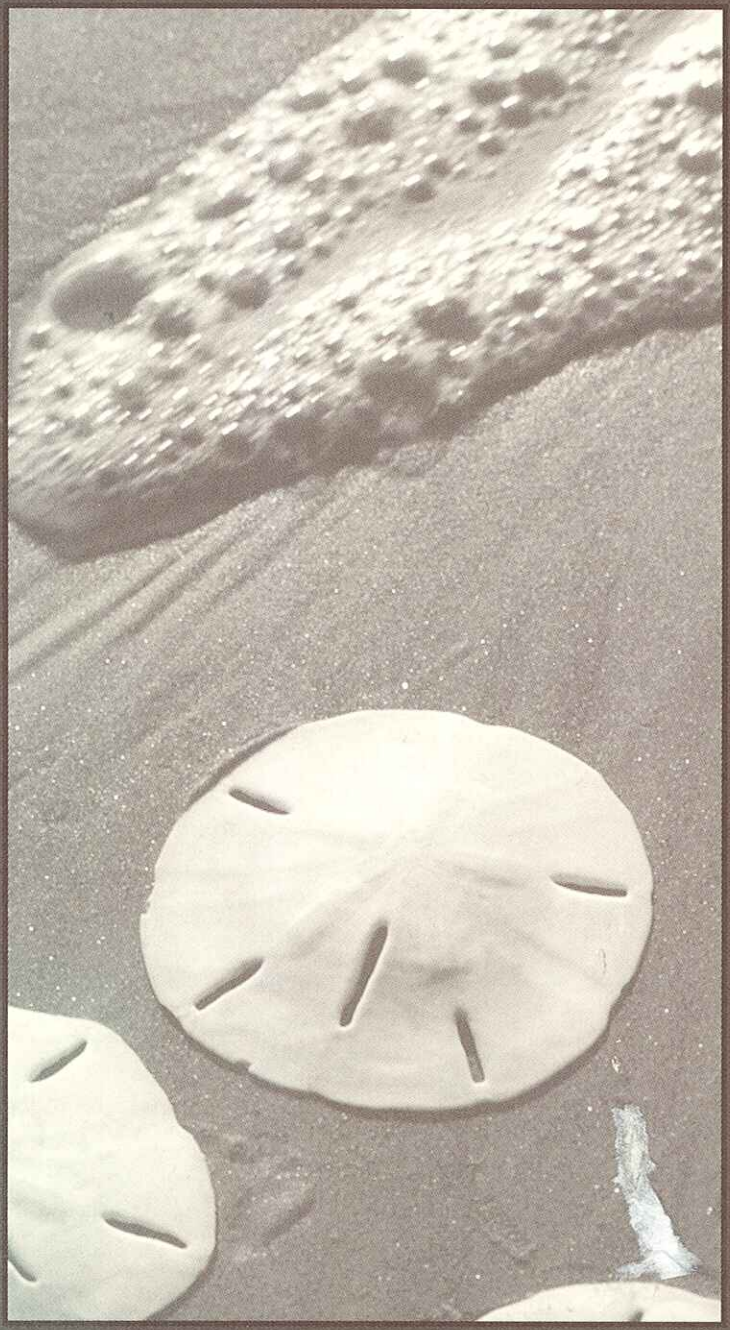

Texas Coastal Management Program

Annual Report 1998

Coastal Coordination Council

The Honorable David Dewhurst
(Council Chair)
Commissioner
Texas General Land Office

The Honorable Michael Williams
Commissioner
Railroad Commission of Texas

The Honorable William Clayton
Council Member, Galveston City Council
Coastal Local Government Representative

Mr. John Barrett
Agriculture Representative

Mr. Lee Bass
Chairman
Parks and Wildlife Commission

Mr. Bob Dunkin
Coastal Citizen Representative

Mr. Robert Huston
Chairman
Texas Natural Resource Conservation Commission

Mr. William Madden
Chairman
Texas Water Development Board

Mr. Robert Nichols
Commissioner
Texas Transportation Commission

Ms. Elizabeth Nisbet
Coastal Business Representative

Mr. Waldo Smith
Texas State Soil and Water Conservation Board

Coastal Coordination Act of 1991

It is declared to be the policy of this state to make more effective and efficient use of public funds and provide for more effective and efficient management of coastal natural resource areas, and to better serve the people of Texas by:

- continually reviewing the principal coastal problems of state concern, coordinating the performance of government programs affecting coastal natural resource areas, and coordinating the measures required to resolve identified coastal problems

- making all coastal management processes more visible, accessible, coherent, consistent, and accountable to the people of Texas.

(Texas Natural Resources Code §33.202(a))

For more information

Texas Coastal Management Program
and Grants Program
Texas General Land Office
1700 North Congress Avenue, Room 617
Austin, Texas 78701-1495
1-800-85-BEACH
512-463-5385 (CMP)
512-463-5058 (Grants)
512-475-0680 (Fax)

Small Business and Individual Permitting
Assistance Office
Texas A&M University – Corpus Christi
Natural Resource Building, Suite 2800
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512-980-3465 (Fax)

Contents

Introduction

Chapter 1

In the late 1980s, Texas coastal communities initiated a grass roots campaign to improve the management of coastal resources. Building on this grass roots effort, the Legislature passed the Coastal Coordination Act of 1991, establishing a comprehensive state coastal management program based on existing statutes and regulations. This act led the way to making more effective and efficient use of public funds and to better manage the state's resources.

The National Oceanic and Atmospheric Administration (NOAA) formally approved the Texas Coastal Management Program (CMP) on January 10, 1997, making Texas the 30th state to have a federally approved coastal program. The Texas CMP has made significant strides in addressing many issues impacting the coastal zone during its first two years of implementation.

Chapter 1 of this report provides background information on the Texas coast and the economic and environmental importance of its natural resources. It also provides a brief overview of the Coastal Zone Management Act and the Coastal Coordination Council (Council). Chapter 2 covers five of the program's main achievements in 1998:

1. Protecting and Restoring Coastal Natural Resource Areas
2. Making Government More Effective and Efficient
3. Upholding the State's Interest in Federal Decision-Making
4. Improving Access to Coastal Lands and Resources
5. Promoting the Use of Accurate Scientific Data in Decision-Making

Chapter 3 discusses the CMP grants program and lists the projects recommended for funding for the latest grant cycle. Chapter 4 gives a status and trends update of Texas coastal natural resource areas. Chapter 5 outlines the Council's goals for the future.

The Challenge: Texas Coastal Resources

The Texas coast spans 367 miles of Gulf shoreline, contains 3,300 miles of bay-estuary-lagoon shoreline, and is one of the most biologically rich, ecologically diverse, and popular areas of the state (CMP, 1996). The Texas coastline is characterized by marshy plains with narrow beach ridges; long barrier islands; and shallow lagoons. Of the 367 miles of Gulf shoreline, approximately 55 miles are developed, 24 miles are available for development, and 288 are undeveloped (SMA, 1990). Tourists and residents alike are drawn to the coast's beaches, bays, barrier islands, and forested areas for fishing, hunting, and general recreation.

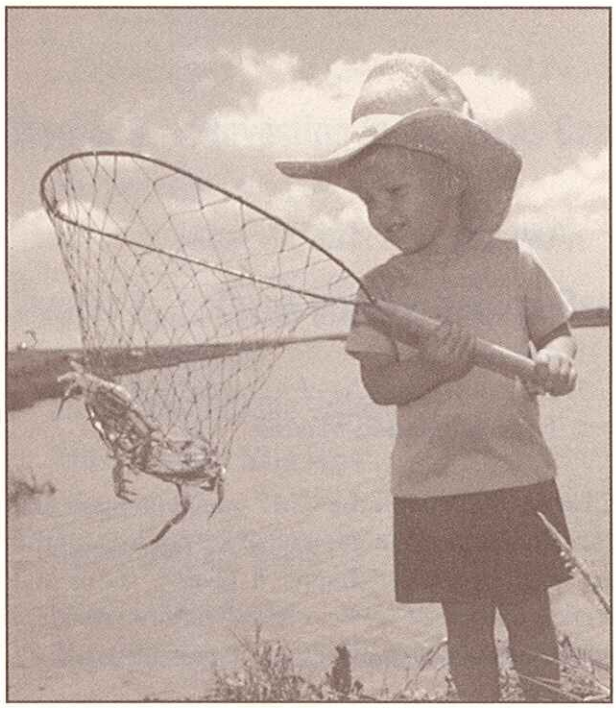


Photo courtesy of Texas Department of Transportation

TOURISTS SPEND MORE THAN $26 BILLION EACH YEAR IN TEXAS.
Texas Department of Economic Development

TEXAS IS THE SECOND MOST-VISITED STATE IN THE COUNTRY.
Texas Almanac, 1998-1999

COASTAL TOURISM IN TEXAS GENERATES MORE THAN $7 BILLION ANNUALLY.
Texas Department of Economic Development

THE TEXAS TOURISM INDUSTRY SUPPORTS MORE THAN 440,000 JOBS, WHICH ACCOUNT FOR 5.6% OF TOTAL EMPLOYMENT IN TEXAS.
U.S. Travel Data Center

Another major element driving the Texas economy is the significant presence of the petroleum industry. This, coupled with a healthy agricultural industry, makes Texas the leader of all states in total net job creation.

TEXAS IS THE LEADING PRODUCER OF CHEMICALS, CRUDE OIL, AND NATURAL GAS.
Texas Department of Economic Development

MORE THAN 70% OF TEXAS' ECONOMIC ACTIVITY IS LOCATED WITHIN 100 MILES OF THE COASTLINE.
CMP, 1996

TEXAS HAS 29 COASTAL AND INLAND WATERPORTS WITH DIRECT ACCESS TO THE NATION'S INLAND WATERWAY SYSTEM.
Texas Department of Economic Development

Commercial fishing is also big business in Texas. The fishing industry, which relies on coastal wetlands to provide essential habitat for the approximately 250 different species of fish along the Gulf coast, pumps $400 million into the economy each year.

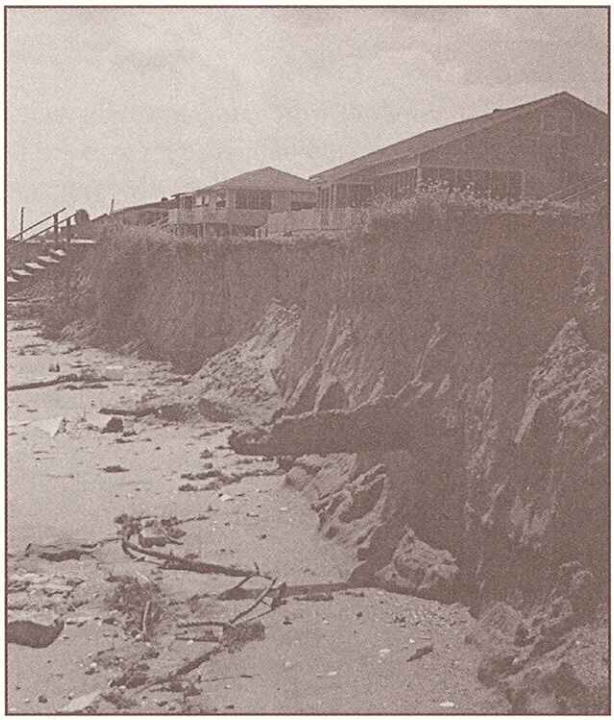
THE FISHING INDUSTRY PROVIDES JOBS FOR APPROXIMATELY 30,000 TEXAS COASTAL RESIDENTS.
Texas Comptroller of Public Accounts, 1996

Texas is the second most populous state in the country. The state has witnessed more population growth than any other state in the 1990s.

MORE THAN ONE-THIRD OF THE STATE'S POPULATION IS LOCATED WITHIN 100 MILES OF THE COASTLINE.
CMP, 1996

BY THE YEAR 2000, A PROJECTED 5.3 MILLION PEOPLE WILL LIVE IN TEXAS COASTAL COUNTIES.
CMP, 1996

Growth along the Texas coast creates jobs and provides economic prosperity; however, it also burdens local environments with the potential loss or degradation of coastal wetlands, dunes, water quality, and public access to the shoreline. The erosion and consequent loss of Texas beaches, bays, and coastal wetlands is a serious public concern. Erosion can damage or destroy private and public property, harming the economies of our coastal communities and devastating Texas beaches.



General Land Office Archives

TEXAS HAS ONE OF THE HIGHEST SHORELINE EROSION RATES IN THE COUNTRY.
CMP, 1996

THE GULF SHORELINE IS ERODING AT AN AVERAGE RATE OF SIX FEET PER YEAR WITH AN AVERAGE YEARLY LOSS OF 42 ACRES.
Texas General Land Office

Changes in the environment due to natural processes such as wind, waves, and storms are inevitable. The environment can adapt to these changes if allowed to adjust on its own. However, interference with natural processes can hinder the coastal area's ability to recover from natural damage. Ironically, as more people move to coastal areas, the natural features that may have attracted them to the coast are lost or diminished.

TEXAS LOSES ABOUT 5,700 ACRES OF COASTAL WETLANDS EACH YEAR.
Moulton, 1997

Losing coastal wetlands can impact a community economically and ecologically. Coastal wetlands provide habitat for more than 90% of the sport and commercially valuable fish and shellfish species in the Gulf of Mexico (*Texas Shores*, Winter 1999). They also improve water quality, reduce flooding by acting as a natural buffer, and reduce shoreline erosion.

Coastal Zone Management Act

Congress enacted the Coastal Zone Management Act (CZMA) in 1972 to reduce conflicts between land and water uses in the coastal zone. The CZMA is a comprehensive approach to managing the coast that allows coastal states to balance development while safeguarding economic prosperity. The foundation of the CZMA is to address increasing pressures in coastal areas through voluntary partnerships of federal and state government. Federal approval of the Coastal Management Program has benefited Texas in two ways:

1. Texas has gained more influence over federal decisions affecting its coast.
2. Texas is eligible to receive more than $2 million in federal grants for coastal enhancement projects.

Coastal Coordination Council

The Coastal Coordination Council (Council) is composed of seven state agency representatives and four governor-appointed members. It is charged with upholding the goals and policies of the Texas Coastal Management Program and provides general oversight of the program. The Council's mission is to avoid duplication and conflicts in agency policies with regard to coastal erosion, wetland protection, water quality, dune protection, and shoreline access.

In 1998, the Council:

- approved the Texas Nonpoint Source Pollution Control Program;
- began working on measures to streamline the wetlands permitting process;
- spearheaded efforts to increase public access to beaches and bays;
- began characterizing the quality of watersheds that are in, or may affect natural resources within, the coastal boundary.

The Council also dealt with many important issues affecting the coastal environment such as red tide and federal dredging. Recognizing the value of public participation in implementing the program, the Council made every effort to make coastal management more visible and accessible by holding Council meetings on the coast and by encouraging citizens to voice their opinions on coastal issues.

This section discusses the Council's accomplishments and continued efforts in protecting and restoring coastal resources; making government more effective and efficient; upholding the state's interest in federal decision-making; improving access to coastal lands and resources; and promoting the use of comprehensive and accurate scientific data in decision-making.

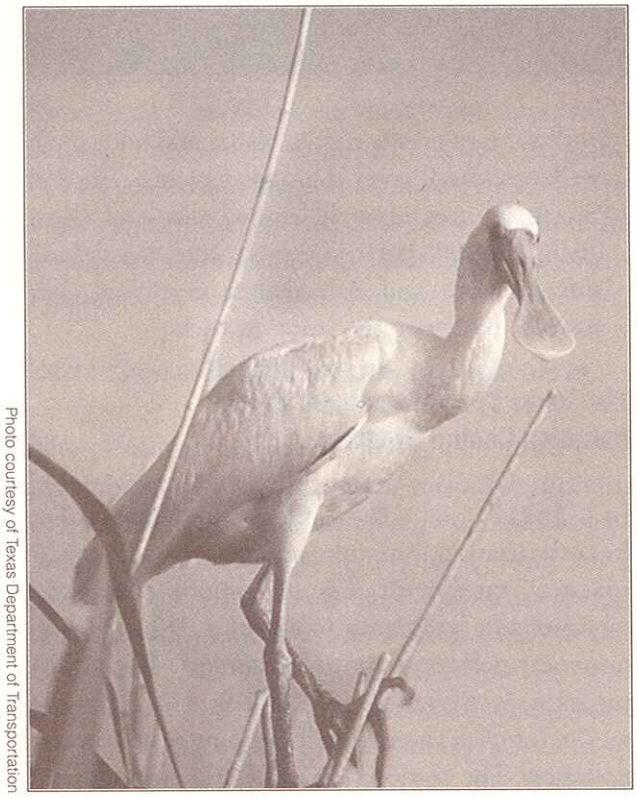


Photo courtesy of Texas Department of Transportation

Protecting and Restoring Coastal Resources

The main objective of the Texas Coastal Management Program is to improve the management of coastal natural resource areas (CNRAs). The Council achieved this goal through its federal grants program under §306 and §306a of the Coastal Zone Management Act by investing in coastal communities' resource areas.

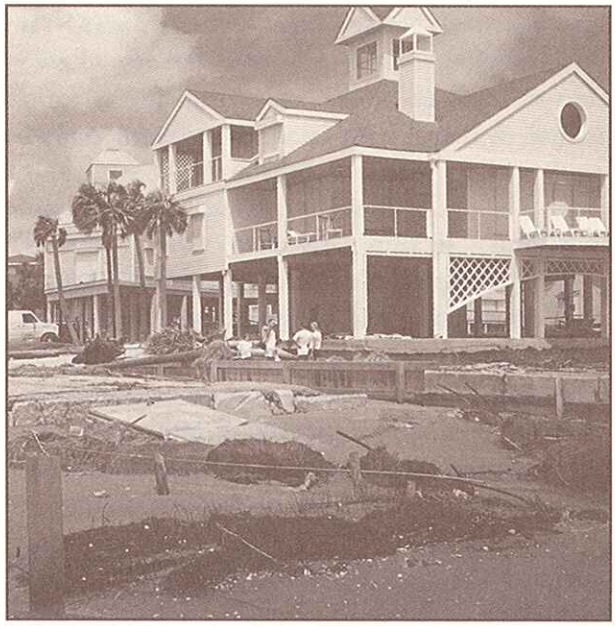
Funding Coastal Hazards Response and Resource Protection

Two of the Council's funding categories, Coastal Natural Hazards Response and Critical Areas Enhancement, are aimed at protecting dunes and wetlands.

SINCE 1997, THE COUNCIL HAS INVESTED MORE THAN $2.4 MILLION IN COASTAL COMMUNITIES FOR PROJECTS THAT ENHANCE OR RESTORE WETLANDS, DUNES, SEAGRASSES, OYSTER REEFS, TIDAL SAND AND MUD FLATS, AND GULF BEACHES.

Coastal natural hazards are storms, erosion, and flooding that impact property and lives. These hazards may originate from natural conditions or may be human-induced. The Coastal Natural

Hazards Response category is geared towards sand dune restoration or emergency planning projects. Critical areas are defined as coastal wetlands, submerged aquatic vegetation, oyster reefs, tidal sand and mud flats, and hard substrate reefs. The Critical Areas Enhancement category is used for funding wetland acquisition or protection planning projects. A description of one project funded by the Council in each of these categories follows.



General Land Office Archives

Result

Armand Bayou Nature Center

The Council awarded more than $40,000 to the Armand Bayou Nature Center in 1997 to restore an intertidal marsh and reintroduce seagrass in Armand Bayou. The center will restore a total of 2,550 linear feet of fringe marsh to an average width of 25 feet, resulting in a total of 63,750 square feet of restored marsh. The center will use established restoration techniques that have been used successfully in the Clear Lake watershed for the past several years. Project information will be posted on the Internet at the conclusion of this project.

Result

Dune Restoration Demonstration at Pirates' Beach

The Council awarded $62,711 to Texas A&M University at Galveston in 1997 to construct a line of sand dunes at Pirates' Beach. The university removed structural impediments, anchored approximately 450 hay bales along 5,000 feet of back beach, and installed a sprinkler system. The university transplanted the dunes with nursery-grown native plants and built dune walkovers and water drainage systems. Tropical Storm Frances severely eroded many of these areas in 1998, but the dunes protected upland infrastructure and provided a minimum, but natural, barrier to the storm impacts.

The Texas Coastal Nonpoint Source Pollution Control Program

In §6217 of the Coastal Zone Act Reauthorization Amendments of 1990, Congress requires states with federally approved coastal management programs to develop state coastal nonpoint pollution control programs. The §6217 program is designed to identify and improve methodologies to prevent nonpoint source water pollution. The National Oceanic and Atmospheric

Administration (NOAA) and the Environmental Protection Agency (EPA) have conditionally approved §6217 programs for all 29 of the coastal states that entered the federal Coastal Zone Management Program before Texas, and have announced a goal of fully approving all programs by December 1999.

- The Texas Coastal Nonpoint Source Pollution Control Program was approved by the Council on December 9, 1998, and subsequently submitted to NOAA and EPA.
- The Texas program is based on existing state nonpoint source regulations and does not expand regulatory power.

If the U.S. Department of Commerce and EPA find that Texas has failed to submit an approvable coastal nonpoint pollution control program, federal coastal and nonpoint-source funding will be withheld. In that event, state law requires the governor to withdraw the Coastal Management Program from the federal program.

Restoration of Coastal Natural Resource Areas

The Council is developing an innovative program to use funding from various sources to restore coastal areas. Sources of potential funding include recoveries of money that arise from Natural Resource Damage Assessment cases, recoveries of money that arise from Clean Water Act §404 and Rivers and Harbors Act §10 enforcement cases, and state and federal grant money. The goal of this 18-month project is to develop a list of potential sites for restoring coastal natural resource areas near major estuaries and is associated with the Council's efforts to include federal restoration plans as actions subject to the CMP.

Potential sites, which can be on public or private land, may include fresh, brackish, or salt marshes; seagrasses; bottomland hardwoods; oyster reefs; tidal sand or mud flats; or other coastal natural resource areas. Existing lists of proposed restoration projects will be compiled into a master list of potential restoration project opportunities. Input from the two National Estuary Programs and from state, federal, and local governments and citizens will be sought for the list.

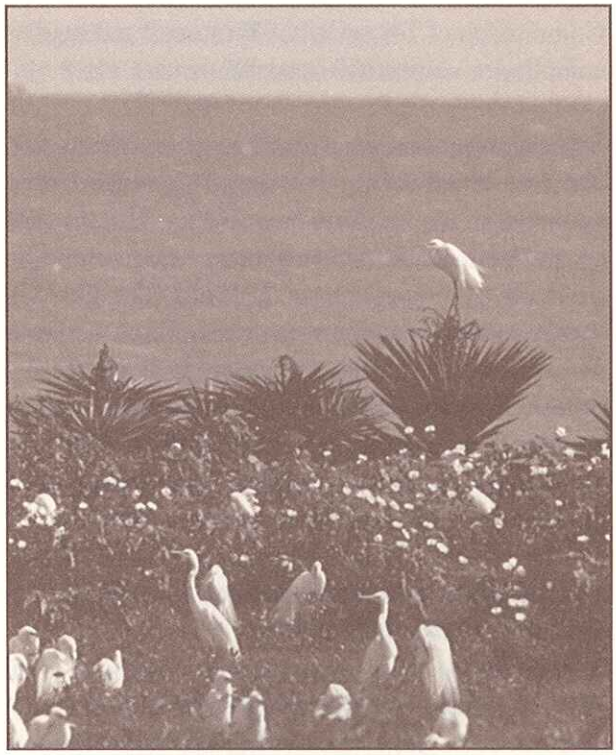


Photo courtesy of Texas Department of Transportation

Making Government More Effective and Efficient

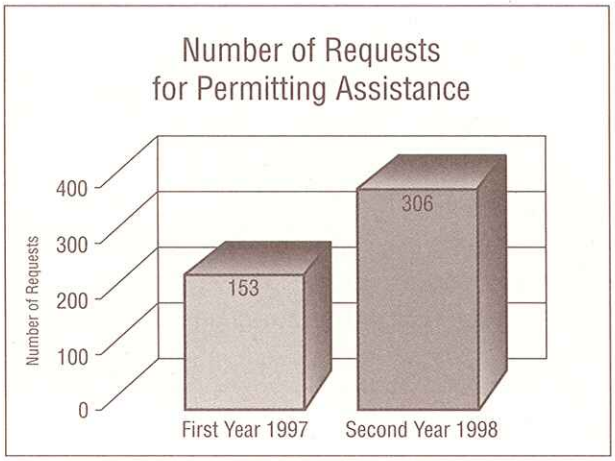
The management of the coast is fragmented among several federal and state agencies. Four state and four federal agencies are involved in wetlands permitting or review, which can result in inefficiency and duplication of effort. Currently, if a project is on state-owned submerged lands, the applicant must apply for separate authorizations from the U.S. Army Corps of Engineers (COE) and the Texas General Land Office (GLO).

The project may also require an authorization from the Texas Natural Resource Conservation Commission (TNRCC) or the Railroad Commission of Texas (RRC) for state water quality compliance under the Clean Water Act.

Several initiatives to streamline government and improve coordination between federal and state agencies were undertaken during the CMP's second year. All resource agencies began attending the COE's pre-application meetings. The Council began examining ways to streamline wetlands permitting. And the Council's Individual and Small Business Permitting Assistance Office continued to provide technical assistance to permit applicants and to ensure that applicants understood permit requirements.

The Individual and Small Business Permitting Assistance Office

The Individual and Small Business Permitting Assistance Office, established by the Coastal Coordination Act, opened on March 31, 1997, in Corpus Christi. The permitting assistance office serves as a clearinghouse for permit information. The office received 306 requests for technical assistance in 1998, an increase of 100% over 1997.



The majority of the requests for assistance received during 1998 came from individuals and small businesses seeking COE and GLO coastal construction permits. Many clients received information about permit requirements and were directed to the appropriate agency representatives for additional information and application forms. Other types of assistance provided included scheduling of meetings between applicants and the appropriate state and federal agency staff and advising applicants on mitigation options to offset unavoidable impacts resulting from their work. While most requests were from individual applicants, an increasing number of requests for assistance have come from local governments.

Council members are revising permitting assistance program rules to reflect several changes. First of all, the permitting assistance coordinator is no longer an employee of the Texas Department of Economic Development. The coordinator is now an employee of the GLO. The new rules also clarify that the coordinator's role is to advise and assist applicants by providing permitting information.

The coordinator is responsible for bringing general permitting issues (as opposed to issues with individual pending applications) to the attention of the permitting assistance group (PAG) for discussion and resolution. The PAG was created by the Coastal Coordination Act to facilitate permitting assistance to individuals and small businesses. Each networked agency has a representative that participates in the PAG.

Streamlining the Wetlands Permitting Process

Although there are protective mechanisms in place, Texas continues to experience an overall loss of wetlands. Wetlands provide numerous economic, recreational, and educational benefits. They are invaluable in controlling floodwaters, providing erosion control, and maintaining water quality. Industries such as commercial and recreational fishing and nature-based travel depend on coastal wetlands for their livelihood. Wetlands also provide critical habitat for fish and wildlife.

THE STATE HAS MORE THAN A HALF-MILLION ACRES OF TIDAL COASTAL WETLANDS AND MORE THAN THREE MILLION ACRES OF FRESHWATER COASTAL WETLANDS, BUT LOSES MORE THAN 5,700 ACRES PER YEAR.
Moulton, 1997

The Council is working towards developing measures to streamline the wetlands permitting process. These may include development of a standardized state and federal permit application and a state programmatic wetland permit, and providing for interagency conflict resolution. The purpose of the state programmatic wetland permit would be to reduce redundant or conflicting regulatory requirements or processes, to increase predictability and timeliness, and to simplify the application process for applicants.

Integrating Coastal Management into State Agency Decision-Making

The CMP is a "networked" program, meaning that it links existing agencies and local governments that have coastal natural resource management or regulatory programs. Using a uniform set of coastal policies, the Council is charged with resolving conflicts and promoting greater efficiency through better intergovernmental coordination.

The Council uses two mechanisms to coordinate state agency and local government programs:

1. Review of agency rules.
2. Review of agency and local government permits.

The Coastal Coordination Act requires that agencies and local governments proposing a rule or individual authorization subject to the CMP

affirm that the action is consistent with the CMP's goals and policies. Each networked agency is responsible for ensuring that its actions are consistent with the CMP.

Networked agencies are required to submit reports to the Council listing all permits or authorizations that have been issued for each quarter. The networked agencies are doing an excellent job in submitting these reports. Based on this reported information, networked agencies reviewed 876 state actions for consistency with the CMP in 1998. There were no requests for rule certification in 1998.

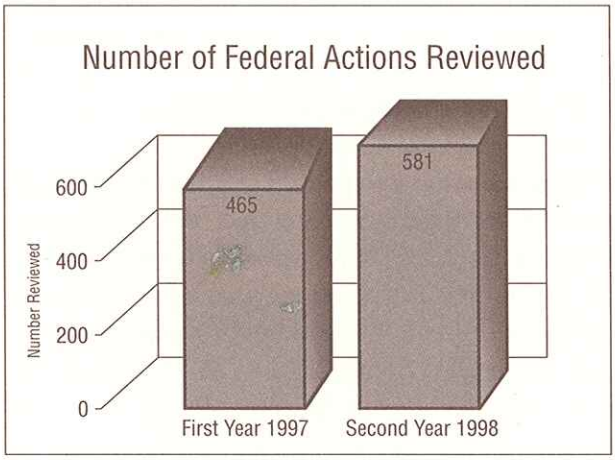
Upholding the State's Interest in Federal Decision-Making

Protecting the state's interest is the core of the Coastal Management Program. To ensure that this interest is fairly represented, the Council reviews federal and state actions proposed in the coastal zone. It also continually seeks out other avenues for guaranteeing that the state has a say in policy, procedures, or actions that may affect the management of coastal areas.

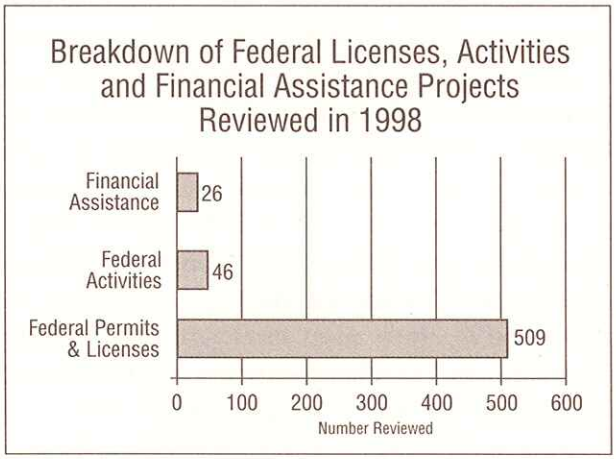
Review of Federal Actions on the Texas Coast

Any project that is in or may affect land and water resources in the Texas coastal zone and that requires a federal license, is a direct activity of a federal agency, or is federally funded must be reviewed for consistency with the Texas Coastal Management Program.

DURING 1998, A TOTAL OF 581 PROPOSED FEDERAL ACTIONS WERE REVIEWED FOR CONSISTENCY, AN INCREASE OF 20% OVER THE 465 ACTIONS REVIEWED IN 1997.

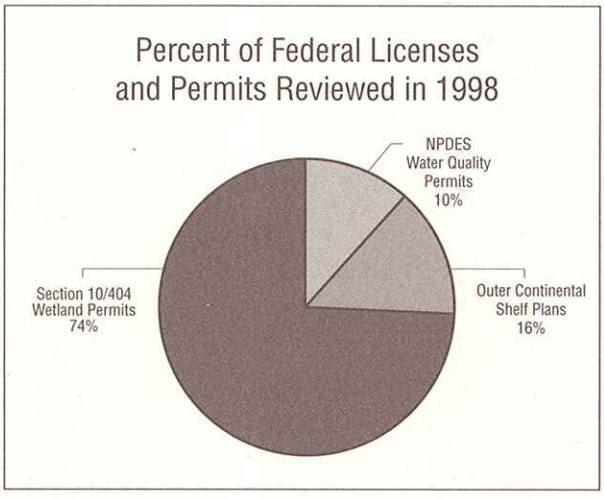


Illustrated below is the breakdown of federal licenses, activities, and financial assistance projects reviewed in 1998.



Federal licenses or permits subject to federal consistency review include any which govern land or water uses in the coastal zone. For example, projects requiring a COE §10/404 permit are subject to the program. A total of 509 actions requiring a federal permit or license were reviewed for consistency in 1998.

Applications for COE permits dominated the types of projects reviewed, followed by the Minerals Management Service's Outer Continental Shelf Plans. Maps showing locations of proposed COE permits for 1997 and 1998 are included in the appendix. The breakdown of actions requiring a federal license or permit is shown below.



Federal activities are those performed by or for a federal agency in response to its statutory responsibility. Examples include maintenance dredging, fishery management plan amendments, and changes in federal permitting processes. A total of 46 federal activities were reviewed for consistency in 1998.

The Texas State Clearinghouse, known as the Texas Review and Comment System (TRACS), circulates copies of all applications for federal funding within Texas to interested state, regional, and local government agencies. The TRACS is a statewide system that provides state and local officials with opportunities to review state plans, applications for federal or state financial assistance, and environmental impact statements before the proposals are approved or funded. A total of 26 financial assistance projects were reviewed for consistency in 1998.

Review of Federal Dredging Plans on the Gulf Intracoastal Waterway

Approximately 13 to 15 million cubic yards of material is dredged each year to maintain Texas waterways (TxDOT). The Council reviews federal maintenance dredging projects proposed by the COE to seek opportunities for using dredged material beneficially.

The review process is designed so that the COE submits a few dredging projects about every six months. If no opportunities for beneficial use of dredged material exist, such as creating marshes, the project is deemed to be consistent with the CMP.

- The Council reviewed 12 federal dredging plans for segments of the Gulf Intracoastal Waterway in 1998.
- Since the CMP's inception, the Council has identified 17 opportunities to use dredged material to build beaches and restore marshes.

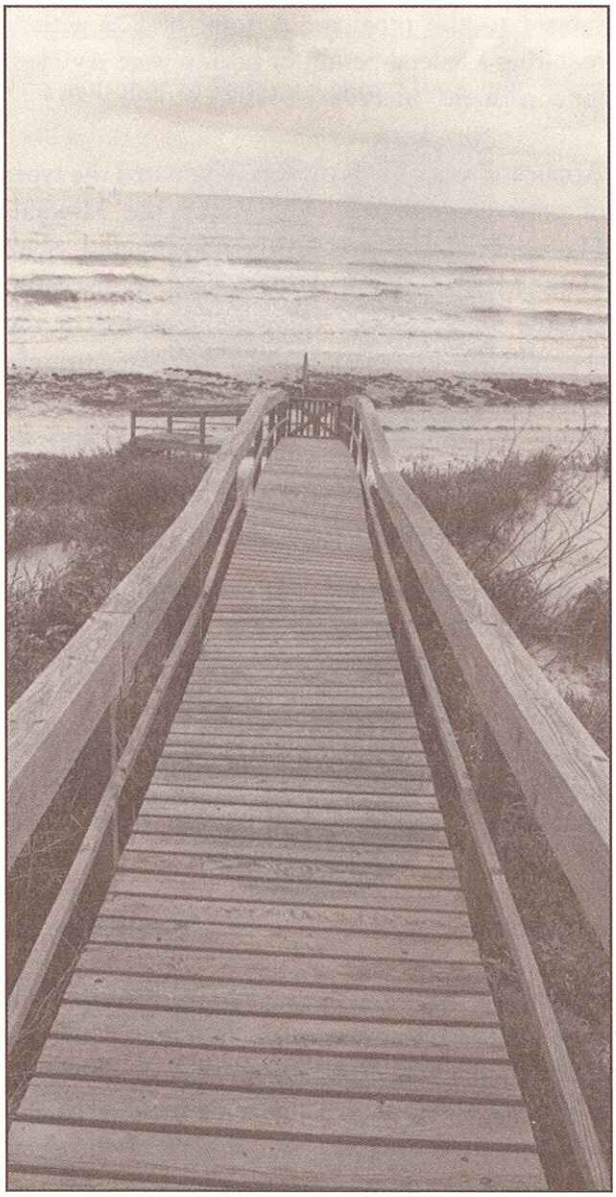
Out of the 18 federal dredging plans reviewed since 1997, six plans have been deemed consistent. The remaining 12 plans are still being reviewed for beneficial use opportunities.

Texas Pollutant Discharge Elimination System

On September 14, 1998, the EPA approved the Texas Pollutant Discharge Elimination System (TPDES) pursuant to §402 of the Clean Water Act. The TNRCC now administers the TPDES program including the regulation of wastewater and storm water discharges, the industrial pretreatment program, and sewage sludge disposal. The EPA retains federal authority for discharges associated with oil and gas exploration and production under the jurisdiction of the RRC. As a result, there will be very few EPA permits for the Council to review.

Improving Access to Coastal Lands and Resources

One of the Council's goals is to increase and enhance public access to coastal resources. To achieve this, the Council is working with local communities and non-profit organizations on specific projects to improve access by providing needed infrastructure and protection of Gulf beaches. It is also working with coastal communities to develop a shoreline access plan and a comprehensive guide to Texas beaches and bays. Since 1997, the Council has provided more than $740,000 in funding for projects to build dune walkovers and marinas, and to make other improvements that enhance the public's ability to access and enjoy the Texas coast.



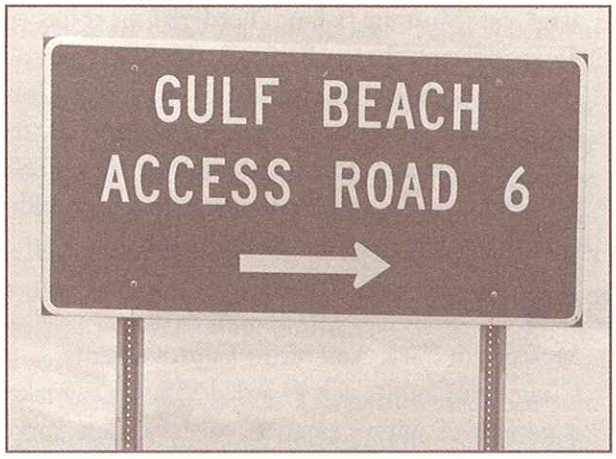
General Land Office Archives

Development of a Comprehensive Guide to Texas Beaches and Bays

Continued population growth along the Texas coast, particularly in the Houston, Corpus Christi, and Lower Rio Grande Valley areas, is likely to impact both the quality and availability of coastal access and facilities. Some sites may be overused while others may be underutilized. Because coastal communities rely so heavily on coastal tourism for their livelihood, maintaining and improving public access to the Gulf and bay shorelines is crucial.

The state is required by the National Oceanic and Atmospheric Administration to develop a shoreline access plan as a condition of federal approval of the CMP. To meet this mandate the Council launched a two-year effort, in partnership with local coastal communities, to develop a shoreline access plan and publish a comprehensive public access guide to Texas beaches and bays by September 2000.

This initiative will involve working with local governments and citizens to identify current public shoreline access facilities and determining what action needs to be taken to enhance access in the 18 counties in the coastal zone. Evaluating and improving current access to Texas beaches and bays will benefit coastal communities through enhanced tourism. By doing so, local officials can determine if existing facilities are adequate to support demand, know how to plan for future growth, and take full advantage of and expand their existing tourism and recreational markets.



General Land Office Archives

Funding Shoreline Access Improvements

The Texas Open Beaches Act, passed in 1959, guarantees the public's right to use and have access to the public beaches of the state. However, increased coastal development makes meeting the shoreline access needs of the public a challenge.

Furthermore, there is no equivalent mechanism for ensuring public access to bay shorelines. To address access deficiencies along the coast, the Council funds a variety of projects under its Shoreline Access category. The types of projects funded include land acquisition for parks or public access corridors, off-beach parking, construction of park amenities, and installation of access signs. Two examples are provided below.

Result

Land Acquisition on Mustang Island

The Council awarded the City of Corpus Christi $85,000 to acquire a minimum of 3.5 acres of

land on Mustang Island bordered by Nueces County Beach Access Road #2, the Port Aransas city limits, State Highway 361 and the Gulf beach. The purpose of the acquisition is to accommodate future construction of about 180 off-beach public parking spaces and provide pedestrian access to the public beach.

Result

McCollum Park Amenities Improvements
Chambers County was awarded $55,975 to make a variety of improvements to McCollum Park, which serves Chambers County and a large portion of the City of Baytown in Harris County. The county will build wooden steps leading to the water; several benches are to be built as well. Other improvements will include the addition of two covered pavilions, renovation of restrooms, and closing the parks to motorized vehicles.

Promoting the Use of Accurate Scientific Data in Decision-Making

Efforts to improve resource management are often impeded by a lack of up-to-date, comprehensive information. Data on natural resources may be unavailable or not in an easily understood or accessible format. In managing coastal resources, it is imperative that the Council use complete and accurate scientific information. In keeping with this directive, the Council looks favorably on grant projects that involve research of coastal methodologies and new technologies. The Council aims to use the most up-to-date scientific information to promote sound coastal management decision-making.

Funding Coastal Research and Data Collection

The Council's Information and Data Availability grant category seeks to make agency and subdivision decision-making more effective by using accurate, up-to-date information and scientific data. Projects funded under this category include mapping and aerial photography, and engineering studies and research. Three coastal projects funded under this category are described below.

Result

Texas High School Coastal Monitoring Program
Since 1997, the Council has provided more than $112,000 in funding for the Texas High School Coastal Monitoring Program to support students in five schools conducting scientific research on selected beaches. The program gives students the opportunity to conduct scientific research on dune vegetation, make observations on weather conditions, and collect and analyze data on selected beaches. This program increases public awareness and understanding of coastal processes and hazards through student research. It also educates future leaders while at the same time providing valuable data.

Result

Aerial Photography for Orange County Drainage Master Plan
The Orange County Drainage District received $110,000 in grant funds to produce aerial photography with highly detailed topographic features for a master plan covering a 359-

square-mile area. This area has a minimal amount of permeable soil and thus has a dramatic potential for flooding. This Coastal Management Program grant enabled the district to prepare for future storm impacts using precise and current information.

Result

Orange County Drainage District Mapping Project

The Council awarded $58,000 to the Orange County Drainage District to produce a property and easement map of the county in a format that will allow the public to view the map through the Internet. This grant will allow a variety of data currently available through state and federal agencies to be converted into a format compatible with Geographic Information Systems.

Using GIS to Map Projects Proposed in the Coastal Zone

The Council launched the first Spatial database to map COE permits proposed in the coastal zone. Geographic Information Systems (GIS) is used to compile and map the geographic distribution of permits, to evaluate cumulative and secondary impacts (actions that are cumulative in nature and build up over time), and to improve the Council's decision-making.

Texas Symposium on Red Tide

Red tides occur throughout the world, drastically impacting fisheries and shellfishing along U.S. coasts. Red tides are caused by several species of marine phytoplankton, microscopic plant-like cells that produce potent chemical toxins. These toxins cause extensive fish kills, contaminate shellfish, and create severe respiratory irritation in humans. Red tide is the result of a single-celled algae, called Gymnodinium breve, which is usually found in warm saltwater but which can exist at a lower temperature.

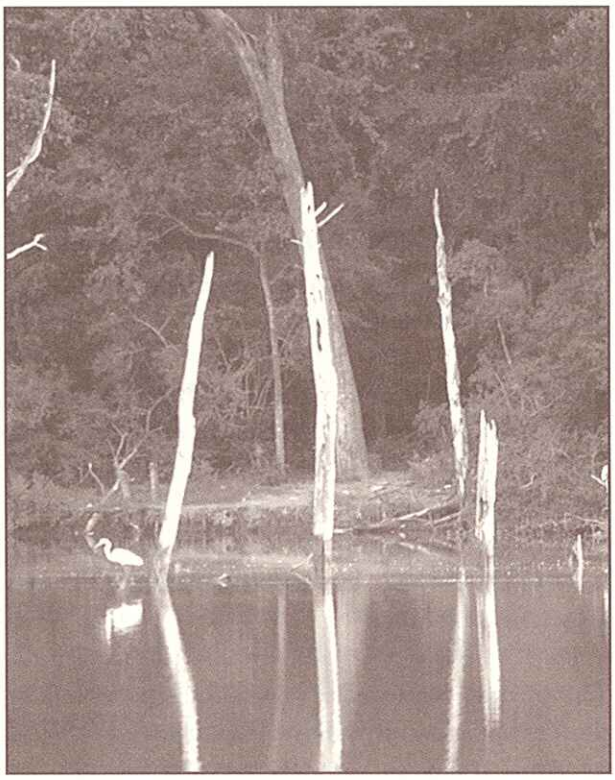
Red tides may produce a brownish-red sheen on the surface of the water and can cover up to several hundred square miles. Because of the economic impact of these naturally occurring events, the Council is committed to expanding the state's current monitoring and reporting of red tide and associated fish kills.

The Council initiated a symposium sponsored by the Texas Parks and Wildlife Department (TPWD) in April 1998 to develop an action plan for addressing red tide on the Texas coast.

Result

Approximately $450,000 in Disaster Funds Available

Disaster funds are available to Texas through the TPWD under §312(a) of the Magnuson-Stevens Fishery Conservation and Management Act for assessment, education, monitoring, mitigation, and research related to red tide events in Texas. The funds will be used in accordance with the action plan resulting from the red tide symposium. In addition, a National Fish and Wildlife Federation grant was awarded to the TPWD to set up a red tide



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monitoring program, which began in November 1998. The TPWD is sampling water quality at certain monitoring stations for harmful algal species twice a month and will continue doing so for one year.

Assessment of Water Quality in Armand Bayou and Oso Bay

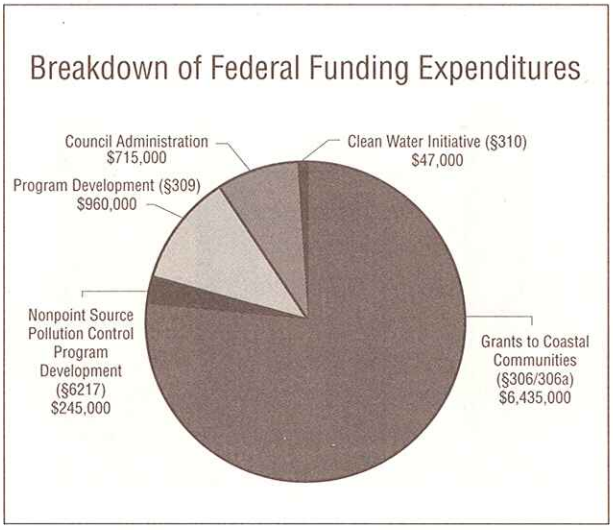
The Council is working with the TNRCC to spearhead a characterization of water quality conditions in Armand Bayou and Oso Bay. The purpose of this undertaking is to collect water quality data and to develop information needed to improve water quality. Armand Bayou is targeted because it occasionally has low dissolved oxygen concentrations and occasionally exceeds screening levels of fecal coliform. This characterization will also establish the maximum daily load for dissolved oxygen in Armand Bayou.

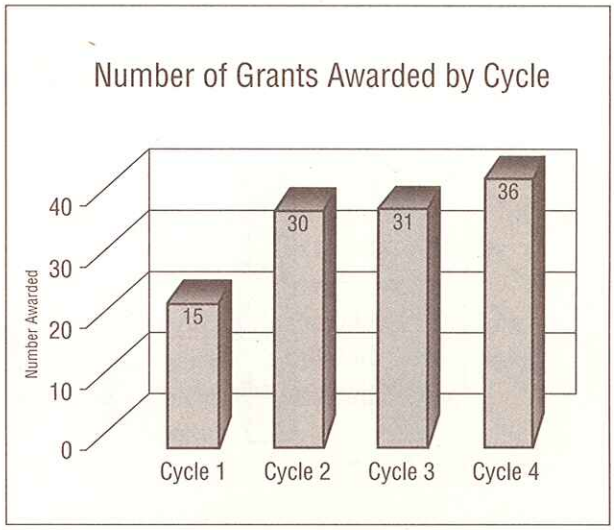
For fiscal year 1999, the Council received more than $2.8 million under the Coastal Zone Management Act (CZMA) to implement the state coastal program. The CZMA provides funding for four purposes: grants to coastal communities (§306/306a), program development (§309), clean water initiative (§310), and development of the state nonpoint source pollution control program (§6217). As seen in the diagram below, most of the federal funding is earmarked for grants to coastal communities. Of all the money the Council receives, only 8.5% is retained for administrative purposes. Texas is one of the few states to pass through 90% of its §306/306a funding in the form of grants.

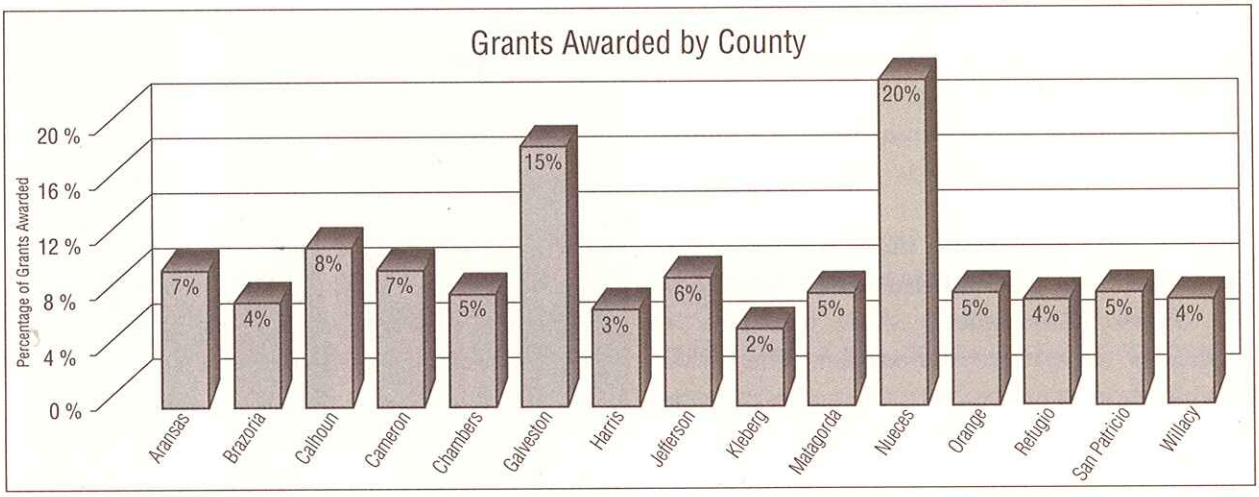
Since 1997, the Council has awarded close to $6.5 million in grants for 114 projects that will further the goals of the program. These projects have addressed primarily five areas:

- coastal hazards
- waterfront revitalization
- critical areas
- public access
- information and data availability

To date, 23 projects have been completed, and the rest are scheduled to be completed by December 2000. The diagram below illustrates the number of grants awarded during each of the four cycles since the CMP was implemented.

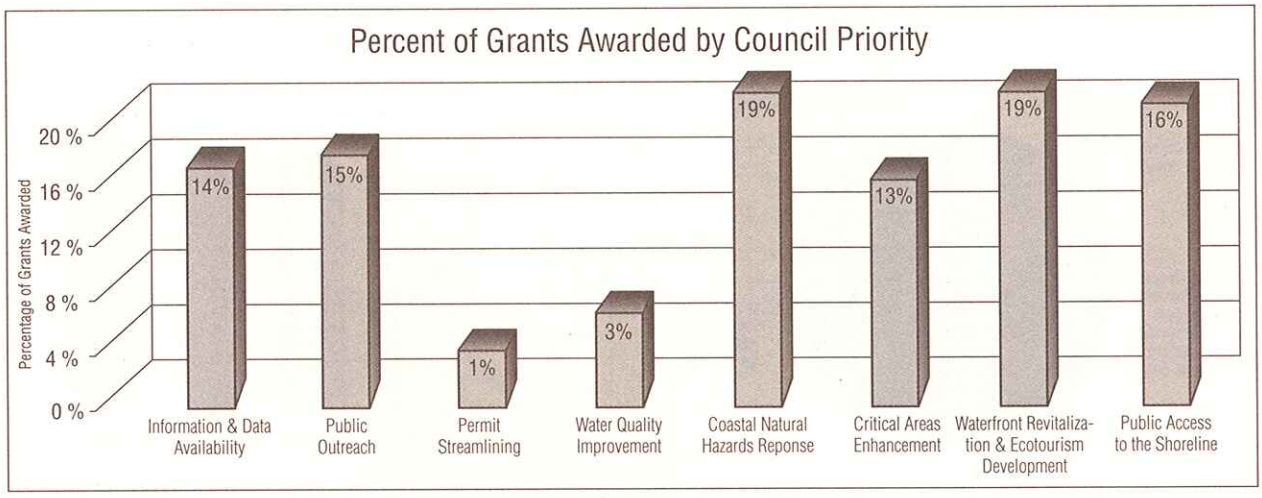






The diagram above illustrates a breakdown of the CMP grants awarded to local governments, state agencies, public universities, subdivisions of the state, councils of governments, the Galveston Bay Estuary Program, and the Coastal Bend Bays and Estuaries Program by county, based on amount funded. Counties not shown either did not submit a grant application or did not receive funding.

The bar graph below illustrates the breakdown of Coastal Management Program grants awarded by Council funding priority. As shown, most of the Council's eight priorities are well represented in the types of grants awarded. The eighth priority, water quality improvement, was added to the Council's list in February 1998.



In December 1998, the Council approved $1,772,469 in grant funding for 35 projects that address such priorities as coastal natural hazards response, critical areas enhancement, public access to the shoreline, waterfront revitalization and ecotourism development, permit streamlining, water quality, information and data availability, and public outreach.

These projects are scheduled to begin in July 1999 and will continue until December 2000. Because the council received more than $2 million in federal funds, it will use the remaining funds for Pathways 2000, a $1 million multi-year project to improve bayshore access in the city of Jamaica Beach. A map showing the geographical distribution of grant projects, cycles 1-4 can be found in the appendix.

The table to the right illustrates the distribution of approved grant projects for grant cycle 4 by county.

Breakdown of Cycle 4 Projects by County

County	# Funded	Amount Funded
Aransas	1	$155,000
Brazoria	3	$114,084
Calhoun	1	$85,000
Cameron	5	$206,893
Chambers	2	$79,475
Galveston	2	$12,530
Jefferson	1	$60,000
Kleberg	3	$115,800
Matagorda	5	$186,740
Nueces	5	$161,160
Orange	1	$79,050
Willacy	2	$110,849
Lower Coast	3	$291,708
Upper Coast	1	$35,000
Coastwide	1	$79,450
Total	**36**	**$1,772,739**

New Numeric Scoring System for Cycle 4

In grant cycle 4, the Council ranked grant applications using numeric scoring criteria for the first time. While considerations such as geographic distribution and funding category distribution were not considered in the scoring, they are still within the Council's purview in evaluating grant applications.

- The Council prefers funding "on-the-ground" projects (e.g., construction, land acquisition, mapping, education initiatives, engineering studies, and research).
- The Council prefers to fund projects that meet local needs and are undertaken by local entities.
- The Council prefers not to fund applicants' operating costs.
- The Council prefers to fund projects that implement or carry out the recommendations included in existing plans approved by the local government or nonprofit organization applying for the grant.
- The Council prefers to fund projects that result in a balanced distribution of grant

funds among the funding categories, reflecting current Council priorities.

- The Council prefers to fund smaller grant projects (under $50,000).
- The Council prefers to fund construction and acquisition projects of less than $150,000 and non-construction projects of less than $50,000.
- The Council prefers to fund projects that result in a wide geographic distribution of grant funds.

Cycle 4 Projects (July 1999 – December 2000)

This section lists the project title, applicant, category, amount of funding, and project description for each project approved for funding for grant cycle 4. Under NOAA's newly published guidelines for its §306/306a funding, certain projects approved by the Council may not qualify for funding.

High School Coastal Monitoring Program Ball High School

Applicant Ball High School, Galveston ISD
Category Public Education
Funding Amount Recommended: $12,530
Description This is the third year for the Texas High School Coastal Monitoring Program. As part of their course work, science students will monitor selected beaches over a period of one year. They will measure shore normal beach and dune topographic profiles and make observations on weather conditions, sea state, longshore current, and dune vegetation.

High School Coastal Monitoring Program Port Isabel High School

Applicant Port Isabel High School, Port Isabel ISD
Category Public Education
Funding Amount Recommended: $19,003
Description See High School Coastal Monitoring Program for Ball High School.

High School Coastal Monitoring Program Port Aransas High School

Applicant Port Aransas High School, Port Aransas ISD
Category Public Education
Funding Amount Recommended: $19,003
Description See High School Coastal Monitoring Program for Ball High School.

Oyster Reef Restoration Project

Applicant Galveston Bay Foundation
Category Critical Areas
Funding Amount Recommended: $35,000
Description The Galveston Bay Foundation will plant oysters at one of two selected sites in the Galveston Bay system using oyster gardening techniques that have been successfully used in Chesapeake Bay. Oyster reef and fringing marsh will provide fisheries habitat, improve water quality, and protect shorelines. Public outreach and

publication of an instruction manual will help educate the general public and make the project accessible to others in the Galveston Bay area as well as other Texas coastal bays.

Coastal Hazards Atlas of Texas Vol. 3
A Tool for Hurricane Preparedness

Applicant University of Texas
Bureau of Economic Geology
Category Information and Data Availability
Funding Amount Recommended: $97,894
Description The Bureau of Economic Geology will develop a coastal hazards atlas for the area from Corpus Christi Bay to Matagorda Bay. This is a geographical expansion of the atlas volumes under development for the upper coast, which were funded during cycles 2 and 3. The bureau will completely revise and update a 1974 atlas to include current transportation routes, hurricane flooding areas, shoreline erosion data, and information on subsidence and faulting. The atlas will be produced in a format that will allow integration with other digital maps of the coastal zone.

Sargent Beach Redevelopment

Applicant Matagorda County
Category Waterfront Revitalization and Ecotourism Development
Funding Amount Recommended: $99,200
Description This project is the third phase in the Sargent Beach Redevelopment Plan, created by an initial grant from the CMP to provide for development landward of the new eight-mile, $60 million revetment. This phase will add individual, permanent covered picnic sites, a covered pavilion, and safety barriers.

Causes and Effects of Hypoxia
(Low Oxygen) in Corpus Christi Bay

Applicant University of Texas
Marine Science Institute
Category Information and Data Availability
Funding Amount Recommended: $47,471
Description Hypoxia, or low oxygen conditions, has occurred in the southeastern region of Corpus Christi Bay every summer since 1988. Hypoxia is a serious water quality issue because organisms require oxygen to live. This project will involve researching the causes and effects of low oxygen conditions on animals and coastal resources.

Anahuac Harbor Improvements

Applicant Chambers and Liberty Counties Navigation District
Category Waterfront Revitalization and Ecotourism Development
Funding Amount Recommended: $23,500

Description The Chambers and Liberty Counties Navigation District has undertaken a public outreach project designed to educate the public on the value of the lower Trinity River, its delta, and the upper Galveston Bay by increasing the public's exposure to these natural resources.

This public service project, Water-Borne Education Service, will provide boating facilities, boats, and captains for single-day and overnight trips for on-the-water education on coastal problems and the methodologies to address them.

Orange County
Geographical Information Systems
Data Dissemination Project

Applicant Orange County Drainage District
Category Information and Data Availability
Funding Amount Recommended: $79,050
Description The Orange County Drainage District proposes to create an Internet Web site to make data gathered from two previous CMP grant projects available on the World Wide Web. This data is used by a variety of private and public agencies. It will also allow users to view, query, and create custom maps and reports on their desktops.

Recent Changes
in Gulf Shoreline Position
Mustang Island and North Padre Island

Applicant University of Texas
Bureau of Economic Geology
Category Coastal Hazards
Funding Amount Recommended: $74,014
Description The Bureau of Economic Geology will gather information on regional rates of beach erosion and land loss that are important for future planning and economic development of the barrier islands near Corpus Christi. Much of the Gulf shoreline of Nueces and Kleberg counties is eroding, but the current rates of erosion and locations of highest rates of land loss are unknown. It has been more than 25 years since field surveys of the Gulf shoreline in Nueces and Kleberg counties were conducted.

Newport Pass Beach Access Road Improvement

Applicant Nueces County
Category Shoreline Access
Funding Amount Recommended: $78,976
Description The county will construct a road to provide the public with safe access to the Gulf Beach at Newport Pass. Presently visitors choose a "shortcut" across critical habitat for a wide variety of coastal shorebirds. Vehicular traffic disturbs habitat and endangers the public.

Coastwide Conservation Plan

Applicant National Audubon Society
Category Public Education
Funding Amount Recommended: $79,450
Description The society will gather coastwide information to evaluate the impact of coastal erosion on important habitat areas and the productivity of coastal habitat for colonial waterbirds and "flat nesting guild" species.

Other tasks include promoting nature tourism, recruiting and training 30-100 volunteers who will provide hands-on conservation of the coastline, and establishing a coastwide outreach campaign to increase public awareness and understanding of coastal issues.

Port Aransas Beach Showers

Applicant City of Port Aransas
Category Waterfront Revitalization and Ecotourism Development
Funding Amount Recommended: $7,010
Description The city proposes to construct two public multi-head shower facilities on the beach in the City of Port Aransas right-of-way. A dilapidated shower stall will be replaced with a six-head shower facility. In addition, a new public shower facility will be constructed on the beach.

Beach Walkovers Project

Applicant Village of Surfside Beach
Category Shoreline Access
Funding Amount Recommended: $7,194
Description The village proposes to construct four handicapped-accessible walkovers on the drive-on beach area. This project will complete all walkovers on the dead-end streets ending at the beachfront, providing beach access to residents as well as to the public.

Captain Clean Crab Anti-litter Educational Campaign

Applicant Valley Proud Environmental Council
Category Public Education
Funding Amount Recommended: $44,000
Description Sponsors of the "Captain Clean Crab" program will use TV, radio, newspaper, billboards, bumper stickers, and flyers and posters printed in English and Spanish to launch an anti-litter campaign in the spring and summer of 1999. The purpose is to educate Valley residents and tourists about the unnecessary taxpayer expense associated with cleanup of litter on public beaches.

Construction of a Specialized Teaching Vessel

Applicant Marine Advisory Service
Texas A&M University

Category Public Education
Funding Amount Recommended: $50,000
Description The Marine Advisory Service will construct a specialized 50-foot teaching vessel to be headquartered in the state's mid-coast area. The primary purpose of this floating laboratory will be to serve the marine study needs of fourth- through twelfth- grade students and their teachers from across the state. This teaching vessel will serve an estimated 4,000 to 5,000 participants annually. On-board training will include specimen collecting and instruction on critical coastal topics and issues.

Bayfront Peninsula Erosion Control Project

Applicant City of Port Lavaca Port Commission
Category Waterfront Revitalization and Ecotourism Development
Funding Amount Recommended: $85,000
Description To address existing erosion problems at a popular area at the north end of Bayfront Peninsula, all existing concrete rubble around the end of the peninsula will be removed. Access to the water's edge is hampered and considered dangerous due to the large pieces of concrete rubble which have been deposited over the years in an attempt to reduce erosion. Concrete steps will be constructed and designed to allow people to reach the water's edge, and to provide increased erosion protection.

San Luis Pass County Park Erosion Control Bulkhead

Applicant Brazoria County Parks Department
Category Coastal Hazards
Funding Amount Recommended: $73,740
Description This project addresses a critical erosion problem that is threatening property owned by the Texas Parks and Wildlife Department and leased to Brazoria County

The existing bulkhead is over 30 years old and no longer stabilizes the shoreline. Extreme high tides during Tropical Storm Josephine in 1996 undercut several bulkheaded areas, causing a serious erosion problem. The county will reconstruct 655 feet of bulkhead at San Luis Pass County Park to minimize future loss of public property.

Field Test for Pilot Oily Bilge Pumpout Station

Applicant Matagorda Navigation District
Category Water Quality
Funding Amount Recommended: $15,000
Description Funding for this project will defray the costs of manpower, filter replacements, and water quality testing during the first year of operation of the second

pilot Oily Bilge Water Pumpout Facility that is under construction at the Port of Palacios.

Matagorda County

Birding Nature Center Web Site

Applicant Matagorda County Birding Nature Center

Category Public Education

Funding Amount Recommended: $7,130

Description The Matagorda County Birding Nature Center will develop an Internet Web page to inform the public about the natural attractions, birding sites, and heritage of the area.

Expansion of Oily Bilge Facility and Program

Applicant Port Isabel/San Benito Navigation District

Category Water Quality

Funding Amount Recommended: $93,800

Description The Port Isabel/San Benito Navigation District will develop a dedicated dock facility with additional equipment for the oily bilge pumping program.

Nature Trail Boardwalk and Education Program

Mad Island Marsh Preserve

Applicant The Nature Conservancy of Texas

Category Public Education

Funding Amount Recommended: $15,410

Description The Nature Conservancy will construct a boardwalk to enable visitors to get closer to wetlands. Currently, people are not allowed direct access to the wetlands because of high water levels and the presence of alligators and poisonous snakes. To sample aquatic vegetation, or to collect aquatic organisms for observation and study, students have to get dangerously close to the edge of the slough. Nature Conservancy volunteers and AmeriCorps students will construct the boardwalk.

Marsh Restoration Project

Applicant Texas State Aquarium

Category Waterfront Revitalization and Ecotourism Development

Funding Amount Recommended: $8,700

Description The Texas State Aquarium will restore the eroded Outdoor Marsh Exhibit at the Aquarium using experts involved in the original construction and build a walkway to provide access to a rehabilitated shorebird population in the marsh.

Additionally, the "high marsh" dry land area will be revegetated with native marsh and dune plants. Once the marsh is revegetated, interpretive graphics will explain the importance of the various marsh plants to migratory birds that frequent South Texas.

Engineering Design for New Seawall at Kaufer-Hubert Park

Applicant Kleberg County
Category Coastal Hazards
Funding Amount Recommended: $17,500
Description Kleberg County will contract with an engineering firm to design a new concrete seawall along an 800-foot stretch of bay shoreline located adjacent to Kaufer-Hubert Memorial Park. Construction will be funded through a second grant described below.

New Seawall at Kaufer-Hubert Park

Applicant Kleberg County Parks and Recreation Department
Category Coastal Hazards
Funding Amount Recommended: $78,300
Description Kleberg County will construct a new concrete seawall along an 800-foot stretch of bank located adjacent to Kaufer-Hubert Memorial Park.

Seawind Campground Construction of RV Spaces

Applicant Kleberg County Parks and Recreation Department
Category Waterfront Revitalization and Ecotourism Development
Funding Amount Recommended: $20,000
Description The Kleberg County Parks and Recreation Department will construct 25 additional recreational vehicle pull-through camp sites in the existing Seawind Campground in Kaufer-Hubert Memorial Park on Baffin Bay in Riviera, Texas. This will allow park management to book approximately 5,500 more days.

McCollum Park Amenities Improvements

Applicant Chambers County
Category Shoreline Access
Funding Amount Recommended: $55,975
Description McCollum Park serves Chambers County and a large portion of the City of Baytown in Harris County. The county will build several benches and wooden steps leading to the water. Other improvements will include the addition of two covered pavilions, renovation of the restrooms, and closing the park to motorized vehicles.

Student Water Quality Monitoring Program Lower San Bernard River

Applicant Magnolia High School
Category Public Education
Funding Amount Recommended: $33,150
Description Students at Magnolia High School will monitor water quality in the San Bernard River, south of FM 521, to gain educational experience for environmental science and chemistry classes and to collect data. This experience, as well as related coastal and wetlands conservation informa-

tion, will be shared with high school students across the state of Texas. A curriculum will be developed that may be used by other schools wishing to do similar projects.

Boca Chica Beach Shoreline Cleanup Equipment and Access Project

Applicant Cameron County
Category Shoreline Access
Funding Amount Recommended: $43,750
Description Cameron County will purchase beach-cleaning equipment to operate a regular cleanup program for Boca Chica Beach. This grant will fund the equipment purchase and operational costs.

Fast Water Rescue and Recovery Equipment for Hurricanes and Floods

Applicant City of Brownsville Fire Department
Category Coastal Hazards
Funding Amount Recommended: $6,340
Description The City of Brownsville has many bodies of water including resacas, the Rio Grande River, and the Gulf of Mexico coastline. During hurricanes and floods, these areas can pose hazards. The city proposes to purchase equipment to give the Brownsville Fire Department personnel the resources to do swift-water rescues and protect divers when removing drowning victims from contained waters.

Guadalupe Delta Flood Zone Mapping and Modeling

Applicant Guadalupe-Blanco River Authority
Category Information and Data Availability
Funding Amount Recommended: $119,800
Description The Guadalupe-Blanco River Authority proposes to prepare topographic maps of the Guadalupe-Delta Flood Zone using aerial photography and computer modeling of flow paths. The finished maps will be compatible with Geographic Information Systems.

Erosion Protection and Environmental Enhancement, North Fulton Beach

Applicant Aransas County
Category Coastal Hazards
Funding Amount Recommended: $155,000
Description The county will provide erosion protection for a county road and upland property in the North Fulton Beach area using an engineering design developed under grant cycle 1.

Retaining Wall for Neches River Shoreline Erosion Protection

Applicant Port of Beaumont Navigation District Jefferson County
Category Coastal Hazards

Funding Amount Recommended: $60,000
Description Erosion has undermined the foundation of an existing port-owned storage building, causing a portion of the riverside wall to collapse. If the erosion continues unchecked, it will also threaten the integrity of the "Low Line" railroad track, which is one of the port's two main rail feeders. In order to prevent continued erosion and the loss of critical rail infrastructure, the port will build a retaining wall designed to withstand the current river forces and turbulence in this area.

Bulkhead to Protect Pavilion and Create Boat Dock Space

Applicant Port Mansfield Chamber of Commerce
Category Waterfront Revitalization and Ecotourism Development
Funding Amount Recommended: $78,000
Description The Port Mansfield Chamber of Commerce will build a bulkhead around a new fishing pavilion.

SB 503 Agricultural Water Quality Improvement Demonstration Projects

Applicant Willacy Soil and Water Conservation District
Category Water Quality
Funding Amount Recommended: $32,849
Description The conservation district will develop and implement agricultural water quality management plans. All plans will address soil erosion, nutrient management, pest management, and irrigation water management where applicable.

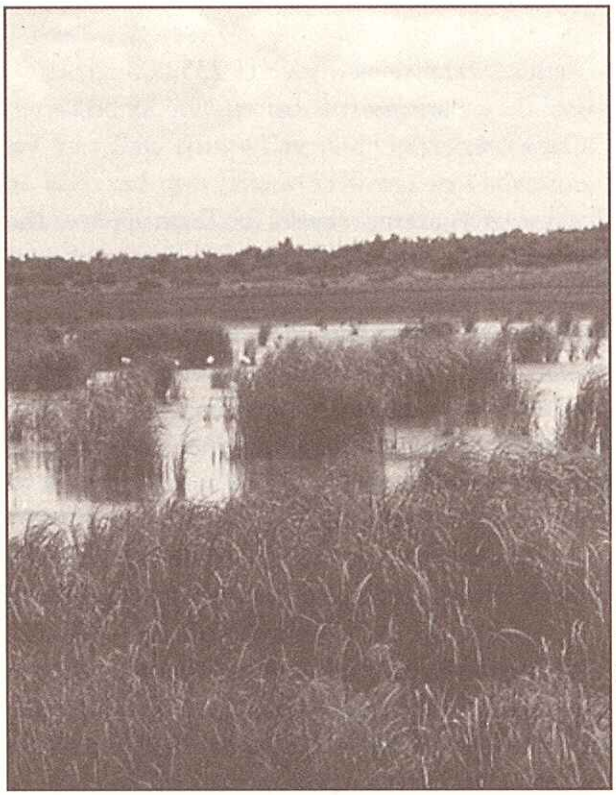
Coastal natural resource areas are the coastal resources designated in the Coastal Coordination Act as the focus of the CMP (Texas Natural Resources Code §33.203). It is these resources upon which much of the economy and environment of the Texas coast depend. Accordingly, the Council's annual report includes an update on the health of these resources.

Coastal Wetlands

Coastal wetlands are those areas having a predominance of hydric soils that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances support, the growth and regeneration of hydrophytic vegetation. Recent estimates of wetland loss coastwide (Moulton, 1997) show that:

- estuarine emergent (salt marsh) wetlands decreased by 9.5% (30,400 acres) between the mid-1950s and the early 1990s;
- palustrine emergent (freshwater marsh) wetlands declined by about 29% (235,129 acres);
- forested wetlands, swamps, or bottomland hardwoods (generally, forested wetlands in floodplains) declined by 10.9% (96,500 acres);
- palustrine scrub-shrubs (freshwater wetlands dominated by woody vegetation less than 20 feet in height) increased by 58.7% (63,300 acres).

According to the GLO's Federal Consistency Database, 48 projects, potentially impacting 314.5 acres of coastal wetlands, were proposed in the



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coastal zone in 1998. The areas subject to potential impacts ranged from 0.006 to 48.6 acres, with 31 of the 48 projects affecting greater than one acre. In 1997, there were fewer proposed projects (26) but more acreage (333.3) potentially impacted.

Submerged Aquatic Vegetation

Submerged aquatic vegetation is rooted aquatic vegetation growing in permanently inundated areas in estuarine and marine systems. Current status and trends information on seagrasses is included in the Texas Parks and Wildlife Department's Seagrass Conservation Plan for Texas.

> THERE WERE APPROXIMATELY 235,000 TOTAL ACRES OF SEAGRASSES ON THE TEXAS COAST IN 1994.

Total seagrass acreage figures for Texas apply to the permanently established beds of the four perennial seagrass species (*Halodule wrightii*, *Thalassia testudinum*, *Syringodium filiforme*, and *Halophila engelmannii*) and annual widgeongrass (*Ruppia maritima*) beds. Seagrass inventories by individual bay systems show that 79.1% of the seagrass occurs in Laguna Madre while only 1.7% occurs north of Pass Cavallo in Matagorda Bay or on the upper coast. The remaining 19.2% is found in the San Antonio/Aransas/Corpus Christi Bay system.

Ruppia maritima is found occasionally in the Sabine Lake system. *Halodule wrightii* is the predominant species north of Redfish/Aransas Bay. The most extensive *Halodule wrightii* beds are found in upper Laguna Madre, while *Thalassia* and *Syringodium* are the dominant species in lower Laguna Madre.

> ALMOST ALL SEAGRASS BEDS HAVE BEEN LOST FROM THE GALVESTON BAY SYSTEM SINCE THE LATE 1970s.
> *Pulich and White*, 1991

> ONLY ABOUT 275 ACRES OF SEAGRASSES REMAIN IN THE SECONDARY BAY, CHRISTMAS BAY.

Some scattered beds of *Ruppia maritima* occur throughout the Galveston Bay system. In the Corpus Christi Bay system, net seagrass acreage appears to be fairly stable in a 40-year time frame. Comparisons of 1958, 1975, and 1994 inventories show evidence of seagrass bed fragmentation and loss in the Redfish Bay area but increases along Mustang Island, in the Harbor Island complex, and in the Nueces Bay area (Pulich et al., 1997).

Both upper and lower Laguna Madre have undergone dramatic seagrass changes since the 1950s, primarily in response to changes in salinity regimes (Quammen and Onuf, 1993). In upper Laguna Madre, between 1967 and 1976, there was a 66% increase primarily in *Halodule*, but also in *Halophila* and *Ruppia*.

> BETWEEN 1976 AND 1988, THERE WAS A 29% INCREASE IN SEAGRASS ACREAGE. HOWEVER, FROM 1988 TO 1994, A DECREASE OF 2,320 ACRES OF HALODULE OCCURRED DUE TO A CONTINUOUS BROWN TIDE ALGAL BLOOM.
> *Pulich et al., 1997*

In lower Laguna Madre, between 1967 and 1988, *Halodule* decreased 60%, while *Syringodium* and *Thalassia* increased by 270% (Quammen and Onuf, 1993). Overall, bare unvegetated areas increased by 280%. In 1998, according to the GLO's Federal Consistency Database, no proposed projects impacted seagrasses in the coastal zone. In 1997, one project impacting 3.5 acres of seagrasses was proposed.

Tidal Flats and Mud Flats

Tidal sand and mud flats are silt, clay, or sand substrates, unvegetated or vegetated by algal mats, that occur in the intertidal zone and that are regularly or intermittently exposed and flooded by tides. The only recent coastwide information on status and trends for tidal sand or mud flats is based on data from Moulton et al. (1997).

> IN 1955, THERE WERE 236,400 ACRES OF ESTUARINE UNVEGETATED SHORE, WHEREAS IN 1992, THERE WERE 206,000 ACRES, FOR A LOSS OF 30,400 ACRES OVER THE 27 YEARS.

The estuarine intertidal unvegetated shore category includes wetlands with less than 30% areal coverage by vegetation and periodically flooded by tidal waters with salinity of at least 0.5 part per thousand. This category includes sandbars, mudflats, and other unvegetated or sparsely vegetated saltflat habitats. Habitats consisting mostly of sand flats dominated by algal beds or blue-green algal mats and periodically flooded by astronomic or wind tides are also included in this category (Moulton et al., 1997).

Oyster Reefs

Oyster reefs are natural or artificial formations in intertidal or subtidal areas that are composed of oyster shell, live oysters, and other organisms and that are discrete, contiguous, and clearly distinguishable from scattered oysters. The only information on oyster reefs and their status and trends for the Texas coast is based on information from the Galveston Bay National Estuary Program for the Galveston Bay system (Powell et al., 1994).

> IN 1991, OYSTER REEF AND UNCONSOLIDATED SHELL SEDIMENTS COMPRISED A TOTAL OF 26,700 ACRES IN THE GALVESTON BAY SYSTEM.
> *Powell et al., 1994*

The surveyed area included the majority of West Bay, East Bay, Trinity Bay, and Galveston Bay. Of the surveyed area, about 53% was in Galveston, East, and Trinity bays. The remaining 47% was in West Bay and the Pelican Island area. The area of oyster reef and shell bottom identified in the 1991 survey was substantially greater than depicted on earlier TPWD charts from the 1970s.

Comparing all but the West Bay area, the 1991 survey identified 14,210 acres of oyster reef, compared to the 7,424 acres measured in the TPWD 1976 survey. Three areas in which reef accretion was most noticeable were:

1. along open-bay reaches of the Houston Ship Channel;
2. at the southern edge of Redfish Bay and the Bull Hill extension of the Hanna Reef tract; and

3. in the Dickinson Bay area. Reef loss was concentrated along the southern shore of Trinity Bay, in the Mattie B./Tom Reef area at the northern end of the Hanna Reef tract, and in the inner portion of the Clear Lake area.

To partially address oyster reef loss in the Galveston Bay system, a CMP grant for oyster reef restoration was awarded to the Galveston Bay Foundation in 1998. The Foundation will plant oysters at one of two selected sites in the Galveston Bay system using oyster gardening techniques that have been successfully used in Chesapeake Bay.

Hard Substrate Reefs

Hard substrate reefs are naturally occurring, discrete and contiguous hard substrate formations, such as rock outcrops or serpulid (annelid or polychaete) worm reefs (living or dead), in intertidal or subtidal areas. Baffin Bay and adjoining areas of upper Laguna Madre contain serpulid reefs composed of calcareous tubes of serpulid polychaete worms. Most reefs are distributed along the bay margins and across the mouth of Baffin Bay at Point of Rocks and Alazan Bay near Starvation Point (Alvarado, 1996).

The reefs have an areal coverage of approximately 10.5 square miles (Brown et al., 1977). Coquina outcrops are located south of Baffin Bay along the mainland shoreline of Laguna Madre. The areal extent of this outcrop ranges from Penascal Point southward for 10 miles and inland for 492 feet (Alvarado, 1996).

Critical Dune Areas

Critical dune areas are protected sand dune complexes on the Gulf shoreline within 1,000 feet of mean high tide. There is currently no status and trends information available for critical dune areas or complexes; however, many local governments have established dune protection lines, including Jefferson County, the City of Port Arthur, Galveston County, the City of Galveston, Chambers County, the City of Jamaica Beach, Brazoria County, the Village of Surfside Beach, Matagorda County, the Town of Quintana, the City of Port Aransas, the City of Corpus Christi, Nueces County, Cameron County, Kleberg County, and the Town of South Padre Island.

Gulf Beaches, Coastal Shore Areas and Critical Erosion Areas

Gulf Beaches

The Texas Natural Resources Code defines gulf beaches as beaches bordering on the Gulf of Mexico that extend inland from the line of mean low tide to the natural line of vegetation bordering on the seaward shore of the Gulf of Mexico, or such larger contiguous area to which the public has acquired a right of use or easement to or over by prescription, dedication, or estoppel, or has retained a right by virtue of

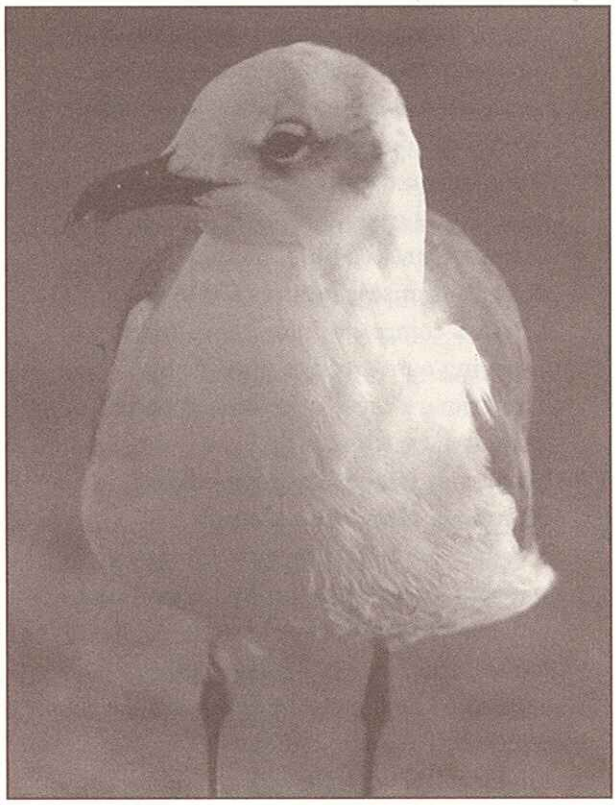


Photo courtesy of Texas Department of Transportation

continuous right in the public since time immemorial. Texas has about 367 miles of open Gulf shoreline.

Morton (1993) has summarized erosion data for developed beaches between High Island on the upper coast and South Padre Island on the lower coast. Most of the Gulf shoreline between High Island and Bolivar Peninsula has undergone cycles of erosion and accretion or stability. The predominant trends have been erosion from the 1800s to the 1930s, accretion from the 1930s to the 1950s, erosion from the 1950s to 1974, and accretion or stability since 1974.

After the jetties were constructed at the east end of Galveston Island, East Beach began accreting rapidly because sand was trapped between the south jetty and the seawall (Morton, 1993). The accretion continued until the 1950s, when the shoreline position stabilized.

All the other beach segments experienced net erosion between the mid-1800s and 1990. Follets Island showed net erosion between the mid-1800s and 1974. Since 1974, the beach has accreted. The beaches of Mustang Island, North Padre Island, and South Padre Island have generally eroded since the late 1800s.

Coastal Shore Areas

Coastal shore areas are all areas within 100 feet of the high water mark on submerged lands. Texas has approximately 3,300 miles of bay-estuary-lagoon shoreline. There is no current status and trends information for coastal shore areas, primarily because of their dynamic nature. The Bureau of Economic Geology at the University of Texas has mapped shoreline types for the Gulf of Mexico and the bays and estuaries from Sabine Pass to the Sargent Beach area (Morton and White, 1995).

Critical Erosion Areas

Critical erosion areas are those Gulf and bay shorelines that are undergoing erosion and are so designated by the commissioner of the GLO under §33.601(b) of the Texas Natural Resources Code. The GLO rules for management of the beach/dune system define "eroding area" as "a portion of the

shoreline which is experiencing a historical erosion rate of greater than two feet per year based on published data of the University of Texas at Austin, Bureau of Economic Geology" (31 TAC §15.2 (31)).

An eroding area is considered critical when the rate of erosion exceeds two feet per year and poses a threat to:

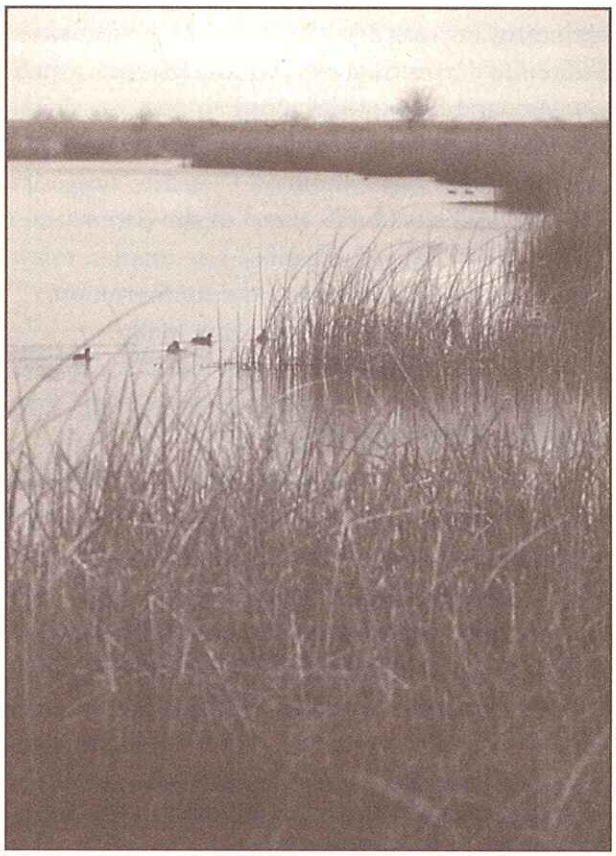
1. public infrastructure or areas of national importance;
2. public beach access and recreation;
3. traffic safety;
4. private property;
5. fish or wildlife habitat.

Generally, monitoring is not performed often enough to detect rates of accretion or erosion. Based on public input, nine critical erosion areas have been designated in the Texas Coastwide Erosion Response Plan (GLO, 1996):

- **Alamo Beach/Magnolia Beach/Indianola Historical Site, Calhoun County**
  Approximately 8 miles of shoreline is affected by severe erosion. Causes of erosion include prevailing winds, waves, and surges generated by ship traffic.
- **Welder Flats State Coastal Preserve, Calhoun County**
  Shoreline recession and deepening of shallow-water habitat in the preserve is believed to be caused primarily by boat wakes from the Gulf Intracoastal Waterway.
- **Caplen Beach, Bolivar Peninsula, Galveston County**
  The Gulf beach is generally receding at 2-10 feet per year. Causes of erosion in this area include a deficit of sediment, sea level rise, land subsidence, and a combination of natural compaction of coastal sediments and extraction of water, oil, and natural gas.
- **Corpus Christi Ship Channel at Port Aransas, Nueces County**
  Marshes comprising the bay shoreline are being converted to open water. The primary cause of erosion is waves generated by ships.
- **Galveston Island State Park Bay Shoreline, Galveston County**
  Marshes are being converted to open water. Causes of erosion include natural wave erosion and wave activity due to recreational vessels. The rate of loss appears to be increasing following the loss of protective emergent shoals.
- **Highway 87 in Jefferson & Chambers Counties**
  Retreat of the Gulf shoreline has resulted in periodic landward relocation of the highway. At present, about 16 miles of Highway 87 is impassable due to tide and wave damage to the road surface.
- **Lower Neches River Marsh, Orange County**
  Between the mid-1950s and 1978, about 9,400 acres of marsh were displaced primarily by open water along an approximately 10-mile stretch of the lower Neches River valley north of Sabine Lake. Main causes of this wetland loss are subsidence, direct and indirect effects of dredged canals

and navigation channels, and artificial levees that inhibit overbank flooding.

- **South Padre Island, Cameron County**
  Erosion rates are generally greater than 5 feet per year. The jetties at the Brazos Santiago Pass have trapped sand, causing accretion along two miles of the shoreline north of them. However, the amount of available sand is decreased and thus the shoreline further northward is eroded.
- **Treasure Island, Brazoria County**
  The present shoreline trend is erosion of more than 10 feet per year. The primary causes are wave activity, sea level rise, and possibly the shifting of land following Hurricane Alicia in 1983. There was no beach nourishment on this Gulf of Mexico shoreline in 1998.



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Coastal Preserves

Under the Texas Coastal Management Program, coastal preserves are any lands owned by the state that are designated and used as parks, recreation areas, scientific areas, wildlife management areas, wildlife refuges, or historic sites and that are designated by the TPWD as being coastal in character. In 1996, the TPWD maintained 13 parks and three fishing piers that total 16,593 acres in the 18 coastal counties.

These range in size from the 149-acre Bryan Lake State Park to the 18,000-acre Sea Rim State Park. The three state fishing piers are from 1.8 to seven acres in size. The TPWD currently manages 10 wildlife management areas (WMAs) in the 18 coastal counties that total 51,436 acres. These range in size from the 37-acre Redhead Pond to the 43,900-acre Matagorda Island WMA. In 1998, no additional acreage was added to state parks and WMAs.

Under the Texas Coastal Preserve Program, the GLO leases coastal lands to the TPWD which manages them as preserves. The Coastal Preserve Program is designed to protect unique coastal areas and fragile biological communities,

including important colonial bird nesting sites. There are currently four coastal preserves:

- Armand Bayou (319 acres)
- Christmas Bay (5,660 acres) in the Galveston Bay system
- Welder Flats (1,400 acres) in the San Antonio Bay system
- South Bay (3,400 acres), the southernmost extension of the lower Laguna Madre

Coastal Historical Areas

Coastal historic areas are sites in the National Register of Historic Places on public land and state archaeological landmarks that are identified by the Texas Historical Commission in its rules as being coastal in character. There are 161 National Historic Sites (approximately 16,898 acres) and 2,248 state archaeological landmarks in the coastal zone. Two additional National Historic Sites were added in 1998. No new state archaeological landmarks were designated in 1998.

Coastal Barriers

Coastal barriers are undeveloped areas on barrier islands and peninsulas or otherwise protected areas, as mapped by the U.S. Fish and Wildlife Service (i.e., Coastal Barrier Resource System (CBRS) units). There are approximately 192,355 acres of CBRS units in the coastal zone. There were no additions or changes in CBRS units in 1998.

Special Hazard Areas

Special hazard areas are areas designated by the administrator of the Federal Insurance Administration under the National Flood Insurance Act as having special flood, mudslide and/or flood-related erosion hazards, and shown on a flood Hazard Boundary Map or Flood Insurance Rate Map as Zone A, AO, A1-30, AE, A99, AH, VO, V1-30, VE, V, M, or E. Flood Insurance Rate Maps are available for the coast, but status and trends information is not available for flood hazard areas.

Submerged Lands

Submerged lands are lands underlying waters under tidal influence or waters of the open Gulf of Mexico that are owned by an agency or subdivision of the state, or by a person other than the state.

> THE TOTAL AREA OF SUBMERGED LANDS IS APPROXIMATELY 6,250 SQUARE MILES, OR 4,000,000 ACRES.

Status and trends data for sediment quality is generally limited to studies conducted for the Galveston Bay system by the Galveston Bay National Estuary Program (Ward and Armstrong, 1992; GBNEP, 1994) and for bays and estuaries in the Corpus Christi area by the Coastal Bend Bays and Estuaries Program (Ward and Armstrong, 1997; CBBEP, 1998). Sediment quality data is also available in the State of Texas Water Quality Inventory (TNRCC, 1996) and sediment sampling

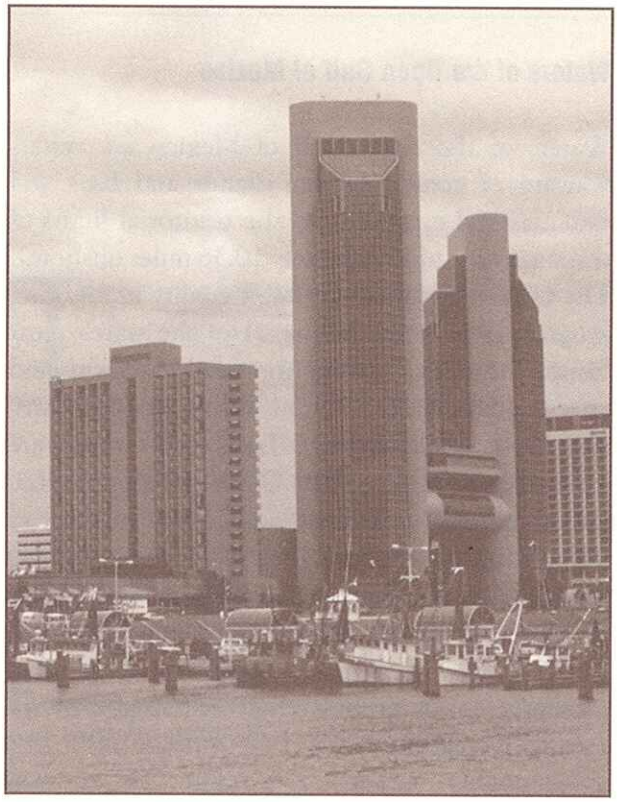


Photo courtesy of Texas Department of Transportation

data available on the Internet through the Texas Coastal Natural Resource Inventory Program Web site (http://www.nri.state.tx.us/nri/).

Sediments of the bays tend to accumulate metals (TNRCC, 1996). Elevated concentrations of various metals are found in sediments of 17 bay segments monitored by the TNRCC. In the Galveston Bay system, elevated concentrations of metals and organic compounds in sediments occur in regions of runoff, inflow, and waste discharge; lower concentrations are found in the open bay (GBNEP, 1994).

In the Corpus Christi Bay system, the quality of sediment is generally good to moderate (CBBEP, 1998). Zinc concentrations appear to be increasing in large areas of Corpus Christi and Baffin bays (Ward and Armstrong, 1997). Zinc levels in the Inner Harbor are an order of magnitude higher than those found in the Houston Ship Channel. Nueces Bay has consistently high levels of metals in both the water column and sediments.

Waters Under Tidal Influence and Waters of the Open Gulf of Mexico

Waters Under Tidal Influence

Waters under tidal influence are those waters in the state that are contained behind coastal barrier islands and within bays and estuaries and rivers to the inland extent of tidal influence. Status and trends data for water quality is generally limited to studies conducted for the Galveston Bay system by the GBNEP (Ward and Armstrong, 1992) and for the Corpus Christi Bay system by the CBBEP (Ward and Armstrong, 1997). Water quality data is also available in the State of Texas Water Quality Inventory (TNRCC, 1996).

Estuaries are primarily monitored by the TNRCC and the Texas Department of Health (TDH). Screening criteria for one or more nutrient parameters were exceeded in 11 of 44 bay segments (TNRCC, 1996). Elevated nutrients can cause excess algal growth and subsequent oxygen depletion, especially during warm summer months. Fecal coliform densities are elevated in 13 bay segments and cause nonsupport of oyster

water use. Time, extent, and area of actual shellfish closures are determined by the TDH. The TDH has issued a consumption advisory for upper Galveston Bay and associated secondary and tertiary bays due to elevated dioxin levels in catfish and blue crabs.

The TDH has also issued an aquatic life closure for parts of Lavaca and Cox bays due to elevated mercury levels in fish and crabs. The closure prohibits the possession of any finfish and crabs from these areas. Water quality in the CBBEP study area is generally good to moderate; however, program reports and state agencies have identified areas that exhibit poor quality and may benefit from source reduction activities (CBBEP, 1998). The most significant issue facing Corpus Christi Bay is declining nutrient concentration levels.

Waters of the Open Gulf of Mexico

Waters of the open Gulf of Mexico are waters seaward of coastal barrier islands and bays and estuaries and extending to the territorial limits of the state (i.e., approximately 10.36 miles offshore). The GLO has initiated a water quality monitoring program to ensure safety at 11 of the state's most visited beaches. Testing for fecal coliform and enterococcus is conducted on a weekly basis. Results have shown that Texas Gulf waters are generally safe and healthy. Complete information, including results, can be found on the Internet at www.glo.state.tx.us/beachwatch. The Corpus Christi area conducts extensive swimmer safety monitoring for its recreational beaches. The TNRCC also monitors coastal waters at least quarterly to determine their sustainability for contact recreation.

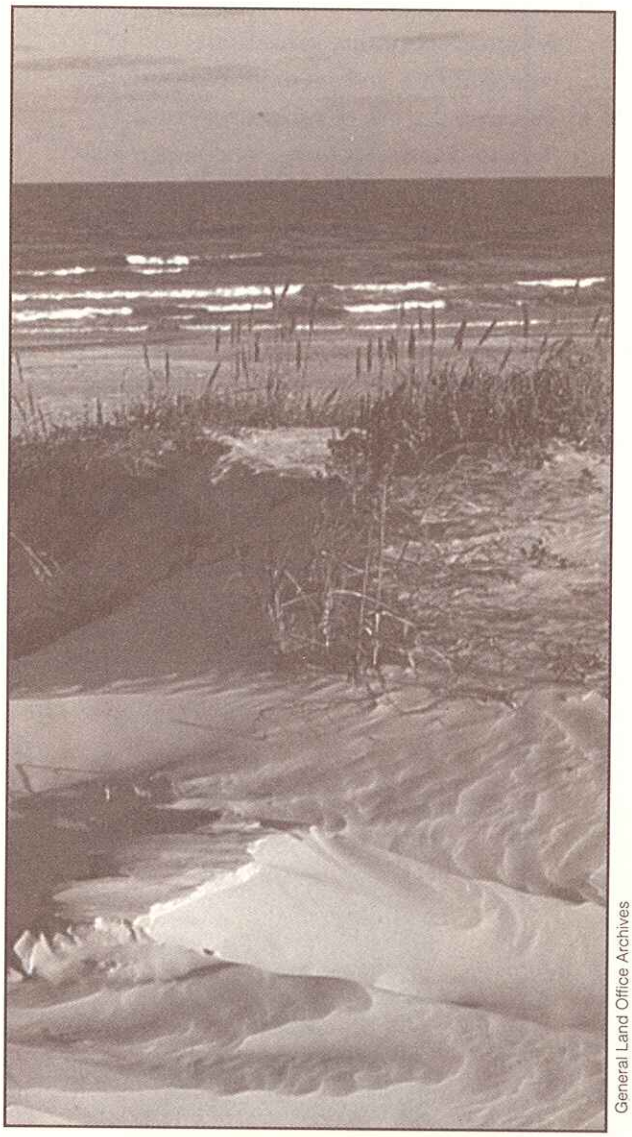
Looking to the Future

This report has provided a broad overview of the progress made during the Texas Coastal Management Program's second year of implementation. It has also touched upon the events occurring in the coastal zone that may impact or influence the direction of the program or how it operates. The coastal program has a lofty goal: to protect coastal resources and to increase the efficiency of governmental procedures and permitting processes affecting these resources.

These two priorities, protection of coastal resources and coordination and streamlining of coastal policies, are important because communities depend upon sustainable natural resources to support numerous coastal industries, and they seek effective government to authorize development necessary to support the increasing population living on the coast.

While the CMP has made significant strides, there is much more that needs to be done. In keeping with this mission, the Council seeks to:

- Increase acreage of coastal natural resource areas.
- Make government more effective and efficient by providing technical assistance to permit applicants; streamline the permitting process; and make coastal management more accessible and visible.



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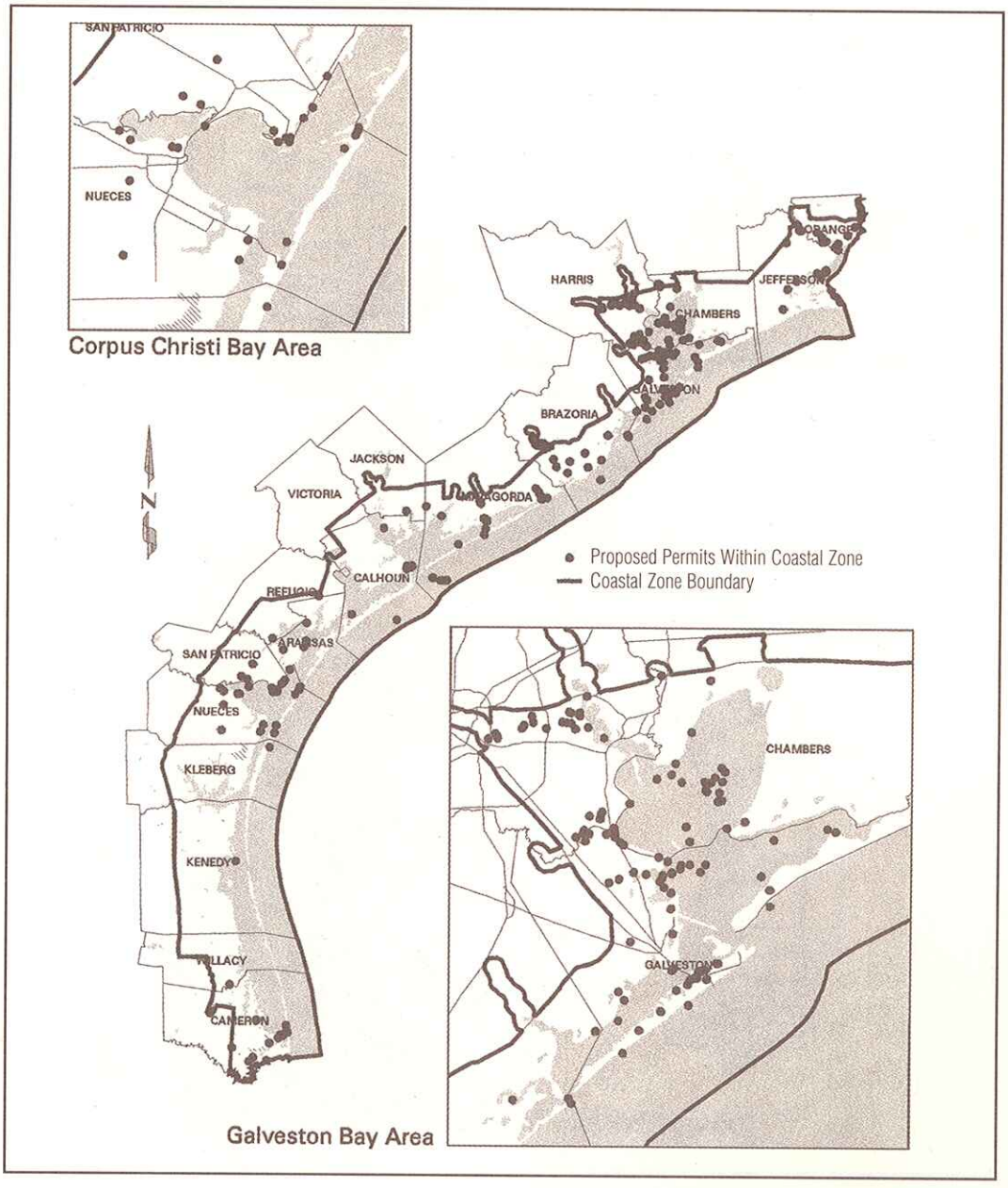
- Uphold the state's interest in federal decision-making by continuing to review federal actions proposed in the coastal zone and evaluate their potential impacts to coastal natural resource areas.
- Improve access to coastal lands and resources; revitalize waterfront communities; and promote ecotourism.
- Promote the use of accurate scientific data in decision-making; encourage a better understanding of natural coastal processes; and use sound science and the latest technology.
- Publish a guide to Texas beaches and bays; develop a shoreline access plan with local government partnership; provide access information on the Internet; and increase mileage of publicly accessible beaches.
- Update the Texas Coastwide Erosion Response Plan and publish erosion rates on the Internet.

The State of Texas has been given a unique opportunity to influence the development and management of the coast. It has been entrusted to serve as protector of Texas Gulf beaches, wetlands, dunes, barrier islands, oyster reefs, and coastal shore areas.

The Texas Coastal Management Program has provided Texans with the tools and financial capability to achieve this.

U.S. Army Corps of Engineers Proposed Permits 1997



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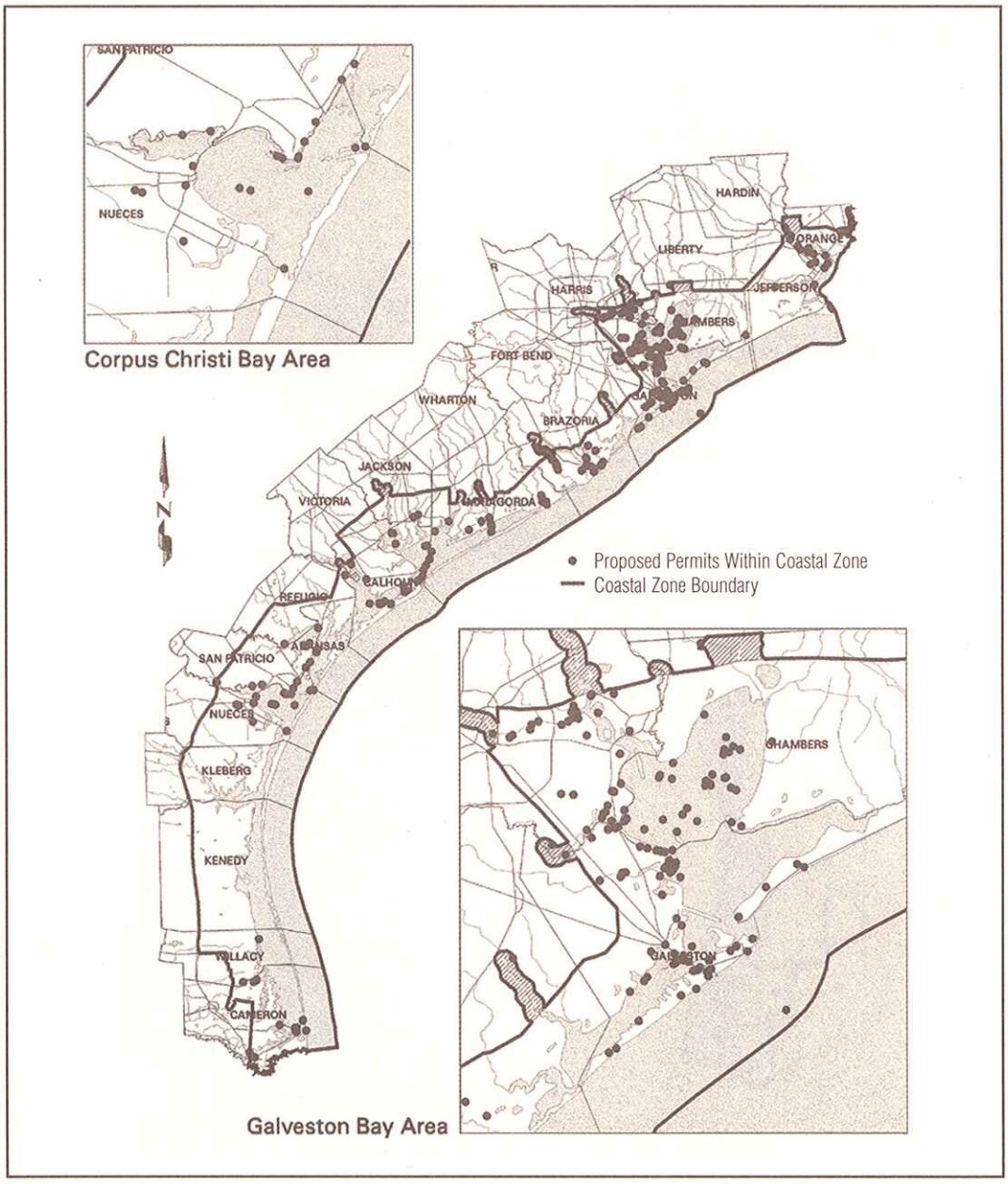
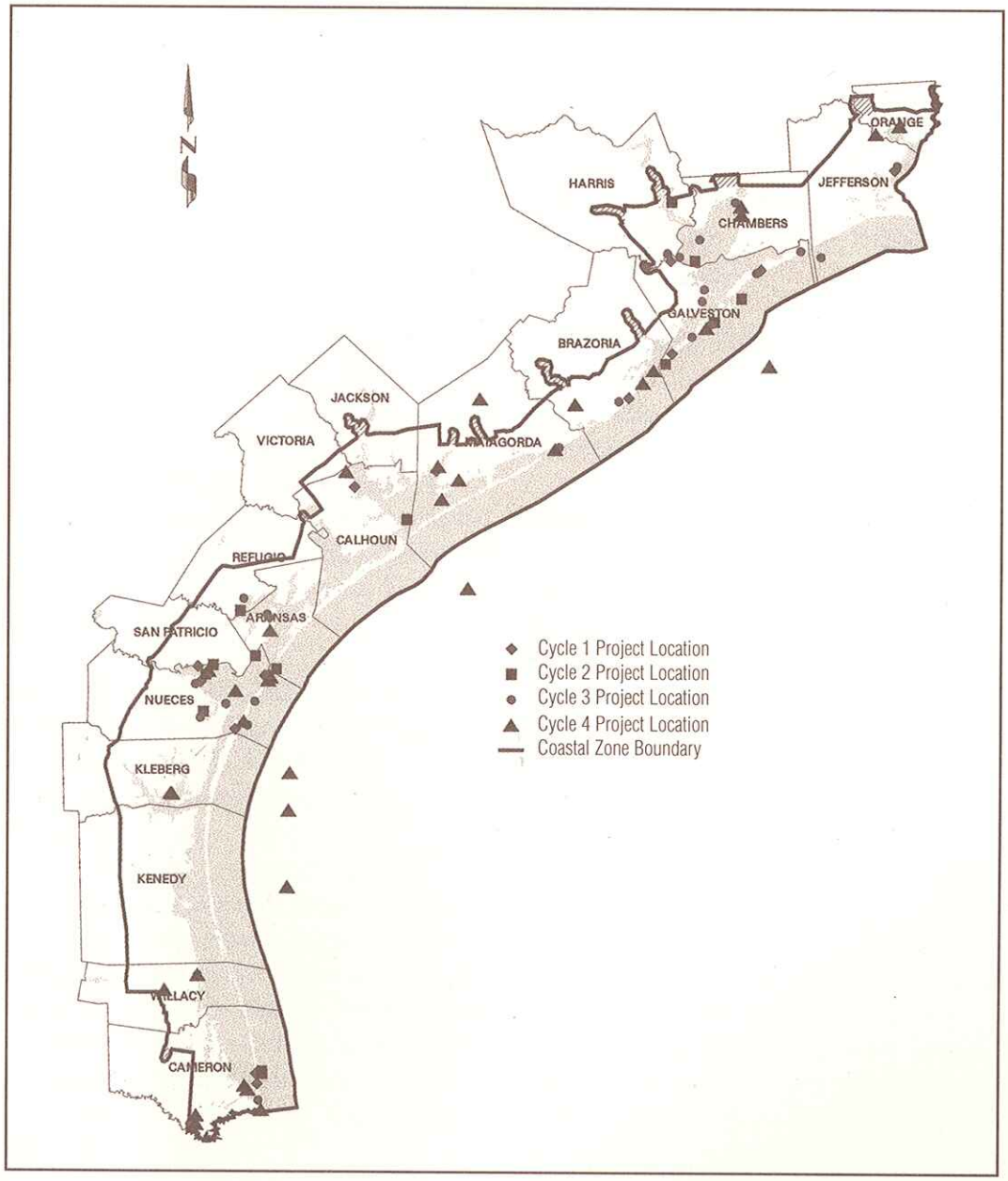


Coastal Management Program Grants



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