

# Coastal Management Solutions To Nonpoint Source Water Pollution



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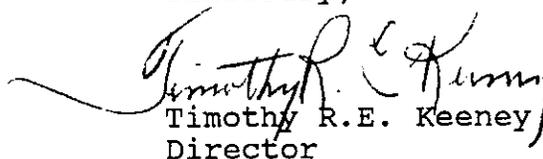
Nonpoint source pollution control is a major item on the environmental agenda of the Administration and Congress in 1990. The Administration sees an opportunity in the reauthorization of the Coastal Zone Management Act to encourage the coastal states to address this significant source of water pollution. Coastal management programs are in a unique position to deal with the land-based causes of nonpoint source pollution through their existing land management capabilities. Already, we have found that state coastal management programs have developed innovative and successful methods for its control. It is hoped that this document will be of interest and help to states that are faced with similar problems, as well as to individuals interested in the welfare of our Nation's coasts.

The document is organized into five parts. The first part provides a brief overview and summary of nonpoint source pollution and its relation to coastal management. The second part surveys innovative, successful projects undertaken by coastal management programs in eight areas of nonpoint source pollution. The third part provides greater detail on six specific state efforts. The fourth part of this document provides a summary of the Federal coastal management program. This section is primarily intended as background for those individuals unfamiliar with the program. The fifth part contains a list of the state coastal programs.

This Office sincerely thanks the many state program managers who contributed to the information contained in this document.

For further information on activities highlighted in this report, contact the state program manager listed at the end of this document or the Coastal Programs Division, 1825 Connecticut Ave., N.W., Washington, D.C. 20235, Tel. (202) 673-5158.

Sincerely,

  
Timothy R.E. Keeney  
Director



The Cover: This salt pond in Rhode Island is protected by the Coastal Management Program and the Town of South Kingstown using a variety of nonpoint source pollution controls: development setbacks, vegetative buffers, technical assistance on repairing and maintaining septic systems, stormwater management and runoff controls, reduced zoning density and continued monitoring.

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## I. INTRODUCTION: NONPOINT SOURCE POLLUTION AND COASTAL MANAGEMENT

### What is nonpoint source pollution?

Nonpoint source pollution is defined as all pollution entering the surface water system other than from pipes. Examples include: soil eroding into streams, agriculture fertilizer seeping into creeks, failing septic systems polluting bays, and runoff from parking lots into adjacent rivers. Discharges from sewage treatment plants and factories, on the other hand, are called "point source" pollution, because they come from a single point--usually a pipe.

### How significant is nonpoint source pollution?

Nonpoint sources contribute more than half of the suspended solids, phosphorus, chromium, copper, lead, iron, zinc and fecal coliform bacteria which pollute our waters.<sup>1</sup> The most common nonpoint pollutant is soil eroded from farms, construction sites, and stream banks. The soil destroys aquatic habitat by increasing turbidity, cutting off sunlight to aquatic plants and other organisms and smothering fish spawning areas. Runoff poisoned with fertilizer, pesticides, toxic metals and oils can have worse affects. Excessive nutrients in the water accelerates vegetation growth which can lead to oxygen depletion. The lower oxygen levels can cause fish kills. As the pace of coastal population growth and development continues to increase, there will be more impervious surfaces, septic systems, litter, chemicals and pesticides applied to lawns and gardens--all of which will increase the pollution of coastal waters.

The results of pollution from nonpoint sources are serious. Public and private drinking water supplies are threatened. Over 40 percent of the shellfish waters in the contiguous U.S. are closed from point and nonpoint source pollution. Since more than 70 percent of commercially important species of fish and shellfish spend some portion of their lifecycle in estuarine waters, pollution significantly affects the \$3 billion a year commercial and recreational fishing industry. Also, beach closings resulting from debris washup not only cause lost recreational opportunities but lost revenue for local economies.

### Why hasn't nonpoint source pollution been stopped?

The severity of the nonpoint source pollution problem only recently has been fully recognized. Nonpoint sources are harder to identify, and may initially appear less serious than discharges from industrial point sources. Public awareness is the most important component of efforts to stop the degradation of coastal waters. The farmer who lets cattle stand in a stream to cool off in the summer may not see how their waste could cause much harm. Neither does the homeowner who puts off fixing

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<sup>1</sup> See U. S. Congress, Office of Technology Assessment, Wastes in Marine Environments, 1987 Chapter Three.

a faulty septic tank or who dumps used motor oil into a storm sewer. These seemingly small sources of pollution add up to significant adverse impacts when multiplied by the large number of people living adjacent to our coastal waters.

### What are the sources of nonpoint pollution?

Storm water runoff, from rainfall and snowmelt, is the major source of nonpoint pollution. It consists of rainwater that is not absorbed into the land, combined with eroding soil, and litter, oil and heavy metals from roads. Unless properly managed, stormwater runoff increases as the land becomes urbanized. Unlike open land in fields or greenways, asphalt and concrete do not allow rain water to be absorbed into the land and filtered before it enters into waterbodies. Unless storm water runoff is controlled, its effects will be more severe as coastal areas continue to develop.

Boats and marinas are potential sources of untreated human and fish wastes, antifouling paints, boat cleaners, petroleum products, and runoff from parking lots.

Airborne sources, such as toxic chemicals transported by rain and wind, contribute significantly to coastal water pollution. In Long Island Sound, for example, it is estimated that 23 percent of the total nitrogen load is caused by atmospheric pollution. Airborne sources also account for a significant portion of the nitrogen load in the Chesapeake Bay.

Groundwater transport of pollutants into nearby water bodies can result from faulty septic systems and landfills located too close to the water. Rainwater can absorb pollutants as it flows through a landfill with an improper base and then pollute groundwater, which may flow into rivers and streams.

### What is coastal management?

Congress enacted the Coastal Zone Management Act, P.L. 92-583 (CZMA), in 1972, to improve the nation's management of coastal resources, which were being irretrievably damaged or lost due to poorly planned development. Specific concerns included the loss of living marine resources and wildlife habitat, decreasing open space for public use, and shoreline erosion. Congress also recognized the need to resolve conflicts between various competing uses of coastal lands and waters. Key elements of the CZMA are:

- \* The basic goal of the CZMA is to encourage coastal states to voluntarily develop comprehensive management programs. The CZMA establishes a partnership in which the states take the lead in managing their coastal resources, while the Federal government provides financial and technical assistance and agrees to act in a manner consistent with the federally-approved

management programs. The law also establishes a National Estuarine Reserve Research System to designate and preserve specific estuarine sites.

- \* The CZMA was reauthorized in 1976, 1980 and 1986. It is subject to reauthorization in 1990.
- \* The Office of Ocean and Coastal Resource Management (OCRM), within the National Ocean Service of the National Oceanic and Atmospheric Administration (NOAA) administers the CZMA at the Federal level.

#### Who is responsible for coastal management?

- \* Of the 35 eligible states and territories, 29 participate in the Federal program. At the state level, a lead agency oversees implementation of the CZM program and administers the Federal grant funds. This agency may be solely responsible for all CZM planning, regulation, and management, or it may share implementation authority with other state agencies.
- \* Local governments are involved in the implementation of state CZM programs, either formally or informally. In some states, local governments play a central role by developing local coastal programs and by making land use decisions in accordance with state standards.
- \* Federal agencies are also involved in the development and implementation of state CZM programs. State and Federal agencies must coordinate during the development of state programs. Once NOAA approves a state coastal program, other Federal agencies must ensure that their actions are consistent with the state program. Through coastal management, states and Federal agencies cooperate in planning and permit processes, simplifying the regulatory process.

#### What can coastal management programs do about nonpoint source pollution?

State coastal management programs are in a unique position to help control nonpoint source pollution because they address land and water use issues within the coastal zone. Traditionally, addressing the shoreside causes of nonpoint pollution has been a state and local government responsibility through land use decisions. With state permits and support for local governments, coastal management programs can help focus attention on controlling nonpoint source pollution through stormwater regulations, land use planning, and zoning.

- \* States implementing their programs through state permits often require buffers to set development back from the shore, strict erosion and sedimentation control practices for construction projects, and stormwater control systems in new development, to cite a few examples.

- \* States implementing their coastal programs through local governments work with municipalities and counties to improve zoning and subdivision ordinances to control nonpoint source pollution, including reducing the density of development adjacent to shorelines .

Coastal management programs use several non-regulatory mechanisms to address nonpoint source pollution. They provide funds for research, public information and to encourage the voluntary use of best management practices, a term used to include a variety of nonpoint source pollution control techniques. The staff of coastal programs also provide public information and education on effective solutions to nonpoint source problems. Finally, coastal programs initiate purchases of property for wildlife habitat, research and recreation when that appears to be the only method to protect threatened coastal waters.

How are nonpoint source efforts being coordinated with other Federal agencies?

The Coastal Zone Management Act requires state coastal programs to incorporate the provisions of the Clean Water Act into their programs. Section 319(h) of the Clean Water Act requires states to submit to the Environmental Protection Agency (EPA) a Nonpoint Source Pollution Assessment Report and a State Management Program. Once the management program has been approved, the state is eligible for implementation grants. For the first time, funding will be available for the Section 319 program in Fiscal Year 1990; \$40 million will be available for all fifty states to implement their nonpoint source programs. (The Fiscal Year 1990 appropriation for coastal management is \$34 million for 29 states).

NOAA and EPA have coordinated their nonpoint source pollution efforts by sharing information with state contacts about each others' programs and encouraging the coastal agencies to participate in preparing Section 319 Assessment Reports and Management Programs. OCRM has reviewed the Section 319 management programs and encourages coastal management programs to give due consideration to the priorities established in these programs.

At the state level coordination has varied among states, often increasing in instances where the water quality agency and the coastal agency are in the same department. Even where this is not the case, as in New York, the coastal agency was a member of the task force that developed the Nonpoint Source Pollution Assessment. In Florida and South Carolina, the Section 319 Assessments recognized the importance of the Federal Consistency provisions of the CZMA (see Part IV of this report) as a tool for implementing some of the nonpoint source reduction goals. Nevertheless, all participants recognize that there needs to be

much better coordination. OCRM is working to assure that future revisions to Section 319 management plans incorporate state coastal programs efforts and assets, where appropriate.

In states participating in EPA's National Estuarine Program, there are several opportunities to closely coordinate solutions to nonpoint source pollution. NOAA and EPA have signed a Memorandum of Understanding(MOU) toward this effort. In partial fulfillment of this MOU, NOAA and EPA held a regional conference in the Northeast to foster coordination and communication. NOAA continues to evaluate coordination through OCRM's formal state evaluation process.

OCRM has established a working relationship with the U. S. Department of Agriculture (USDA) to address agricultural contributions to nonpoint source pollution. The USDA will spend over \$201 million on water quality issues in Fiscal Year 1991. Other parts of NOAA have contributed in the past to USDA research and database committee activities. OCRM and the Soil Conservation Service (SCS) have met to assure the programs compliment each other and do not duplicate efforts. OCRM has participated in various agricultural forums, such as the National Association of Conservation Districts 1990 conference to explain coastal management programs in nonpoint source control and has invited similar participation by the USDA in its activities.

State coastal program staff and SCS extension agents have worked in the field to assure coordinated programs, and have participated on each others advisory boards. In a few instances, CZM has provided partial funding to joint research efforts. Part II F of this report provides more specific examples.



**II. A SURVEY OF COASTAL MANAGEMENT PROGRAMS SOLUTIONS TO NONPOINT SOURCE WATER POLLUTION PROBLEMS**

**A. MANAGING LAND USE: WATERSHED MANAGEMENT, BUFFERS AND SETBACKS**

One of the most effective methods to protect water quality is to properly manage development immediately adjacent to waterbodies. Because state and local coastal programs can regulate the use of land, they can require buffers between development and the water. Vegetated, undeveloped land can absorb the nonpoint source pollution impact of development before it gets to the water. For example, a 100-foot buffer in native vegetation between a parking lot and a river can strain the oil and grease from cars before it reaches the water. A buffer can serve the same purpose in providing some protection from poorly functioning septic tanks.

Alaska CZM\* uses buffers to protect rivers rich with salmon.

Nearly 50 percent of the United State's entire sockeye salmon production comes from Bristol Bay, Alaska. The local coastal program wanted to assure protection of the coastal waters for salmon, which is an important commercial and subsistence resource.

The Bristol Bay local coastal program establishes a 100-foot buffer for development which does not need to be adjacent to the water. The buffer thus protects the rivers for salmon migration, spawning and rearing and extends to the tributaries that affect those waters. Program policies place high priority on maintaining subsistence activities by natives and controlling the potential water quality impacts from placer mining.

The California Coastal Commission addresses nonpoint source pollution through its review of permits and local coastal programs.

The California Coastal Act contains policies related to controlling runoff and requiring vegetated buffers, which enables the Commission to review individual permits to require grading plans and erosion control provisions.

The Commission also reviews local coastal programs developed by cities and counties for consistency with the nonpoint source pollution policies.

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\*Throughout this document CZM refers to the coastal management agency. Refer to Part V for specific agency names and addresses.

For example, the Santa Barbara County Local Coastal Program establishes minimum buffers for wetlands and stream corridors. A minimum 100-foot buffer must be maintained in its natural condition along all wetlands. A minimum buffer for major streams in rural areas is 100 feet and 50 feet in urban areas. The local zoning code incorporates these requirements thus assuring their implementation.

The Rhode Island Coastal Program requires buffers for new development along non-urban waters.

Under its permit program, the Coastal Resources Management Council reviews all development within 200 feet of the water. It requires a minimum 50 foot buffer, kept in natural vegetation, for all development. The Council has required buffers up to 200 feet adjacent to environmentally sensitive waters.

New York local governments use CZM funds to address nonpoint source pollution problems.

The Town of East Hampton coastal program has a seven point program to address nonpoint source pollution: (1) setbacks from waters for structures and septic systems and low density zoning; (2) land acquisition and conservation easement programs; (3) redesign of street ends to minimize runoff; (4) fertilizer application and land clearing restrictions; (5) a permit system which requires special review of projects near designated natural features; (6) surface water quality monitoring and testing and (7) improved local law enforcement. All of these practices are included in the Local Waterfront Revitalization Program which is incorporated into local zoning and binding on State agency actions.

North Carolina requires permits for development projects impacting critical areas.

CZM reviews development in the 575 foot Area of Environmental Concern adjacent to nine waterbodies designated as Outstanding Resource Waters. CZM also reviews all development within 75 feet of tidal wetlands. New development projects cannot add nonpoint source impacts on the critical areas.

Maryland encourages planting buffer zones.

CZM funds have been used to plant trees, shrubs and native ground cover in several areas along the Chesapeake Bay and its tributaries. The state's "Greenshores Program" promotes the planting of forested buffers along the

shoreline of the bay. This activity is especially important because these buffers minimize nonpoint pollution, as well as provide wildlife habitat.

In American Samoa, a local village council regulates land use to protect a lagoon.

CZM has supported a significant public education effort which combines the protection of wetlands and other natural resources with the preservation of Samoan culture. Meetings in Nu'uuli Village resulted in support from the local village council for continued regulatory and enforcement efforts to protect Pala lagoon from nonpoint pollution sources. This was a significant resource management landmark in working within the traditional land tenure system in American Samoa.

A mangrove forest adjacent to the Nu'uuli lagoon was threatened by nonpoint pollution and encroachment by filling. Recognizing the significance of the lagoon, the Coastal Program commissioned a resource management study. As a result, the American Samoa Government obtained EPA funds to construct a sewer line around the lagoon to significantly reduce water quality threats from 400 nearby homes.

In Massachusetts, coastal Areas of Critical Environmental Concern (ACEC) along rivers and estuaries are protected.

After an area is designated an ACEC, proposed development projects within it are subject to more intense scrutiny under the Commonwealth's regulatory programs and the Massachusetts Environmental Protection Act. For example, every application for a dock or pier located in an ACEC is reviewed for nonpoint pollution impacts. There are currently 12 ACECs designated, which protect over 145 miles of shoreline.

New Hampshire assists local governments to incorporate water quality issues in land use decisions.

CZM funds were used to prepare the estuarine portion of the water resource plan for the towns of Newfield and Stratham. A comprehensive resource inventory and maps of resources along the river corridor will be prepared. This information will be used by both towns in making decisions on zoning, subdivision controls, and setbacks.

## **B. CONTROLLING URBAN AND SUBURBAN RUNOFF**

Control of stormwater runoff can significantly control pollutants. Stormwater can contain soil from eroding cliffs and construction sites, as well as lawn chemicals, street litter, oil and grease. State coastal programs issuing permits or having other land use authorities often require stormwater prevention techniques for new developments to assure that stormwater is controlled.

Urban runoff, containing street litter, pet waste, road salt, sand and oil, can be carried by water and winds into adjacent rivers. State coastal programs are beginning to get involved with towns to emphasize the importance of regular street sweeping, catchment basins, and other activities.

North Carolina requires new developments to control stormwater and encourages local coastal plans to include stormwater regulations.

CZM initiated the development of stormwater runoff regulations which now apply to all new development projects adjacent to estuarine waters.

CZM has encouraged local land use plans prepared in coastal counties to include stormwater runoff plans. Nine plans are currently being completed.

New York local coastal plans require no increase in stormwater runoff and control runoff from streets.

The local waterfront plan of the Village of Mamaroneck instituted stormwater runoff retention regulations which require that peak rates of discharge are not increased beyond pre-development or pre-construction levels for all new development. This "zero increase" policy is now a model for other local waterfront plans.

The Village of Patchogue used CZM funds to redesign street ends to reduce stormwater flowing directly into the bays and rivers. Included in the redesign were sediment basins and buffers of native planting.

In Wisconsin, a Priority Watershed Program protects the Milwaukee River.

The coastal program funded a study to control nonpoint source pollution in the Milwaukee River. A model ordinances for construction site erosion control and a development handbook were prepared. Model ordinances for other urban problems are being developed on stormwater, water retention, pet waste and sweeping streets. In agricultural areas, CZM is working with landowners to develop conservation plans.

South Carolina Coastal Council reviews stormwater management plans for new permits.

The Coastal Council adopted stormwater guidelines in 1988, which generally require retention of the first inch of rain and requires the release of runoff in excess of one inch to be at a rate no greater than if was undeveloped based on a five-year, 24 hour storm event.

### C. IMPROVING SEWAGE DISPOSAL SYSTEMS

Poorly located or faulty septic systems are a major source of pollutants in some rural and suburban waters. As a result shellfish bed closures are often necessitated. Coastal programs have been involved in assisting local governments and homeowners in correcting these problems, and in evaluating and monitoring alternative systems.

New York funds promotion of alternative systems.

CZM funded Save the River, a non-profit group operating along the St. Lawrence River, to assist riverfront property owners in correcting faulty individual sewage disposal systems that have polluted the river for years.

Homeowners were provided information about alternative systems such as aerobic tanks, low flush, composting and incinerating toilets, and offered free, on-site surveys on the effectiveness of their system. Trained volunteers conducted the surveys using tracer dyes.

Once a homeowner successfully passes the survey, Save the River awards them a hand-crafted Save the River Clean Water Award. Over 120 surveys were conducted in the summer of 1989; there is currently a waiting list of 45.

Rhode Island assists owners to properly maintain or improve septic tanks.

CZM awarded grants to the towns of Charleston and South Kingstown to evaluate septic systems that were suspected of having failed near the ecologically fragile salt ponds. A CZM funded brochure about the "care and feeding" of septic systems was mailed with tax bills to property owners. As a result of this effort, South Kingstown established a tax rebate as an incentive for annual pump-outs.

CZM funds were also used to provide information to owners about low interest loans and a State grant program to make desired improvements. The towns were influential in obtaining State legislation which enabled special management districts to be created for non-sewered areas. Four districts are now operating which have an inspection system requiring mandatory pumping every three years and the authority to make corrections.

#### D. CONTROLLING MARINA IMPACTS

Wastes from boats can severely degrade shallow estuarine waters. The long-recognized solution for controlling boat wastes has been to require boats to have holding tanks and marinas to have facilities for pumping them out. While there has been some resistance to these approaches in the boating community, CZM programs have often pressed for requirements for pump-out facilities in new marinas. Marinas also cause adverse impacts on waters through their normal operations - i.e., pumping gas, scraping and painting hulls, and engine repairs. CZM permits have been used to control some of these impacts.

Poorly sited marinas can destroy habitat and degrade water quality when located in basins with low flushing rates. Marinas can alter circulation patterns and destroy wetlands during construction and maintenance dredging. CZM programs have played an active role in the siting of new marinas, using regulatory permits to direct marinas away from pristine or valuable shellfish areas. Dredging for marinas is also closely reviewed by coastal programs. Another criterion for siting has been assuring that flushing rates and circulation patterns in proposed project areas are adequate to minimize adverse impacts on water quality and habitat protection.

Connecticut CZM requires pump-out facilities for new marinas and proposes "No Discharge Zones."

The State requires pump-out and other marina sanitation facilities as a condition of approval for all permits for new marinas and significant marina expansions. CZM has proposed legislation which would establish "no discharge zones," requiring marinas and other dock facilities to provide pump-out facilities, and allowing inspection of vessels and docking facilities for compliance with the new regulations.

New Jersey CZM requires pump-out facilities for new marinas and controls siting of marinas in critical areas.

The CZM permit requires pump-out facilities for new or expanding marinas. The permit may require dockside restrooms. CZM has proposed legislation to recover some of the fuel tax from recreational boaters to subsidize pump-out facilities at existing marinas.

CZM has been actively involved in improving water quality along the St. Georges watercourse in Brigantine, Atlantic County. In addition to initiating a Special Area Management Plan to address many coastal issues, CZM has been denying permit applications for the construction of marinas, docks and piers because of the presence of valuable, harvestable shellfish resources. As a result, there has been a continuing improvement of water quality.

CZM has completed a shellfish mapping project which identifies areas of high quality shellfish resources. These maps are used by permit review staff in decisions on siting marina development in the coastal zone.

Delaware CZM has supported marina retrofitting legislation.

The CZM agency will promulgate final regulations on marina siting and operations in March 1990. The regulations will include requirements that existing marinas develop operations and maintenance plans. These plans must address the 1988 marina pump-out law, which requires existing and new marinas to provide pump-out facilities for all vessels, and direct slipside pump-outs for liveaboards.

The South Carolina Coastal Council minimizes marina impacts on wetlands and marine resources.

The Council not only regulates siting of marinas but also their operations. See Part III D of this report for details.

## E. SITING LANDFILLS AND REDUCING PLASTICS AND LITTER

Solid waste landfills often have been placed adjacent to rivers with little thought given to their impact on the adjacent waters. Landfills can leach toxics and nutrients into the groundwater and from there into adjacent rivers. Direct contamination can occur during floods.

Litter often is washed directly into waterways with stormwater or through combined sewer outfalls. Coastal programs have been involved in several efforts to control solid waste, including leading a massive, nationwide beach cleanup effort every fall. (See Coastal Management: Solutions to Our Nation's Coastal Problems, December 1988 for details.)\*

Some Alaska local programs prohibit hazardous waste in landfills.

The Juneau local coastal plan prohibits hazardous landfill materials within 100 feet of a floodplain, in order to protect the waters from any leaching from the landfill.

In addition, no new development which will involve the storage of hazardous materials will be permitted in the 100 year floodplain unless there is no feasible and prudent alternative and unless safety measures are provided to prevent accidental discharges.

Alabama requires solid waste sites to control impact on coastal waters.

CZM funds have been used recently to conduct a solid waste monitoring study of unpermitted solid waste sites in the coastal zone. Sites were inventoried using aerial reconnaissance and field inspections. Property ownership was determined. After notification, the State negotiated with owners to clean up the sites and has initiated several administrative and enforcement procedures against owners still not complying.

New Jersey encourages street sweeping and improves solid waste handling.

As part of its coastal development permit, CZM has required regular street sweeping when litter is likely to be a major pollutant. CZM and the U.S. EPA worked together to examine sources, types, and movement of marine debris along the New Jersey coast. A major debris wash-up in August 1987 of medical waste, wood, and glass was investigated. It was found that the

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\* Copies available from OCRM, see address in Preface.

solid waste handling, transfer, and disposal procedures of New York City were the major source of floating debris. The City and New Jersey have since reached agreement to reduce inadvertent releases of trash as it is moved by barges.

Mississippi CZM enforces strong pollution legislation.

The CZM initiated legislation which made the State the first to adopt the marine pollution provisions of Annex V of the Protocol of 1978 of the International Convention of Pollution. CZM now monitors and enforces this State law and promotes increased public awareness through information programs.

The legislation prohibits the discharge of any litter from land, any size marine vessel, oil rigs, or the air. It regulates the discharge of all types of plastics, garbage, food and human wastes. Boaters will also be held liable for accidental spills, dumping or disposal of materials into State waters.

California Coastal Commission encourages recycling as part of its Adopt-A-Beach program.

A specific goal of the Commission's Adopt-A-Beach program, a year-round coastal clean-up program, is to increase the number of beaches where recycling occurs. Currently, all beaches operated by Los Angeles County have recycling programs for beach debris.

## **F. MANAGING FARM PRACTICES**

Farming practices can be a significant source of nonpoint pollution. Fertilizers, chemicals for weed control, soil tilling in a manner that causes runoff into the waters, and animal waste can all cause pollution. Minor changes to farming operations by farmers can limit these impacts. Coastal programs have worked with local soil conservation officials and rural governments to assist farmers to use best farm management practices on a voluntary basis and occasionally have used the regulatory process to require such practices.

Delaware funds a unique solution to the animal disposal problem.

Numerous large poultry growers operate in Delaware; manure and bird carcasses create a significant nonpoint source pollution problem. Local conservation districts, which operate with CZM funds, have developed a dead bird composting program in cooperation with extension services and state universities. Farmers first add a mixture of manure and water to bird carcasses. The compost pile then "cooks" the carcasses through natural processes until only compost remains. The process is virtually odor-free and produces a quality compost. Although the program is only in the pilot stage, the results are encouraging.

Maryland requires conservation plans and best management practices on agricultural lands.

The Maryland Critical Area Program requires soil conservation and water quality plans to be developed for agricultural lands and best management practices implemented to minimize runoff from agricultural lands. See III A for details about the Critical Area Program.

In 1990, Maine adopted shoreline zoning ordinances which require improved farming procedures.

CZM assisted in preparing a shoreline ordinance which prevents future tilling of soil, manure storage and livestock grazing in areas adjacent to waters. The range of the prohibited area--25 to 100 feet from the water--varies by waterbody (i.e., great ponds, wetlands, and stream tributaries, etc.).

In Washington CZM conducted a study which found farming practices contributed to pollution and developed procedures for improvements.

Better pasture management, including fencing along the creeks, were initiated as a result of a CZM study. The success of this small study led to a larger effort by the State to develop a Basin Water Quality Plan which was partially funded by CZM. See Part III C of this report for more details.

## G. MONITORING NONPOINT SOURCE POLLUTION

The specific relationships between development and nonpoint source pollution are not completely understood nor are the solutions. State CZM programs have initiated unique research and monitoring activities to increase their understanding of these relationships.

Rhode Island CZM monitors a new septic system.

CZM, working with the University of Rhode Island(URI), and URI Sea Grant, funded research to monitor and field check an innovative denitrification septic system which CZM had required homeowners to use in an extremely sensitive cove. The ongoing study has found that standard septic systems remove much less nitrogen than scientists previously believed.

New Hampshire CZM monitors the Great Bay.

CZM has identified nonpoint source pollution as a potential problem in the Great Bay area and is funding a project through the Jackson Estuarine Laboratory to study the significance of high volume runoff storm events on bacterial and nutrient loading.

The study results will be used to develop improved criteria for municipal water resources plans which are now required by the Water Protection Assistance Program Act. These plans are a prerequisite for either adopting or amending local zoning ordinances.

In Washington, coastal funds are used to investigate freshwater wetlands for nonpoint pollution control.

Kings County used CZM funds in a multiphased research program to investigate the viability of using freshwater wetlands for urban surface water management and nonpoint source pollution control. The project involves collecting baseline data, sampling, analyzing, and monitoring the wetlands and interpreting the results to devise policy and management guidelines that protect wetlands and downstream waterbodies.

In 1989, CZM funded the design of a monitoring program to diagnose sources of bacterial contamination of shellfish beds. Since its completion, a number of water resource managers have used the monitoring program in other localities.

South Carolina CZM funded instream monitoring.

CZM funded Section 208 Clean Water Act updates for communities located in the coastal zone. As part of the update for the Charleston area, CZM funded instream monitoring for water pollutants and sources in the Ashley and Waccamaw Rivers.

Northern Mariana Islands provided staff and funds for water quality monitoring activities:

CZM has provided staff and funding to support the Commonwealth's water quality monitoring program, within the Division of Environmental Quality. In addition, special studies have been conducted such as the Suspended Sediment Load Study for Saipan Lagoon and Lau Lau Bay, which was completed in August 1989.

New York CZM scientifically studies two stream corridors.

CZM, with the Long Island Regional Planning Board, is developing recommendations for maintaining and improving fresh and marine water quality in stream/river corridors feeding into the Great South Bay. The study will be conducted using one semi-rural and one urban stream corridor. The purpose of the study is to identify for the first time, the options, costs, and recommended actions needed to cope with stream corridor pollution. Water quality conditions indicate that the stream corridors are significant contributors to pollutant loadings in the Bay.

In Florida, over \$30 million in State funds in 1987 and 1988 were directed to water basin monitoring and planning.

CZM developed the administrative procedures to guide the program and administers the trust fund grants to water management districts. CZM also manages the State review of completed basin plans. See Part III B of this report for more details.

## H. INCREASING INFORMATION ABOUT NONPOINT SOURCE POLLUTION

Because nonpoint source pollution is difficult to control and some of its reduction requires citizens to alter their actions, there is a large role for public education. Coastal programs have been actively involved in information exchange on a broad spectrum of problems by providing newsletters and other publications which have proven useful in increasing public understanding. In addition, coastal programs have worked with special interest groups, such as developers, who have specific technical information needs which can be met through publications and training sessions.

Northern Mariana Islands sponsors Stormwater Control Handbook.

CZM contracted with the SCS to prepare a handbook to assist developers and farmers in minimizing erosion and sedimentation of marine waters. The handbook includes soil and rainfall information specific to the inhabited islands of Saipan, Tinian, and Rota, as well as technical guidance for controlling runoff during construction and farming operations.

Other state CZM programs which have prepared similar handbooks are New Jersey, South Carolina, Virginia and Maryland.

New York sponsored three workshops on nonpoint source pollution.

In 1989, the coastal program sponsored three workshops about: 1) boater pollution 2) septic systems and 3) nonpoint source pollution. Experts from other states were brought in to describe their experiences; written summaries of the results of the workshops are available. Over 150 people attended.

# LOCALITIES AND STATE UNITS GET FUNDS FOR 41 COASTAL RESOURCE PROJECTS

**T**wenty-one local governments and eight planning districts in Virginia's Tidewater region—from Northern Virginia to Hampton Roads and the Eastern Shore—are benefiting from a federal grant to carry out coastal resource management projects. This is the third year Virginia has participated in the federal-state-local program.

Half of Virginia's 1988-89 fiscal year grant of \$1,786,000 is devoted to assisting local projects. The other half is being used by eight state agencies for 20 projects. The money is provided by the National Oceanic and Atmospheric Administration, a branch of the U.S. Department of Commerce.

Reservation of half of the funds for local activities is a long-standing commitment the Commonwealth made with the NOAA in establishing the Virginia Coastal Resources Management Program.

Fifteen counties and six cities and towns are sharing the funds to conduct projects ranging from \$10,000 to \$25,000. Almost half of the efforts are related to development or revision of local comprehensive plans in order to protect the jurisdictions' sensitive coastal zone resources.

Local matching money totals \$377,877. Added to the federal funds, the local projects will cost about \$1.25 million. Localities are contributing almost 70 percent of the total.

Overall \$3.3 million is available for the projects.

Mobile Register

## Oyster beds saved by compromise

BY EARL SWEATT  
Press Register Reporter  
Mobile Register

model and an interface with the Geographical Information System for the region, including evaluation and a nonpoint source pollution control project review. A groundwater protection handbook and suggested ordinances for water management are being developed. Southeastern Virginia PDC. Both are doing work with \$25,000 grants. This is in addition to basic grants given to each Tidewater planning commission for technical coastal management assistance to localities within their districts.

Ten local governments are working on comprehensive plans, conducting projects as creating coastal and natural resource plans; developing regulations to implement land use plan and an environmental revisiting plan to set standards for urban and management to ensure coastal protection; adding a shoreline management section to comprehensive plan; emphasizing water quality; establishing guidelines for development; and revising county ordinances to enable handling of management pressures.

Other projects to protect include addition of a position for land-use planning and management of stormwater runoff in King George and Wight County's relationship with the state. Other projects include protection of environmental resources and a study of water resources.

Mobile Register

## Nature group buys island

Purchase ends plans to develop Permuda

By TOM MATHER

CHAPEL HILL — A private conservation group Friday purchased half of Permuda Island with an option to buy the remaining half — apparently bringing an end to the long-standing controversial plans to develop the 50-acre coastal island.

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# Joint effort backed on watershed regulation

8-9-88 Raleigh N+C

By SEAN M. BAILEY Staff writer

In a move to bring uniformity to inconsistent rules governing development in the Falls Lake watershed, a City Council panel recommended Monday that a joint city-county committee be appointed to draft consistent watershed regulations.

The recommendation by the council's Public Works Committee

long debated whose watershed restrictions are the toughest. The regulations are important because they control the degree of development allowed in the watershed, which drains into Raleigh's primary source of drinking water, Falls Lake.

"This is an attempt to resolve that and get it straightened out all at once," committee chairman Charles C. Meeker said in an interview. "Our hope is that we can agree on a standard that will

toward arriving at a regional watershed standard.

Wake commissioner Larry B. Zieverink said in an interview that he welcomed the Raleigh proposal and agreed that it would boost the effort to arrive at regional watershed controls.

"Everybody lives in someone's watershed, and we need to get the state to take a more active role in this," Zieverink said.

While both governments limit residential development to about

total lot size. Wake allows 10 percent hard surfaces on residential lots in the primary shed.

During a rain, water rapidly off hard surface picks up impurities as it through the watershed, then contributing to pollution.

While no suggestions made about specific regulations, Louis A. Jones, a Raleigh resident who often appears before

## III DETAILED EXAMPLES OF COASTAL MANAGEMENT AND NONPOINT SOURCE POLLUTION

### A. CRITICAL AREA PROGRAM IN MARYLAND

#### Overview and problem

In passing the Chesapeake Bay Critical Area Protection Act (Critical Area Act) in 1984, the Maryland General Assembly recognized that the cumulative effects of human activity have resulted in deteriorating water quality and productivity of the Bay and its tributaries. The primary purpose of the Critical Area Law is to foster more environmentally sensitive development within Chesapeake Bay's critical areas thereby minimizing damage to water quality and natural habitats.

The bay has experienced three centuries of human use and neglect. Rapidly increasing population and development pressures, and agricultural and urban runoff have caused an increase in bay nutrients which deplete the oxygen supply for fish and aquatic life. Uncontrolled agricultural practices and urban development have increased sedimentation of the Bay, blocking the light needed for submerged aquatic vegetation and filling navigational channels. Finally, toxic laden runoff and dredge material disposal have adversely affected the diversity and health of bay species.

#### The Chesapeake Bay

The Chesapeake Bay is the nation's largest estuary and one of its most valuable natural resources. Located within Maryland and Virginia, its mainstream is over 195 miles long and 3.4 to 35 miles wide. The bay drains 64,000 square miles with over 150 rivers, creeks and streams flowing through portions of six states and the District of Columbia.

The bay provides an abundant fishery and wildlife habitat of national importance. Its extensive finfish and shellfish harvest represents an annual commercial value of approximately one billion dollars. In addition to the riches from its waters, the extensive 7,000 miles of shoreline and over 200,000 acres of wetlands support more than 2,700 species of animals and plants, and are a major stopover for migratory birds along the Atlantic flyway.

#### Development and administration of the Chesapeake Bay Critical Area Program

In 1983, the Governor of Maryland appointed a task force to address the declining health of the Chesapeake Bay. The task force proposed that the State enact a Critical Area Act. During initial discussions, the Maryland Coastal Zone Management Program's (MCZMP) Coastal Resources Advisory Committee

(CRAC) played an important role in the development of the Critical Area Act. The CRAC, with over 100 members from local governments, state agencies, Federal agencies, and private interests, is supported by CZM funds, and advises the Maryland Department of Natural Resources (DNR) on coastal issues.

In June 1984, the Critical Area Act was enacted and the new Critical Area Commission (Commission) began developing the criteria to guide local government development and implementation of local Critical Area Plans. The 26 member Commission is composed of local officials and broadbased interest group members from each coastal county, as well as state officials. After much public input, the Commission promulgated criteria in December 1985, which were then signed into law in May 1986. Local plan development then started and by January 1990, 55 of the 60 local plans were completed and are being implemented. The five remaining plans are nearing completion. Since 1983, approximately \$1.4 million in federal CZM funds have been used by the MCZMP, the Commission, and CRAC in the development and implementation of the Critical Area Law. State funds for the Critical Area Program have totaled more than \$10.4 million.

The Critical Area Program includes all Chesapeake Bay tidal waters and tidally submerged lands, the 100-year tidal floodplain and extends 1,000 feet beyond the landward boundaries of state or private wetlands. Local governments may expand the boundaries of their critical area, but they cannot reduce it below the 1,000 foot minimum area. Within the 1,000 foot management boundary, local jurisdictions are required to incorporate the Commission's criteria into their plans and permit process. The criteria contain policies addressing habitat protection, water dependent facilities, agriculture, surface mining, and development.

The primary responsibility for implementing the Critical Area Act lies with the local governments which are required to develop management programs to carry out three protective goals: (1) minimize adverse impacts on water quality; (2) conserve fish, plant and wildlife habitat; and (3) establish land use policies for development in the Critical Area.

#### **Criteria for controlling nonpoint pollution through the Critical Area Program**

To minimize the impact of growth on water quality, the Commission designated three land use categories: Resource Conservation Areas, Limited Development Areas, and Intensely Developed Areas.

- \* Resource Conservation Areas (RCAs) generally have less than one dwelling unit per five acres, no public water or sewer, and are mostly composed of wetlands, forest, and uncultivated and cultivated fields. Development in RCAs is limited to an overall density of one residential dwelling unit per 20 acres. Local governments are directed to conserve, protect, and enhance

ecological values, biological productivity, and species diversity in the critical area. Development activities in the RCA must also comply with the Limited Development Area criteria.

- \* Limited Development Areas (LDAs) are characterized by one dwelling unit per five acres up to four units per acre. The LDAs have water and/or sewer, and land use is mixed but not dominated by agriculture, wetlands, forest or open space. Nonpoint source pollution controls for LDAs include restricting the removal of forested land to 20% for any one development project, limiting impervious areas to 15% of a site, encouraging clustering of dwelling units, criteria restricting stream alteration, and requirements for replacing cleared forest land elsewhere in the critical area on a one-to-one basis.
- \* Intensely Developed Areas (IDAs) are characterized by dense residential or commercial uses. IDAs have four or more dwelling units per acre and/or have public sewer and water serving three or more units per acre. Reducing nonpoint source pollution in IDAs is accomplished by reducing pollutant loadings by 10% from pre-development loads for redevelopment projects, protecting remaining wooded areas and enhancing vegetation for new developments, and requiring local government water quality assessments and programs that improve water quality and protect remaining natural habitats.

Up to five percent of a county's RCA may be redesignated as IDAs or LDAs, excluding the RCA acreage in tidal wetlands or federally owned property. No more than one-half of this expansion may occur in the RCA.

Specific nonpoint source pollution control policies which apply to the entire Critical Area include: establishing a 100-foot buffer landward from the mean high water line of tidal waters, streams, and wetlands; a 25-foot buffer around non-tidal wetlands; limiting timber harvesting within 1,000 feet of the Bay and perennial tributary streams; developing agricultural soil conservation plans and best management practices; and maintaining a 25-foot filter strip along tidal waters until a soil conservation plan is implemented.

#### Evaluation and future efforts

Local Critical Area Plans are now being implemented. The success of the program depends on adequate enforcement at both the state and local levels. In addition, sufficient funds will be needed by the Commission and the local governments to fulfill their responsibilities. While the Commission is already seeing an increase in forested areas due to the criteria and better development designs, there is growing concern that the program which promises to do much for the health of

the Chesapeake Bay may be inadequate by itself. Many believe that increased growth along the entire bay watershed, may, in the long run, overwhelm efforts to improve water quality unless stricter controls and stronger growth management policies are applied. In response to this concern, the Governor of Maryland appointed the 2020 Chesapeake Bay Growth Management Commission to examine this problem. Recommendations from the Commission are expected in the fall of 1990.

## **B. BASINWIDE WATER QUALITY IN FLORIDA**

### **Overview and problem**

The State of Florida is growing at a tremendous pace. Despite the economic benefits of development, rapid growth exerts pressures on the natural systems including wetlands and water quality. Urban development within the state and increased agriculture has increased stormwater and waste water loading in many watersheds in the State. Florida responded to these pressures by setting up a variety of statewide, regional and local initiatives to address water quality issues. Two of these important programs are described below:

### **Development and administration: SWIM program**

The Surface Water Improvement and Management Act (SWIM) was signed into law by Governor Martinez on June 29, 1987. This landmark legislation set up a program and provided initial funding to begin the cleanup and restoration of polluted surface water in Florida, along with the preservation of threatened waterbodies within the State. The State's five water management districts are responsible for implementing the law.

Each water management district is required to address priority waterbodies named by the legislature within its area and prepare a priority list of other waterbodies in need of restoration, conservation and/or preservation.

Funds are provided through a trust fund administered by the state Department of Environmental Regulation (DER). The Coastal Management Program, within the DER, is responsible for reviewing and recommending actions pertaining to SWIM waterbody plans, projects, and funds. The Coastal Zone Management grants have provided significant influence over the direction taken by the water management districts' SWIM activities.

### **Criteria to control nonpoint source pollution: SWIM program**

After they identify priority watersheds, each water management district develops a plan to address the identified water quality problem for each watershed. Besides biological and physical descriptions of the waterbody, the plans contain land use and nonpoint source assessments which will help determine overall impacts of land use within the basin and lead to revised best management practices. The plans identify legal frameworks, needed coordination efforts between state and local entities, and public information programs required for the success of the overall effort. The plans include a timetable for bringing all sources into compliance with state water quality standards and a strategy to restore those water bodies

in need of restoration. Finally, the plans will describe projected cost and revenue capability in order to reach each intended water- body goals.

**Evaluation and future efforts: SWIM program**

The Coastal Zone Section within DER's Bureau of Surface Water Management has played a pivotal role in overseeing the SWIM program. Coastal zone staff produced the administrative procedures used to guide the statewide program and administer the SWIM trust fund grants to the water management districts. The coastal zone staff also directly manages the State's review of proposed SWIM plans including coordination of DER and other State agency comments. These efforts have been essential to the success of the program to date.

As of August 1989, the DER had approved SWIM plans for 18 waterbodies, including, among others, Tampa and Biscayne Bays, Apalachicola River and Bay, and the Suwannee River. Plans for such critical areas as the Everglades Natural Park/Florida Bay, Indian River Lagoon and the lower St. Johns River were either conditionally approved or are under development.

**Development and administration: Estuarine Initiative**

For several years, CZM funds have been a catalyst for interagency investigations to assess the overall health of the several major estuarine areas, to identify priority management problems, and to provide direction and leadership for coordinated intergovernmental management. Major improvements have been made in Florida's ability to cope with present and future problems affecting these areas due to the actions funded through this program. The importance of CZM funding in making these achievements possible is significant.

**Little Manatee River Project** This project is one of four main estuarine areas being funded through the Estuarine Initiative. The objective of this project is to develop a comprehensive, basin-wide management program for the Little Manatee River watershed, involving Federal, state, regional, and local agencies. The project will also serve as a prototype for similar efforts in other watersheds in the Tampa Bay system, with the long term goal of enhancing the overall health of the bay.

The Tampa Bay area is one of the fastest growing regions in the State. Impacts of this growth on the Tampa Bay estuarine system have been the subject of numerous scientific investigations and have triggered a variety of efforts related to controlling point sources of pollution, habitat destruction and other negative activities. The State recognizes that if they are to be successful, these projects must be better coordinated and must be conducted within a broader, basin-wide management perspective. They must also focus clearly on controlling nonpoint source pollution, maintaining historic freshwater inflows to the estuary, and

integrating consideration of living resource management efforts in local and regional capital improvement programs and comprehensive plans.

The Little Manatee River is a priority tributary of Tampa Bay, providing nursery habitat for many fish species, and is critical to the quality of the state aquatic preserve in the area. This area is the last major river of the Tampa Bay system remaining in relatively natural condition. Although there has been considerable state, regional and local interest in the area, local governments have been unable to develop a comprehensive management plan for the watershed primarily due to a lack of funding and intergovernmental support. The Initiative will foster such a comprehensive plan.

Phases 1 and 2 of the project have been completed. Work elements completed during Phase 1 include the collection of chemical, hydrological, and biological data from the Little Manatee River and identification of sources and acquisition of land use information for incorporation into a geographic information system (GIS). In Phase 2, riverine data was analyzed to develop a hydrological characterization of the watershed, rating curves and fluxes of dissolved and particulate nutrients, and characterization of biological communities. The land use information was entered into the GIS.

#### Evaluation and future efforts: Estuarine Initiative

Phase 3 of the project, now underway, involves a coordinated effort by DER/CZM, Department of Natural Resources, Southwest Florida Water Management District, and Hillsborough County to develop the management plan for the Little Manatee River. As a result of the progress made using CZM support, the Phase 3 effort is being jointly supported by CZM and the Florida SWIM program.

The CZM funds have provided the management tools and leadership focus necessary to leverage State, regional and local funding and provided continuity of effort toward achieving priority goals and objectives. This has influenced State legislation and made possible ongoing State, regional and local programs to help manage the Tampa Bay system.

Project results are intended to improve the overall management of local and State programs affecting the Tampa Bay area and provide the basis for integrating local land use, environmental protection and stormwater management programs with the ongoing effort of State agencies charged with water quality and habitat protection.

## **C. MARINA SITING IN SOUTH CAROLINA**

### **Overview and problem**

The South Carolina coastal zone contains more tidal marsh than any other Atlantic coast state. The ecological importance of wetlands and other estuarine aquatic habitats is well established. Population growth, development and recreational demands, however, continue to threaten wetlands, jeopardizing their value as wildlife habitat, nurseries for finfish and shellfish, and as filters for natural and man-made pollutants.

Marina construction can destroy productive estuarine areas through dredging and bulkheading. Shading, maintenance dredging, and various forms of water quality degradation create continuing stresses on wetlands adjacent to marinas. Improper marina siting and design can heighten wetland stress through inadequate tidal flushing, sedimentation control, and stormwater management practices. Marinas often indirectly create adverse effects through increased residential and commercial development, road construction, and related activities.

### **Development and administration**

Two state agencies play a key role in reviewing marina permits in South Carolina:

- \* The South Carolina Coastal Council (SCCC) is responsible for permitting in tidal areas. The SCCC considers permits in the context of its marina policies and other coastal zone management considerations established in the South Carolina Coastal Management Program; and
- \* The South Carolina Department of Health and Environmental Control (DHEC) issues a water quality certification under §401 of the Clean Water Act. Additionally, marinas must meet DHEC requirements for sanitation, fuel, sewage, and related facilities.

Under the South Carolina Coastal Management Act of 1977, the SCCC has direct permitting authority for activities in the "critical area," which includes estuarine and salt marsh areas, and indirect permitting authority through certification reviews throughout the eight coastal counties. The SCCC has signed agreements with State agencies outlining the consultation process. The SCCC is active in developing a regulatory framework to protect tidal wetlands. Anticipating increased demands for new marina construction and recognizing problems in existing marina operations, the SCCC in 1984 developed comprehensive requirements for new marina siting and operations.

## Marina siting criteria

According to SCCC policies, marinas should be sited and designed to:

- \* Minimize adverse effects on wetlands, wildlife habitat, and marine resources;
- \* Take advantage of physical characteristics so as to minimize dredging and shoreline fill and excavation;
- \* Avoid disrupting currents and ensure that all docking areas, turning basins, and navigation channels flush adequately with the tides;
- \* Build where possible open dockage which leads to deep water instead of boat basins, and where feasible, dry storage instead of wet slips;
- \* Provide for proper handling of petroleum products, sewage, waste and other refuse consistent with DHEC specifications; and
- \* Construct boat maintenance facilities on dry land and provide for residue control.

Finally, marina developers must demonstrate to SCCC satisfaction that public demand for the facility exists.

To assist marina developers, the SCCC published a document detailing step-by-step procedures for engineering and environmental analyses which are required in the permit application. The Council published a marina operations handbook, presenting the policies for managing the primary environmental risks in coastal marinas. The operations manual also recommends management rules and regulations to help protect adjacent waters.

Before filing a permit application, developers must meet with SCCC and DHEC for a pre-application conference to discuss the project, identify major obstacles to constructing the proposed marina, (such as proximity to shellfish beds) and decide on the scope and depth of the Coastal Marina Report (CMR) required by the permit application. The CMR includes engineering evaluations of marina siting and design, environmental assessments of the site, and technical studies of dredging requirements, tidal flushing, and other considerations.

The CMR is a comprehensive review of the proposed marina and its effects and includes:

- \* A description of the proposed project (siting justification, dredging and spoil disposal plans, construction drawings, and a demonstration that the marina project is needed);
- \* A description of the existing environment (hydrology, water quality studies, soils characterization, a review of the area's terrestrial and aquatic ecosystem, historical and archeological sites, the local economy and land uses, and an evaluation of the available public facilities), and consideration of aesthetic values;
- \* An environmental impact assessment (a review of pollution loadings from stormwater runoff, and direct boat discharges in the context of state water quality standards, impacts on soils, and effects on the aquatic and terrestrial ecosystems);
- \* A review of measures taken to mitigate the effects described in the environmental impact assessment;
- \* A summary of unavoidable adverse and beneficial impacts on water quality, ecosystems, historical sites, local economy, public infrastructure, and aesthetic values; and
- \* A complete marina operations and maintenance plan.

#### Marina operations criteria

As part of the permit application package, the marina developer submits a marina operations and maintenance (O&M) plan acceptable to the SCCC, DHEC, and the U.S. Coast Guard. Should the SCCC issue the permit, the operations and maintenance plan becomes a permit condition. Required components of the O&M plan include:

- \* **Water quality management:** O&M plans must address sewage disposal, fuel pumping precautions, and a complete regime of water quality sampling and testing. Where appropriate, the SCCC consults with DHEC and/or requires DHEC certification of procedures and equipment.
- \* **Maintenance dredging/disposal and shoreline construction operations:** The plan must describe the extent of maintenance dredging anticipated and mitigation measures to be taken. The plan must certify that all spoil will be

disposed of in permanent upland sites and must describe those sites and their preparation. Further, the SCCC must be notified of any maintenance dredging 30 days before it takes place; a report of the activity must be filed with the SCCC upon conclusion of each maintenance dredging activity. Dredging is permitted only from December 1 to March 1.

- \* Shoreline construction approved in the permit must follow accepted practices such as the use of silt screen and/or absorbent material to isolate construction activity from natural waters. The O&M plan must include a description of all techniques used to protect the environment.
- \* Oil pollution management: The O&M plan must contain a comprehensive oil spill response and clean up plan. The O&M plan must also include procedures for transferring and handling fuel and other petroleum products.
- \* Sewage pollution management: Plans must include a comprehensive sewage spill response plan and procedures for transferring and handling sewage. No liveboards are permitted.
- \* Hurricane/severe weather operations: Marina operators must develop a hurricane response plan and have on hand necessary equipment and supplies. The plan must include standard operating procedures for early planning, evacuation, and recovery.

The SCCC issues a three-year renewable marina permit. Should the Council modify its policies and requirements, those modifications may become permit conditions either during the life of a permit or at the renewal stage. During renewal proceedings, the Coastal Council may reduce the size of or change the configuration of the marina to prevent further water quality degradation. The SCCC will also consider the marina's pattern of compliance with permit conditions and the efficacy of monitoring and other required programs already in place.

The SCCC enforcement staff regularly inspects coastal marinas for compliance with permit conditions and terms. The Council may impose administrative fines and penalties.

### Evaluation and future efforts

The policies and guidelines developed by the Coastal Council have helped ensure that coastal marinas minimize estuarine resources loss, including wetlands and other adverse environmental effects, during a time of significant population growth and demand for new marina facilities. However, recognizing that such growth will continue indefinitely, the Council has launched a review of its marina

regulations to evaluate whether existing regulations are adequate to protect wetlands, water quality, and coastal resources.

Among policies under evaluation are:

- \* Zoning waters under SCCC jurisdiction to prohibit or severely restrict marinas and other uses of non-degraded estuarine areas;
- \* Replacing wet slip construction with dry stack or lock basin marinas unless such alternatives are not possible; and
- \* Encouraging local governments to develop comprehensive shoreline use plans and zoning regulations.

At this time, there is no agreement in the SCCC on the appropriate scope of these policies, or whether they should be adopted.

## D. WATERSHED MANAGEMENT IN WASHINGTON

### Overview and problem

Historically, Burley Lagoon and Minter Bay, located within Pierce and Kitsap Counties, have been very productive for clam, oyster, and mussel rearing, spawning, and harvesting. Increasing nonpoint source fecal coliform bacterial contamination of these watersheds has resulted in the partial or complete closure of shellfish beds since 1978.

As a rural area, the nonpoint sources of contamination from the various land uses include agricultural waste from farms, inadequate on-site sewage disposal systems, and construction related impacts. A marked expansion of rural development and population, particularly along small creeks and streams which ultimately discharge to the watersheds, has resulted in an increase of bacterial contamination, and a detrimental impact on water quality in the watersheds.

Since 1984, the Washington State Department of Ecology's (DOE) Shorelands and Coastal Zone Management Program has taken an active role in the effort to correct the bacterial problems in Burley Lagoon and Minter Bay. DOE has conducted an extensive water quality survey the purpose of which was to analyze existing nonpoint pollution sources, reduce the inundation of fecal coliform contamination, and work towards the reopening of commercial and recreational shellfish beds. DOE is lending further support by funding the development of a Basin Water Quality Plan, and providing both technical assistance and regulation enforcement.

### Development and administration

The Washington State Department of Social and Health Services (DSHS) routinely uses fecal coliform levels to determine the viability of commercial shellfish operations. Due to rising fecal coliform levels in the late 1970's, Burley Lagoon was closed for commercial harvesting of oysters in 1981, followed by Minter Bay in 1982. These two areas remain closed.

In March 1984, DOE, through its State Shellfish Protection Strategy, completed a comprehensive study that analyzed the existing water quality conditions within the Burley and Minter watersheds. The objectives for this study were to:

- \* Determine baseline levels of fecal coliform bacteria;
- \* Locate specific sources of bacterial contamination;
- \* Evaluate nonpoint source pollution associated with various land uses;
- \* Estimate the total annual fecal coliform load;

- \* Relate environmental and water quality data to levels of shellfish contamination;
- \* Recommend methods for reducing or controlling existing coliform sources and preventing further pollution; and
- \* Develop a standardized approach for investigating future sanitation problems.

The study concluded that the main contributors to fecal coliform contamination were the nonpoint sources of failing on-site septic systems, and wastes from domestic animals.

### Evaluation and future efforts

In response to the study, Pierce County adopted new, more stringent requirements related to minimum soil absorption levels, and the installation of septic systems, while Kitsap County adopted larger minimum lot sizes.

Several important projects have been completed, including fencing of creeks, stormwater runoff control, and better pasture management have been completed: thirteen farm plans were adopted; 7,620 feet of fencing was installed; 500 feet of stream bank stabilization measures were instituted; 566 acres of pasture were protected; 2.9 miles of vegetative streamside buffers were created; 950 on-site septic systems were inspected; and 49 septic systems were found failing and corrected.

The study concluded that the most effective long-term solution to the pollution problem in the Burley and Minter watersheds was to implement regulatory measures to manage drainage, animal keeping practices, and on-site septic systems. To this end, Pierce and Kitsap Counties received grants from DOE to develop a Basin Water Quality Plan (plan) which was completed in 1988.

Throughout the plan's development, the counties have worked closely with state agencies, including DOE, which participated in the citizen meetings during which where most of the implementation measures were proposed. As the plan is implemented, the counties and state will continue to coordinate activities to assure that implementation is proceeding effectively. The plan recommends that DOE conduct water quality monitoring in conjunction with, or in addition to, monitoring by the County Health Department, and provide technical assistance for the plan's implementation and future evaluation. The plan further states that continued financial support from Federal programs, such as Section 205j of the Clean Water Act and the Coastal Zone Management Program, for projects directed at improving water quality will be sought.

## E. STORMWATER MANAGEMENT IN NEW JERSEY

### Overview and problem

The New Jersey Coastal Program provides a good example of how a coastal program has served as a catalyst to regulate new development for stormwater impacts improve stormwater standards. The Coastal Program adopted stormwater runoff policies in 1986 and uses them in reviewing all permits in the coastal zone. In 1989, the Coastal Program completed a report entitled Stormwater Management in the New Jersey Coastal Zone, which evaluated existing practices and recommended several innovative techniques for the regulatory program.

Stormwater management is designed to compensate for the added stormwater runoff and pollution caused by development. When land that was formally undeveloped becomes covered with parking lots and buildings, rain water can no longer be absorbed into the ground. Unless properly managed, this excess water can overflow into streams causing erosion and downstream flooding. Most stormwater management ordinances require that peak flows be controlled on site and that the pollutants gathered in the stormwater be cleansed. Ideally, stormwater controls will apply along an entire watershed, not just along the coast, thus capturing the nonpoint pollutants at upstream sources.

### The Atlantic Basin Watershed

The Atlantic Basin, with a drainage area of 2,059 square miles, stretches from just south of Sandy Hook to just north of Cape May. Generally, it encompasses the State's Atlantic coastline. The Atlantic Basin has a population of over 1.2 million and is rapidly growing.

For that portion of the watershed which is not subject to a coastal permit, development projects are subject to town zoning and building codes. New Jersey published a compendium of design guidelines for erosion and sediment control in 1974, which have been incorporated into most municipal ordinances within the Atlantic Basin. Some counties within the basin also have specific design criteria for subdivisions which emphasize groundwater recharge of stormwater.

### Development and administration

The New Jersey Coastal Program, located in the Division of Coastal Resources in the Department of Environmental Protection, issues permits for all development immediately adjacent to the coast and for large scale development up to 24 miles inland. The Coastal Program also passes Federal CZM funds through to localities to encourage better land use decisions at their level.

## Stormwater criteria

The Coastal Program requires that stormwater criteria be met for any development needing a coastal permit within the 849 square mile coastal zone of the Atlantic Basin. All development immediately adjacent to wetlands and coastal waters also needs such a permit. Only larger scale developments need permits further inland (i.e., housing developments of more than 24 units, commercial areas providing more than 300 parking spaces). A permit is based on a three-step process which takes into consideration the location of the project, the proposed land use and the resource policies.

The regulations addressing stormwater runoff are contained within the resource policies. These policies call for best available technology to minimize off-site runoff, increase on-site infiltration, simulate natural drainage systems and minimize off-site discharge of pollutants to ground or surface water, and encourage natural filtration functions.

Best available technology may include measures such as retention basins, recharge trenches, porous paving and piping, contour terraces, and swales. Eliminating curbs, reducing roadway widths and rooftop recharge basins are strongly encouraged.

The key standard relevant to flood and erosion control is that detention requires that volumes and rates be controlled so that after development, the site will not generate a greater peak runoff than prior to development. The key standard relevant to water quality control is to detain a one year frequency 24-hour storm or a storm of 1.25 inches of rainfall in two hours.

Because of concern for impacts on groundwater infiltration, the State has discouraged detention ponds in areas where there are seasonally high water tables, and has required that detention ponds or swales be sited as far horizontally from surface water and as far vertically from ground water as is practical.

## Evaluating best management practices and future efforts

The Coastal Program has just completed a review of the stormwater practices they have been requiring and have made several findings.

- \* More attention needs to be placed on "Minimum Disturbance/Minimum Maintenance Site Development" which stresses the importance of vegetated buffers. Particular emphasis is placed on using vegetation which does not need chemical fertilizer applications. Given that much of existing and projected development in the Atlantic coastal drainage is seasonal or tourism related, the elimination of costly and

time-consuming maintenance requirements such as lawn mowing, fertilizing and spraying, may be attractive to absentee owners and to the growing retirement oriented population.

- \* More use of porous paving is recommended because it is an effective way of naturally removing pollutants, assuming that necessary soil and other standards are met. Maintenance of paving and monitoring of nearby wells would be required with a permit.
  
- \* Dual purpose detention basins for impervious or paved area runoff are recommended in nontidal areas. Dual purpose basins will not only detain stormwater but will capture the "first flush" of stormwater which contains the bulk of pollutants--i.e. particulate matter and hydrocarbons. These basins can capture from 40 to 90 percent of pollutants and yet can add little to the construction of a retention basin already needed for flood control purposes.

## F. NEW YORK INVOLVES LOCAL GOVERNMENTS

### Overview and problem

One of the problems in implementing nonpoint source policies and best management practices has been to incorporate them into regular day-to-day land use decisions. With the exception of a few states which require a state permit for development projects, local governments have the primary authority to implement nonpoint pollution policies.

The New York Coastal Program addresses nonpoint source pollution through the Local Waterfront Revitalization Programs (LWRP). Locally developed LWRPs identify nonpoint source pollution problems and develop implementation techniques to prevent and control nonpoint source pollution by developing water quality goals and non-point source prevention and control standards.

This approach to addressing nonpoint source pollution has several advantages. It takes advantage of existing land use regulatory processes and hence does not require new legislation. Towns implement their nonpoint policies by revising zoning, subdivision and other ordinances. The other advantage is that standards may differ depending upon local circumstances. Intensely developed communities tend to rely more upon structural controls and techniques, such as requiring the collection, treatment, and disposal of runoff prior to release into ground or surface waters, while less developed communities tend to rely upon development-limiting, non-structural controls, including the adoption of restrictive zoning standards which limit the type and intensity of land use in coastal areas.

### Criteria for best management practices by local governments

The most common approaches taken by coastal communities include developing nonpoint source runoff standards in local zoning ordinances or other local laws. Typical standards or best management practices include the following:

- \* Deleting from calculations of minimum lot size, lot yield, density, building and coverage, those "environmentally sensitive lands" such as steep slopes, freshwater and tidal wetlands, areas of shallow groundwater, highly erodible soils and bluffs. This would result in less land being developed and more left in open space.
- \* Adopting a "Zero Additional Runoff" standard which prohibits runoff from sites during and after construction that is greater than predevelopment conditions. In some cases, a "zero runoff" standard may be applied, requiring that all runoff be contained and recharged on-site using such techniques

as leaching catch basins, sediments basins, detention ponds, recharge basins, biofiltration basins and wetlands.

- \* Requiring the retention of natural drainage swales, land contours and native vegetation, and minimizing grading operations on construction sites.
- \* Prohibiting the installation of street curbs in selected areas in order to allow runoff to infiltrate soils adjacent to roadways, rather than being channeled to a body of water, and by restricting the width of roadways in new subdivisions to reduce runoff by reducing impermeable paved areas.
- \* Requiring buffer areas adjacent to wetlands and surface waters, and prohibiting the removal or disturbance of native vegetation in buffer areas to allow settling of particulates and biological uptake of nutrients and pollutants by vegetation.
- \* Limiting impermeable paved surfaces near surface waters and in drainage basins by limiting the amount of land that may be covered by buildings and impermeable surfaces, and by requiring the use of permeable materials in parking areas near surface waters.
- \* Prohibiting land uses and activities in coastal areas which contribute to substandard water quality or which have the potential to pollute.
- \* Requiring during the site plan review process, that roadways, pathways, driveways and structures be located as far from surface waters as possible, and requiring that certain natural features such as drainage swales are retained.
- \* Authorizing the "Transfer of Development Rights" in order to move activities and uses which contribute to nonpoint source pollution out of sensitive coastal areas.
- \* Rezoning wetlands and floodplain areas as "conservation and open space" zones, and rezoning underwater lands and lands below mean high water as "estuarine" zones. Conservation and open space zones serve primarily as buffer and treatment areas, while estuarine zones restrict uses and activities to those uses and activities which are less likely to result in contributions to substandard water quality.
- \* Authorizing cluster zoning to preserve open space and to reduce impermeable surfaces.

- \* Establishing local vessel waste no-discharge zones, requiring the installation of vessel waste pump-out facilities at new and expanded marinas, and requiring public restroom facilities at all marinas.
- \* In those communities which regulate dredging and dredge spoil disposal, requiring dredging "windows" which restrict dredging activities to the late fall and winter months, and prohibiting reintroduction of polluted sediments into surface waters, on underwater lands, or in proximity to surface waters, and requiring the use of sediment control techniques including sediment curtains, hay bales and berms to prevent pollutants and sediments from re-entering surface waters.
- \* Restricting motorized vessel operation in shallow nearshore areas and wetlands to reduce erosion, sedimentation, and sediment and pollution suspension due to vessel wakes and propeller wash.

#### Evaluation and future efforts

Towns use different techniques to implement these practices. Some may be applying the policies only to new developments, while others may be requiring that existing development meet new runoff standards or implement nonpoint source best management practices by "phasing in" standards over time or within five years of adoption of the standards.

There are 245 coastal municipalities in the New York coastal zone. Participation in the coastal program is voluntary. Over 115 towns are now participating in developing local waterfront revitalization plans. This represents 60 percent of the coastline and 90 percent of the coastal population. To date, 22 towns have completed their plans, all of which incorporate nonpoint source pollution policies.



## IV. AN OVERVIEW OF COASTAL MANAGEMENT

### What is the coastal zone?

- \* The coastal zone is the dynamic area where the land meets the sea. It includes coastal waters and the adjacent shorelands; areas which strongly influence one another. It is composed of open waters, estuaries, bays, inlets, lagoons, marshes, swamps, mangroves, beaches, dunes, bluffs, and coastal uplands.
- \* The United States has over 95,000 miles of shoreline, including the Great Lakes. The shoreline ranges from the rocky cliffs of Maine to the broad Louisiana wetlands to the rich Hawaiian coral reefs. The wide climatic range is seen in the frozen coastal plain of Alaska and the mangrove swamps of Florida.
- \* The uses of the coastal zone are as diverse as its physical forms, including: housing, recreation, wildlife habitat, resource extraction, fishing, aquaculture, transportation, energy generation, commercial development, and waste disposal.

### Why is it important?

- \* More than half of the U.S. population resides in the coastal counties, on less than 10 percent of the nation's land. The coastal counties are five times denser in population than non-coastal counties, 10 times denser along the Atlantic coast. This population continues to grow dramatically.
- \* The 189 commercial ports in the U.S. coastal zone moved 1.3 billion tons of cargo in 1986 alone.
- \* Almost 40% of the industrial facilities in the U.S. are within the drainage basin of the Great Lakes. Over half of Canada's industry is within the Great Lakes drainage basin.
- \* Wetlands currently number about 11 million acres within the coastal zone. Wetlands serve as spawning, nursery, and feeding grounds for over 60 percent of the saltwater fish and shellfish harvested annually in the U.S. This harvest is valued at \$3.1 billion. The commercial and recreational fishing industries contribute \$17 billion and \$13.5 billion, respectively, to the U.S. economy annually.

- \* Marine aquaculture is a growing industry. In 1986, the culture of Pacific salmon, shrimp, mussels, clams and oysters totaled 52,000 tons, valued at \$89 million.
- \* Development pressure is three to four times greater in coastal areas than in the rest of the country. Peoples' desire to be near the coast has resulted in the development of areas vulnerable to coastal storms. The Federal Flood Insurance Program, which insures structures in flood prone areas, represents the Federal government's second greatest liability, second only to Social Security. As of August 1987, there were 64,000 policies under the Flood Insurance Program in coastal high hazard areas or v-zones; coverage valued at \$5.2 billion.
- \* Coastal recreational facilities and water dependent uses, such as energy development and ports, must be sited in limited shoreline areas. Accommodation of such competing uses is important and extremely challenging.
- \* Coastal areas provide habitat for millions of waterfowl and other wildlife, including 100 threatened and endangered species.

**What must state CZM programs address?**

- \* The requirements for state coastal programs, set forth in Federal regulations, emphasize the need for comprehensive, predictable, and enforceable policies to guide coastal regulatory, planning, and public investment programs. The requirements identify the range of issues that states must consider in developing their programs (e.g., wetlands protection, erosion control, public access, water-dependent facility siting), yet provide flexibility for criteria that allow states to design programs that meet their particular needs. Broad public review of the programs by state agencies, Federal agencies, and interest groups is achieved through public hearings in the states and National Environmental Policy Act review prior to OCRM approval of the state CZM programs.

**What kind of funding does the CZMA provide?**

- \* States have an incentive to participate in the Federal program because of the availability of Federal funds. Section 305 program development funds, awarded from 1972-1979, have been phased out. Section 306 program implementation funds continue to be available and are allocated to states with approved programs based on a formula set by state

coastal population and shoreline mileage. In Fiscal Year 1990, 29 states and territories will receive Section 306 grants totalling \$35.3 million. Eight states receive the maximum award of \$2 million and five states received a minimum award of less than \$500,000.

- \* The average award was \$1.15 million. States are required to match the Federal funds, dollar for dollar. Over the last decade, increases in the number of states with approved programs and inflation have drastically reduced Federal implementation funds available to states. Funding has remained relatively constant at \$33 million per year.

**What are the other important aspects of the CZMA?**

- \* The Federal consistency provisions under Section 307 of the CZMA provide another important incentive for state participation. Federal activities, permits, or funding, which significantly affect a state's coastal zone, must be consistent with the enforceable elements of the state's federally-approved CZM program. The intent of the Federal consistency process is to ensure that Federal agencies adhere to the state comprehensive plans and to foster consultation and coordination between Federal and state agencies in order to resolve conflicts at the earliest stages of project/program development.

**What is the future of coastal management?**

- \* Coastal management programs are dynamic. They are changing to address emerging coastal issues such as sea level rise, coastal pollution, marine debris, and wetlands protection. States respond by developing new program policies or regulations, often with Federal funds. OCRM encourages states to improve their management programs through recommendations resulting from the periodic evaluation of state programs.

## V. LIST OF STATE COASTAL PROGRAMS

### Alabama

Coastal Resources Div.  
Dept. of Economic and Community Affairs  
P.O. Box 2939  
Montgomery, AL 36105  
(205) 284-8778

### Alaska

Division of Governmental Coordination  
431 North Franklin  
Juneau, AK 99811-0165  
(907) 465-3562

### American Samoa

Development Planning Office  
Government of American Samoa  
Pago Pago, AS 96799  
(684) 633-5155

### California

California Coastal Commission  
631 Howard Street, 4th floor  
San Francisco, CA 94105  
(415) 543-8555

### Connecticut

Dept. of Environmental Protection  
18-20 Trinity Street  
Hartford, CT 06106  
(203) 566-7404

### Delaware

Dept. of Natural Resources  
and Environmental Control  
89 Kings Highway  
Dover, DE 19903  
(302) 736-4403

### Florida

Dept. of Environmental Regulation  
Twin Towers Office Bldg.  
2600 Blair Stone Road  
Tallahassee, FL 32301  
(904) 488-6221

### Guam

Bureau of Planning  
P.O. Box 2950  
Agana, GU 96910  
(671) 472-4201

### Hawaii

Office of State Planning  
State Capitol, Room 700  
Honolulu, HI 96813  
(808) 548-3026

### Louisiana

Coastal Mgmt. Div.  
Dept. of Natural Resources  
P.O. Box 44487  
Baton Rouge, LA 70804  
(504) 342-7591

### Maine

State Planning Office  
State House Station #38  
Augusta, ME 04333  
(207) 289-3261

### Maryland

Coastal Resources Div.  
Dept. of Natural Resources  
Tawes State Office Bldg.  
Annapolis, MD 21401  
(301) 974-2784

### Massachusetts

Office of Environmental Affairs  
100 Cambridge Street  
Boston, MA 02202  
(617) 727-9530

### Michigan

Land & Water Mgmt. Div.  
Dept. of Natural Resources  
P.O. Box 30028  
Lansing, MI 48909  
(517) 373-1950

### Mississippi

Coastal Programs  
Bureau of Marine Resources  
2620 West Beach Blvd.  
Biloxi, MS 39531  
(601) 385-5860

### New Hampshire

Office of State Planning  
2 1/2 Beacon Street  
Concord, NH 03301  
(603) 271-2155

New Jersey

Dept. of Environmental  
Protection, CN 401  
Trenton, NJ 08625  
(609) 292-2795

New York

Department of State  
162 Washington Street  
Albany, NY 12231  
(518) 474-3643

North Carolina

Div. of Coastal Mgmt.  
Dept. of Environment, Health, and Natural  
Resources  
512 N. Salisbury Street  
Raleigh, NC 27611  
(919) 733-2293

Northern Mariana Islands

Coastal Resources Mgmt. Office  
Nauru Building  
Saipan, MP 96950  
(670) 234-6623

Ohio

Dept. of Natural Resources  
Fountain Square  
1930 Belcher Drive  
Columbus, OH 43224  
(614) 265-6877

Oregon

Dept. of Land Conservation  
and Development  
1175 Court Street, N.E.  
Salem, OR 97310  
(503) 378-4017

Pennsylvania

Div. of Coastal Zone Mgmt.  
Dept. of Env. Resources  
P.O. Box 1467  
Harrisburg, PA 17120  
(717) 541-7808

Puerto Rico

Dept. of Natural Resources  
P.O. Box 5887  
Puerta de Tierra, PR 00906  
(809) 724-5516

Rhode Island

Coastal Resource Mgmt. Council  
Stedman Office Bldg.  
Tower Hill Road  
Wakefield, RI 02879  
(401) 277-2476

San Francisco Bay Conservation  
& Development Commission

30 Van Ness Avenue, Room 2011  
San Francisco, CA 94102  
(415) 557-3686

South Carolina

S.C. Coastal Council  
AT&T Capitol Center  
1201 Main Street, Suite 1520  
Columbia, SC 29201  
(803) 737-0880

U.S. Virgin Islands

Dept. of Planning and Natural Resources  
Nisky Center, Suite 231  
No.45A Estate Nisky  
St. Thomas, VI 00802  
(809) 774-3320

Virginia

VA Council on the Environment  
903 Ninth St. Office Bldg.  
Richmond, VA 23219  
(804) 786-4500

Washington

Department of Ecology  
State of Washington (PV-11)  
Olympia, WA 98504  
(206) 459-6777

Wisconsin

Coastal Mgmt. Program  
Dept. of Administration  
101 South Webster, 6th floor  
Madison, WI 53707  
(608) 266-3687