.4 |
| CALIFORNIA | 22 | 3653.6 | 684.3 | 103329.2 | 172251.9 | 192416.2 | 172936.3 | 107667.0 | 285.4 | 458.3 |
| CONNECTICUT | 4 | 379.6 | 101.7 | 9190.1 | 17895.1 | 28592.6 | 17996.8 | 9671.3 | 25.6 | 47.7 |
| DELAWARE | 3 | 107.6 | 18.1 | 2509.6 | 5074.1 | 5076.6 | 5092.2 | 2635.3 | 7.0 | 13.5 |
| FLORIDA | 41 | 1045.9 | 212.1 | 35769.4 | 49308.1 | 59630.3 | 49520.1 | 37027.3 | 98.1 | 131.2 |
| GEORGIA | 7 | 37.3 | 128.5 | 1022.4 | 1760.5 | 36136.7 | 1889.0 | 1188.3 | 3.1 | 5.0 |
| HAWAII | 4 | 110.8 | 18.6 | 4237.7 | 5222.3 | 5224.0 | 5240.8 | 4367.1 | 11.6 | 13.9 |
| ILLINOIS | 2 | 1077.3 | 294.3 | 30872.0 | 50790.0 | 82759.8 | 51084.3 | 32243.6 | 85.5 | 135.4 |
| INDIANA | 3 | 92.0 | 117.1 | 1888.7 | 4335.3 | 32921.2 | 4452.4 | 2097.8 | 5.6 | 11.8 |
| LOUISIANA | 25 | 309.2 | 78.5 | 9580.6 | 14578.2 | 22078.9 | 14656.7 | 9968.3 | 26.4 | 38.8 |
| MAINE | 10 | 50.4 | 19.6 | 1824.6 | 2374.4 | 5520.7 | 2394.1 | 1894.6 | 5.0 | 6.3 |
| MARYLAND | 17 | 356.7 | 96.8 | 9304.2 | 16815.5 | 27227.3 | 16912.3 | 9757.7 | 25.9 | 44.8 |
| MASS | 9 | 870.2 | 177.9 | 25619.7 | 41027.9 | 50008.5 | 41205.7 | 26667.8 | 70.7 | 109.2 |
| MICHIGAN | 42 | 665.8 | 226.8 | 14020.1 | 31388.3 | 63783.0 | 31615.2 | 14912.7 | 39.5 | 83.8 |
| MINESSODA | 3 | 12.0 | 102.9 | 941.0 | 564.6 | 28940.1 | 667.5 | 1055.9 | 2.8 | 1.8 |
| MISSISSIPPI | 3 | 26.4 | 32.7 | 558.2 | 1246.8 | 9188.4 | 1279.5 | 617.3 | 1.6 | 3.4 |
| NEW HAMPSHIRE | 2 | 25.4 | 23.7 | 724.6 | 1198.7 | 6660.6 | 1222.4 | 773.7 | 2.1 | 3.2 |
| NEW JERSEY | 15 | 989.9 | 209.6 | 28852.1 | 46668.5 | 58927.0 | 46878.1 | 30051.5 | 79.6 | 124.2 |
| NEW YORK | 27 | 2639.3 | 494.1 | 83725.7 | 124432.3 | 138937.6 | 124926.5 | 86859.2 | 230.2 | 331.1 |
| N. CAROLINA | 20 | 45.9 | 125.8 | 1159.4 | 2164.8 | 35374.0 | 2290.6 | 1331.1 | 3.5 | 6.1 |
| OHIO | 9 | 464.3 | 252.5 | 11080.1 | 21890.1 | 71007.8 | 22142.6 | 11796.9 | 31.3 | 58.7 |
| OREGON | 9 | 158.4 | 50.6 | 4725.9 | 7466.8 | 14239.5 | 7517.5 | 4935.0 | 13.1 | 19.9 |
| PENNSYLVINIA | 4 | 434.2 | 262.9 | 12968.6 | 20471.9 | 73921.9 | 20734.8 | 13665.8 | 36.2 | 55.0 |
| RHODE ISLAND | 5 | 126.0 | 21.1 | 3268.6 | 5940.9 | 5942.5 | 5962.0 | 3415.7 | 9.1 | 15.8 |
| S.CAROLINA | 9 | 63.4 | 57.8 | 2004.1 | 2986.9 | 16240.5 | 3044.6 | 2125.2 | 5.6 | 8.1 |
| TEXAS | 19 | 743.9 | 377.8 | 21938.8 | 35072.7 | 106227.9 | 35450.5 | 23060.5 | 61.1 | 94.0 |
| VIRGINIA | 40 | 449.9 | 114.6 | 11729.8 | 21209.6 | 32233.0 | 21324.3 | 12294.4 | 32.6 | 56.5 |
| WASHINGTON | 15 | 396.0 | 89.6 | 11342.8 | 18668.6 | 25196.4 | 18758.3 | 11828.4 | 31.3 | 49.7 |
| WISCONSIN | 15 | 288.3 | 101.1 | 6653.4 | 13592.6 | 28436.7 | 13693.8 | 7042.9 | 18.7 | 36.3 |
| PUERTO RICO | | 207.0 | 17.4 | 4656.2 | 4880.6 | 4880.6 | 4880.6 | 4880.6 | 12.9 | 12.9 |
| GUAM | | | | 150.9 | 150.9 | 150.9 | 150.9 | 150.9 | 0.4 | 0.4 |
| VIRGIN ISLAND | | | | 338.8 | 338.8 | 338.8 | 338.8 | 338.8 | 0.9 | 0.9 |
| N. MARIANA | | | | | | | | | | |
| AMERICAN SAMOA | | | | | | | | | | |
| UNITED STATES | 404 | 15844.5 | 4590.1 | 459474.5 | 747010.1 | 1290606.8 | 751600.2 | 480000.5 | 1271.9 | 1992.0 |

| | | | |
|---|---|---|---|
| US ALL ACTIVITIES | 1513.1 | COASTAL GNP** | 1271.9 |
| US GNP | 4010.3 | C GNP MODIFIED*** | 1992.0 |
| | | % CONTR OF COAST | 32.1--49.3**** |

*DATA NOT AVAILABLE OR CALCULATION NOT DEFINED FOR BLANK PLACES
**COASTAL GNP = (SUBSETORS 1+2+3) x (US GNP) / (US ALL ACTIVITIES)

TABLE A7
REGRESSION RESULTS: AVERAGE GROWTH IN COASTAL OUTPUT

| COAST-DEPENDENT | | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| CONSTANT | 3.19 | 19.5 | -14.77 | 55.23 | -29.175 | -24.56 |
| | (11.93) | (15.96) | (34.57) | (30.63) | (7.03) | (14.16) |
| AVGCZM | 2.57e-05 | 3.65e-05 | 3.19e-05 | 3.19e-05 | 1.60e-05 | 0.000012 |
| | (9.20e-06) | (1.16e-05) | (1.34e-05) | (1.34e-05) | (4.78e-06) | (5.8e-06) |
| AVGPOP | | | | | 6.35e-03 | 0.00732 |
| | | | | | (7.00e-04) | (7.1e-04) |
| PART | | -35.05 | -48.84 | -48.84 | | 1.46 |
| | | (23.41) | (27.52) | (27.52) | | (12.26) |
| NAT | | | 61.24 | -8.76 | | 16.89 |
| | | | (38.32) | (27.53) | | (16.24) |
| SAT | | | 20.07 | -49.93 | | -18.05 |
| | | | (37.74) | (31.66) | | (15.86) |
| MIDAT | | | 35.81 | -34.19 | | -3.19 |
| | | | (37.98) | (28.8) | | (15.97) |
| LAKES | | | 34.82 | -35.18 | | -24.24 |
| | | | (31.8) | (30.49) | | (14.2) |
| GULF | | | 44.74 | -25.26 | | -16.67 |
| | | | (36.42) | (29.79) | | (16.03) |
| PAC | | | 69.99 | | | 5.73 |
| | | | (43.99) | | | (19.03) |
| MULT | | | | 69.99 | | |
| | | | | (43.99) | | |
| ADJ $R^2$ | 0.1897 | 0.2241 | 0.1687 | 0.1687 | 0.7916 | 0.8613 |
| ESS | 52165 | 48164 | 40138 | 40138 | 12934 | 6379 |

NULL HYPOTHESIS DUMMIES = 0: F = 0.898924

Standard error is reported in parentheses below each coefficient estimate.

TABLE A8
REGRESSION RESULTS: AVERAGE GROWTH IN COASTAL OUTPUT

| COAST-LINKED | | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| CONSTANT | -1.12 | -0.86 | 0.27 | 3.6 | -2.011 | -0.147 |
| | (0.996) | (1.38) | (2.2) | (1.95) | (1.13) | (1.79) |
| AVGCZM | 1.22e-06 | 1.40e-06 | 1.47e-06 | 1.47e-06 | 9.60e-07 | 6.12e-07 |
| | (7.70e-07) | (1.00e-06) | (8.60e-07) | (8.60e-07) | (7.70e-07) | (7.40e-07) |
| AVGPOP | | | | | 1.74e-04 | 3.10e-04 |
| | | | | | (1.13e-04) | (9.01e-05) |
| PART | | -0.56 | -3.95 | -3.95 | | -1.82 |
| | | (2.03) | (1.75) | (1.75) | | (1.55) |
| NAT | | | 3.51 | 0.17 | | 1.63 |
| | | | (2.44) | (1.76) | | (2.06) |
| SAT | | | 2.41 | -0.92 | | 0.796 |
| | | | (2.41) | (2.02) | | (2.01) |
| MIDAT | | | 1.78 | -1.56 | | 0.123 |
| | | | (2.42) | (1.84) | | (2.02) |
| LAKES | | | -3.85 | -7.19 | | -6.35 |
| | | | (2.03) | (1.94) | | (1.8) |
| GULF | | | 3.28 | -0.06 | | 0.673 |
| | | | (2.32) | (1.9) | | (2.03) |
| PAC | | | 3.34 | | | 0.61 |
| | | | (2.81) | | | (2.41) |
| MULT | | | | 3.34 | | |
| | | | | (2.81) | | |
| ADJ $R^2$ | 0.0505 | 0.0181 | 0.4313 | 0.4313 | 0.0951 | 0.6251 |
| ESS | 364 | 362 | 163 | 163 | 334 | 102 |

NULL HYPOTHESIS DUMMIES = 0: F = 3.699387

Standard error is reported in parentheses below each coefficient estimate.

TABLE A9
REGRESSION RESULTS: AVERAGE GROWTH IN COASTAL OUTPUT

| COASTAL SERVICES | | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| CONSTANT | -75.92 | 176.37 | -538.06 | 740.33 | -555 | -677.28 |
| | (187.48) | (249.72) | (523.45) | (463.79) | (125.89) | (272.54) |
| AVGCZM | 4.82e-04 | 6.50e-04 | 5.51e-04 | 5.51e-04 | 3.39e-04 | 2.62e-04 |
| | (1.44e-04) | (1.81e-04) | (2.03e-04) | (2.03e-04) | (8.57e-05) | (1.12e-04) |
| AVGPOP | | | | | 9.39e-02 | 1.04e-01 |
| | | | | | (1.25e-02) | (1.40e-02) |
| PART | | -542.35 | -817.99 | 817.99 | | -102.15 |
| | | (366.13) | (416.63) | (416.63) | | (236.02) |
| NAT | | | 1294.72 | 16.33 | | 663.69 |
| | | | (580.15) | (416.77) | | (312.6) |
| SAT | | | 632.75 | -645.64 | | 90.2 |
| | | | (571.35) | (479.31) | | (305.26) |
| MIDAT | | | 774.51 | -503.88 | | 219.55 |
| | | | (574.95) | (436.01) | | (307.47) |
| LAKES | | | 656.56 | -621.83 | | -183.75 |
| | | | (481.38) | (461.61) | | (273.4) |
| GULF | | | 967.51 | -310.88 | | 93.6 |
| | | | (551.4) | (451.13) | | (308.64) |
| PAC | | | 1278.39 | | | 363.9 |
| | | | (666.05) | | | (366.31) |
| MULT | | | | 1278.39 | | |
| | | | | (666.05) | | |
| ADJ $R^2$ | 0.2607 | 0.2909 | 0.2884 | 0.2884 | 0.7503 | 0.808 |
| ESS | 12743883 | 11786059 | 9200008 | 9200008 | 4150127 | 2364531 |

NULL HYPOTHESIS DUMMIES = 0: F = 1.15561

Standard error is reported in parentheses below each coefficient estimate.

TABLE A10
REGRESSION RESULTS: AVERAGE GROWTH IN COASTAL OUTPUT

| GNP2 | | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| CONSTANT | -0.14 | 0.71 | -1.57 | 2.5 | -1.73 | -2.04 |
| | (0.61) | (0.81) | (1.7) | (1.51) | (0.3861) | (0.831) |
| AVGCZM | 1.53e-06 | 2.09e-06 | 1.78e-06 | 1.78e-06 | 1.05e-06 | 8.22e-07 |
| | (4.70e-07) | (5.90e-07) | (6.60e-07) | (6.60e-07) | (2.60e-07) | (3.40e-07) |
| AVGPOP | | | | | 3.13e-04 | 3.46e-04 |
| | | | | | (3.85e-05) | (4.17e-05) |
| PART | | -1.82 | -2.64 | -2.64 | | -0.266 |
| | | (1.19) | (1.36) | (1.36) | | (0.72) |
| NAT | | | 4.02 | -0.05 | | 1.93 |
| | | | (1.89) | (1.36) | | (0.953) |
| SAT | | | 1.86 | -2.21 | | 0.062 |
| | | | (1.86) | (1.56) | | (0.931) |
| MIDAT | | | 2.38 | -1.7 | | 0.535 |
| | | | (1.87) | (1.42) | | (0.937) |
| LAKES | | | 2.18 | -1.9 | | -0.61 |
| | | | (1.57) | (1.5) | | (0.833) |
| GULF | | | 3.03 | -1.05 | | 0.123 |
| | | | (1.79) | (1.47) | | (0.941) |
| PAC | | | 4.08 | | | 1.04 |
| | | | (2.17) | | | (1.12) |
| MULT | | | | 4.08 | | |
| | | | | (2.17) | | |
| ADJ $R^2$ | 0.2507 | 0.2855 | 0.276 | 0.276 | 0.7743 | 0.8285 |
| ESS | 134 | 124 | 97 | 97 | 39 | 22 |

NULL HYPOTHESIS DUMMIES = 0: F = 1.14433

Standard error is reported in parentheses below each coefficient estimate.

TABLE A11
REGRESSION RESULTS: AVERAGE GROWTH IN COASTAL OUTPUT

| GNP3 | | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| CONSTANT | -0.12 | 0.92 | -1.46 | 4.31 | -2.39 | -2.18 |
| | (0.91) | (1.23) | (2.63) | (2.33) | (0.647) | (1.28) |
| AVGCZM | 1.91e-06 | 2.61e-06 | 2.24e-06 | 2.24e-06 | 1.24e-06 | 7.55e-07 |
| | (7.00e-07) | (8.90e-07) | (1.02e-06) | (1.02e-06) | (4.40e-07) | (5.30e-07) |
| AVGPOP | | | | | 4.44e-04 | 5.35e-04 |
| | | | | | (6.45e-05) | (6.44e-05) |
| PART | | -2.24 | -3.85 | -3.85 | | -0.17 |
| | | (1.8) | (2.1) | (2.1) | | (1.11) |
| NAT | | | 5.21 | -0.57 | | 1.96 |
| | | | (2.92) | (2.1) | | (1.47) |
| SAT | | | 2.14 | -3.63 | | -0.644 |
| | | | (2.87) | (2.41) | | (1.44) |
| MIDAT | | | 3.35 | -2.42 | | 0.501 |
| | | | (2.89) | (2.19) | | (1.45) |
| LAKES | | | 1.85 | -3.92 | | -2.46 |
| | | | (2.42) | (2.32) | | (1.29) |
| GULF | | | 3.75 | -2.02 | | -0.738 |
| | | | (2.77) | (2.27) | | (1.45) |
| PAC | | | 5.77 | | | 1.08 |
| | | | (3.35) | | | (1.72) |
| MULT | | | | 5.77 | | |
| | | | | (3.35) | | |
| ADJ $R^2$ | 0.1823 | 0.198 | 0.1586 | 0.1586 | 0.6923 | 0.8012 |
| ESS | 302 | 285 | 232 | 232 | 109 | 52 |

NULL HYPOTHESIS DUMMIES = 0: F = 0.905172

Standard error is reported in parentheses below each coefficent estimate.

## TABLE A12
## DESCRIPTIVE STATISTICS FOR PROGRAM PARTICIPANTS

CZM-SPENDING AND CHANGE IN COASTAL OUTPUT

| | DEPENDENTa | LINKEDa | SERVICESa | GNP2b | GNP3b | CZM-SPENDa |
|---|---|---|---|---|---|---|
| MEAN | 215.85 | 2.46 | 3214 | 10.8 | 13.9 | 5081012 |
| MEDIAN | 69.94 | 0.36 | 557.17 | 1.84 | 2.57 | 3641904 |
| STD. DEV. | 376.29 | 22.37 | 6162 | 19.9 | 28.33 | 3117321 |

a Measured in millions of 1982 $.
b Measured in billions of 1982 $.

## TABLE A13
## PERCENT CHANGE IN COASTAL OUTPUT

| | DEPENDENT | LINKED | SERVICES | GNP2 | GNP3 |
|---|---|---|---|---|---|
| MEAN | 0.6631 | 0.0184 | 0.1989 | 0.2755 | 0.217 |
| MEDIAN | 0.6333 | 0.0068 | 0.177 | 0.2556 | 0.1969 |
| STD. DEV. | 0.2762 | 0.1229 | 0.18 | 0.1902 | 0.2004 |

TABLE A14
VARIABLE DEFINITIONS

AVGCZM - Average annual expenditures from Section 306 of the CZMA, 1982-85

PART - Dummy variable equal to 1 if the state participates in the CZMA and equal to zero otherwise

NAT - Dummy variable equal to 1 if the state is in the North Atlantic and equal to zero otherwise

SAT - Dummy variable equal to 1 if the state is in the South Atlantic and equal to zero otherwise

MIDAT - Dummy variable equal to 1 if the state is in the Middle Atlantic and equal to zero otherwise

GULF - Dummy variable equal to 1 if the state is on the Gulf Coast and equal to zero otherwise

LAKES - Dummy variable equal to 1 if the state is on the Great Lakes and equal to zero otherwise

PAC - Dummy variable equal to 1 if the state is on the Pacific Coast and equal to zero otherwise

MULT - Dummy variable equal to 1 if the state is on two or more coasts and equal to zero otherwise

AVGPOP - Average state population, 1977-85

TABLE A15
REGIONAL CLASSIFICATIONS

| | PART | NAT | SAT | MIDAT | GULF | LAKES | PAC | MULT |
|---|---|---|---|---|---|---|---|---|
| ALABAMA | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| ALASKA | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| CALIFORNIA | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| CONNECTICUT | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DELAWARE | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| FLORIDA | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| GEORGIA | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| HAWAII | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| ILLINOIS | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| INDIANA | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| LOUISIANA | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MAINE | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MARYLAND | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| MASSACHUSSETTS | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MICHIGAN | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| MINNESOTA | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| MISSISSIPPI | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| NEW HAMPSHIRE | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| NEW JERSEY | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| NEW YORK | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| NORTH CAROLINA | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| OHIO | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| OREGON | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| PENNSYLVANIA | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| RHODE ISLAND | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| SOUTH CAROLINA | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| TEXAS | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| VIRGINIA | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| WASHINGTON | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| WISCONSIN | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| TOTAL | 23 | 6 | 4 | 5 | 5 | 8 | 5 | 3 |

TABLE A16
MEANS AND STANDARD DEVIATIONS FOR
INDEPENDENT AND DEPENDENT VARIABLES[a]

INDEPENDENT VARIABLES

| | MEAN | STD. DEV. |
|---|---|---|
| CZM | 3895443 | 3485629 |
| AVGCZM | 973861 | 871407 |
| PART | 0.77 | 0.43 |
| NAT | 0.20 | 0.41 |
| SAT | 0.13 | 0.35 |
| MIDAT | 0.17 | 0.38 |
| GULF | 0.17 | 0.38 |
| LAKES | 0.27 | 0.45 |
| PAC | 0.17 | 0.38 |
| MULT | 0.10 | 0.31 |

DEPENDENT VARIABLES

| | | |
|---|---|---|
| SECTOR 1 | 197.34 | 335.6 |
| AVGSECT1 | 28.19 | 47.95 |
| SECTOR 2 | 0.47 | 25.88 |
| AVGSECT2 | 0.07 | 3.7 |
| SECTOR 3 | 2752 | 5492 |
| AVGSECT3 | 393.2 | 784.6 |
| GNP2 | 9.44 | 17.72 |
| AVGGNP2 | 1.35 | 2.53 |
| GNP3 | 12.15 | 25.41 |
| AVGGNP3 | 1.74 | 3.63 |

a Calculations use all states eligible to participate in the CZM program.

*NCRI Publication No. NCRI-W-91-003*

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