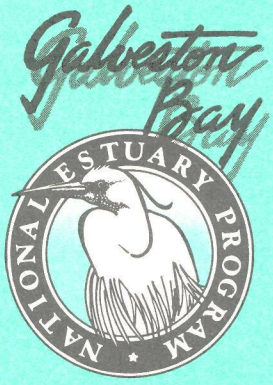
Environmental Management Inventory of Galveston Bay



Galveston Bay
National Estuary Program

GBNEP-24
October 1992

Environmental Management Inventory of Galveston Bay

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Environmental Management Inventory of Galveston Bay

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Principal Investigator

LBJ School of Public Affairs
The University of Texas

The Galveston Bay National Estuary Program

Publication GBNEP-24
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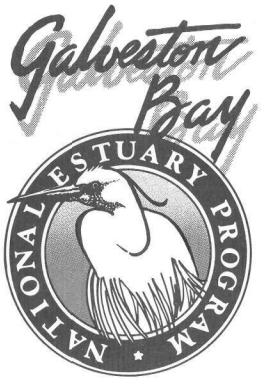

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AN ENVIRONMENTAL MANAGEMENT INVENTORY OF GALVESTON BAY

Dr. Susan G. Hadden, Principal Investigator
LBJ School of Public Affairs

EXECUTIVE SUMMARY

Purpose

The outpouring of environmental concern that began in the 1960s in the United States resulted in passage of more than 20 major federal statutes and scores of state and local laws. As new problems were identified, new laws were added to the list. Thus U.S. environmental policy is embodied in a multitude of laws and carried out by many different agencies at different levels of government. The early laws tended to focus on a single medium or problem: air, water, noise, endangered species. Growing experience and scientific understanding suggested the importance of a more comprehensive approach such as the "cradle-to-grave" oversight of hazardous materials required by the Resource Conservation and Recovery Act (RCRA). Nevertheless, U.S. environmental policy remains generally fragmented, a result of the history of incremental additions to the statutory arsenal. Recent concerns about cross-media pollution and preservation of entire ecosystems have yet to be embodied in law.

An important exception to this generally piecemeal approach to environmental oversight are the more comprehensive planning requirements of the federal Coastal Zone Management Act of 1972 and the National Estuary Program established by the Water Quality Act of 1987. The former law encouraged coastal states to develop comprehensive plans for protecting coastal resources, including beaches, sand dunes, and wetlands, and tried to overcome one of the most important barriers to coherent policymaking by allowing states to control federal projects in state waters. The National Estuary Program reflects the new scientific understanding of the importance of estuaries in maintaining the health of large coastal ecosystems and calls for development of Comprehensive Conservation and Management Plans (CCMPs) in "estuaries of national significance."

In order for the CCMP to take a comprehensive and coordinated approach to environmental protection in the affected estuary, it must either operate within the existing regulatory framework or act to change it. Both paths rest on a clear and systematic understanding of the multitude of federal, state, and local laws and agencies that have gained authority over different aspects of the environment during the last quarter century.

The purpose of this report is to provide an inventory of those agencies and laws, along with their associated regulations, that constitute the regulatory framework for environmental

protection of Galveston Bay, one of the estuaries of national significance covered under the 1987 law. This inventory is largely descriptive, serving as the first phase in a larger project which will ultimately evaluate the effectiveness of the existing regulatory framework. That assessment in turn will form the basis for the CCMP as well as for policy recommendations to improve the coordination of environmental management of the Bay.

Report Organization

Because of the multiplicity of laws, regulations, and agencies, as well as their overlapping authorities, it is not easy to provide an orderly inventory. For example, the federal Clean Water Act is now being implemented by two federal agencies–the Environmental Protection Agency and the Army Corps of Engineers–as well as by designated agencies in the several states to which EPA has delegated authority (the Texas Water Commission for Galveston Bay). Concern about human health from environmental pollution is embodied in numerous statutes, including the Safe Drinking Water Act, pesticide laws, the Clean Air Act, and the so-called "Superfund" Act, all administered by EPA. Another example is the permitting of disposal of dredge and fill, which requires participation of as many as nine agencies. Because of the cross-cutting and overlapping regulatory authorities, it is difficult to identify an ordering principle that allows us to describe each law or agency only once.

We have resolved this difficulty in two ways. In this report, the appendices contain brief descriptions of each law and agency, while the main body of the text considers the Action Plan Topics identified by the Galveston Bay National Estuary Program. These topics were developed to identify the general topics to be addressed by the CCMP Action Plans. They are listed in Table 1; those covered in this report–that is, the substantive topics concerning source controls and estuary management–are indicated by a checkmark at the left-hand side. The appendices are accompanied by a table that lists the agencies with the laws they administer. Appendix 1 presents information about federal laws and agencies. Appendix 2 is organized differently: It is not the custom to identify separate state laws in the same way as federal laws, but rather to refer to the sections of the different Texas Codes (Natural Resources, Health, etc.) where those statutes are codified. Therefore, Appendix 2 is organized only by state agency, with appropriate references to the codes included in the discussions. Appendix 3 presents descriptions of many of the local and regional bodies whose ordinances, regulations, and activities affect the environment of Galveston Bay. In the main body of the report, those agencies, laws, or other topics covered in the appendices are indicated at their first mention by a **boldface** reference.

Our second approach to the difficulty of cross-cutting regulatory authorities is to develop a computerized information base using hypertext, a technique that allows the programmer (and the user) to create pathways between different pieces of information. This in turn allows the user to look at the information in different ways: along different axes, as it were. In our system, users may explore information about the environmental regulatory framework for Galveston Bay according to agency, law, problem, and other characteristics. The user may also switch back and forth among these methods of obtaining information and may

Table 1
Action Plan Topics List
Galveston Bay National Estuary Program

Overall

1. Framework for Action

Source Controls

✓ 2. Point Sources
✓ 3. Non-Point sources
✓ 4. Spills/Dumping
✓ 5. Dredging/Filling
✓ 6. Freshwater Inflow

Estuary Management

✓ 7. Shoreline Development
✓ 8. Habitat Protection
✓ 9. Species Population Protection
✓ 10. Public Health Protection
✓ 11. Subsidence/Shoreline Erosion/ Sea Level Rise

Action Plan Support

12. Monitoring
13. Data and Information Management
14. Research
15. Public Participation

obtain it at different levels of detail. Thus the cross-cutting categories are embodied in the pathways, while each specific description of a law, agency, or regulation is contained only once. This makes a very efficient method of providing information as complex as that contained in the management inventory. Finally, the computerized information system may be updated as laws and especially regulations change, making it more flexible than a printed document. Rather than presenting large sections of the statutes and regulations in the text of this report, we have incorporated many of them verbatim in the computerized information system. These are indicated in the text of the present report by an underlined reference.

This report was prepared in midsummer, 1991. In the First Called Session of the Texas Legislature, August 1991, a bill was passed that reorganized many of the agencies dealing with environmental protection. Because the full implications of the reorganization will not be apparent for several months, we will not discuss it in the remainder of the report. S.B. 2 creates a new agency, the Texas Natural Resource Conservation Commission, which will come into being on September 1, 1993, replacing and incorporating the functions of the Texas Water Commission, the Texas Air Control Board, the Water Well Drillers Board, and the Texas Board of Irrigators. In addition, on March 1, 1992, several functions of the Texas Department of Health will be transferred to TWC: solid waste, water hygiene, on-site sewage and wastewater treatment, and radioactive waste disposal. Readers should note that these changes in administration will be made; we will discuss them more fully in the Management Evaluation to be completed in summer, 1992. Finally, in February and March 1992, the

TWC underwent a complete reorganization; the new structure is described in Appendix B.

In addition to the main body and appendices, the text portion of this report contains a bibliography of sources for the information contained here. We consulted numerous written documents as well as interviewing many staff people in relevant agencies. We are grateful for the assistance of all of them.

The project was conducted by the Lyndon B. Johnson School of Public Affairs, The University of Texas at Austin. Student interns Paige Buechley and Charles Crout were instrumental in conducting many of the interviews and gathering primary materials. Professors Chandler Stolp and Terrell Blodgett were also on the project team. The computerized information system was prepared by W. James Hadden, Jr.

Although the inventory is only the first step in the much larger management evaluation, we have attempted to make this report readable on its own. To that end, we begin with a brief description of Galveston Bay.

CHAPTER ONE
SUMMARY OF FINDINGS

The regulatory framework for protecting the environment of Galveston Bay is very complex, involving literally hundreds of laws and every level of government: federal, state, regional, local, and special district. A clear understanding of this framework is an essential first step toward developing a comprehensive management plan for the bay. This study consists of two parts: the text of this report and a computerized information base containing relevant portions of the texts of the federal and state laws and regulations. Information contained in the computerized information is indicated in the text (except in this chapter) by underlined references. The text portion of the report is itself divided into two parts, with three appendices providing additional information about federal laws and agencies, state agencies and their regulatory authorities, and local and regional authorities. Information contained in the appendices is indicated in the text (again, not in this chapter, where it would be intrusive) by boldfaced references.

One way to understand the complex regulatory framework is to order laws and agencies according to issues or problems. The Galveston Bay National Estuary Program has developed a list of sixteen "action plan topics," or areas for which it intended to develop action plans as part of its comprehensive management program. Our discussion of the regulatory framework is ordered by using the ten action plan topics that concern substantive areas.

SOURCE CONTROLS

Point Sources. In Texas at present, generators of point source discharges are regulated under a dual permitting system: they must obtain permits both from the Texas Water Commission (TWC) or the Texas Railroad Commission (RRC) and from the U.S. Environmental Protection Agency (EPA), which administers the National Pollution Discharge Elimination System (NPDES). TWC designates uses for segments of water and calculates surface water quality standards, which are revised every three years, for these uses. EPA issues NPDES permits based on the Texas water quality standards and consistent with the National Environmental Policy Act. The Texas Railroad Commission has authority over discharges from activities relating to exploration and production of oil and gas. In an effort to improve water quality, storm water discharges are now defined as point sources.

Non-point Sources (NPS). Nonpoint sources of pollution come from such sources as urban runoff, agriculture, hazardous waste disposal sites, and septic tanks. Stormwater runoff is now regulated as a point source under the federal Clean Water Act. Federal funding is available to implement control programs for NPS pollution under the Clean Water Act, which requires states to identify water bodies affected by NPS pollution and develop programs to control it. The Texas Water Commission undertakes these programs.

Agricultural and urban pesticide runoff is indirectly regulated by federal and state requirements that pesticides be used according to labeled instructions. Soil erosion also constitutes a nonpoint source of pollution, both because of pesticide residues the soil may contain and, more importantly, because the sediment itself can increase turbidity of bay water. Several agencies, including the federal Soil Conservation Service and the local Soil Conservation Districts, work with landowners to control erosion.

Wastes of several kinds may become nonpoint sources. Septic tanks, which are regulated by the Texas Department of Health or designated local county health departments, may leak or create runoff if not operating properly or installed in unsuitable locations. Landfills containing hazardous or nonhazardous waste may also create surface runoff. Municipal landfills are regulated by TDH; hazardous waste disposal facilities are primarily regulated by the Texas Water Commission under several federal laws. A permitting system allows TWC to ensure that wastes are put into properly constructed disposal facilities. The Texas Railroad Commission regulates injection wells for disposal of materials from oil and gas exploration and production. Leachates from any of these landfills or wells could enter Galveston Bay through groundwater and could then pose a further environmental risk. Finally, wastes disposed into air are regulated by the Texas Air Control Board. If such wastes fall onto Galveston Bay waters, they might concentrate on the bottom or be taken up by living organisms, but the extent of this problem is presently unknown.

Spills/Dumping. Spills are regulated by many different agencies, and spill response is conducted by these agencies as well as by private spill response teams maintained by private companies or by public-private response teams. The Texas Water Commission is the lead agency for spill response and cleanup, with special responsibility for hazardous materials. Oil spills were the responsibility of the Texas Railroad Commission until the 1991 session of the Texas Legislature gave it to the General Land Office. The federal Environmental Protection Agency and the Coast Guard ensure that responsible parties undertake cleanup and assist when necessary. Starting in 1995, oil tankers will gradually be required to have double hulls in order to minimize the likelihood of marine oil spills. Dumping is regulated under a series of federal laws, but enforcement is difficult and dumping is widely believed to occur regularly. Marine debris is regulated under Annex V of the MARPOL Convention, which prohibits disposing any plastics into the sea. Under the Marine Plastic Pollution Research and Control Act of 1987, the Environmental Protection Agency regulates discharge of plastics, food wastes, and other garbage within the 200 mile zone. The Coast Guard enforces the law by boarding ships.

Dredging/Filling. Construction activities in navigable waters of the U.S. are regulated under the federal Rivers and Harbors Act of 1899. Disposal of dredge material is also regulated under Section 404 of the Clean Water Act. Permits under both laws are granted by the U.S. Army Corps of Engineers; section 404 permits are also reviewed by EPA, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service and several state agencies, including TWC, Texas Parks and Wildlife Department, and the General Land Office. A recent interagency agreement between the Corps and EPA is intended to provide additional

protection to wetlands. The Corps may also issue general permits and letters of permission that exempt projects meeting certain criteria from individual review.

Freshwater Inflow. Freshwater inflow is regulated largely by the water rights provisions of the Texas Water Code administered by the Texas Water Commission. Diversions of water are ranked, with municipal and agricultural uses much more important than preservation of bays and estuaries. In issuing permits for diversions, TWC must take into account 1) studies by the Texas Parks and Wildlife Department and the Texas Water Development Board that determine inflow conditions necessary to maintain bays and estuaries and 2) effects on fish and wildlife. Although TPWD reviews permits, it cannot veto them.

ESTUARY MANAGEMENT

Shoreline Development. Shoreline development is regulated primarily under local zoning and development ordinances. The major cities on Galveston Bay, Houston, Baytown, and Pasadena, do not have zoning ordinances although Houston is developing one. Existing and proposed zoning ordinances focus on neighborhood compatibility rather than natural resource protection. At the same time, all localities on the bay are actively seeking new development and, in many cases, providing tax and permit abatements as part of the recruitment effort. The Texas Coastal Zone Management Plan, provided for in acts passed by the legislature in 1989 and 1991, may increase governmental control over shoreline development. The more stringent clean air standards of the federal Clean Air Act of 1990 may have the effect of limiting new manufacturing in the bay area, and development in undeveloped areas of barrier islands and beaches is discouraged under the Coastal Barrier Resources Act.

Habitat Protection. Habitat is protected under the federal Endangered Species Act, the Fish and Wildlife Conservation Act, and other laws, generally administered by the federal Fish and Wildlife Service, that require various activities to be reviewed for their effects on habitat and for habitat to be acquired if necessary. The Texas Parks and Wildlife Department reviews many activities at the state level for their effects on habitat, although in general it cannot veto permits. The General Land Office grants easements on state-owned submerged lands and oversees recreational cabins already built in bays and wetlands.

Several federal laws focus especially on wetlands, a particularly important and diverse form of habitat. A controversy over the definition of wetlands has been fueled by the August 1991 announcement of a Bush Administration proposal to alter the definition to reduce the number of acres designated as wetlands and rank wetlands according to their importance. Resolution of this controversy will be important to continued use of the Rivers and Harbors Act and section 404 of the Clean Water Act as tools to protect habitat.

Species Protection. The federal Endangered Species Act, which is implemented by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, protects living resources and their habitat. The two agencies may review all projects, whether federal or not, which

may affect species listed as endangered or threatened. Under the Fish and Wildlife Coordination Act, the same agencies, along with the Texas Department of Parks and Wildlife, also have authority to review proposed projects of any federal agency that hopes to control or modify any body of water. TPWD also sets limits on takings of fish and wildlife and enforces them, and undertakes a variety of other programs, including nursery protection and designation of scientific areas, that are intended to protect living resources. The Texas Department of Agriculture reviews special use permit requests for pesticides to ensure that the use will not adversely affect endangered species.

Human Health. Human health is protected by water quality laws discussed above, by laws concerning hazardous waste disposal, and by state activities concerning fish and shellfish consumption. The Texas Department of Health surveys bodies of water and classifies them according to their ability to produce healthful shellfish. Of Galveston Bay's total of 331,000 acres available for shellfish production, 60 percent were closed in 1990. The Texas Water Commission also samples water to determine water quality.

Subsidence/Shoreline Erosion/Sea Level Rise. The Harris-Galveston Coastal Subsidence District attempts to end subsidence by regulating withdrawal of groundwater within its boundaries. Other actions that could reduce shoreline erosion and minimize flooding are possible under the federal Coastal Management Act of 1972, in which Texas is not yet a participant. The 1989 and 1991 state laws that designated the General Land Office as the lead agency in working with numerous other state agencies to develop a long-term plan for managing the Texas coast may lead to additional state power to limit shoreline erosion. The U.S. Soil Conservation Service along with local soil conservation officers have instituted programs for reducing soil erosion through appropriate plantings.

CHAPTER TWO
GALVESTON BAY

The Galveston Bay system constitutes the seventh largest estuary in the United States, with 600 square miles of shallow (10-12 foot) water. Because precipitation exceeds mean evaporation and an additional 10 million acre-feet of fresh water enter the estuary annually, the bay has a very low salinity, which in turn is one of the keys to its extraordinary productivity. A second factor is the large number of marsh, forest, and fresh water ponds and lakes that surround the bay, filtering runoff and providing a rich source of nutrients and valuable habitat. The bay supports a wide range of commercial and recreational fishing, producing nearly 7 million pounds of shrimp in 1987 along with oysters, redfish, flounder, and many others. It also provides rookeries for colonial nesting birds. More than 70 species of waterfowl and shorebirds live or migrate through the bay as do 90 species of amphibians and reptiles.

Galveston Bay is composed of four main bodies of water and several smaller side bays. It lies generally southeast of the Houston Metropolitan Area and is fed in part by the San Jacinto River which drains populated areas of northern Harris and southern Montgomery Counties. Other municipalities on its shores include Baytown, Pasadena, Galveston, and Texas City/LaMarque, putting it at the edge of the most heavily populated area of Texas. The bay is surrounded by four counties: Harris, Chambers, Brazoria, and Galveston. The Trinity River, which flows into the bay, cuts through the Dallas/Fort Worth Metroplex. Other municipalities along the Trinity include Athens, Corsicana, Huntsville, and Waxahatchie. Thus the bay is affected by cities and towns with a population of more than 4 million people, although the distance of many of the cities from the bay may reduce the effects of pollution from them. In addition, it is at the center of the state's petrochemical industry, with 30 percent of U.S. petroleum industry and nearly 50 percent of U.S. production of ethylene and propylene occuring on its shores.

In order to support ocean-going ship traffic, the Houston Ship Channel was cut across Galveston Bay: a 400-foot-wide, 40-foot deep cut through the floor of the otherwise shallow bay. The channel has allowed the Port of Houston to become the third largest port in the United States. The channel carries 70 percent of the state's total port traffic and generates over $3 billion of revenue to the state and local economy. More than 150 companies line the channel, primarily producing petrochemicals and steel. It is estimated that over 110,000 Texas residents are employed in organizations that are related to business activity along the Houston Ship Channel. In addition, the Gulf Intracoastal Waterway, a barge channel, crosses the bay.

In short, Galveston Bay is of great economic importance to Texas. The Port of Houston generated $3 billion in revenue in 1987; the Intracoastal Waterway system carried almost 73 million tons of commodities in 1986. In May 1988, when then-Governor William

Clements nominated Galveston Bay as an estuary of national significance, the Texas Water Commission estimated the total economic value of its natural resources, including habitat, fishing, and recreation, to be $2.74 billion.

The economic importance of the bay contributes to the difficulty of developing coherent and sensible policies for environmental protection. On the one hand, the continued economic importance of the bay depends upon its environmental health, including its ability to sustain fishing and recreation. On the other hand, environmental protection must be balanced against long-established patterns of use whose disruption could be extremely costly. Phase 2 of this project will include an evaluation of the present balance between these competing values embodied in the present set of laws and regulations and agency practices. However, the purpose of this phase, the environmental regulatory inventory, is to sketch the existing legal framework for protection of the bay's environment. The following sections are organized according to several problems identified by the Management Conference of the Galveston Bay National Estuary Program.

CHAPTER THREE
ACTION PLAN TOPICS: SOURCE CONTROLS

POINT SOURCE POLLUTION

Point source pollution originates from a single defined source such as municipal or industrial wastewater treatment discharges. Under new EPA regulations, storm water discharges will also be regulated as point sources. However, regulation of storm water discharges is discussed more fully under nonpoint source pollution section because nonpoint source pollutants constitute such a large portion of storm water.

Over half of the permitted wastewater discharges in Texas have a final destination in Galveston Bay. Thus a review of water quality control legislation and programs is of special importance for the bay. Some 485 industrial and 617 domestic sources are permitted to discharge into the bay and immediately adjacent bodies of water, a permitted total of more than 750 million gallons per day (Texas Water Commission, 1990).

The Dual Permitting System

Point source pollution is regulated by a combination of state and federal laws. Point source discharges into water bodies in Texas must be permitted pursuant to Section 301 of the **Clean Water Act** and Section 26.121 of the Texas Water Code. Currently, permits for discharges are required from both the federal **Environmental Protection Agency** (EPA) and the **Texas Water Commission** (TWC) (or, in the case of dishcarges from oil and gas facilities, the **Texas Railroad Commission**, or TRC) because the federal National Pollution Discharge Elimination System (NPDES) program has not yet been delegated to Texas.

TWC has been pursuing delegation of the NPDES program since early in 1990. In order for a state to be delegated the NPDES program, it must meet certain federal guidelines, both for the program itself and for related administrative and legal arrangements. In February 1991, the **Office of the Texas Attorney General** informed TWC that it had found two deficient areas in state law that would prevent federal delegation (Lynch letter, February 20, 1991):

1) Citizen Participation in State Enforcement. The federal Clean Water Act establishes a policy of encouraging citizen participation in enforcement. If the federal program is to be delegated, therefore, either citizens must be allowed under state law to intervene in civil and administrative actions, or the implementing agency must provide at least 30 days for citizen comment on proposed settlements of state enforcement actions and must make certain assurances that it will allow and encourage citizen participation. The Attorney General's Office found that Texas law does not meet these criteria.

2) Conflict of Interest Provision. Federal law requires that no one serving on the permitting body, in this case the Texas Water Commission, may have received a significant portion of his or her income from permitholders or applicants in the previous two years. Texas law has no such restrictions, only preventing Commissioners from having a spouse employed by regulated entities or from owning or controlling more than a ten percent interest in a regulated entity. On January 15, 1991, just before leaving office, Governor Bill Clements signed Executive Order WPC-90-12 which essentially meets the requirements of the federal law. However, because executive orders are neither laws nor regulations and because state law does not seem to grant executives authority to impose such conditions, the Attorney General's Office believes that the executive order would not meet the federal requirements.

A third area of concern for the AG's Office is the state Open Records Act, which may or may not meet the federal requirements. In addition to these concerns, environmental groups have identified other areas where they believe that state law does not meet minimum federal guidelines for NPDES delegation. They include lack of a state requirement for an Environmental Impact Statement process; low level of penalties assessed under state law; and TWC's lack of ability to enter facilities for enforcement and to regulate federal discharges. These groups are concerned more generally about what they perceive as TWC's use of engineering judgment rather than effluent standards in granting permits, and they prefer the dual permitting system which allows them two chances to affect the decisionmaking process. In contrast, regulated entities feel that the dual permitting process is burdensome.

The dual permitting process is coordinated to some degree as TWC drafts a large percentage of the NPDES permits for the EPA. These draft permits, however, are not always utilized by the EPA. EPA is not compelled to follow TWC rules nor to use TWC calculations. If permits issued by the two agencies for the same facility contain different restrictive parameters, the more restrictive permit governs.

Permitting by State Agencies

The Texas Water Commission is responsible for promulgating the State of Texas Surface Water Quality Standards which contain general and numerical criteria for each classified stream segment in the state. These standards must be revised every three years and are subject to EPA approval and a public hearing process. General use criteria are descriptive in nature. For example Upper Galveston Bay (segment 2421) and Lower Galveston Bay (segment 2439) have the following "designated uses": contact recreation, high quality aquatic life habitat, and shellfish waters. Criteria to protect these designated uses include a dissolved oxygen criterion of 4.0 mg/L and a fecal coliform criterion of 14/100 mL (30 day geometric mean not to be exceeded). NPDES and state discharge permits are required to be protective of applicable instream water quality standards. As noted, state discharge permits are issued by the TWC or the RRC. The permit application is subject to an open hearing process.

Most of the data used for monitoring discharges is self-reported by the permit holders on a monthly basis (the frequency of sampling required in the monthly report depends on the capacity of the plant). TWC also maintains several hundred additional monitoring stations state-wide that obtain data used for both ambient conditons and permit monitoring. Periodic wasteload evaluations are performed at selected sites to determine the approximate distribution of loading of point, nonpoint, and "natural" pollutants (BOD); these evaluations are similar to the Total Maximum Daily Loads (TMDL's) required by Section 303 (d) of the federal Clean Water Act. Compliance inspections are conducted according to a schedule determined by the potential impacts of the discharge and the results of previous compliance inspections. Mandatory compliance hearings are conducted for those permit holders whose self-reporting data indicate substantial noncompliance for four consecutive months. Enforcement options for noncompliance include warning letters, corrective orders, administrative penalties, and referral to the Attorney General for civil penalties.

The **Texas Railroad Commission** (RRC) has jurisdiction over the disposal of wastes into or adjacent to the waters of the state from activities associated with the exploration, development, and production of oil, gas, and geothermal resources. As with other facilities, oil and gas facilities must obtain discharge permits from both the EPA and the RRC until delegation of the NPDES program to the RRC. The RRC has adopted Statewide Rule 77 (16 TAC 3.75) which will become effective upon NPDES delegation and is more comprehensive than regulations presently in place. Currently, waste discharges are regulated under Statewide Rule 8 (16 TAC 3.8) which expressly prohibits polluting offshore and estuarine zones. Furthermore, Section 26.131(b) of the Texas Water Code prohibits the RRC from issuing permits that will violate state water quality standards. Dischargers are required to sample monthly, and submit quarterly monitoring reports to the RRC's District 3 Office in Houston. Annual on-site inspections are also conducted to detect possible permit violations.

Senate Bill 1103, passed in the 72nd Texas Legislature (1991), provides the RRC an additional tool to combat pollution from abandoned wells. A fund with a $6 million floor and a $10 million dollar ceiling will be established for the purpose of plugging such wells throughout the state. The fund will be created through the collection of fees and penalties, and will be utilized to plug abandoned wells and cleaning up both surface and underground wastes which are causing or likely to cause water pollution. Approximately 7,000 wells in need of plugging have already been identified as possible environmental threats, and it is estimated that between 40,000 and 50,000 wells are producing less than three barrels a day (*Austin American Statesman*, May 29, 1991). It is likely that many of these wells will require plugging in the near future, and money from this new fund will aid in reducing pollution associated with abandoned wells. The fund, originally called the "Well-Plugging Fund," was renamed the "Oil Field Cleanup Fund" in the legislation as passed in order to emphasize the equal importance of surface cleanup.

Municipal Wastewater Treatment

Municipal water treatment plants (POTWs, or publicly owned treatment works) are subject to the same water treatment standards as other dischargers. In order to assist them in meeting these standards, industries that dischange into municipal wastewater treatment systems must pretreat their own wastes under the National Pretreatment Program, established in 1981. Municipalities are responsible for enforcing regulations under the pretreatment program, which incorporates general standards preventing anyone from releasing pollutants that might interfere with the treatment process or create a hazard as well as specific standards for 26 industries.

Municipalities with populations greater than 5000 people must comply with the Municipal Water Pollution Control and Abatement Program, regulations for which were developed by TWC. The program requires municipalities to maintain an inventory of all significant waste discharges to the water within the city and, optionally, the extraterritorial jurisdication; to monitor significant waste discharges; to inspect and test these discharges; and to work with TWC to obtain compliance. The Gulf Coast Waste Disposal Authority, a regional authority, operates eleven municipal wastewater treatment plants and seven water treatment plants serving approximately twenty-four districts and cities. Five of these are large, regional facilities. The Authority also owns and operates three industrial wastewater treatment facilities handling liquid waste from over forty-five plants.

The increased standards have placed burdens on localities to construct and maintain high quality wastewater facilities. The Texas Water Development Board, which oversees water supply and water financing, provides up to 55 percent of funds needed for certain components of public wastewater collection and treatment facilities. Under the 1987 amendments to the federal Clean Water Act, this grant program will be gradually converted to a revolving loan program. Municipalities obtain low-interest loans, repayment of which is used to sponsor new projects. The Water Development Fund, a similar revolving fund, emphasizes regional wastewater treatment programs, and can also be used for regional water facilities and projects intended to convert from ground water to surface water.

Even from this brief description it is possible to identify some potential problems with the regulatory framework for point source pollution. For example, TWC cannot review discharge permits issued by the RRC. Thus no single entity necessarily reviews all the discharges into any body of water. Even in cases where a single agency does review all the permits affecting a body of water, enforcement emphasizes compliance with a single permit rather than evaluating the cumulative impact of the permitted discharges on the receiving waters. For toxic substances, which are often difficult to detect and may have effects at extremely low levels, this problem is especially severe. However, both EPA and TWC are adopting a watershed approach to water quality that may alleviate this problem when implemented. Similarly, tidal disposal activities permitted by the RRC may adversely impact aquatic life due to their high salinity, but RRC permits are not required to consider this parameter. Other problems include those raised by the Attorney General's Office (and

additional problems identified by environmental groups) as preventing NPDES delegation. Finally, ever-worse financial stringency may affect the abilities of local governments to fulfill their obligations for waste treatment and monitoring of water quality.

NON-POINT SOURCE POLLUTION

Nonpoint source pollution (NPS) is associated with agriculture, silviculture and urban runoff as well as leaks from septic tanks and waste disposal sites. Such pollution does not emanate from a single location, and therefore it is harder to control and regulate than point source discharges. Yet, as point source municipal and industrial pollution is further reduced, nonpoint source pollution plays a relatively larger role in the degradation of the nation's waters. Although storm water discharges are defined as point source discharges under the provisions of the federal **Water Quality Act**, NPS pollutants constitute a major portion of the pollutants in such discharges. Storm water regulations, therefore, are analyzed in this section rather than in the section on point sources. Conversely, two other sources of nonpoint pollution–dredging and disposal of dredged material, and spills of oil and hazardous materials–are treated in the respective sections on those two activities.

Section 405 of the **WQA** establishes a new management structure for permitting storm water discharges through the addition of Section 402(p) to the **Clean Water Act**. With the exception of storm water from industrial activities, most storm water discharges were exempted from **EPA**'s first storm water regulations issued in 1973. EPA's attempts to formulate a comprehensive storm water regulatory program were unsuccessful in the 1970s, and the WQA imposed new deadlines for the regulatory program. Deadlines requiring regulations for storm water discharges for industry and cities were established in the following order: industries and municipal separate storm sewer serving populations over 250,000; municipal separate storm sewers serving populations between 250,000 and 100,000; and municipal separate storm sewers serving populations under 100,000.

The provisions mandated under Section 402(p)(3)(A) of the CWA require that industrial dischargers meet the applicable provisions of Sections 301 and 402 of the CWA (which includes requirements to use both Best Available Technology –BAT–and Best Conventional Pollutant Control Technology–BCT–pollution control technology and the use of water-quality based controls where necessary). Section 402(p)(3)(B) of the CWA dictates requirements to be included in NPDES permits for municipal storm sewers. Permits for muncipal systems may be issued on a system or jurisdiction-wide basis, must include a requirement to prevent non-storm sewer discharges into the storm sewers, and must require methods of control which eliminate the discharge of pollutants to the maximum extent practicable.

Section 401 of the WQA amends section 402(1)(2) of the CWA by stipulating that a storm water permit will not be required for runoff from mining and from oil and gas exploration, production, treatment, or transmission if the discharge does not come into contact with any raw material, product, byproduct, or waste product located on the site. Section 503 of the

WQA amends Section 502(14) of the CWA by excluding agricultural storm water discharges from the definition of a point source, thereby excluding such discharges from permit requirements (55 FR, 1990, pp.47992-47994). These excluded categories obviously contribute to nonpoint source pollution, but are exempt from storm water regulations. The storm water requirements of the WQA, however, were not the only provisions of the act aimed at reducing nonpoint source pollution.

Section 319 of the Water Quality Act requires states to identify and assess water bodies affected by NPS pollution and to develop programs to control NPS pollution. These programs are to include Best Management Practices (BMPs) which will reduce NPS pollution. The Texas Water Commission, which is primarily responsible for nonpoint source pollution control in Texas, has submitted the *1990 Update to the Nonpoint Source Water Pollution Management Report for the State of Texas* as a response to this mandate, and parts of it have been approved by the EPA.

EPA approval of the plans is required before the state can receive federal grants which could cover as much as 60 percent of the implementation costs of the nonpoint source pollution reduction plans. Although $400 million has been authorized for the federal program from 1988-1991, the $38.6 million appropriation in Fiscal Year 1990 marked the first appropriation for the program. An additional $50 million has been appropriated for FY 1991. President Bush's FY1992 budget request amounts to $23 million for the Section 319 grants (Copeland, June 12, 1991, p.6). It is likely, therefore, that only one-fourth of the authorized funds will be appropriated for the nonpoint source reduction program.

Indeed, it is possible that Section 319 may follow the fate of Section 208 of the CWA. Section 208 required the development of area-wide waste treatment plans by the states, but no federal implementation money was authorized and few plans developed were ever implemented (Copeland, June 12, 1991, p.7). Some observers fear that the Section 319 NPS program will be delegated entirely to the states without any federal funding as part of the reauthorization process of the CWA (Beckett Interview).

Section 26.177 of the Texas Water Code provides an additional framework for NPS pollution control by requiring cities having populations of 5,000 or more to establish pollution control and abatement programs. Under this section, plans must be established and implemented "for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rain water." This program resembles a similar program authorized in the early 1970s which was never fully implemented due to a lack of funding and a lack of an effective enforcement mechanism. In the Galveston Bay area, local drainage districts along with county and city authorities are responsible for maintaining storm drainage systems.

In 1989, TWC was given review authority over city programs and the authority to adopt rules for the establishment of the program. Moreover, TWC may assess fees to recover the costs

of administering the program. The rules initially proposed were not well received by the cities, and the agency is presently working on revisions to be published in summer 1991. TWC is also taking measures to ensure that provisions of the program will be consistent with the federal permit requirements for storm water systems (which are treated as point sources under the NPDES permit program). The program requires cities to inventory and monitor wastes being discharged into or adjacent to waters in the city, in addition to the required formulation and execution of plans to control nonpoint source pollution.

In addition to stormwater runoff, sources of NPS pollution in Galveston Bay include agricultural runoff, soil erosion, leaks from septic tanks and landfills, and airborne contaminants that enter the water. Agricultural runoff is controlled in different ways: through EPA-approved labels on pesticides that include instructions for use that are intended to minimize runoff, and through the programs of several agriculture-related agencies to teach farmers ways to minimize runoff. The success of labeling depends not only upon the farmers' willingness to follow the instructions exactly but also upon the extent to which the instructions are related to actual conditions of use. Rice growing, an important agricultural activity in areas near Galveston Bay, usually entails use of standing water, with the result that any pesticide application could occasion some runoff into waters flowing into the bay. Mosquito abatement, which occurs during the spring and summer when juvenile fish and shellfish enter the marshes, also causes pesticide runoff into Galveston Bay. Mosquito control is usually carried out by local health departments. Finally, urban pesticide use for purposes including both insect control and lawn enhancement creates considerable potential for runoff into Galveston Bay.

Soil erosion is another source of possible pollution, both from the soil itself and from any contaminants, including pesticides, it may contain. The 1935 Soil and Water Act created the Soil Conservation Service, which was authorized to provide technical assistance for soil conservation. By 1947, every state, including Texas, had passed soil conservation district enabling legislation which allowed districts to be established and gave them power to develop conservation plans and provide some assistance to private landowners.

The **United States Department of Agriculture** (USDA), through the Soil Conservation Service (SCS) and the Agricultural Stabilization and Conservation Service (ASCS), offers farmers grants and training in best management practices (BMPs) for reducing runoff. The SCS studies soil, water, and vegetation characteristics and compiles techniical guides that describe BMPs for controlling runoff and reducing erosion under local conditions. SCS specialists also provide on-site technical assistance to individual farmers in planning and applying BMPs. The ASCS provides small cost-share grants to individual farmers for installation of BMP capital improvements. In addition, the Texas Agricultural Extension Service works directly with farmers on agricultural soil management, land use, and proper pesticide use.

Septic tanks are regulated by the **Texas Department of Health**, which has promulgated construction standards designed to insure that the tanks do not leak. People who want to

build septic tanks must obtain a permit from the local TDH field office, except in areas where TDH has delegated authority to "local authorized agents" to oversee standards that may be more stringent than those promulgated by the state. All five of the bay-area counties' health departments are local authorized agents. Although leaks from septic tanks frequently affect groundwater, they may also affect surface water in two ways: when the water table is shallow and when systems fail, creating runoff. Given the age of many of the septic tanks in the Galveston Bay area and the frequency and intensity of rainstorms, septic tanks do create a possible nonpoint source of pollution for bay waters.

Landfills containing hazardous or nonhazardous waste, leaks from which usually affect groundwater, may also create surface runoff. The Bureau of Solid Waste Management in TDH has regulatory oversight of all aspects of non-hazardous municipal solid waste. Municipal waste facilities must be permitted by TDH. The permits are generally valid for the life of the site. TDH is responsible for periodic monitoring of disposal sites to ensure compliance with department standards. The standards include surface drainage controls to minimize drainage problems, requirements to protect against a 100-year flood, and protective measures to ensure that a facility will not harm endangered or threatened species, as well as provisions to prevent groundwater contamination through soil liners and monitoring programs. The department tries to inspect sites serving more than 5,000 people at least once every three months and smaller sites annually. TDH may take enforcement measures which include notification letters of noncompliance, permit revocation, administrative penalties, and referral to the Texas Attorney General. Under a law passed in the special session of the Texas legislature in summer 1991, the Solid Waste Division of the Texas Department of Health will be incorporated into the Texas Water Commission in March, 1992 and its responsibilities will pass to the new Natural Resource Conservation Commission when it is created in 1993.

Hazardous waste ranks very high on the list of public concerns for both the environment and human health. It is handled in four different ways: disposal in landfills, disposal in injection wells, incineration, and treatment. Land disposal including injection wells is the most commonly used practice and the one of primary concern for Galveston Bay to the extent that it creates surface runoff. However, it does not usually constitute the most serious health risk faced even by people living near abandoned waste sites.

Hazardous waste is regulated under the Resource Conservation and Recovery Act (**RCRA**), the Hazardous Solid Waste Amendments (**HSWA**), the Safe Drinking Water Act (**SDWA**), and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). RCRA regulates waste currently generated to ensure correct handling and disposal, treatment or storage. The HSWA, the reauthorization legislation for RCRA, imposed a ban on landfill disposal of specified wastes, emphasized minimization and treatment techniques to reduce the volume and toxicity of hazardous wastes, and established strict Minimum Technical Requirements for all landfills including new landfills and ones already in use (Texas House, Task Force, pp. 48-49).

The **Texas Water Commission** is in charge of hazardous waste programs, which are funded by federal grants and through fees paid by generators and facilities. In order to operate, all waste storage, treatment, and disposal facilities must have a TWC permit, issued by the Hazardous and Solid Waste Division, that includes provisions for design, construction, operation, emergency procedures, monitoring, closure activities, and financial responsibility.

Enforcement of both federal and state laws is accomplished by inspections scheduled through the TWC central office and performed by district office personnel. Land disposal facilities are inspected about once a year. Inspections are performed according to the following priorities: state regulations, emphasis on groundwater protection, compliance with permit and closure plans, overseeing corrective action, and enforcing HSWA regulations, particularly land disposal requirements (State Auditor, Feb. 1990, p.20). TWC has several enforcement tools including civil penalties, criminal fines, injunctive relief from the Attorney General's Office, emergency orders and administrative penalties (Department of Agriculture, p.15).

Many different substances may enter the waters of Galveston Bay after being emitted to and carried in the air. Air emissions are regulated by the **Texas Air Control Board**. Although there is some potential for airborne toxics to enter the water and bioaccumulate, the extent of this problem is difficult to measure. New information about the nature and quantity of air emissions of many toxics is now available under **EPCRA (SARA Title III)**.

Again, even this brief review suggests areas of potential difficulty. Storm water discharges from oil, gas, and agricultural activities are expressly exempted from permitting requirements under the Water Quality Act amendments to the Clean Water Act. Federal funding for the NPS pollution provisions of Section 319 of the WQA has been far below authorized levels and may decline to nothing if the reauthorization of the Clean Water Act includes full delegation of the program to the states. There is a possible overlap in authority between the NPS pollution requirements of the WQA and the state pollution abatement requirements for cities with populations over 5,000. The complexities of regulated hazardous and nonhazardous waste disposal sites, the uncertainties regarding the effects of air pollution on bay waters, and the difficulties of regulating thousands of old, scattered septic tanks compound the problems in controlling nonpoint sources.

SPILLS/DUMPING

With four major ports and hundreds of major petrochemical and steel companies on its shores, Galveston Bay supports a great amount of ship traffic. These ships and barges may accidentally spill some of their loads; in addition, they must pump out sewage and water used in cleaning the hold between shipments. Land-based facilities may also experience accidents that cause untreated effluent to reach the waters of the bay or feeding streams.

In 1990, the Apex barge spill in Galveston Bay resulted in a discharge of over 700,000 gallons of petroleum.

The mechanisms for managing spills are quite complicated because of the number of agencies involved and the fact that oil, hazardous materials, and other materials are treated differently. Chapter 26, subchapter G of the **Texas Water Code** designates the Texas Water Commission as the lead agency for spill response and cleanup and for implementing the state's policy to prevent spills and discharges of hazardous substances. TWC also implements "Superfund" activities under the federal **CERCLA** and **SARA** and serves as Texas' primary representative to the federal Regional Response Team (RRT). However, spills of oil in coastal waters are the responsibility of the **General Land Office**, while the **Railroad Commission** retains sole responsibility for regulating small coastal discharges and all other activities relating to oil and gas exploration or production that might affect surface or ground waters. "Major upsets" or spills into air are primarily the responsibility of the **Air Control Board**. In addition, a new federal law, the **Oil Pollution Act of 1990**, requires tank vessels and on-shore facilities to develop oil spill response plans and requires tankers eventually to be converted to double hull construction. Finally, two federal agencies, **EPA** and the **Coast Guard**, ensure that responsible parties undertake cleanup and assist when necessary.

The first step in spill response is that the responsible party must report the spill to the federal National Response Center and to the Water Commission (or, in the case of oil spills, the Railroad Commission). The state maintains an Emergency Response Center which may be notified instead and is open 24 hours a day. Responsible parties may also need to notify local authorities.

The party responsible for the spill is also responsible for its containment and cleanup. Many fixed facilities have emergency response teams specially trained for the hazards that might arise from substances used at that particular facility. If they require assistance, the spill goes off the site, or if agency personnel determine that response is inadequate, the responsible agencies intervene.

The Governor's Division of Emergency Management (DEM), which helps coordinate response to natural disasters such as tornadoes as well as man-made spills and which is headed by the Director of the **Department of Public Safety**, may call together teams including representatives from a wide range of state agencies and the Red Cross, depending upon the nature of the emergency. This Emergency Management Council is the coordinating body if a disaster is declared under the Texas Disaster Act of 1975.

First, a local on-scene coordinator is designated. Many localities in Texas have received money from DEM to develop comprehensive emergency response plans; these plans include a method for determining the on-scene coordinator. He reports to TWC, whose agent arrives and provides technical assistance and, as appropriate, mobilizes state emergency response resources. Other state agency representatives also assist if their agencies have relevant duties. If the accident is big enough, federal response agencies may also become involved. Coordination authority moves to representatives from higher level agencies if the response is inadequate or assistance is requested.

Oil spill response was coordinated by the Texas Water Commission, working with the Coast Guard. However, in 1991, the Texas Legislature passed the Oil Spill Prevention and Response Act, which designated the General Land Office as the lead agency for initiating response to actual or threatened unauthorized discharges of oil. GLO is to develop a coastal discharge contingency plan, with the other agencies contributing portions according to their authorities, differing according to the environmental conditions of the different areas along the coast. GLO is now the agency that receives notification of oil spills and is responsible for on-scene coordination.

The most effective spill response is spill prevention. Many of the requirements discussed under point and non-point source pollution above are intended to prevent spills. Once a spill has occurred, adverse effects are minimized by speed and accuracy in response. Because so many different agencies have some authority for spill response, they have worked together to develop Memoranda of Understanding and other mechanisms to ensure coordination. The designation of a single on-scene coordinator and recognition by all participants of the coordinator's authority is one of the most important means for ensuring an efficient response. Oil spills, which are of particular concern in Galveston Bay, may be reduced once the full effect of the 1990 federal Oil Pollution law is felt, but this will not occur until after 1995. New data on the effects of oil spills on wildlife and wetlands, and especially upon young shrimp, will soon be available as a result of a study funded by Apex, owners of the barges involved in the July 1990 Galveston Bay oil spill.

Marine Debris

Marine debris is the term used to describe trash and non-chemical objects that are dumped into the ocean. Animals may ingest or become entangled in the debris that is accumulating in the water and along the coast.

The problem results from the routine dumping of waste overboard into the water by marine vessels. It is estimated that the world's merchant shipping fleet dumps at least 4,800,000 metal, 300,000 glass and 450,000 plastic containers into the sea every day. Direct ocean dumping of debris from land-based sources, litter from visitors, and indirect sources, such as rivers, run-off, and municipal and industrial waste disposal also contribute to pollution in the ocean. The increasing production of plastic packaging and other plastic products is a major contributor to the problem. It has been estimated that at least 50 percent of all visible surface debris is made of plastic. Other materials degrade or sink while undegradable plastic floats in the areas where marine life thrives. Marine debris constitutes a special problem for Galveston Bay due to the shallow, closed nature of the bay. Tourism is affected when recreational boat propellers and intakes are clogged with trash and fishing is inhibited.

Congress has addressed these problems through legislation and the adoption of Annex V of the MARPOL 73/78 Convention. In 1987, the Senate approved Annex V, entitled Regulations for Prevention of Pollution by Garbage from Ships. This international

agreement prohibits disposal into the sea of all plastics including synthetic ropes, synthetic fishing nets and plastic garbage bags. The **Marine Plastic Pollution Research and Control Act of 1987** implements Annex V and amends the 1980 Act to Prevent Pollution from Ships. Under the 1987 law, EPA is responsible for regulations prohibiting the discharge of all plastics into the sea as well as food wastes and other garbage within specified distances from the land. This ban applies to any nation in the 200 mile Exclusive Economic Zone under U.S. jurisdiction. This ban excludes the accidental loss of synthetic fishing nets and repair materials if "reasonable precautions" have been taken.

The Coast Guard is responsible for enforcing Annex V to the MARPOL Convention and accomplishes this through routine boardings of boats scheduled for entry into U.S. ports. It is, however, very difficult to catch a ship that dumps garbage in the middle of the night. The Degradable Plastic Ring Carrier Act of 1988 requires all plastic ring carriers to be made of naturally degradable plastic. However, these and the other antidumping laws discussed above are even more difficult to enforce because there are so many ships and other potential polluters. One of the most effective mechanisms for reducing marine debris would be gradual elimination of those items that cause the most problems. This approach would require federal and state legislation offering incentives to recycle, dispose properly of wastes, and substitute degradable materials for nondegradable ones. One existing federal law, the **Toxic Substances Control Act**, which may be used to limit production of new plastics if it is found that they endanger the health of the environment because they are nondegradable, might be used to control marine debris.

In addition to plastic containers and similar debris, ships generate vast quantities of organic garbage which is routinely dumped at sea or illegally in port. In relatively shallow areas or areas with poor circulation, this garbage may alter the biological balance and attract inappropriate scavengers as well as presenting a potential public health problem. Galveston Bay's four ports may well experience dumping. Ships may also dump parts of their cargoes and, more likely, dirty water from washing their holds.

Several laws prevent such dumping. The Refuse Act of 1899 prohibits the disposal of garbage into U.S. navigable waters, including the territorial sea. The Marine Protection, Research and Sanctuaries Act of 1972 prohibits all unpermitted dumping by U.S. vessels and in the U.S. jurisdictional waters. This act, which excludes dumping of the Corps of Engineers permitted dredged materials and EPA permitted dumping (see below on dredging/filling), is also enforced by the Coast Guard. The Deepwater Port Act of 1974 regulates deepwater port loading and unloading of materials and evaluates any environmental effects. The corresponding state law, the Texas Deepwater Port Procedures Act, gives the governor the authority to determine the approval of applications for deep water ports. The Commissioner of the General Land Office is charged with administering the law to ensure that deep water ports on the Texas Gulf Coast are in compliance with state and local laws relating to environmental protection, land and water use, and coastal zone management.

The Port and Tanker Safety Act of 1978 was passed in order to reduce cargo loss and damage to life, property and the marine environment. The Water Resources Act of 1986 restricts and regulates ocean dumping. The Ocean Dumping Ban Act of 1988 prohibits the dumping of municipal sewage sludge and medical wastes into the sea after December 31, 1991. The Act also provides for a monitoring program to be created by EPA and **NOAA** to track municipal sewage sludge dumping until December 31, 1991. The Shore Protection Act of 1988 requires vessels to install handling systems and obtain permits from the Secretary of Transportation for the transportation of non-hazardous commercial waste.

In addition, the **U.S. Department of Agriculture** prohibits foreign ships from disposing of garbage in ports unless it has been burned or steam-sterilized to prevent the introduction of insects or disease. Unfortunately, few ships have the equipment to meet the standards or the money to pay for expensive waste disposal, and few ports have the USDA approved facilities for waste disposal. Therefore, most of the waste is probably being dumped at sea.

Texas also plays a part in regulating marine pollution. The **General Land Office** has revised its regulations and its lease contracts governing submerged lands off the coast to prohibit discharges of solid wastes from oil and gas drilling and production platforms and from seismic vessels operating in state waters. Oil and gas operators in state waters are asked to present detailed solid waste management plans including descriptions of collecting, storing, transporting and disposing of trash generated on platforms and supply vessels. Violation of the management plans may result in cancellation of leases or operating permits. Inspectors from the General Land Office routinely inspect offshore operations to insure that no solid waste is being dumped from oil and gas platforms or seismic or supply vessels. GLO implements an Adopt-A-Beach program which organizes volunteers for local beach cleanup purposes. GLO also organizes annual trips to pick up and record trash found along the entire Texas shoreline.

Efforts to prevent spills, especially oil spills, and to minimize their effects have increased in the last two years. However, a spill remains an emergency, which means that there is always the possibility that planning efforts will not be as successful as hoped. Dumping, as the very word suggests, is a more informal activity, often simply illegal, and as such it is very difficult to regulate.

DREDGING/FILLING

The presence of so many large industries and cities seeking to maintain or increase their commercial activity creates constant pressure for additional dredging and filling in Galveston Bay and concomitant disposal of resulting material. Myriad small projects, such as individuals building marinas, exacerbate the problem. Disposal of dredge and fill material has important consequences for water quality, because it can add to the suspended solids by stirring up contaminants previously trapped in the sediment, may alter circulation and salinity patterns of the water, and may affect benthic communities. In wetlands, dredge and fill may respectively remove or smother plant and animal communities or alter local

hydrology, although the material may also be used in positive ways to create wetland marsh areas.

Section 404 of the **Clean Water Act** establishes a regulatory framework for the disposal of dredge and fill materials jointly administered by the **Corps of Engineers** and **EPA**. The Section 404 program has a controversial history, and court and policy decisions have altered the balance between its two purposes: it is both a water quality law and a wetlands protection law. As a water quality law, Section 404 gives EPA authority to designate disposal sites and veto proposed ones if they will adversely affect water quality. It operates in conjunction with Section 401, which requires applicants for federal permits to obtain state certification that proposed discharges will not violate state water quality standards. In Texas, the **Texas Water Commission** is responsible for such certification.

The present interpretation of Section 404 emphasizes its ability to protect wetlands. Any kind of work proposed to be conducted in the navigable waters of the United States requires a permit from the Army Corps of Engineers under Section 10 of the **Rivers and Harbors Act of 1899** (RHA). The Corps also regulates disposal of dredge and fill material in virtually all U.S. waters and associated wetlands under section 404 of the Clean Water Act. The permitting processes for the two programs resemble one another very closely and are often conducted jointly for those activities requiring both permits (for example, an activity may involve dredging under the RHA, and the disposal of such material under the CWA). However, because of its broader scope, the RHA offers much greater opportunity to control environmental effects of any construction or other activity in Galveston Bay.

The section 404 process calls for the Army Corps of Engineers first to determine whether a permit is required. This enables the Corps to determine whether the affected area contains wetlands. To qualify as a wetland, an area must have hydric soil, wetlands hydrology, and wetlands vegetation. If the area is determined to be a wetland, the interested party must file an application with the Corps. In the case of Galveston Bay, the application is filed at the Galveston District Office of the Corps.

The District Office holds bi-weekly joint processing meetings which enable those agencies with review authority to consult amongst themselves and with the applicant to address areas of concern entailed in the application. EPA has the authority to review the application to ensure that disposal will comply with its regulations and can veto power a permit it believes will adversely affect the environment. Under the Fish and Wildlife Coordination Act, the **U.S. Fish and Wildlife Service**, the **National Marine Fisheries Service**, and the **Texas Parks and Wildlife Department** are also entitled to comment on the application. The Texas Water Commission, deriving its authority from Section 401 of the Clean Water Act, is entitled to comment on the permit application and must certify that it will not violate state water quality standards. The Texas Antiquities Committee and the State Historic Preservation Officer have the authority to comment on activities which may affect historic properties or artifacts pursuant to the National Historic Preservation Act. The **General Land Office** also reviews the application to determine if an easement authorization may be required for work

on submerged state-owned lands.

After this review, applications are available for public comment, and a public hearing may be held if there is sufficient interest. This public review phase provides additional oversight as the Corps cannot issue permits for activities which the Corps determines to be contrary to the public interest [33 CFR 320.4(a)]. As part of its public interest review, the Corps attempts to determine whether a project could be relocated or whether it is dependent upon the wetlands site. Upon completion of this review process, the Corps may issue or deny a permit for the proposed activity.

In addition to individual permits, the Corps may also authorize activities through letters of permission or general permits. Letters of permission may be granted when the District Engineer determines that the proposed work would be minor, would not have significant individual or cumulative impacts, and is not likely to encounter appreciable opposition. In such situations, the relevant agencies are notified along with the property owners likely to be affected by the activity. Letters of permission are exempt from individual public notice requirements.

The Corps' regulations presently contain twenty-six general permits. Activities falling under these general categories do not require additional permits. For example, a nationwide permit allows discharge of dredge and fill materials into lakes less than 10 acres, including adjacent wetlands. General permits are intended to cover activities that have been found to have no short- or long-term deleterious effects in the affected region. Critics believe that all activities should be considered on a case-by-case basis.

The Galveston District Office processes approximately 800 permits annually for the Texas coastal region (U.S Congress, House, 1989, p. 702). Permit fees are currently $100 for commercial projects and $10 for noncommercial projects. No permit fee is required if the application is withdrawn or denied [33 CFR 325.1(f)]. The Corps has recently proposed increasing fees to $2,000 and $500 for commercial and noncommercial projects respectively (Zinn, June 11, 1990).

In February 1990, the Corps and EPA signed a memorandum of agreement concerning the permit review process. The MOA establishes an agreed upon sequence of mitigation efforts necessary to demonstrate compliance with the guidelines for the discharge of dredge and fill materials provided in Section 404(b)(1) of the CWA. Generally, the Corps must determine that the impacts of the project have been avoided to the maximum extent possible, then unavoidable impacts must be mitigated to the extent practicable and appropriate, and compensation for unavoidable impacts must be pursued (through the restoration of existing degraded wetlands or the creation of man-made wetlands). The MOA further states that mitigation is to be made on a one-for-one functional basis (in the absence of a determination of the functional value of a wetland, a minimum of a one acre for one acre replacement may be used). The Corps and EPA may deviate from this procedure if the discharge can be expected to produce an environmental gain, or if the discharge would result in an agreed

upon insignificant environmental loss. Although the MOA does not alter the regulatory structure of the 404 program, it reflects a continuing trend of cooperation in the administration of the program which should provide for a more consistent application of the program's guidelines (U.S. Congress, House, 1990 pp. 38-43).

Enforcement concerning noncomplying activities may take the form of letters notifying the responsible party of a violation, written orders requiring compliance, or referral of the case to the U.S. Attorney's office. The Corps and the EPA recently signed an additional MOA clarifying each agency's responsibilities concerning the enforcement of Section 404 violations. Generally, the Corps focuses on permit noncompliance, while EPA directs its attention to unauthorized fill activities for which permits have not been granted (Howe, p.3).

The Army Corps of Engineers is also responsible for many federal dredging projects, which are not covered by Section 404. Among the most important of these ongoing projects in the Galveston Bay area are the Houston Ship Channel,
the Gulf Intracoastal Waterway, and the several ports. The environmental impacts of federal dredging projects are assessed under NEPA, which requires an Environmental Assessment (EA). If the EA shows that the project will have a significant environmental impact, a full Environmental Impact Statement (EIS) is required. EISs must be made available for public comment. Most of the channels in the Bay have been in existence for many decades, and maintenance dredging does not require a new environmental assessment. If a project entails a new disposal site, however, it will entail a new assessment. The Corps makes available to all relevant federal and state agencies a list of maintenance projects proposed for the year.

The Texas Department of Highways and Public Transportation (often called T-DOT for Texas Department of Transportation) is the local sponsor for the Gulf Intracoastal Waterway, which must be regularly dredged to maintain its desired dimensions. As the local sponsor, T-DOT is responsible for finding and maintaining areas for disposal of material generated by routine dredging of the GIWW, which is otherwise considered a federal project. T-DOT is also responsible for designing state highways so as to minimize impact upon wetlands; the agency must obtain section 404 permits if their projects will require any dredging or filling. In the last several years, only one highway project in the 5-county area around Galveston Bay has affected wetlands.

Under state law, Texas owns all the state's submerged lands up to mean high tide. These lands are managed by the General Land Office, which can grant easements and leases for their use. A state permit is required for dredge and fill on state land. Applications undergo an environmental review; if approved by the School Land Board, which is the decision-making authority, the applicant is assessed certain prescribed fees. In the 1991 session, the Texas Legislature approved stronger penalties for those who dredge or fill without or in violation of their permits, allowing the state to assess costs of litigation and remediation. Finally, Texas Parks and Wildlife Department regulates removal of sand, shell, and gravel. In the past, old oyster shells were mined for use on roads, and removal was taxed.

Because mining threatened live beds and created turbidity, it was banned. Several sites in Galveston Bay continue to be mined for sand, which is used to restore beaches. Under Texas law, the Parks and Wildlife Department manages and protects marl and sand within tidewaters and on public lands. Those seeking to remove sand must obtain a permit and pay a fee based on the quantity removed. However, navigation, activity covered by an oil or gas lease, and, according to an Attorney General's ruling, land leased by GLO for any purpose, are exempted from this permit process.

Authorization for many of the provisions of the Clean Water Act expired at the end of Fiscal Year 1991 (September 30). The reauthorization process has focused a great deal of attention on the provisions of Section 404 of the Act. Several legislative proposals which would modify the 404 program have been introduced in the 102nd Congress:

H.R. 404 (Hammerschmidt): Under this bill, EPA would maintain an advisory role, but would lose its veto power. The bill makes a distinction between "limited" and "high value" wetlands. Activities on "limited" value wetlands would not require a permit.

H.R. 1330 (Hayes): Under this bill, EPA would lose its veto power, and EPA and all other federal agencies would lose their advisory roles (providing the Corps with exclusive permitting power). The bill would also classify wetlands in a three tier structure according to"value."

H.R. 2400 (Thomas): This bill would essentially maintain the present administrative structure of the permitting process, but would subject the process to more stringent time constraints. The bill does not create a wetlands classification system.

All three of the bills propose changes in the federal manual delineating wetlands. (Zinn, June 6, 1991) All three are clearly intended to weaken the permit process and expedite dredge and fill operations. These changes would exacerbate the limitations already inherent in the process: Many activities including farming are exempted from review; the Corps may issue general permits covering a state, region, or even the nation for activities it determines to be similar in nature and minimal in environmental impact, thus exempting many minor projects from review; and monitoring of permit compliance is minimal due to lack of staff and budget constraints. Recent proposed changes in the definition of wetlands are discussed below under habitat protection.

FRESHWATER INFLOW

Fresh water inflows not only modify the salinity of Galveston Bay, but also provide nutrient and sediment loads necessary to maintain the bay's ecosystem. The amount of fresh water inflow is determined by the water rights permit system administered by the **Texas Water Commission**.

Section 11.021 of the Texas Water Code stipulates that the water of the ordinary flow,

underflow and tides of every river, natural stream, bay, or arm of the Gulf of Mexico in the state is the property of the state. Parties interested in obtaining a right to divert water must petition TWC, which manages an administrative permit system. Water rights may only be granted if water is available at the point of proposed diversion and the proposed diversion will be for a "beneficial use."

Parties likely to be affected by the proposed diversion are notified and may file protests with TWC. If protests are filed, the application must go through an administrative hearing before the Office of Hearings Examiners. Formal recommendations concerning the permit are then made to the Commission which may issue or deny the permit. Permits may be regular ("in perpetuity"), seasonal, or temporary. Although the water in the Trinity River, which flows into Galveston Bay, has been almost completely appropriated, term permits may be granted for water which is not presently being put to use. Permits for large diverters such as municipalities often include rights to water necessary for future expansion. Thus, term permits may be granted in the intervening period until the parties require the water they have been appropriated.

Section 11.023 of the Water Code lists purposes for which water may be diverted. Bays and estuaries are specifically listed only as waters available for diversion. Preferences for uses of water diverted from streams are stipulated in Section 11.024: allocation is to occur according to the ordered preferences. Bays and estuaries are not specifically listed as a preferred use, but qualify under the eighth and final category of "other beneficial uses."

Section 11.147 of the Water Code requires that the effects of each proposed diversion on bays and estuaries be identified. For proposed diversions within 200 river miles of the coast, TWC must include in the permit those conditions considered necessary to maintain beneficial flows to the affected bay and estuary system. Generally, the Commission makes a determination of the amount of water to be consumed by the proposed diversion and considers the effects of such use on the total volume of return flows. Specific requirements for return flows may then be mandated in the permit.

In setting conditions for permits for diversions, TWC must take into account research conducted according to sections 16.058 and 11.1491 of the Water Code, which direct the **Texas Parks and Wildlife Department** (TPWD) and the **Texas Water Development Board** (TWDB) to conduct joint studies to determine the inflow conditions necessary to support the bays and estuaries in the state. A joint report, to be published shortly, employs a mathematical model targeting seven species to determine a range of inflow requirements for sustaining, maintaining, or enhancing harvests. The study will focus on the San Antonio Bay, but will likely be applied to the remaining major estuaries in the state. The study will be used at the discretion of the Texas Water Commission in determining the needs of bays and estuaries in the water rights permit process and may be used by the TPWD as a tool to establish management goals.

TWC must also consider the effects of diversions on fish and wildlife habitats for permit

applications proposing a diversion in excess of 5,000 acre feet per year (Water Code, §11.152). TWC is also required to submit a copy of such a permit application to TPWD. TPWD has the authority to comment on proposed diversions, and these comments must be considered by the TWC.

Potential problems with the existing process for maintaining freshwater inflow are indicated by the fact that maintenance of bays and estuaries falls into the lowest priority category of "beneficial uses." Moreover, permit conditions concerning beneficial flows to bays and estuaries may be suspended during emergencies upon notification of TPWD (Water Code §11.148). Since the primary condition under which a permit would be suspended is a drought, bays and estuaries are at double risk: first from the drought itself, and second from diversion of additional water to upstream cities.

This approach to setting priorities for water use is made still more problematic for regulating freshwater inflow by the number of different agencies that may construct surface water impoundments, primarily for drinking water for the growing population of the Galveston Bay region. Both the Trinity and the San Jacinto River Authorities, whose charge is to develop fully the water resources of their respective watersheds, operate surface water impoundments and propose additional ones. Lake Livingston, which supplies water to the City of Houston, is managed by the **Trinity River Authority** (TRA). The TRA, together with the city of Houston and the Chambers-Libery Counties Navigation District, is the sponsor of the proposed Wallisville Project, a dam at the lower end of the Trinity River that will prevent saltwater intrusion and supplement Houston's water supply. The **San Jacinto River Authority**, along with the Bureau of Reclamation, proposed a new reservoir on Lower Lake Creed, a tributary of the San Jacinto River, to serve as water supply for The Woodlands; although an EIS has been submitted to EPA, the project is not being considered because of the absence of adequate local funding. Finally, the **Texas Water Development Board** makes loans to communities for reservoirs for water supplies through the Water Development Fund; the Tenessee Colony project in the Trinity Basin is described as a possible new project in the TWDB's 1990 state water plan.

Perhaps more important, TPWD may not veto permits although it may review them. Thus concerns about habitat and species protection only affect permit decisions if TWC agrees. Because the data are generally lacking to show that bays and estuaries and the associated living creatures require a certain amount of freshwater inflow, while the data are readily available to illustrate the amount of water that cities will require, the process is generally biased against the needs of the estuaries.

CHAPTER FOUR
ACTION PLAN TOPICS: ESTUARY MANAGEMENT

SHORELINE DEVELOPMENT

In 1960, the four counties bordering Galveston Bay had a population of about 1.65 million people. By 1990, the population had grown to about 3.6 million. Increases in population create severe pressures on the bay from increased water use, sewage and waste disposal, industrial activity, and recreational use. Similar increases in the population of many areas along the Trinity River only exacerbate the pressures on the bay by creating demands for water diversion and by raising the likelihood that pollutants will flow into the bay from the river.

Growth management is perhaps the most serious of all the problems facing Galveston Bay, because it poses most starkly the conflict between economic development and environmental protection. Yet it is the problem least amenable to a coherent resolution, because land use is controlled only by localities. Under Texas law, only incorporated municipalities have the power to zone property; counties may not do so unless explicitly authorized by the state. Counties may create other political subdivisions such as drainage districts to perform environmental functions. However, the general effect of Texas law is to limit growth management functions to municipalities.

Zoning might provide a tool for controlling the environmental effects of development. However, at the present time, three of the largest cities on the bay, Houston, Baytown and Pasadena, do not have any zoning ordinances in place. Houston is now formulating zoning ordinances to be implemented by July 1992. The Houston Zoning Strategies Committee of the Planning and Zoning Commission has agreed that zoning in Houston will create four types of zoning districts: single-family detached residential, exclusively residential, heavy industrial districts, and multiple use district. The clear intent of these ordinances is to protect residential areas from industrial development, not to protect natural resources; under the proposed ordinance, most development will still be allowed.

Even where present, zoning ordinances are not usually an effective tool for comprehensive or coordinated policymaking. The cities bordering the bay that do have zoning ordinances, such as Seabrook, Texas City, and Deer Park, have not included provisions to protect natural resources. Instead, efforts are directed towards the separation of different land uses. For example, industrial and residential areas are generally not allowed to intermingle. Texas City does, however, require a percentage of all lots developed to be landscaped in an attempt to reduce the negative effects of noise, erosion, and sedimentation caused by impervious or unvegetated areas. The largest amount, 20 percent, is required for residential lots.

In addition, zoning boards consider applications on a case-by-case basis; although general

criteria guide decisions, the overall effect of case-by-case decisionmaking often runs counter to that intended. If decisions are not always consistent within a single jurisdiction, it is clear that they are even less consistent across jurisdictions. Appendix 3 lists eighteen cities, five counties, and several other local or regional authorities which have some jurisdiction in the Galveston Bay area. Zoning ordinances of different localities may impose different criteria and be of widely varying levels of detail.

Perhaps even more difficult than the gaps in jurisdiction and the inconsistencies among jurisdictions is the fact that many localities have strong incentives to encourage, not discourage, growth, even in areas closely affecting the bay. The bay area was seriously hurt by the precipitate decline in oil prices starting in 1986; since that time, localities have vied with one another to lure new employers with tax abatements and other incentives. In such an economic climate, it is unlikely that localities will also impose stringent environmental constraints on potential employers.

Most cities surrounding Galveston Bay have Chambers of Commerce or Divisions of Economic Development to attract new businesses to their areas. Houston has combined the programs of the Chamber of Commerce, Economic Development, and the World Trade and Partnership Resources Division to work for the growth of Houston's business community through the Greater Houston Partnership. The Partnership is the voice of Houston area business, with 80 percent funded by private donations. It promotes the growth of small businesses, attracts new large businesses through a national marketing program, and actively seeks international corporations through international marketing. The Partnership provides information about the price of property, labor and operational costs to potential new businesses and puts interested owners in contact with consultants who can assist them in obtaining the necesary permits.

The City of Galveston is also involved in several projects to increase economic activity. The city is actively recruiting high tech biomedical industry in order to capitalize on the presence of the University of Texas Medical Branch and is exploring plans to form a regional port operation through the consolidation of the **Port of Houston Authority** and the Galveston Wharves. The city also hopes to revitalize its delapidated shipyards. Additional projects with environmental impacts include a new transfer/storage warehouse as part of the Texas Copper operation and the possibility of developing an onshore oil transfer terminal on Pelican Island. Such facilities would obviously increase employment in the areas, but are not without environmental risks.

Most of the cities have provisions for giving new businesses tax abatements. The new businesses may increase the demand for services at the same time that the abatements decrease the tax base. This tendency may adversely affect the cities' ability to maintain environmental standards in providing wastewater treatment, infrastructure improvements, and solid waste disposal. In addition, cities often offer to abate taxes that are specifically intended to control the environmental side effects of growth, including fees for extending water and wastewater services or fees that fund erosion control. In these cases, growth will

have clear adverse effects on the environment of the bay. In contrast, the new, more stringent clean air standards that will take effect under the Clean Air Act of 1990 may have the effect of limiting the number of new manufacturers that can enter the bay area because they would not be able to emit pollutants without obtaining an equal reduction in emissions from some other local facility.

The City of Galveston employs two methods of tax incentives to attract additional economic development: tax abatement and tax reinvestment zones. The first applicant for the tax abatement program was the San Luis Hotel, which plans a $2 million expansion to its current facility. The city currently maintains eight tax reinvestment zones. Under the Texas Tax Increment Financing Act of 1981, incorporated cities or towns may issue bonds to finance public improvements in reinvestment zones. The tax base of the zone is frozen at the rate before development. Taxes may not be levied in excess of this rate for a stipulated period after which the full tax due is paid to jurisdicitons having taxing authority.

Although economic growth may often conflict with the need for environmental protection, one important factor tending in the other direction is that tourism, a very important source of revenue for many communities near Galveston Bay, is dependent upon the continued health and beauty of the bay. Thus economic development and environmental protection maintain an uneasy balance.

The City of Galveston has recognized this balance in some local provisions concerning sand dunes. The zoning standards of the City of Galveston require that a Dune Improvement Plan be submitted to the City whenever an individual wants to build a structure within 50 feet of the vegetation line. A plan is also required whenever there is removal, relocation, or movement of sand dunes, construction of sand dunes or vegetation, movement or construction of sand fences or placement of fill in dune area. Dune walkovers, elevated walkways constructed above the dune area, are required for any new house constructed on a beach front lot in order to prevent damage to the dune area by reducing trail and road cuts. Each year the City of Galveston in cooperation with the Boy Scouts of America and many other volunteer groups, conducts a successful program entitled Trees for the Dunes. This project collects discarded trees during the first week of January to be staked on the beachfront to trap sand and encourage dune growth.

In addition to the relatively weak protections accorded by local ordinances, there is some potential protection of the shoreline against development in the new state Coastal Management Plan and the associated federal Coastal Zone Management Program. These laws are discussed in the section on shoreline erosion and subsidence, the final section in this chapter. The federal **Coastal Barrier Resources Act** discourages development on undeveloped coastal barriers. Locations near Galveston Bay included in the Coastal Barrier Resources System are Bolivar Peninsula, Follets Island, and High Island.

HABITAT PROTECTION

Maintenance of habitat is closely allied to maintenance of the overall health of the estuary and contributes to the continued success of living resources. Wetlands, for example, filter pollution, store floodwater, replenish groundwater, and generally protect and buffer sensitive estuaries. Estuarine wetlands serve as nursery areas for many fish and shellfish, serve as habitat for wildlife, and supply nutrients and organic matter to the estuary. Thus the wetlands delineation process described above in the dredge and fill section is one important feature of habitat protection. Indeed, water quality itself is a very important feature of the habitat for all creatures in the estuary that rely directly or indirectly on the water.

The Section 404 program described under the Dredging/Filling section is significant not only because the program represents the primary mechanism for protecting wetlands, but also because of the activities the 404 program does not encompass. First, normal farming, ranching, and silviculture activities are exempt from the process. Considerable wetland loss from farming has occurred on the east side of Galveston Bay. Furthermore, the 404 program covers only the disposal of dredge and fill materials in the waters of the United States. Other activities which impair the functional values of wetlands, such as clearing or draining, are not covered by the program. In fact, a 1988 (federal) General Accounting Office report concluded that the 404 program as currently structured "does not regulate most of the activities that result in wetland losses" (U.S. Congress, House, 1988, p. 72). While many of the wetlands, even in Galveston Bay, are thus not covered by the 404 process, it is true that many of the bay's most critical wetlands are covered. Despite the weaknesses of the 404 program, it does provide the most direct regulatory means available to protect wetlands.

Recently, the definition of wetlands that are to be covered by the 404 program has become a matter of policy debate. In January 1989, the four federal agencies (the Corps, EPA, FWS, and the SCS) with programs affecting wetlands adopted a common set of criteria for indentifying and delineating wetlands known as the Federal Manual for Identifying and Delineating Jurisdictional Wetlands. Under this manual, an area must have wetlands hydrology and supporting vegetation, and hydric soil to qualify as a wetland. The manual represented one of the first steps in providing a more consistent application of federal programs in regard to wetlands. As noted, the Corps and the EPA have recently signed several MOAs which further clarify agency roles in the 404 program. The new manual became a source of contention as people discovered that large areas previously not defined as wetlands qualified under the new definition. The four agencies considered recommendations for changes to the manual in the fall of 1990, and forwarded recommendations to the Office of Management and Budget.

On August 9, 1991, President Bush proposed a "no-net-loss" policy for wetlands including a new definition of affected land. Whereas the existing manual defines wetlands as those mucky or peat-based soils saturated for as few as 7 straight days to a depth of 18 inches during the growing season, the new definition requires a 21-day saturation period during the

growing season or standing water for 15 consecutive days any time during the year. Critics argue that the new definition will remove 10 to 30 percent of those lands presently defined as wet, presenting a boon to shore developers as well as helping those farmers who were the intended beneficiaries of the redefinition (Weisskopf, 1991). Bush's proposed wetlands program, which must be published for public notice and comment, also establishes new criteria for evaluating the ecological value of wetlands according to three categories, with the highest receiving the most protection. The exact extent of any of these categories of land will not be known until late 1993.

Meanwhile, on August 17, 1991, Congress passed a law containing an unrelated amendment requiring a return to the wetlands manual in effect prior to 1989 (PL-102-104). The exact status of wetlands protection thus remains in flux.

The **1990 Food, Agriculture, Conservation, and Trade Act**, known as the 1990 Farm Bill, represents an indirect means of protecting wetlands. The 1990 Farm Bill modified the "swampbuster" provisions of the 1985 Food Security Act, which first introduced disincentives to converting wetlands into parcels for agricultural production. Under the 1990 Farm Bill, farmers become ineligible for federal benefits under the U.S. Department of Agriculture programs from the time a wetland is converted to make agricultural production possible. Under the Food Security Act, agricultural producers became ineligible for such benefits only during years a crop was planted. This enabled farmers to plant on wetlands during years of high crop prices, when federal subsidies were less important. The 1990 Farm Bill closed this loophole, but also contains a "minimal effects" provision. Agricultural producers will not be ineligible for federal benefits if their activities have minimal effects on wetland values. At the same time as the law provides an incentive for farmers to maintain wetlands, however, it also provides a disincentive by requiring them to disclose the existence of wetlands to bankers and prospective purchasers. Such disclosures usually reduce the value of the land and may place existing loans in jeopardy or limit resale value.

The 1990 Farm Bill also creates a wetlands preserve program through the use of easements. Under this provision, the Secretary of Agriculture may protect up to one million acres of farmed wetlands through the use of federal payments to farmers to place wetlands in 30-year or permanent easements. Although the Farm Bill may have a greater effect on inland farming due to the sheer magnitude of such operations (coastal farming is, of course, subject to the provisions of the bill), it is important in that the program targets an activity expressly exempted from the Section 404 program. The protection of additional inland wetlands should provide benefits for migratory species as well. Both farm bills depend heavily on the definition of wetlands and will be strongly affected by the President's proposal.

The **Endangered Species Act** (ESA) expressly authorizes the Secretary of the Interior (through the **Fish and Wildlife Service**, or FWS) to designate areas as "critical habitat" for endangered or threatened species. Unlike the process of listing such species, economic factors may be considered in the designation of their critical habitat, unless a failure to designate an area as critical habitat would result in the extinction of the species. Once a

species has been listed as threatened or endangered, the FWS and the **National Marine Fisheries Service** (NMFS) may review all federally funded or permitted activities which may affect the listed species and its habitat. Federal agencies and permit applicants may apply for an exemption to the provisions of the ESA after the review process and a determination that there is no alternative to the agency's action or permitted activity. The Endangered Species Committee reviews applications for exemptions. For an exemption to be granted, the Committee must make a determination that there are no alternatives to the action, the benefits of the action clearly outweigh the costs in relation to not protecting the species or habitat, the action is nationally or regionally significant, and the action does not represent an irretrievable commitment of resources (Corn, May 8, 1990). If an exemption is granted, it must also include measures for mitigation.

The ESA also authorizes the acquisition of land necessary to protect listed species through funds according to the provisions of the Land and Water Conservation Fund Act (LWCF). LWCF monies are not limited to the acquisition of habitat for endangered species. Monies may be used to acquire land as part of the National Wetlands Priority Conservation Plan administered by the FWS. The TPWD is responsible for ranking wetlands for acquisition under this program. The Fish and Wildlife Service also manages the National Wildlife Refuge System to protect flyways for migratory waterfowl. Brazoria and Anahuac National Wildlife Refuges border Galveston Bay.

Many activities that require permits under various laws may be reviewed for their effects on habitat protection. Under the **Fish and Wildlife Coordination Act**, the FWS, NMFS, and the TPWD are entitled to comment on any federal activity or permitted activity which may control or modify any water body. This act enables the agencies to comment on Section 404 (Clean Water Act) and Section 10 (Rivers and Harbors Act) permit applications in regard to habitat. Through such reviews, these agencies may suggest alternatives and make recommendations concerning the effects of projects on living resources and their habitats. For example, the NMFS has a Habitat Conservation Program aimed at identifying acceptable habitat replacement and mitigation efforts. The involvement of federal funds in the NPDES program also gives the NMFS and FWS authority to review wastewater discharge permits.

At the state level, the TPWD has review and research responsibilities concerning fresh water diversions which are described more fully in the Fresh Water Inflow Section. TWC must also assess the effects of diversions of more than 5,000 acre feet on fish and wildlife habitats. Finally, the GLO is responsible for granting easements on state-owned submerged lands and oversees leasing and use of recreational cabins already built in Texas' coastal bays and marshes. These cabins are sources of small discharges of human waste; occupants' boats may hurt local habitats through pollutants, noise, waves, and harm to seagrasses.

In addition to the wetlands delineation conducted by the Army Corps prior to dredge and fill operations, wetlands are protected by several other laws. The federal Soil Conservation Service may provide incentives to farmers not to drain or farm wetlands, while the Water

Bank Program administered by the Agricultural Stabilization Service gives farmers payments for preventing loss of wetlands that are habitat for migratory waterfowl. The Texas General Land Office is charged with protecting many of the state's lands, including sand dunes and coastal wetlands. GLO ranks wetlands for state acquisition and regulates geophysical exploration in all areas within tidewater limits (Tx. Nat. Res. Code §§ 15.51-15.54).

Several programs at the federal and state levels provide for acquiring habitat or creating preserves. The Coastal Preserves Program, founded in 1987, is implemented through a memorandum of agreement between GLO and TPWD; under it, GLO leases state-owned land to TPWD to manage as preserves following a process for nominating areas as preserves. Two of the four coastal preserves are in Galveston Bay: Christmas Bay and Armand Bayou. GLO also leases some state lands to other groups, primarily the Audobon Society, which ensures that they remain in a state appropriate for bird habitat. Of approximately 30 Audobon sanctuaries in Texas, three are in the counties under study: Vingt-un Islands, West Bay Bird Island, and Rollover Pass. Peach Point in Brazoria County is one of six state wildlife management areas. Finally, the National Oceanographic and Atmospheric Administration (NOAA) administers both the National Marine Estuarine Research Reserve Program, of which there are none in Texas, and the National Marine Sanctuary Program. There is one new marine sanctuary out in the Gulf of Mexico: the Flower Gardens.

Habitat protection rests on appropriate resolution of the environmental issues described under "Source Controls." For example, Gulf oysters require favorable salinity and temperature regimes on reefs for successful reproduction and spawning and a clean and firm substrate for maturation. Thus oyster habitat is affected by water quality (determined in turn by point and nonpoint source pollution and spills), water quantity and salinity (freshwater inflow), and the substrate (dredge/fill, marine debris). Habitat protection also forms the basis for protecting the diverse ecosystem of the bay. However, many of the habitat and living resources laws call more for planning than for direct actions. The remaining laws include many exceptions and exemptions. Larger ecosystems such as complete estuaries are particularly difficult to protect. As with other programs, staff and funding tend to be inadequate to oversee large and often remote areas, despite the efforts of game wardens and other field staff to ensure compliance with the law.

SPECIES PROTECTION

Galveston Bay and the surrounding wetlands are home to several threatened and endangered species, including the brown pelican, piping plover, bald eagle, wood stork, and several kinds of sea turtles. In addition, other species, including commercially and recreationally important finfish and shellfish, as well as the species upon which they depend, constitute an important resource for Texas.

The tools for protecting species fall into three general categories: habitat protection,

discussed above; endangered species protection; and restrictions on hunting and fishing. In this section, we review only those laws not discussed in the habitat section immediately above, especially those concerning hunting and fishing.

As noted, the federal Endangered Species Act, which is implemented by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, protects living resources and their habitat. The two agencies, along with the Texas Parks and Wildlife Department (TPWD), may review all projects, whether federal or not, which may affect species listed as endangered or threatened. Under the Fish and Wildlife Coordination Act, the same agencies review proposed projects of any federal agency that hopes to control or modify any body of water. In addition to the land use tools and permits outlined above, the law allows prosecution of individuals who violate its provisions. TPWD is responsible for the state component of endangered species protection, but it has had no resources to monitor endangered populations or undertake any active protection measures; at the same time, the regulatory framework for endangered species protection is fragmented.

TPWD also has primary responsibility for overseeing recreational and commercial fishing, which together constitute one of the primary uses of Galveston Bay. Continued availability of oysters, shrimp, and fish depends on careful harvesting practices that allow the young to develop and the mature to reproduce. Many observers believe that in addition to the usual cycles of abundance and scarcity that apparently always characterize fish catches, they detect a general decline in availability of many formerly common bay species. The use of new technologies and the increase in the number of fishermen are increasing the likelihood that the very young are taken along with more full-grown fish, affecting natural replenishment.

Under laws included in the Parks and Wildlife Code, the Fisheries Division of the Texas Parks and Wildlife Department protects fish and their habitat by monitoring abundance of fish, studying fish life cycles and factors affecting the supply of fish, monitoring landings of fish and shellfish, setting limits on fish takes, supervising fish hatcheries, and controlling noxious vegetation. State game wardens may investigate water pollution as well as enforcing wildlife protection rules. TPWD may designate nursery and scientific areas where no fishing is allowed.

The Texas Department of Agriculture advises TPWD when an emergency exemption for pesticide use might affect endangered species. The department is also working on developing forms of resource-conserving agriculture that may assist in habitat and species protection.

In consultation with federal and local soil conservation staff, EPA is developing some county-specific bulletins that will also contain information on endangered species and will list pesticide use limitations. The information will be correlated so that pesticide users can attempt to avoid substances or areas that will adversely affect the endangered species.

In addition, the federal National Marine Fisheries Service implements several laws, including

the **Magnuson Fishery Conservation and Management Act**, which are intended to ensure that overfishing does not occur. However, these laws provide primarily for planning rather than for enforcement.

TPWD also protects species that are not endangered nor threatened. Both the federal migratory bird treaty and TPWD rules forbid hunting or otherwise hurting migratory non-game birds, except for certain nuisance birds under certain circumstances. Fur-bearing animals (which, according to present regulations, do not include coyotes or mountain lions) and game birds are protected by designating limited hunting seasons, limiting takes, and requiring hunters to purchase a license. Alligators, which are on the federal list of threatened species only because of their resemblance to a truely threatened species, the crocodile, may be hunted in Texas during the designated season. There are no crocodiles in Texas.

As noted, species protection is closely related to habitat protection. Without appropriate habitat, estuarine species will not survive. Other threats include overfishing, overharvesting, and human intrusion into the habitat through boating and building. The regulatory regime for species protection suffers from many of the same problems that affect habitat protection: an emphasis on planning over enforcement, a lack of coordinated oversight for complex ecosystems, and a cumbersome permit process that allows many activities that affect species protection to go unreviewed.

HUMAN HEALTH

The health of humans, as with other living resources, depends on the quality of the water and general environmental quality of the estuary. Although all the laws concerning water quality and hazardous waste disposal discussed above have protection of human health as one goal, the most important aspects of human health clearly linked to the estuary are human health risks associated with consumption of chemically contaminated fish and shellfish and microbiologically contaminated shellfish. "Contact recreation," which includes swimming and related activities that get people into the water is another potential source of human health problems.

The Division of Shellfish Sanitation Control (DSSC) in the Texas Department of Health (TDH) oversees human health aspects of the consumption and processing of aquatic life and shellfish under Section 436 of the Texas Health and Safety Code. Shellfish are particularly susceptible to contamination due to the large volume of water they pump through their bodies during their normal feeding process. Additionally, shellfish are relatively immobile, and thus are less free to move in and out of polluted areas. Contaminated shellfish pose a particular threat to human health because many such species are eaten raw without the protection cooking provides. Other forms of aquatic life are subject not only to threats imposed by poor water quality, but also to bio-concentration of contaminants passed on through the food chain. Such species are more mobile than shellfish, but this mobility increases the difficulties involved in monitoring and making

determinations as to the possible sources of contaminants found in such species.

The Division of Shellfish Sanitation Control (DSSC) is responsible for surveying and classifying shellfish growing areas as to the suitability of such areas to produce shellfish fit for human consumption. The Division regulates shellfish harvesting areas primarily through the implementation of the guidelines detailed in the National Shellfish Sanitation Program (NSSP) Manual of Operations. The NSSP represents a cooperative and voluntary effort between the U.S. Food and Drug Administration, the appropriate state regulatory agencies, and the shellfish industry. Currently, the DSSC implements the NSSP, but the state program entails some specific differences from the national program in certain areas. Senate Bill 1463 in the 72nd Texas Legislature provided for a revision of definitions and a consolidation of some of the provisions of Section 436 of the Health and Safety Code, in addition to the elimination of the differences between the NSSP and the state program. This bill did not pass, but similar legislation making the state program consistent with the NSSP program is likely to be introduced and passed in the near future (Thompson, interview, June17, 1991).

The process of classifying shellfish harvest areas involves conducting a growing area survey. The survey includes a determination of all pollution sources; a hydrographic survey (water dynamics, dispersion, etc.); a meteorological survey (quantity and frequency of rains, effects of winds ect.); and a bacteriological survey (identification and assessment of possible contaminants). The results of such a growing area survey are used to classify harvesting waters. Presently, the Division utilizes a three-tier classification system: approved, conditionally approved, and polluted. Shellfish harvested from approved areas may be marketed directly. Conditionally approved areas represent harvest sites from which shellfish may be harvested for direct marketing, but are subject to reclassification based on changes in meteorological conditions (such as rains over a certain amount in a specified time period) or a bacteriological event creating possible hazard. Areas are designated as polluted if contaminants are found to be in excess of NSSP criteria for restricted shellfish areas, or if a determination cannot be made as to the source or form of the hazard in the area. Shellfish cannot be directly marketed from polluted areas, but may be moved to more pure waters for natural cleansing or may be artificially cleansed. If the state program is modified to be entirely consistent with the NSSP, the five-tier NSSP classification system is likely to be adopted (approved, conditionally approved, restricted, conditionally restricted, prohibited).

A minimum of 15 samples under varying conditions is required for classification of the harvest areas. Samples in Galveston Bay are taken at least monthly to monitor conditions at harvesting sites. The frequency of these samples increases with meteorological changes, as changes in storm water runoff and hydrology have a corresponding effect on the suitability of harvesting sites. The Division currently maintains between 50 and 60 monitoring stations in Galveston Bay. The classifications are updated annually, and revised. The entire classification system is completely revamped every twelve years. Enforcement concerning classified shellfish waters is handled by the Texas Parks and Wildlife Department. In 1990, 35 percent of Galveston Bay's total of 331,000 acres were approved, 60 percent were closed,

and 5 percent were conditionally approved (Texas Water Commission, 1990, p. 25).

The DSSC also has authority to regulate aquatic life with respect to human health concerns. Despite this authority, the aquatic life program is essentially nonexistent due to a severe lack of staff and funding. Some Division staff time is devoted to monitoring efforts in Lavaca Bay. Nearly 70 percent of the Division's budget is devoted to the bay classification program, and the Department of Health's laboratory is currently operating at capacity. The DSSC shellfish sampling program utilizes all of the Division's allotted laboratory time, which is barely sufficient to maintain the current program. With the exception of the limited efforts in Lavaca Bay, there is no program in operation that specifically addresses the protection of human health from the consumption of aquatic life in the state. The TWC monitors water quality and informs TDH of water quality problems which may affect human health. Both TDH and TWC also monitor the concentration of various contaminants in fish and shellfish. This program assists in identifying risks to human health, although there is no system for coordination. Similarly, the fish sampling of TPWD, which primarily concerns species propagation, could be used indirectly to monitor potential human health problems.

Based on past budget appropriations, neither the shellfish or the aquatic life program is likely to be expanded in the near future. The Division received its last significant increase in appropriations in Fiscal Year 1982, when roughly $68,000 and $10,000 were appropriated for the operating budget and capital outlays respectively. In the mid-1980s, appropriations for the operating budget and capital outlays peaked at $82,000 and $14,000 respectively. Recently, appropriations have declined. For example, in Fiscal Year 1989 operating appropriations were $71,000 and capital outlay appropriations were roughly $5,000. The Division has received some additional monetary support from within TDH. However, such support has not been sufficient to staff a program for aquatic life. Indeed, appropriations for capital outlays have often been insufficient to meet the current needs of the shellfish program, which entails substantial capital costs such as the purchase of boats. Finally, the one toxicologist position for the entire TDH is currently vacant (Interview, Thompson, June 17, 1991). County health departments, which may also monitor water quality and shellfish, are also lacking in resources and usually devote more attention to problems of drinking water, septic tanks, and vaccinations.

Human health is also affected to the extent that people swim or, as is more likely in Galveston Bay, water ski and windsurf. The programs for guarding human health from contact recreation are those that protect water quality overall. Local health departments may post areas unsafe for swimming.

SUBSIDENCE/ SHORELINE EROSION/ SEA LEVEL RISE

Land subsidence and coastal erosion threaten both the wetlands and the economic activity of Galveston Bay. Since the beginning of the century, the land surface of the Houston area has subsided up to 10 feet in some areas. Subsidence in the Houston-Galveston area has exceeded 1 1/2 feet in an area 70 miles across. Corpus Christi and Beaumont have sunk 5

feet each. The effects of subsidence in the Houston-Galveston area are loss of elevation, change in the slope of the land, and active fault movements (Harris-Galveston Coastal Subsidence District, 1991). Of these, loss of elevation is the most dramatic. Low lying areas become susceptible to inundation from storm tides and runoff; even under normal conditions, some lands have already been lost to flooding. Subsidence also exposes shores to greater wave activity as well as allowing water to come up higher on the coastal banks, contributing in turn to increased erosion rates. By 1974, the cost of property damage in the Houston-Baytown area caused by subsidence was estimated to be $113 million.

Although subsidence, erosion, and sea level rise are distinct phenomena, we treat them together because they are closely related. A rise in the sea level would inundate additional coastal lands; subsidence, or lowering of the land, has the same effect. Erosion, as noted, results from either of these two phenomena.

Subsidence

Land subsidence in Harris and Galveston Counties results primarily from groundwater withdrawal. This extraction of groundwater from underground aquifers reduces the pressure necessary to maintain the water content in the surrounding clay soil. The reduced pressure allows the water to escape from the clay and causes the clay layers to compress, permitting the overlying ground layers and therefore the land surface to subside, or sink. Production of oil and gas may also cause subsidence, but it tends to create greater stress over a smaller area than groundwater withdrawal. Some subsidence has occurred over six oil and gas fields in Harris County.

Although the effects of subsidence are irreversible, there are ways to abate continuing subsidence: artificially recharging the aquifer, re-pressurizing the underground area to prevent soil compaction, and, most important, limiting withdrawals. **The Harris-Galveston Coastal Subsidence District** was formed in 1975 as a direct result of the flooding problems caused by subsidence. The governing body is a 17 member board of directors and is supported by water well permits. It is responsible for ending subsidence by regulating withdrawal of groundwater within its boundaries. The Subsidence District is enforcing a plan for surface water conversion and water conservation. The plan divides Harris and Galveston counties into eight regulatory areas and requires that water wells within the district with a casing diameter of 5 inches must have a permit to withdraw a specified amount of water. The plan has been successful in reducing groundwater pumpage. There are no similar controls on groundwater withdrawal in other areas around Galveston Bay but outside the jurisdication of the HGCSD.

Shoreline Erosion

The gulf coast states have the highest average annual erosion rate in the nation of over five feet per year (Leatherman, 1989). Coastal erosion is primarily a natural process and has long been attributed to tidal action, particularly that brought on by severe storms, but it is

exacerbated by subsidence. Of the 370 miles of Texas Gulf shoreline, approximately 60 percent is eroding at rates between one and 50 feet per year; approximately one-third is stable, and the remainder is increasing (GLO, 1990). Erosion is not confined to beaches, but also affects the bay system. The GLO estimates that about two-thirds of the Texas bayshores are eroding, often because of the large wakes created in the relatively shallow bay by passage of both recreational and, especially, large commercial boats.

Prevention of erosion may be accomplished through limiting development in flood and erosion-prone areas and building seawalls. A series of federal flood insurance laws have attempted to limit development in floodplains and erosion zones. The federal Flood Disaster Protection Act directs the Federal Emergency Management Agency to identify flood related erosion zones and encourages demolition or relocation of structures in the hazardous areas by advancing payment. Other efforts to limit development are considered above in the section on shoreline development. Seawalls often disrupt the beach environment, reflecting wave energy, increasing intensity of littoral currents, and concentrating wave and current energy at the ends of the wall, finally leading to the need for ever larger and more expensive walls. Another, more preferable, method for controlling shoreline erosion is salt marsh grass planting, a technique now being demonstrated in several places on Galveston Bay by the U.S. Soil Conservation Service.

Comprehensive planning, including public aquisition of land where necessary, is another response to erosion. Texas remains one of only two coastal states (the other is Georgia), with no federally approved and funded plan to manage the coastal zone. The **Coastal Management Act of 1972** offers states financial incentives to develop such plans, and attempts were made in the past to formulate comprehensive management policies towards the coastal zone. However, the Texas Coastal Management Program of 1976 and the Texas Coastal Plan of 1979 failed for myriad reasons, especially the multitude of competing interests along the coast and the desire to avoid creating another bureaucracy. In 1989, the 72nd Texas Legislature enacted SB 1571 which designated the General Land Office as the lead agency to develop a long-term plan for the management of Texas coastal public land, in cooperation with other state agencies that have duties relating to coastal matters, including the Parks and Wildlife Department, the Attorney General's Office, the Texas Water Commission, the Texas Water Development Board, the State Department of Highways and Public Transportation, and the Railroad Commission of Texas. GLO established a Coastal Management Advisory Committee and a State Agency Task Force to help it develop the new Texas Coastal Management Plan. A Federal Agency Task Force was also formed to help coordinate overlapping federal and state interests. As a first step, GLO prepared briefing papers on nine areas of coastal concern: nonpoint source pollution, oil spills, hazardous waste generation and disposal, habitat and wetland loss, freshwater inflow, coastal erosion, beach access, dune protection, and marine debris. After presenting these issues at a series of public hearings up and down the coast, three issues appeared to be of primary concern: coastal erosion, wetlands loss, and beach access.

At the recommendation of the Texas Coastal Management Plan, the 73rd Texas Legislature

(1991) passed the Coastal Management Plan for Beach Access Preservation and Enhancement, Dune Protection, and Coastal Erosion. It generally increases the powers of GLO and local governments to protect public access to beaches, protect sand dunes, and prevent coastal erosion. Coastal counties had no authority to manage beaches in unincorporated areas or ability to create enforceable beach policies; this law provides those powers. Most important, this law calls for state policy to provide for more effective and efficient management of coastal natural resource areas, and to that end makes GLO the lead agency for a comprehensive management plan for the entire coast. The Coastal Coordination Council, consisting of the Land Commssioner, the Attorney General, the chair of the Parks and Wildlife Commssion, and the chair of TWC, replaces the governor as the state's representative in negotiations with the federal government. The bill thus appears to lay the groundwork for Texas' belated participation in the federal Coastal Zone Management Act; a plan was rumored to have been sent to NOAA for review as early as August 1991.

CHAPTER FIVE
CONCLUSION

This brief overview of the laws affecting the environment of Galveston Bay and the agencies that implement them shows just how complex the regulatory framework is. No problem is addressed by a single law or agency; no agency works on only one issue or problem. This situation is inevitable in a political system that is both democratic and federal: democracies treat problems incrementally as they arise rather than through comprehensive planning, and federal statutes succeed only when power is distributed among the various levels of government. Furthermore, most people believe that the benefits of both democracy and federalism, with their implicit checks and balances, far outweigh the costs. In the case of protecting the environment of Galveston Bay, the costs include both overlapping authorities and gaps in authority, accompanied both by duplication of effort and failure to attend to important problems. In almost every instance, these difficulties are exacerbated by a lack of funds and staff to implement laws and regulations that are complex and require field investigations over a large and remote area.

The Management Conference of each estuary of national significance must develop a Comprehensive Conservation and Management Plan. One of the steps in developing a comprehensive plan is to delineate the regulatory framework already in place. Following that, the framework is evaluated, identifying areas where the best interests of the estuary are not being served and outlining steps to rectify problems. Because the framework is so complex, any presentation of it entails an implicit analytical approach. Our approach has been to use the Action Plan Topics identified by the Management Conference of the Galveston Bay National Estuary Program.

The ten Action Plan Topics overlap in much the same way as the laws and agency authorities. For example, hazardous waste is treated under nonpoint source pollution, but it might well have been treated as a problem of human health. Shoreline development may well result in point and/or nonpoint source pollution as well as shore erosion. Habitat protection, as noted above, is both a function of maintaining habitat integrity and of controlling various sources of pollution. Each of these topics in turn is regulated by several agencies acting under several different laws.

By focusing on problem areas, we have been able to show clearly how complex the regulatory framework is and to begin to identify its gaps and overlaps. This same problem-oriented approach should serve as a sound basis for evaluating the effectiveness of present environmental regulation in Galveston Bay.

LIST OF ACRONYMS

Federal

ASCS	Agricultural Stabilization and Conservation Service
CEQ	Council on Environmental Quality
CG	United States Coast Guard
Corps	U.S. Army Corps of Engineers
DI	Department of the Interior
DOT	Department of Transportation
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FWS	Fish and Wildlife Service
NMFS	National Marine Fisheries Service
SCS	Soil Conservation Service
USDA	United States Department of Agriculture

State

DPS	Department of Public Safety
GLO	General Land Office
RRC	Railroad Commission
SWCB	Soil and Water Conservation Board
TABC	Texas Air Control Board
TDA	Texas Department of Agriculture
TDH	Texas Department of Health
TDHPT	Texas Department of Highways and Public Transportation
TPWD	Texas Parks and Wildlife Department
TWC	Texas Water Commission
TWDB	Texas Water Development Board

FEDERAL LAWS AND THE AGENCIES THAT IMPLEMENT THEM

CERCLA
EPA
TWC

RCRA
EPA
TWC
TDH
RRC

FWPCA
EPA
TWC
COE
TPWD
RRC
TWDB
SWCB

Water Bank Act
ASCS
SCS

ESA
FWS
NMFS
TPWD

FIFRA
EPA
TDA

NEPA
CEQ
Federal Agencies

National Flood Insurance Act
FEMA
TWC

Rivers and Harbors Act
COE

Safe Drinking Water Act
EPA
TDH

Toxic Substances Control Act
EPA

Coastal Zone Management Act
NOAA
GLO

EXECUTIVE ORDERS
All Federal Agencies

Fish and Wildlife Coordination Act
NMFS
USFWS
TPWD

Food Security Act / Food, Agriculture, Conservation and Trade Act
SCS
ASCS
USDA

Magnuson Fishery Conservation and Management Act
NMFS

Marine Mammal Protection Act
NOAA
FWS

Migratory Bird Hunting Stamp Act/Migratory Bird Conservation Act
FWS

APPENDIX 1:
FEDERAL STRUCTURE FOR ENVIRONMENTAL PROTECTION OF GALVESTON BAY

This appendix describes the federal structure for environmental protection of Galveston Bay. It begins with a review of about 20 major federal laws and a few important Executive Orders. Part 2 of the appendix describes the federal agencies involved in environmental protection. Full citations to the U.S. Code for each law are provided in the bibliography. Readers are also referred to the electronic information system, which includes full texts of relevant laws and associated regulations. This appendix does not use the boldface and underlining keys to cross-referencing that were employed in the main text.

FEDERAL LEGISLATION

Following is a listing of major federal laws that have some effect on the environment of Galveston Bay. They are arranged in alphabetical order except when an act amends another; in that case they are treated together and only the name of the amending act appears in alphabetical order. The name of the implementing agency is provided in bold letters the first time it is mentioned; descriptions of the agencies are provided in the second part of the appendix. Following the list of statutes is a list of Executive Orders of importance to the environment of Galveston Bay. These Executive Orders were issued by presidents to guide agencies in implementing statutes.

Clean Air Act

Although initially states were primarily responsible for air pollution control, the federal role gradually increased and was consolidated by laws passed in 1963, 1965, and 1967. The Clean Air Act was passed in 1970 and significantly amended in 1977; then, despite a schedule calling for regular review, it was not amended again until 1990. The general purpose of the act was to limit pollution of the air by "conventional pollutants"–primarily sulfur and nitrogen compounds resulting from burning of fuels–whose presence in the air affected human health. The law established a set of air quality goals that depended upon the amount of air pollution and level of manufacturing in the area. Many areas failed to meet the goals within the required time.

The 1990 amendments classify areas of nonattainment of the National Ambient Air Quality Standards (NAAQS) according to the extent to which the standard is exceeded. The new legislation also tightens emission standards of automobiles by 35 percent for hydrocarbons and 60 percent for nitrogen oxides, and focuses on cleaner gasolines for cars in the dirtiest cities. Emissions of sulfur dioxides are required to be about 10 million tons less than in 1980

and nitrous oxides are to be reduced as well. A cap is placed on future emissions and clean coal technology is encouraged. The legislation establishes a program of technology-based standards for EPA-listed sources of 189 hazardous air pollutants and addresses the prevention of sudden, catastrophic releases of air toxics and establishes a national policy of ending the production and use of chloroflourocarbons and carbon tetrachloride by the year 2000 and provides for the recovery, recycling and disposal of ozone-depleting substances. Permits and fees will be required under a state-run program for the operation of many sources of air pollutants. New enforcement procedures are also included with the increase of certain penalties.

Clean Water Act
(see Federal Water Pollution Control Act)

Coastal Barrier Resources Act

The Coastal Barrier Resources Act of 1982 is intended to limit federal financial assistance that would have encouraged development in undeveloped coastal barrier areas and generally to prevent or slow development in those areas. The act requires the Department of the Interior to develop a series of maps of undeveloped coastal barriers along the Atlantic and Gulf Coasts and establishes these areas as the Coastal Barrier Resource System. The state coastal zone management agency (established under the Coastal Zone Management Act) or, in the case of Texas, the governor, is directed to prepare a report and coordinate federal and state activities. The act does not prohibit development, only reduces federal subsidies, and applies only to undeveloped coastal barriers. In 1988, the Department of the Interior identified 790,000 acres of coastal barriers that qualified as undeveloped and were not already included under the purview of the law. During the 1990 reauthorization of the act, Congress protected some of this area, primarily in the Florida Kays and the Texas Boca Chica wetlands.

Coastal Zone Management Act

The Coastal Zone Management Act of 1972 authorized a national program to limit unwise use of coastal land and water resources and to protect them. The act provides funds, policy guidance, and technical assistance to states and territorial governments to help establish and maintain coastal management plans that meet federal regulations. In the 1980 amendments to the act, Congress added more goals: to provide for management of coastal development and to minimize loss of life and property caused by improper development in flood prone areas, areas of subsidence and salt water intrusion and by destruction of natural protective features such as beaches, dunes, wetlands and barrier islands. The 1990 reauthorization of the law added management of nonpoint source polllution to the goals. Under the law, states receive assistance from the National Oceanic and Atmospheric Administration (NOAA) to

develop plans for managing coastal development. If the plan meets national standards, the coastal zone management office approves the state plan and provides some funding. Once a state plan is adopted, all federal activities in the plan area will be consistent with the plan. Of the 35 eligible states, 28 have approved state plans. Texas is the only Gulf state without a plan.

Comprehensive Environmental Response, Compensation and Liability Act of 1980

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), otherwise known as the Superfund Act, established a federal program to clean up the nation's most dangerous hazardous waste and chemical contamination sites and respond to spills and other releases or threatened releases as well as leaking hazardous waste dumps. The law gives the federal government responsibility for the program; however, most of the responsibility is delegated to EPA by the President. The federal government may order that hazardous substances be removed from a site or that the site be "remediated" or improved to halt or prevent any release of the substances off the site or into ground water.

CERCLA requires development of a National Priorities List of sites prioritized according to a Hazard Ranking System, with the highest priority assigned to the sites contaminating drinking water supplies. The law sets up a timetable for completion of sites on the National Priorities List, although recent reports from the General Accounting Office suggest that this timetable is not being met.

CERCLA requires public participation in the selection of response actions. Before acting, the federal or state government must prepare a remedial action plan which provides for public notice and comment, a meeting near the site, response to public comment and a statement of basis and purpose. The state must contribute 10 percent of the clean up costs and 50 percent if the state owns the site. The state must pay 100 percent of the costs to restore water quality. The Superfund can be used for all federal costs of response and clean up if the responsible party cannot be found or amount exceeds liability limits.

CERCLA establishes broad liability for responsible parties. It also requires certain offshore vessels and facilities to demonstrate financial responsibility or face denial of entry to U.S. ports or detention.

Because of the vast number of petrochemical plants formerly and presently located on or near Galveston Bay, there are many hazardous waste disposal sites in the estuary as well as in the catchment areas for streams and rivers feeding the bay.

Superfund Amendments and Reauthorization Act of 1986

The Superfund Amendments and Reauthorization Act of 1986 (SARA) was a response to problems that developed in implementing CERCLA. It provided for a new funding mechanism, the $8.5 billion Hazardous Substances Superfund, because the previous fund was insufficient to handle the number of sites. It also established new rules for determining the responsible party or parties and for obtaining payment or partial payment from them.

Title III of SARA, also known as the Emergency Planning and Community Right-to Know Act (EPCRA) created state and local bodies responsible for ensuring the capability to respond to emergencies involving hazardous chemicals. So that local agencies and citizens will know what hazardous substances are present in their communities, EPCRA also requires companies that store, manufacture, or use any of a list of hundreds of hazardous chemicals to report this to the Local Emergency Planning Committee (LEPC). Another reporting requirement that affects only manufacturers requires them to report to EPA their annual emissions of any of a list of about 400 hazardous chemicals. The information on these releases is made available to the public by EPA in an electronic database. The availability of this information is intended to assist in monitoring and cleanup of bodies of water, land, and air that receive these releases of hazardous materials.

Both the emergency response and public information provisions of EPCRA have important implications for protection of Galveston Bay. The ability of local governments to respond more effectively to spills or other accidents involving hazardous materials should limit the amount of materials reaching the bay. The availability of the storage and emissions data should allow local, state, and federal agencies to work with facilities to reduce emissions in the bay area.

Endangered Species Act

The Endangered Species Act (ESA) provides for the conservation of threatened and endangered species and the conservation of the ecosystems upon which such species depend. Section 4 of the ESA requires the listing of endangered or threatened species, and a designation of the critical habitat of the listed species. Section 7 of the Act requires federal agencies to ensure that any action or proposed action funded, authorized, or carried out by the agency will not jeopardize the continued existence of a listed species or the critical habitat of such species. This assurance is to be accomplished through consultation with the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS). Section 7, therefore, gives the FWS and the NMFS broad authority to review federal permits and Environmental Impact Statements which may potentially affect endangered or threatened species. Section 10 of the Act authorizes a permitting process for non-federal projects which may affect listed species and their habitats. The ESA has been a potent tool for protecting entire habitats or ecosystems even if only one species is endangered.

Federal Insecticide, Fungicide and Rodenticide Act

The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) was originally enacted in 1947 and has since been amended several times. Originally, FIFRA was a pesticide labeling law, but amendments passed in 1972 required the registration of all pesticides before allowing them to be sold to the public. In order to approve registration, **EPA** must find that the pesticide will not adversely affect the environment or human health in comparison to the benefits of its use. In addition, FIFRA also grants EPA the authority to declare as a pest any plant or animal which is injurious to human health or the environment.

The states are given primary responsibility for enforcement of FIFRA if the state enters into a cooperative agreement with EPA for undertaking the responsibility; otherwise, EPA has the primary enforcement responsibility. States can also assume responsibility for certification of pesticide applicators. The Texas Department of Agriculture has received delegated authority from EPA to administer FIFRA.

No pesticide can be sold or distributed unless it has been registered with EPA. An applicant must file a statement with EPA that includes the name of the pesticide and the labeling, a statement of all claims made for the pesticide and any instructions, the chemical formula of the pesticide, and the data from tests concerning environmental and health effects. These test data also include requirements for residue chemistry, environmental fate, toxicology, reentry protection, spray drift, and other factors. In order to register a pesticide, EPA must confirm that the pesticide will perform its function without unreasonable risks to human health and the environment by weighing the environmental, economic and social benefits and costs and that the labeling complies with the act. If the registration is denied, the applicant has 30 days to correct the conditions that were the basis for the denial or may seek a hearing with EPA.

As part of the registration process, EPA determines whether the pesticide should be classified for general or restricted use. EPA will classify a pesticide for restricted use if it determines that the use of the pesticide may cause adverse effects on the environment, applicators and other people. When a pesticide is classified for restricted use, it can only be applied by, or under the direct supervision of, an EPA certified applicator if it is restricted due to harm to the applicator. If the pesticide is classified for restricted use due to the adverse effects on the environment, the pesticide may be subject to additional regulations.

Although of limited importance to Galveston Bay, FIFRA is the basic law concerning pesticides, runoff of which is potentially an important cause of nonpoint source pollution in all bodies of water crossing agricultural and urban areas. EPA is authorized to ensure that the labeled instructions for use include mechanisms for minimizing runoff as well as limiting effects on wildlife and beneficial insects such as bees. For example, instructions may forbid application of a pesticide during that portion of the crop's growing period during which it is typically watered heavily. However, the widely diffused use of pesticides makes enforcement of the labelled instructions very difficult and these precautions are not always

honored.

A new proposal would require manufacturers to include generic endangered species warnings on the labels of certain pesticides that are frequently used in areas occupied by threatened or endangered species.

Federal Water Pollution Control Act

The Federal Water Pollution Control Act, enacted in 1972 and subsequently amended, represents the central federal legislation governing the pollution of the nation's waters. The law, commonly known as the Clean Water Act (CWA), consists of two central parts: regulatory provisions concerning water pollution and authorization of federal assistance for the construction of municipal wastewater treatment facilities.

The National Pollutant Discharge Elimination System (NPDES) program, administered by the Environmental Protection Agency (EPA), constitutes the core of the regulatory provisions of the act. States may apply to EPA for permission to administer their own NPDES programs, and delegation of such responsibilities may occur after a state demonstrates the ability to carry out the provisions of the program. The Texas Water Commission's application to administer the NPDES program is currently under EPA review. Until it is approved, applicants must obtain two permits.

The Clean Water Act prohibits point source discharges of any pollutant into navigable waters unless they are expressly authorized by an NPDES permit. Under the NPDES program, industrial and municipal discharges are required to meet both technology-based effluent limitations and receiving water quality standards. The technology-based effluent standards, issued by the EPA, prescribe minimum performance standards to be obtained by industrial discharges. The standards are national in scope and are broken down by class or type of industry. These standards are based on levels obtainable through the use of pollution control technology such as Best Available Technology (BAT), and Best Conventional Pollutant Control Technology (BCT). BCT limitations concern conventional pollutants such as suspended solids, oxygen-demanding materials and bacteria. BAT limitations focus on toxic and nonconventional pollutants. EPA has also issued water quality criteria for over 115 pollutants, including 65 toxic pollutants. Municipal wastewater discharges must meet secondary treatment effluent standards developed by the EPA. These technology-based effluent standards are applicable regardless of the quality of the receiving water.

Section 303 of the Act requires states to establish their own receiving water quality standards, subject to EPA approval. These state standards must be as stringent as EPA requirements at a minimum, but they may exceed such requirements. Under section 303, state water quality standards must be reviewed every three years. The Texas Water Commission completed this review process by adopting revisions to the standards on June

12, 1991; in September, EPA approved the new standards. Section 303 also requires states to identify waters that do not or are not expected to meet water quality standards even after required controls are in place. These waters are considered "quality-limited"; the state must establish Total Maximum Daily Loads (TMDLs) for them and obtain EPA approval based on documentation. Regional offices of EPA approve the state TMDL process, the list of waters, and specific TMDLs for those water. In addition, regional offices provide technical assistance to the states and attempt to minimize duplication of data systems. Section 305 requires a biennial Water Quality Inventory Report.

Section 401 of the Clean Water Act requires an applicant for a federal license or permit authorizing an activity which may result in the discharge of a pollutant into waters of the United States to obtain state certification that the proposed activity will not violate the applicable water quality standards. This section provides for state review of all Section 404 permits. The Texas Water Commission is responsible for this certification.

Section 403 of the Act requires EPA to establish guidelines for permitted NPDES discharges into the territorial sea, the waters of the contiguous zone, or the ocean. Such guidelines include a determination of the effects of discharges on human health or welfare (including fish, shellfish, wildlife, plankton, shorelines, and beaches); marine life; and the effect of discharges on esthetic, recreation, and economic values. NPDES permits must be in accordance with these guidelines and may not be issued if there is insufficient information concerning the permit.

Section 404 of the Clean Water Act establishes a permit program jointly administered by the EPA and the Army Corps of Engineers for the disposal of dredge and fill material in the waters of the United States. Section 404(a) of the Act authorizes the Corps to issue permits for the disposal of dredge and fill materials under guidelines developed by the EPA under Section 404(b)(1) of the Act. The Act further gives EPA a veto power over the issuance of permits for such activities under Section 404(c). Under this provision, the EPA may block a permit for disposal at a specific site if a determination is made that a proposed activity would have "an unacceptable adverse affect on municipal water supplies, shellfish beds, and fishery areas (including spawning and breeding areas), wildlife, or recreational areas." In practice, however, this veto power is rarely utilized. Section 404(e) authorizes the issuance of general permits for discharges on a state, regional, or national basis involving actions determined by the Corps to be similar in nature and which have minimal individual or cumulative adverse environmental impacts. If an activity falls under a general permit classification, an individual permit is not required. Section 404(f) exempts a number of activities from the permit requirement. Such activities include, but are not limited to, normal farming, silviculture, and ranching. Federal projects authorized by Congress are exempt from permit requirements if the effects of such projects are documented in an Environmental Impact Statement pursuant to the National Environmental Policy Act of 1969.

In addition, the CWA contained many provisions for funding and assisting states to meet

their statutory obligations. Section 205 provided for a Construction Grants program, funding water quality management planning, nonpoint source management, water quality in bays and estuaries due to combined storm water and sanitary sewer overflows, and areawide wastewater management. These provisions formed the basis for present-day programs of assistance to states, discussed in the following several paragraphs.

Water Quality Act of 1987

The Water Quality Act (WQA) of 1987 represents the most significant of the three amendments to the Federal Water Pollution Control Act (Clean Water Act). The major provisions of the act included a new framework to manage storm water discharges, requirements for states to develop programs to control nonpoint source pollution, major revisions in the funding structure for federal wastewater treatment assistance, requirements for state review of section 404 dredge and fill discharge permits, and a management program for nationally significant estuaries.

Section 405 of the WQA establishes a new management structure for permitting storm water discharges through the addition of Section 402(p) to the Clean Water Act. This provision requires NPDES permits for three categories of storm water discharges: industrial and large municipal systems (serving populations in excess of 250,000), medium municipal systems (serving populations between 250,000 and 100,000) and small municipal systems (serving populations under 100,000). The provisions of Section 405 are examined in greater detail in the discussion of nonpoint source pollution.

The WQA added Section 319 to the Clean Water Act which required states to develop and implement plans to control nonpoint source pollution. Section 319 requires states to identify those bodies of water not expected to meet water quality standards due to nonpoint source pollution and to develop plans to reduce such pollution. It also authorizes funds for implementation.

The WQA extended the traditional Title II grant program for the construction of wastewater treatment facilities through Fiscal Year 1990. Under Title II provisions, federal funding could cover as much as 55 percent of project costs. The WQA also established a program to capitalize State Revolving Loan Funds (SRF) as a mechanism to phase-out federal funding for the construction of such facilities. Under the SRF program, states must deposit at least 20 percent of the federal capitalization grant into the fund. Monies from the fund may then be loaned to communities to finance the construction of wastewater facilities. Unlike the Title II program, however, recipients must pay back loans to the SRF fund which will serve as a continuing source of funding for future projects in the state. Federal capitalization grants are authorized through Fiscal Year 1994, when financing for wastewater treatment facilities is likely to become solely a state responsibility.

Section 320 of the Act established the National Estuary Program, named Galveston Bay an

Estuary of National Significance, and authorized appropriations of up to $12 million annually for the National Estuary Program.

Section 401 of the WQA provides for state agency certification of Section 404 permits for the discharge of dredge and fill materials. Applicants seeking discharge permits must obtain certification from the Texas Water Commission that the proposed activity will not violate state water quality standards. The permit process for dredge and fill discharges is described more fully in the main body of the text in the section on dredge and fill. Section 401 also provides for state certification of federally issued NPDES permits.

It is obvious that the water acts have a very great impact on environmental protection in Galveston Bay. At the center of a heavily populated and heavily industrialized area, and fed by waters that pass through both urban and rural areas, the bay is affected by both nonpoint and point source pollution, the latter from both industrial facilities and municipal water treatment facilities. The dredge and fill provisions are also important to the bay.

Oil Pollution Act of 1990

Section 311 of the Clean Water Act, which provided for a strategy for cleanup of and compensation for damages caused by the discharge of oil, was amended by the Oil Pollution Act of 1990. This act addressed the problems encountered with the Exxon Valdez oil spill by expanding the existing Clean Water Act liability scheme and adding new provisions for oil spill prevention and strengthening spill response capabilities. The act creates a $1 billion Oil Spill and Liabilities Trust Fund and consolidates federal oil spill laws into a unified liability and compensation program. The law increases civil penalties from $5,000 to $10,000; requires the responsible party to pay for the cleanup of spills and to compensate parties who were adversely affected; and expands the costs which can be recovered from the responsible party including damage to natural resources, loss of profits and earning capabilities and costs for providing increased public services. The responsible party is obligated to respond immediately to potential or actual discharges. All tank vessels and facilities including U.S. and foreign vessels operating in U.S. waters and both offshore and onshore facilities will be required to have approved Oil Spill Response Plans designed to allow the owner or operator to immediately and easily respond to an oil spill. Section 4115 requires a double hull to be fitted on a tank vessel carrying oil as cargo or cargo residue which is constructed or undergoes a major conversion after June 30, 1991 with a phase in period commencing in 1995.

The Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act stipulates that any federal agency which proposes to control or modify any water body must first consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service as appropriate, and with the state wildlife

management agency concerning the effects of the proposed action. This act, therefore, gives the FWS and the NMFS permit review authority which is not strictly limited to endangered or threatened species. The act gives the Texas Parks and Wildlife Department review authority for permitted activities such as the disposal of dredge and fill materials under Section 404 of the Clean Water Act.

Food, Agriculture, Conservation, and Trade Act of 1990
(see Food Security Act of 1985)

Food Security Act of 1985

The Food Security Act of 1985 (FSA) contains "sodbuster" and "swampbuster" provisions encouraging the removal of highly erodible land and wetlands from agricultural production. Under the "sodbuster" provisions, agricultural producers bringing highly erodible land into cultivation after December 23, 1985 are ineligible for federal benefits under Department of Agriculture programs. Agricultural producers may bring highly erodible lands into production without disqualification from such benefit programs if they implement a conservation plan approved by the Soil Conservation Service and the local conservation district. The "swampbuster" provisions of the act are similar in that agricultural producers are discouraged from bringing wetlands into cultivation after December 23, 1985, under the threat of disqualification from federal subsidies.

These two provisions provide disincentives rather than direct land use regulations. Under the act, a violation and subsequent disqualification results only when a commodity crop has been planted on a converted wetland. The law did not expressly prohibit the drainage of wetlands. Thus, the possibility existed that farmers would drain wetlands and only plant during years of high crop prices, minimizing the necessity of federal subsidies. The law contains a Farm Debt Restructure provision which enables landowners to set aside wetlands on private lands for natural resource management. Under this provision, such land must be set aside for at least 50 years to qualify the landowner for debt relief. The FSA also established a program whereby interested parties (including states) may obtain easements on wetlands prior to the resale of lands contained on the Farmers Home Administration (FmHA) property inventory. Many of the provisions of the FSA were modified by the 1990 farm bill described in the following paragraph.

Food, Agriculture, Conservation, and Trade Act of 1990

The Food, Agriculture, Conservation, and Trade Act of 1990, known as the 1990 Farm Bill, restructured many of the key elements of the "swampbuster" provisions of the 1985 Food Security Act. First, the Farm Bill contains a "minimal effects" provision which will exempt agricultural producers from subsidy disqualifications if their activities in wetlands have a

minimal effect on wetland values (including hydrological and biological values and the value of the wetland to wildlife and waterfowl). The loopholes concerning planting in wetlands in years of high crop prices were closed. Under the 1990 Farm Bill, disqualification from the subsidy program occurs when a farmer drains a wetland to make agricultural production possible. Under this new provision, the actual planting of a commodity crop is not a violation requirement; the mere preparation of a wetland for such a crop constitutes a violation. The Farm Bill also restricts the extent of the easement program on Farmers Home Administration (FmHA) inventory list. The percentage of a property's (prior-converted wetland or frequently cropped wetland) total acreage for which an easement may be obtained prior to resale may not exceed 20 percent. The U.S. Department of Agriculture may further restrict the size of the easement if the property is not marketable due to the extent of the easement. Although this provision may actually inhibit wetland protection and restoration, Congress attempted to right the imbalance by establishing a voluntary agricultural wetlands reserve program. Under this provision, the Secretary of Agriculture may protect up to one million acres of farmed wetlands in the reserve by 1995. Farmers will be offered federal payments to place wetlands into permanent or 30-year easements restricting land use. Finally, the Farm Bill enables the conversion of farmed wetlands if the value of such land is offset by the restoration of a previously converted wetland in the same general area.

The Galveston Bay estuary depends heavily on the health of associated wetlands, which are under constant pressure for development. These farm bills provide some measure of protection from agricultural pressure on the wetlands. The Coastal Zone Management Act provides some additional protection for wetlands in affected states, of which Texas is not one.

[Magnuson] Fishery Conservation and Management Act

The Magnuson Fishery Conservation and Management Act requires that immediate action be taken to conserve and manage fishery resources found off the coasts of the United States and the anadromous species and the continental shelf fishery resources of the United States. It involves the preparation and implementation, in accordance with national standards, of fishery management plans which will achieve and maintain, on a continuing basis, the optimum yield from each fishery. These plans may be prepared by the Secretary of the Commerce or the Gulf of Mexico Fishery Management Council. The fishery management plans also include information regarding the significance of habitat to the fishery and assessment of the effects which changes to that habitat may have on the fishery.

Marine Mammal Protection Act

The Marine Mammal Protection Act recognizes that certain species and population stocks of marine mammals are, or may be, in danger of extinction or depletion as a result of man's

activities. It further states that such species and population stocks should not be permitted by the National Marine Fisheries Service to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part or to diminish below their optimum sustainable populations. The Secretary of Commerce may issue permits for the taking or importation of any marine mammal according to regulations established by the Secretary.

Marine Plastic Pollution Research and Control Act

The Marine Plastic Pollution Research and Control Act controls domestic marine plastics pollution. It amends the 1980 Act to Prevent Pollution from Ships. The ban on plastics disposal applies to any nation polluting the waters of the 200 mile Exclusive Economic Zone over which the U.S. has claimed jurisdiction. Government vessels are excluded because the U.S. Navy asserts that it is unable to comply. The law has specific provisions for ship inspections, civil penalties and enforcement. It also requires refuse record books and ship waste management plans for certain ships as well as the posting of placards.

The Act requires the Secretary of Transportation to determine and ensure that there are adequate shoreside waste reception facilities and deny entry to ships without adequate waste facilities. The Act also provides for reports and studies. The Department of Transportation must report annually on compliance, and federal agencies operating ships in noncompliance with the act must have reported by December 1990 on the possibilities of achieving compliance. EPA must study the reduction of plastic pollution, identify improper disposal techniques, comment on the adequacy of the law, assess the impacts of plastic on waste streams, and develop recommendations on incentives for new uses of recycled plastics. EPA must also conduct a public outreach program and establish citizen patrols in cooperation with NOAA. Title IV of the act, entitled The Driftnet Impact Monitoring Assessment and Control Act addresses the problem of drift gillnets.

The Migratory Bird Hunting Act and
The Migratory Bird Conservation Stamp Act

The Migratory Bird Hunting Act and the Migratory Bird Conservation Stamp Act both require waterfowl hunters to purchase "duck stamps" as a permit. Proceeds from sale of the stamps, which are also available for purchase by non-hunters at post offices and wildlife refuges, are used to purchase land for the National Wildlife Refuge System.

The National Environmental Policy Act of 1969 (NEPA)

The National Environmental Policy Act of 1969 declares a national policy encouraging a productive and enjoyable harmony between man and the environment. Section 102(c) of

NEPA contains the most significant provisions of the act, which require documentation of the environmental impacts of major federal actions and permitted activities through an Environmental Impact Statement (EIS).

Title II created the President's Council on Environmental Quality, which is responsible for appraising federal actions in light of the provisions of NEPA. The CEQ issued regulations (40 CFR 1500-1508) that require an Environmental Assessment (EA) to be conducted for all federally funded or permitted activities. An EA must briefly provide sufficient evidence that an EIS is required or must detail a Finding of No Significant Impact (FNSI). An agency is not required to develop an EIS upon reaching a FNSI.

If an EIS is found to be necessary, NEPA mandates that an EIS contain the environmental impact of the proposed action, unavoidable environmental effects entailed in the action should it be implemented, alternatives to the proposed action, an evaluation of the relationship between the short and long-term uses of the environment in regard to its productivity, and an evaluation of any irreversible and irretrievable commitments of resources. The regulations for implementing the provisions of NEPA also require each agency to develop procedures outlining activities normally requiring an EIS or ES. The Corps of Engineers, for example, has a guidance document (ER 200-2-2, 4 March 1988) outlining activities normally requiring the respective statements. Under this guidance document, most Corps permitting activities only require an Environmental Assessment.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) was enacted in 1968 to limit federal flood control and disaster relief expenditures. The program was designed to limit development in the floodplain and provide reasonably priced federal insurance for development in flood hazard areas based on the principle that occupants should pay an equitable share of the cost of the use of the floodplain. The 101st Congress reauthorized the program through 1995 and also enacted a provision that directs the COE to prepare a report for Congress on the advisability of not participating in beach stabilization projects unless the state develops a beach front management plan. Policies are sold directly through a contractor or through private insurance agencies who write policies similar to the federal policies.

The program has two principal components--the emergency phase and the regular phase. Under the emergency phase, the federal government subsidizes the sale of flood insurance to a community after the community's application has been accepted, but usually before the community has completed two mapping or risk studies. The first mapping study, the Flood Hazard Boundary Map, outlines Special Flood Hazard areas based upon the land area having at least a 1 percent chance of being inundated in a given year. It also must delineate areas of special flood-related erosion hazards and areas of special mudslide hazards. The second mapping study, the Flood Insurance Rate Map, depicts the elevation and width of the 100 year floodplain, designates risk zones within the area and is used to determine

floodplain management and insurance rating requirements for new construction. The study also relates the flood risk to the estimated actuarial premium rates required to provide flood insurance on new construction. Both of the studies are used to determine properties which are subject to limited mandatory insurance purchase requirements of the NFIP.

Under the regular phase, the mapping studies are adopted and provide the basis for more detailed regulation of construction in flood prone areas and for determining actuarial rates. To participate, a community must meet minimum floodplain management requirements which include:

- permits for new construction;
- review of subdivision proposals to assure minimal flood damage;
- anchoring and flood-proofing structures in known flood-prone areas;
- safeguarding new water and sewage system and utility lines from flooding; and
- enforcing risk zones, base flood elevations and floodway requirements.

If these requirements are met, then the property owners in the community are eligible for subsidized basic coverage in the emergency phase and a higher level of coverage either subsidized or at actuarial rates in the regular phase. They also may receive federal insured or guaranteed mortgage loans and any flood related federal disaster assistance authorized in special flood hazard areas.

The program has been amended several times. Amendments have included provisions to boost program participation, limit coverage for new construction on coastal barriers, purchase real property and flood damaged structures and relocate or demolish erosion threatened structures. The Flood Disaster Protection Act of 1973 requires the purchase of flood insurance as a condition of receiving any form of federal or federally related financial assistance. However, many property owners purchase flood insurance for the first year of their mortgage, then allow the policy to lapse.

Section 1362 provides some relief for damaged coastal structures. The 1306(c) program, known as the Upton/Jones Amendment, allows funds from the flood insurance program to be used for demolition/rebuilding or relocation of erosion-threatened structures. However, critics feel that the amendment encourages demolition and fails to take into account the need for higher premiums for the additional risks from erosion-threatened structures.

Recent legislation has addressed these concerns. H.R. 1236, which passed the House of Representatives May 1, 1991, would revise the NFIP by creating a new coastal erosion program to restrict development in special erosion zones and increase compliance with mandatory purchase requirements. The legislation would repeal the 1306(c) and 1362 programs and incorporate their demolition/relocation provisions in a revised form, providing more incentive for relocation. The legislation would require review of existing federal loans for compliance with the mandatory purchase requirement. The legislation would also establish a National Flood Mitigation Fund to Provide mitigation incentives to encourage

construction and relocation away from erosion prone zones. H.R. 1050, the National Flood Insurance Compliance, Mitigation, and Erosion Management Act of 1991, and H.R. 1236, the National Flood Insurance, Mitigation, and Erosion Management Act of 1991, which also attempt to address these concerns, have been referred to the Committee on Banking, Finance and Urban Affairs.

Oil Pollution Act of 1990
Third entry under Federal Water Pollution Control Act.

Resource Conservation and Recovery Act

First enacted in 1976, the Resource Conservation and Recovery Act (RCRA) revised the Solid Waste Disposal Act of 1965 and created a systematic program for solid and hazardous waste control. RCRA defines solid waste as any garbage, refuse or sludge from a treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining and agricultural operations, and from community activities. Waste is hazardous if it can cause or contribute to death or serious illness or the waste poses a substantial or potential danger to human health if mismanaged. RCRA does not cover discharges requiring NPDES permits under the Federal Water Pollution Control Act or nuclear wastes regulated pursuant of the Atomic Energy Act of 1954 (Wolf, p. 183-188). Amendments created regulatory programs for underground storage tanks.

Subtitle C directs EPA to establish a "cradle to grave" system of regulation for hazardous wastes by identifying hazardous wastes to be subject to regulation, creating a tracking system to monitor the path of hazardous wastes from the generator to the disposal site, developing standards for hazardous waste transportation and for owners and operators of hazardous waste facilities including a permit program. Transportation regulations are made with the cooperation of the Department of Transportation. Ninety days after the promulgation of a regulation identifying a hazardous waste, all generators, owners and operators of treatment or storage facilities or transportation operations must file with the EPA or approved state program a description of the location and description of activities of the certain hazardous waste. The amendments of 1984 extended the act to small quantity generators creating hazardous wastes of 100 to 1000 kilograms per month.

Subtitle D assigns to the states responsibility for nonhazardous solid waste regulation according to guidelines developed by EPA for solid waste land disposal operations and for the development of state solid waste plans. The standards identify sites known as open dumps which do not satisfy EPA requirements for sanitary landfills and require them to be closed. All nonhazardous solid waste must either be used for resource recovery or disposed in a secure sanitary landfill where there is no reasonable probability of adverse effects on human health or the environment.

Each state may develop a permit or review program to ensure that sanitary landfills meet EPA requirements. If the state fails to do this, EPA may enforce the requirements. With federal financial and technical assistance and cooperation, the states are to develop a comprehensive solid waste management plan to be approved by EPA.

The amendments of 1984 required EPA to establish a regulatory program for petroleum storage tanks more than ten percent underground. The Superfund amendments and the Reauthorization Act of 1986 gave more authority to EPA and state programs to clean up these underground storage tanks financed by a $500 million Leaking Underground Storage Tank Fund established through a one cent gasoline tax.

Rivers and Harbors Act of 1899

The Rivers and Harbors Act, enacted in 1899, gives the U.S. Army Corps of Engineers regulatory powers over any type of work in the navigable waters of the United States. Section 9 of the act prohibits the construction of any dam or dike across any navigable water in the U.S. without Congressional consent and Corps approval. Section 10 of the Act authorizes the Corps to issue permits for activities which may affect the "navigable capacity of any of the waters of the United States." Such activities include excavation and filling in navigable waters, and the construction of structures such as wharves, piers, and jetties. The wide scope of this definition brings virtually every project on Galveston Bay under its purview.

Superfund Amendments and Reauthorization Act of 1986

(see Comprehensive Environmental Response, Compensation, and Liability Act of 1980)

Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) authorizes EPA to regulate chemical substances that present a hazard to human health or the environment. It is intended to control chemical hazards at the source or discharge. The act gives EPA broad regulatory powers to control virtually all chemical substances, including those manufactured in the United States and imported chemicals. Section 4 of the act provides for testing of chemical substances if the possibility of manufacture, processing, distribution or disposal may pose an unreasonable risk to human health or the environment or if there may be production of the chemical in substantial quantities that may enter the environment and may be significant exposure to humans. Section 5 requires that manufacturers and processors provide advance notice of significant new use of new chemical substances. EPA may regulate the manufacture, processing, distribution and disposal of chemical substances and mixtures to protect humans and the environment. The act instructed EPA to establish rules governing the production and disposal of polychlorinated biphenyls (PCB's), to promulgate regulations

for reports and record keeping by manufacturers and processors of commercial chemicals, and to compile a list of all chemicals manufactured or processed in the United States. Each year EPA is required to submit to the President and Congress a comprehensive report on the administration of TSCA including a list of chemical testing rules, the number of premarket notices received, a list of hazardous chemical rules, a list of judicial actions under TSCA, a summary of the major problems of administration, and any recommendations. TSCA may be used to limit production of new plastics if it is found that they endanger the health of the environment because they are nondegradable.

Water Bank Act of 1970

The Water Bank Act of 1970 gives authority to the Agriculture Stabilization and Conservation Service, the Soil Conservation Service and local agricultural producers to develop a plan to maintain in their natural character wetlands designated by the Agricultural Stabilization and Conservation Service. The ASCS, the local soil and water conservation district, and the land owner set standards of practice which are enforceable by the ASCS.

Water Quality Act of 1987
(See Federal Water Pollution Control Act)

EXECUTIVE ORDERS

Executive Order 11514, as amended by Executive Order 11991

Executive Order 11514 (1977) directs federal agencies to ensure that their activities are consistent with enhancing the quality of the environment. It directed federal agencies to develop procedures to enhance public disclosures of federal plans and programs entailing environmental impacts. and established the Council of Environmental Quality as the arbitrator of conflicts between federal agencies concerning the implementation of the provisions of NEPA. Such conflicts, known as "elevation procedures," occur when agencies cannot reach agreement on proposed activities at lower organizational levels, thereby requiring resolution at the national level.

Executive Order 11990

Executive Order 11990 (1977) directs federal agencies to take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural beneficial values of wetlands in carrying out agency responsibilities. Section 1(b) stipulates that the provisions of the order do not apply to the issuance of federal permits to private parties for activities on non-federal property.

Executive Order 11988

The objective of Executive Order 11988 (1977) is to limit use of the floodplain. If an action must be located on the floodplain, the order requires that the agencies minimize potential harm to people and property and to natural and beneficial floodplain values. The public must also be informed of any proposed actions in the floodplain. The order is based in part on the National Environmental Policy Act of 1969, and applies to areas with a 1 percent chance in any year of inundation by a flood. The Order is administered under the framework of the Unified National Program for Floodplain Management which includes planning, research, education, legislation, regulation, administration, construction, operation and maintenance actions.

FEDERAL AGENCIES

Agricultural Stabilization and Conservation Service

The Agricultural Stabilization and Conservation Service (ASCS) is part of the Department of Agriculture and administers commodity and related land use programs. State operations are supervised by a state committee of three to five members appointed by the Secretary of Agriculture. In the counties, an elected three member committee of farmers is responsible for local administration. The ASCS administers the Commodity Credit Corporation's commodity stabilization programs for various crops through commodity loans, purchases, and payments to eligible producers. Emergency assistance is available to farmers in emergency designated areas. ASCS is also responsible for defense preparedness plans and programs and administers programs prescribed by the Federal Emergency Management Agency. The ASCS operates a reporting system for collecting information under the Agricultural Foreign Investment Disclosure Act of 1978 (7 USC 3501).

ASCS has two important responsibilities with respect to wetlands. The Conservation Reserve Program, authorized by the Food Security Act of 1985, conserves and improves soil and water resources on highly erodible cropland. The Agriculture Conservation Program provides funds to help with up to 80 percent of the cost of conservation and environmental measures, attempting to minimize nonpoint source pollution. The Water Bank Program allows people having eligible wetlands in important migratory waterfowl habitat to enter into 10-year agreements and receive annual payments for preventing the serious loss of wetlands and for preserving, restoring, and improving inland fresh water.

Bureau of Reclamation

The Bureau of Reclamation in the Department of the Interior was established under the Reclamation Act of 1902 to provide the arid and semiarid lands of the 17 contiguous western states a secure, year-round water supply for irrigation. The Bureau now provides

water for farms, towns, and industries, and is responsible for generating hydroelectric power, regulating rivers for flood control, and enhancing fish and wildlife habitats. As a primary supplier of water, the Bureau builds and operates many dams. It also becomes involved in all activities relating to water and water quality, including salinity control, groundwater management, and hazardous waste control.

In Texas, where the Bureau has one office in Austin, it has constructed Palmetto Dam and Lake Meredith. A proposed multipurpose project at Lower Lake Creek in the San Jacinto River basin which would have affected river flow into Galveston Bay is presently dormant for lack of local matching funds.

Council on Environmental Quality

The Council on Environmental Quality (CEQ) was established in the Executive Office of the President by the National Environmental Policy Act of 1969. The Council is to formulate and recommend national policies to promote the improvement of the quality of the environment.

The Council consists of three members appointed by the President with the advice and consent of the Senate. The Council develops and recommends to the president national policies that further environmental quality; performs a continuing analysis of changes or trends in the national environment; reviews and appraises programs of the federal government to determine their contributions to sound environmental policy; conducts studies, research, and analyses relating to ecological systems and environmental quality; assists the President in the preparation of the annual environmental quality report to the Congress; and oversees implementation of the National Environmental Policy Act.

Environmental Protection Agency

The purpose of the Environmental Protection Agency (EPA) is to protect and enhance the environment. It has authority to control pollution in air and water, pollution from solid waste, pesticides, radiation, and toxic substances. Its activities include research, monitoring, standard setting, permitting, planning, emergency response, assistance to states, review of Environmental Impact Statements, and enforcement. EPA supports research and antipollution activities by state and local governments, private and public groups, individuals, and educational institutions.

In order to administer the many laws for which it is responsible, EPA has created ten regional offices, each headed by an appointed Regional Administrator. Texas is in Region VI, which is headquartered in Dallas and includes Louisiana, Arkansas, Oklahoma, and New Mexico. The Region VI office is organized into several divisions, which are in turn divided into branches. Those that have responsibility for programs affecting Galveston Bay are

described below.

Water Management Division

The Water Management Division coordinates planning and objectives for the water quality management programs within EPA. These programs include the National Pollution Discharge Elimination System (NPDES) permits and enforcement, water quality management, construction grants, and water supply.

The Permits Branch coordinates the operational and planning elements of the National Pollutant Discharge Elimination System (NPDES) pursuant to the Clean Water Act. The Industrial and Municipal Sections develop NPDES permits detailing effluent limitations for discharges for industry and publicly-owned treatment facilities respectively. The Toxics Control Section establishes toxic control limitations for NPDES permits to enable compliance with state water quality standards. The Administrative Issuance Section issues public notices for NPDES permits and refers noncompliant cases to the Enforcement Branch.

The Enforcement Branch manages the enforcement process through the Administrative Section which compiles analytical data necessary for tracking compliance data. The Permit Compliance System tracks compliance data electronically. The Compliance Sections review noncompliant permit holders and take actions to ensure permit compliance.

The Water Quality Management Branch is responsible for regional water quality planning in order to preserve surface water quality. (Groundwater is primarily the responsibility of the Office of Groundwater in the Water Management Division.) The State Programs Section netoaties workplans for the various grants they administer. Additional technical expertise, including modeling and water quality standards guidance, is provided to state and local governments through the Technical Section, which also oversees the TMDL program. The Marine/Estuarine Section coordinates and provides technical assistance to the Galveston Bay National Estuary Program, the Gulf of Mexico Program, the Near Coastal Water Program, and site monitoring under the Ocean Dumping Program.

The Municipal Facilities Branch administers two financing programs for local sewage treatment projects: the State Revolving Loan Fund, which loans states money to make low-interest loans to local governments, and the construction grants program. The programs have been delegated to the Texas Water Development Board, while the TWC reviews and approves all project plans.

The Water Supply Branch is responsible for managing regional water supply programs to maintain national drinking water standards pursuant to the Safe Drinking Water Act. The Public Water Supply Section provides technical assistance to state and local entities to establish and operate water supply programs which protect public drinking water supplies. States are provided technical assistance for the development of state Underground Injection

Control Programs through the The Underground Injection Program Section. The Texas Railroad Commission currently operates such a program which has been approved by the EPA.

Hazardous Waste Management Division

The Hazardous Waste Management Division oversees regional hazardous waste and Superfund management programs. The Division implements oversight and regulatory responsibilities of the EPA pursuant to the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The Superfund Programs Branch is responsible for implementing CERCLA. The Programs Branch works with states to identify hazardous wastes sites. The Branch also administers the grant program for site evaluation and provides advice on designs for remedial measures in instances where states take the lead role in closing sites on the National Priorities List. The Texas Section of the Superfund Enforcement Branch pursues those parties potentially responsible for contaminating sites on the National Priorities List. The Section attempts to establish enforcement agreements with the responsible parties for site cleanups. If such agreements are not forthcoming, the Section may order the party to perform the cleanup or conduct the work itself, and seek recovery of costs through the Cost Recovery Section.

Environmental Services Division

The Environmental Services Division collects, processes and evaluates environmental monitoring data through the Surveillance Branch. This Branch coordinates all of the monitoring programs and provides information for environmental planning and regulatory decisions. The Emergency Response Branch coordinates regional response plans under the authority of CERCLA and the Clean Water Act. The branch also coordinates EPA response for oil spill cleanup in non-tidal waters according to the National Contingency Plan. The Federal Assistance Section conducts NEPA reviews and ocean dumping site designation. The Office of Quality Assurance ensures the quality of the Region's programs and environmental data collection.

Other Divisions

The Air, Pesticides, and Toxics Division assists states in developing control programs for air, pesticides, radiation, and toxic substances. The Air Branch assists states in carrying out responsibilities under the Clean Air Act, while the Pesticides and Toxics Branch is responsible for enforcement activities of asbestos laws and for grant support and oversight of state pesticide, asbestos, and PCB programs. The Regional Counsel and the Management Division provide support services. The State Programs Section provides guidance to state agencies.

Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA) was established to provide a single point of accountability for all federal emergency preparedness, mitigation, and response activities. The agency is charged with ensuring that resources at the federal, state and local levels are coordinated in preparing for and responding to a full range of emergencies. FEMA requires comprehensive plans covering hazard mitigation, preparedness, relief, and recovery. The National Preparedness Directorate develops and coordinates policies. The Programs and Support Directorate administers support programs to state and local governments. The Office of Training provides training and education programs. FEMA also provides federal insurance and works closely with the nation's fire services.

National Marine Fisheries Service

The National Marine Fisheries Service (NMFS) is part of the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Texas falls under the NMFS' Southeast Region. In this region, the NMFS maintains a Galveston Field Branch operating under the Region's Habitat Conservation Division. The NMFS has the authority to comment on the impacts which federally funded or permitted activities have on marine fisheries, marine mammals, and endangered sea turtles. Under the Fish and Wildlife Coordination Act, the NMFS has authority to review federally funded or permitted projects which may alter any water body to determine the effects of the project on marine mammals and marine fisheries. This includes reviews of COE 404 permits and waste water discharge (NPDES) permits. Under the Endangered Species Act, the NMFS may review any federally funded or permitted activity which may affect endangered and threatened marine mammals and marine fish. The responsibility for endangered and threatened sea turtles rests with the Department of Commerce (NMFS) when the turtles are in the water. The Department of the Interior (FWS) assumes responsibility when the sea turtles are on land. The NMFS has additional responsibilities regarding marine fisheries and marine mammals under the Magnuson Fishery Conservation and Management Act and the Marine Mammal Protection Act.

National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA) was created in 1970 to explore and map, manage and conserve the ocean and its living resources and the atmosphere. NOAA, which is in the Department of the Interior, reports weather, conducts satellite observations of the oceans and atmosphere, administers the National Sea Grant College program, and conducts research in all these areas. Activities affecting Galveston Bay include NOAA's responsibility for several federal laws, including the National Marine Fisheries Act, Marine Mammal Protection Act, Endangered Species Act, Fishery Conservation and Management Act, the Offshore Shrimp Fisheries Act, and the Coastal

Zone Management Act. NOAA provides technical assistance to states attempting to develop coastal zone management plans. The Office of Sea Grant receives research and educational proposals from universities, laboratories, and other entities which may be accorded up to two-thirds of their costs from federal funds. (See Texas Sea Grant in Appendix B.)

Office of Coastal Zone Management

The Office of Coastal Zone Management, U.S. Department of Commerce, acting, under the Coastal Zone Management Act of 1972, gives funds to states to develop and implement coastal management programs and provides matching funds for planning, acquiring and operating estuarine sanctuaries. Through the Coastal Energy Impact Program, the Office assists in mitigating the impacts of expanded energy activities. The Office also mandates that all federal action affecting the coastal zone must be consistent with approved state programs.

Soil Conservation Service

The Soil Conservation Service (SCS) was established under the Soil Conservation Act of 1935 (16 USC 590 a-f). It has responsibility for developing and carrying out national soil and water conservation programs and assisting in agricultural pollution control, environmental improvement, and rural community development. The Soil Conservation Service carries out its conservation programs by providing soil maps and other data that determine soil use potentials and conservation needs and by developing and coordinating the local plans. The SCS operates the federal part of the National Cooperative Soil Survey in cooperation with state agricultural experiment stations and other agencies. The Soil and Water Resources Conservation Act of 1977 requires the Service to appraise the status and use trends of soil, water, and other resources; develop long-range conservation plans in cooperation with local soil conservation districts; and evaluate progress in meeting conservation needs.

The SCS oversees certain aspects of wetlands protection. Under the authority of the Food Security Act of 1985 (16 USC 3801) field staff assist producers in preparing conservation plans in compliance with Department of Agriculture standards to be eligible for program benefits and help to determine if cropland is wetland or highly erodible. The Service cooperates with the Economic Research Service, the Forest Service and other agencies in studying watersheds of rivers and waterways. It provides loans to help fund the local share of watershed and flood prevention improvement works. The Agriculture Credit Act (16 USC 2203) gives the authority for the Service to carry out emergency watershed protection. In the Galveston Bay Area, SCS staff are helping to plant spartina alterniflora along eroding shorelines in Galveston Bay as a demonstration project illustrating alternatives to ecologically intrusive erosion control methods such as concrete bulkheads.

United States Army Corps of Engineers

The United States Army Corps of Engineers (COE) provides engineering support for the Army and Air Force and civil works support for the entire nation. It is organized into 11 divisions; Texas falls into the Southwestern Division, which in turn has five district offices in Fort Worth, Galveston, Little Rock, Tulsa, and Albuquerque. The Secretary of the Army has delegated his permit-issuing authority to the Chief of Engineers, who in turn authorized Division and District Engineers to manage programs under section 404 of the Clean Water Act.

The Galveston District Office regulates work in the navigable waters of the United States and the disposal of dredge and fill material in the waters of the U.S. The distinction between the two definitions of "water" is important as the respective definitions determine under what statutory authority a proposed activity falls. The "navigable waters of the United States are defined in 33 CFR 329.4 as "those waters which are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce." Work done or structures built in these waters require a Corps permit under Sections 9 and 10 of the Rivers and Harbors Act of 1899. "Waters of the United States," defined in 33 CFR 328.3, include not only the above defined navigable waters of the U.S., but nearly all other waters in the country, including the wetlands adjacent to those waters. A Corps permit is required for discharges of dredged or fill materials in these waters under Section 404 of the Clean Water Act. The Galveston District Office processes applications for proposed activities not involving federal funds through its Regulatory Branch in the Construction-Operations Division. The Environmental Resources Branch in the Planning Division ensures compliance with the relevant legislation for projects involving federal funds.

United States Coast Guard

The U.S. Coast Guard is a branch of the Armed Forces which operates as part of the Navy in time of war. In peacetime, the Coast Guard acts as an arm of the U.S. Department of Transportation. It maintains a system of rescue vessels, aircraft, and communications facilities in order to save life and property in the high seas and the navigable waters of the United States including flood relief and removing hazards to navigation. It is the primary enforcement agency for maritime law and enforces applicable treaties and international agreements, and it works with other agencies in the enforcement of such laws as they pertain to the protection of living and nonliving resources and in the suppression of smuggling and illicit drug trafficking. Finally, the Coast Guard is charged with formulating, administering and enforcing various safety standards for the design, construction, equipment, and maintenance of commercial vessels of the United States and offshore structures on the Outer Continental Shelf.

To achieve these goals, the Coast Guard conducts surveillance operations and boat

boardings, licenses U.S. Merchant Marine personnel, and develops safe manning standards. The Captain of the Port is authorized to enforce rules and regulations governing the safety and security of ports and the anchorage and movement of vessels in U.S. waters. Vessel Traffic Services provides for the safe movement of vessels at all times, especially during hazardous conditions. The Coast Guard establishes and maintains the U.S. aid to navigation system that includes buoys and fog signals. The Coast Guard also directs a national boating safety program.

Two of the Coast Guard's activities are of special importance to environmental protection in Galveston Bay. Under the Deepwater Port Act of 1974 (33 USC 1501), the Coast Guard administers a licensing and regulatory program governing the construction and operation of deepwater ports on the high seas to transfer oil from tankers to shore. It also promulgates the U.S. regulations to implement an international treaty on disposal of plastics. The optional Annex V to the MARPOL 73/78 convention titled "Regulations for the Prevention of Pollution by Garbage from Ships" prohibits the disposal of all plastics including synthetic ropes and fishing nets and plastic garbage bags. Annex V requires disposal beyond 12 miles of food wastes and other garbage including paper products, rags, glass, metals, bottles, crockery and similar refuse if not ground. Otherwise disposal is allowed as close as 3 miles offshore. Nonplastic garbage such as floatable lining and packing materials are required to be disposed of beyond 25 miles. Annex V also prohibits garbage disposal from fixed offshore platforms.

The second Coast Guard function that affects Galveston Bay concerns spill response and enforcement of laws relating to the protection of marine habitat. Marine Environmental Response is responsible for enforcing the Federal Water Pollution Control Act other laws that affect habitat. In the case of spills, the Coast Guard encourages and monitors responsible party cleanups and coordinates federally-funded spill response operations including a National Strike Force.

United States Fish and Wildlife Service

The U.S. Fish and Wildlife Service (FWS) is responsible for conserving, protecting, and enhancing inland sport fisheries, migratory birds, endangered species, certain marine mammals, and other fish and wildlife and their habitats. Programs in Texas are handled through one of the seven regional offices located in Albuquerque, New Mexico. FWS conducts biological monitoring and studies of fish and wildlife populations, surveillance of pesticides, heavy metals and thermal pollution, ecological studies and environmental impact assessments on hydroelectric dams, nuclear power sites, stream channelization,dredge and fill permits and environmental impact studies review.

The Wildlife and Fisheries Resource Program is responsible for improving and maintaining fish and wildlife resources through refuge management, law enforcement, and disease and population distribution studies. Other programs include cooperative fish and wildlife

research at universities, and coastal anadromous fish hatcheries production, stocking, and research. The USFWS also administers the Endangered Species Act by developing Endangered Species Lists, conducting state surveys, preparing recovery plans, research, operation of wildlife refuges, law enforcement and coordination of national and international efforts. Public information programs include news releases, leaflets, and brochures, operation of visitor centers, self guided nature trails, observation towers and recreational activities.

Under the 1986 Emergency Wetlands Resources Act, the FWS must prepare a National Wetlands Priority Conservation Plan. The plan lays the basis for state and local governments to acquire high-priority wetlands using revenues from the Land and Water Conservation Fund. It also identifies wetlands that can be protected through measures other than direct acquisition. Regional plans complement the national plan. The Region II Wetlands Regional Concept Plan, covering the Galveston Bay area, was completed in 1989. It identified the Hoskins Mound areas as a high-priority wetlands site. FWS also works on the North American Waterfowl Management Plan.

US Geological Survey

The Geological Survey's primary responsibilities are to identify the nation's land, water, energy, and mineral resources; classify federally owned lands for minerals and energy resources and water power potential; investigate natural hazards; and conduct the National Mapping Program. The agency prepares maps and digital and cartographic data, collects and interprets data on energy, mineral and water resources, conducts research, and publishes and disseminates the results. USGS has conducted studies on freshwater inflow to the Gulf of Mexico and, on the basis of streamflow gauging stations, a trend analysis of water quality, salinity, and quantity.

APPENDIX 2:
TEXAS REGULATORY FRAMEWORK FOR GALVESTON BAY

This appendix describes the duties and powers of Texas agencies that affect the environment of Galveston Bay. Because it is customary to refer to the various codes rather than to specific statutes, this appendix is organized differently from Appendix 1. Agencies are listed in alphabetical order; included in each discussion are references to the relevant codes. Texas statutes are organized in several different topical codes, such as Natural Resources or Water. Rules and regulations are codified in the Texas Administrative Code (TAC). Substantial portions of both statutes and TAC are included in the computerized information system that supplements this report. Some references to the codes are included here as guides to further information.

As noted in the introduction, several agencies are or will soon be reorganized. Although the functions of the agencies will not change, the divisions within which they are performed may change.

Attorney General's Office

The Attorney General's Office is the legal arm of Texas government. The Environmental Protection Division of the Attorney General's Office represents state environmental and natural resource agencies in court cases. Attorneys process citizen complaints and handle cases handed over from agencies for violation of agency statutes and regulations. The division prosecutes violators of laws including the Texas Open Beaches Act, Texas Clean Air Act, Texas Water Quality Act, Solid Waste Disposal Act (TX Health and Safety Code, §361.001 et seq.), and the Radiation Control Act. In addition, the division defends statutes and regulations against legal challenges and provides legal counsel to client agencies.

Texas Air Control Board

The Texas Air Control Board (TACB) is responsible for air quality and pollution control under the Texas Clean Air Act. The federal Clean Air Act (CAA) requires each state to develop a Statewide Implementation Plan (SIP) which details how the state will meet the National Ambient Air Quality Standards (NAAQS). Texas has developed a plan that complements the regulatory program under the Texas Clean Air Act. Under the CAA, geographical areas are classified as attainment or non-attainment areas depending upon whether such areas meet the National Ambient Air Quality Standards. Brazoria, Galveston, and Harris Counties have been designated as non-attainment areas for ozone.

A permit must be acquired, prior to construction, from the TACB for any facility likely to emit pollutants (TX Health and Safety Code, §382.051 et seq.). An operating permit must be obtained within 60 days of beginning construction of the facility. Operating permits must

be reviewed every 15 years by the TACB which may grant continuances for operation at that time. The TACB maintains a Monitoring Program, which is responsible for monitoring through air sample analysis and the Enforcement and Field Operations program which is responsible for ensuring compliance with the provisions of the Texas Clean Air Act.

General Land Office

The General Land Office is the state agency responsible for management and use of state-owned public lands. This includes submerged lands extending 10.3 miles into the Gulf of Mexico. The agency has the authority to issue permits for use of submerged lands as preserves, refuges, or recreational areas.

Through the Dune Protection Act, GLO has the authority to identify critical dune areas that are essential to the protection of state-owned lands, shores and submerged lands (TX Nat Res Code §63.001 et seq,31 TAC 15.43(a)). GLO must notify the Commissioner's Court of every county where a dune area is located (31 TAC 15.43(b)). GLO has developed regulations governing critical dune areas with guidelines that apply to removal of dune material, pipeline placement, private construction and other artificial construction in and around the critical area (31 TAC 15.44(1)-(10)). GLO also coordinates the Adopt-A -Beach Program which was recently expanded to include the entire coast.

The General Land Office has authority to protect the state's wetlands through the Coastal Wetland Acquisition Act (TX Nat Res Code §33.231-33.238; 31 TAC 15.51-15.54). GLO is to certify and rank coastal wetlands and inform the Texas Parks and Wildlife Department of priorities for state acquisition of certified wetlands. GLO also is responsible for implementing the Texas Coastal Preserve Program.

GLO administers the Deepwater Port Procedures Act (TX Civ Stat Art 5415). Under legislation passed in 1991, the General Land Office has become the lead agency for coping with oil spills in state waters. GLO issues permits for activities including exploration of oil and gas, channel dredging, and construction of piers, docks, and wharves. The Commissioner of the General Land Office oversees and manages leases for oil and gas wells (TX Nat Res Code §§52.321-325, 53.161-163; 31 TAC ch 9). A permit for oil and gas and mineral exploration is required from the GLO for any activities involving soil sampling or geophysical survey techniques (TX Nat Res Code §52.322(a). GLO has authority to regulate oil and gas and certain minerals including coal, lignite, sulphur, salt and potash exploration activity on public school lands. (TX Nat Res Code §§52.321-52.325, 53.161-163). GLO regulates geophysical exploration within tidewater limits as defined in the Administrative Code. (TX Nat Res Code §§52.321-52.325; 31 TAC 9.1-9.12). Exploration must be authorized by a permit and must follow operational standards governing the use of explosives, pollution prevention, and protection of marine life (31 TAC 9.5,9.7, 9.8).

The Land Office Commissioner may grant miscellaneous easements and surface leases in coastal public lands for activities not mentioned or authorized under chapter 33.

Miscellaneous easements are grants for rights of way for such uses as telephone, telegraph, electric transmission, and power lines; oil and gas pipelines; sulfur lines, irrigation canals and laterals, and pipelines connecting onshore storage facilities with offshore facilities of deepwater ports. The Commissioner may also issue surface leases on coastal public lands for such projects as oil and gas drilling and production platforms, electrical substations, pumping stations, loading racks, and tank farms (TX Nat Res Code §51.001). GLO also participates with the Army Corps of Engineers in reviewing permits under Section 404 of the Clean Water Act.

The School Land Board manages public lands dedicated to the Permanent School Fund by the Texas Constitution or other state law, a majority of which is located along the coast as submerged tracts (TX Nat Res Code §§52.321(3), 53.161(4)). The School Land Board sets dates for lease and sale of surveyed lands and determines the price for both surveyed and unsurveyed lands (TX Nat Res Code sec 32.061). Its activities are administered through the General Land Office. GLO has established a program for leasing lands to organizations such as the Audobon Society for coastal bird sanctuaries, and it works with the Texas Parks and Wildlife Department to designate and manage coastal preserves.

The School Land Board may lease state land and all unsold surveyed and unsurveyed public school land to any person for the production of oil and natural gas (TX Nat Res Code §52.011). Other activities covered by easements or leases issued by the School Land Board include floating piers, wharves, docks, jetties, groins, levees, breakwaters, fences, posts, cabins, walls, shelters, landfills, excavations, canals, channels, and roads. The School Land Board also is in charge of the administration, implementation, and enforcement of the Coastal Public Lands Management Act (TX Nat Res Code §33.001-33.176).

Railroad Commission

The Railroad Commission (RRC), a three-member elected body, is responsible for the prevention of pollution of surface and subsurface water caused by activities related to the exploration, development and production of oil and gas. The RRC is organized into twelve districts. Galveston Bay is in District 3.

The Commission issues permits for waste discharges under §26.131(b) of the Water Code and §91.101(4) of the Natural Resources Code. The Oil and Gas Division regulates nearly all phases of the oil and gas production process, and handles permitting and enforcement duties for discharges of wastes associated with such operations. Statewide Rule 8 (16 TAC 3.8) on Water Protection is the most significant rule protecting the waters of the State from pollution associated with oil and gas operations. The rule contains provisions which expressly prohibit the pollution of offshore waters and adjacent estuarine zones (16 TAC 3.8(8)(e)). This section also applies to operations conducted on inland fresh waters of the state. The same provisions prohibit pollution which may threaten aquatic life, and require discharges which may affect such life to be treated to remove constituents which may be harmful to aquatic life or injurious to life or property.

The Commission has adopted the following additional rules related to the protection of surface and subsurface waters in the state: Rule 9 (16 TAC 3.9) on Disposal Wells; Rule 13 (16 TAC 3.13) on Casing, Cementing, Drilling and Completing Wells; Rule 14 on Plugging of Wells (16 TAC 3.14); Rule 46 on Fluid Injection into Productive Reservoirs (16 TAC 3.46); and Rule 74 on Underground Hydrocarbon Storage (16 TAC 3.71).

The RRC has developed Rule 77 (16 TAC 3.75), which will become effective if EPA approves the Commission's NPDES program proposal. Both federal NPDES permits and Railroad Commission permits are currently required for the discharge of oil and gas wastes. §26.131 of the Water Code requires that permitted discharges under the jurisdiction of the Railroad Commission must meet the Texas Water Commission's water quality standards. The Railroad Commission monitors discharges through quarterly reports submitted to the District office in Houston and inspections are normally made at least once annually. Like the Texas Water Commission, the RRC can assess administrative penalties of up to $10,000 per day, or work with the AG's Office to seek civil or criminal penalties.

Recently passed legislation (Senate Bill 1103–1991) provides an additional tool to combat pollution associated with oil and gas operations. The bill establishes an oilfield cleanup fund with a $6 million floor and a $10 million ceiling. The fund will be created through the collection of fees and penalties, and will be used to plug abandoned wells and clean up wastes which are causing or likely to cause water pollution. Approximately 7,000 wells in need of plugging have already been identified as possible environmental threats, and between 40,000 and 50,000 wells are known to be producing less than three barrels a day.

Texas Department of Agriculture

Among other duties, the Texas Department of Agriculture regulates the use, distribution, and disposal of pesticides within the state to safeguard human health and the environment. The authority for administering the FIFRA program delegated to TDA by EPA is carried out through the Pesticide Program. This program is responsible for state registration of pesticides; establishing specific use criteria for high-risk pesticides; licensing private, commercial, and non-commercial applicators; monitoring health and environmental impacts in areas of pesticide use; and enforcing federal and state pesticide laws. Under the Pest Management Program, TDA controls destructive plant pests and diseases. TDA has an Endangered Species Coordinator who helps to ensure that emergency exemptions and special local needs registrations for pesticides are evaluated for potential effects on endangered species; on this subject, TDA thus serves in an advisory capacity to the Texas Parks and Wildlife Agency analogous to the way in which EPA advises the U.S. Fish and Wildlife Service.

The Producer Relations Division of TDA also includes staff with specializations in sustainable agriculture and a more general form of low-resource use agriculture called agricultural systems. Staff in these programs work with farmers to develop methods of farming and ranching that preserve or even enhance habitat, and reduce runoff and erosion,

limit use of pesticides (including herbicides) when appropriate. The aquaculture program in the Intergovernmental Relations Division assists producers in raising fish and aquatic species. TDA has also worked with federal and state soil conservation officers to develop Best Management Practices for pesticide use.

Texas Department of Health

The Texas Department of Health (TDH) administers programs to protect and promote public health. The Associate Commissioner for Environmental and Consumer Health Protection oversees five bureaus, two of which are directly relevant to Galveston Bay: the Bureau of Consumer Health Protection and the Bureau of Solid Waste Management.
The Shellfish Sanitation Control Division is one of four divisions within the Bureau of Consumer Health Protection. The Shellfish Sanitation Control Division's primary activity is to survey, classify, and monitor coastal waters to reduce the risk to public health from contaminated shellfish under §436 of the Texas Health and Safety Code. The Texas Parks and Wildlife Department is responsible for enforcement of violations under this section. Although the Division maintains the authority to monitor aquatic life for contaminants which may affect human health, it does not presently have the staff or budget required for the task. Currently, the only monitoring of aquatic life other than shellfish takes place on a very limited basis in Lavaca Bay. The Division is also responsible for licensing and monitoring shellfish processing plants.

The Bureau of Solid Waste Management oversees storage, collection, handling, transportation, processing, and disposal of non-hazardous municipal solid waste under the authority of the Solid Waste Disposal Act (Health and Safety Code §361.001 et seq.). TDH also has jurisdiction when municipal and industrial solid wastes are collected together unless Class I industrial waste is included. Class I industrial waste falls under the jurisdiction of the Texas Water Commission.

The Bureau of Solid Waste Management consists of three divisions: Surveillance and Enforcement, Permits and Registration, and Plans and Programs. The Permits and Registration Division reviews and processes permits for municipal solid waste facilities in accordance with department regulations (25 TAC 325 et seq.). Every municipal waste facility must be permitted by TDH; the permits are generally issued for the life of the site (25 TAC 325.53). The Surveillance and Enforcement Division is responsible for periodic monitoring and inspection of disposal sites to ensure compliance with department standards. It is the department's policy to inspect sites serving more the 5,000 people at least once every three months and smaller sites annually. Such inspections may vary with the history, size and potential environmental impact of the site (25 TAC 325.221). TDH may take enforcement measures for noncompliance which include notification letters of noncompliance, permit revocation, administrative penalties, and referral to the Texas Attorney General.

The Plans and Programs Division is responsible for planning, rulemaking, and the

development of regional and local solid waste management plans. The Houston-Galveston Area Council has developed a regional plan entitled the "Action Guide for Solid Waste Management in the H-GAC Region, 1985-2000," which has been approved and adopted by the TDH.

Texas Department of Highways and Public Transportation

The Bridge Division of TDHPT controls all phases of bridge and drainage structure construction. The agency is also responsible for ferry service in Galveston Bay from Galveston Island to Point Bolivar. The agency is in charge of the administration of the Coastal Waterway Act of 1975, making the agency the non-federal sponsor of the Gulf Intracoastal Waterway.

Texas Department of Public Safety

The Director of the Department of Public Safety (DPS) also serves as the Director of the Governor's Division of Emergency Management. The Division of Emergency Management provides leadership for State Comprehensive Emergency Management Program and coordinates relief and recovery operations for local governments in the event of natural and manmade disasters. It also serves as coordinator for sate activities under federal EPCRA (SARA Title III). The division is involved in coordination and training with local governments through the District Disaster Committee in the regional Department of Public Safety offices and assists local governments with the development of a local Emergency Management Plan.

Texas Parks and Wildlife Department

The Texas Parks and Wildlife Department has as its mission to preserve, conserve, and protect the state's natural resources and maximize man's opportunities to enjoy them.

The director of TPWD has the authority to issue permits for taking bed and bottom materials from the state's waters if no other state permit is required and to consider whether the operation under the proposed permit will damage oysters, fish-inhabited waters, islands, bars, channels, rivers, creeks, or bayous used for navigation. The TPWD can also make recommendations to the GLO concerning geological, geophysical, and other surveys and investigations within coastal public lands (Natural Resources Code, ch 31).

The Wildlife Division manages public hunting areas, acquires land for endangered species, performs research and management, leasing, and development. The Wildlife division protects wildlife resources by regulating hunting activities and investigating wildlife development.

The Fisheries Division conserves, protects, and manages statewide finfish and shellfish resources, operates stocking programs, and protects marine life, habitat, and environment

by controlling aquatic habitation and promoting greater consumption of underutilized fish species. This division protects fish and their habitat by regulating both sport and commercial fishing, supervising fish hatchery and development operations, and controlling noxious vegetation. (31 TAC ch. 57). The division also permits leasing, transplanting, and harvesting of oysters. It is responsible for protecting state-owned fish and wildlife from harm due to navigation, water development, and municipal, industrial, or land development projects (31 TAC ch. 57).

The Resource Protection Division protects fish, wildlife, plant, and mineral resources, investigates pollution that causes loss of fish and wildlife resources and provides information on the protection of fish and wildlife. The division also reviews TWC and RRC permits for wastewater discharge and hazardous waste disposal and works with the Army Corps of Engineers in regulating development of wetland areas and dredge disposal in the bay by reviewing requests for dredging permits and evaluating environmental impacts of proposed projects. It works with the U.S. Fish and Wildlife Service on endangered species protection and oversees such state endangered species protection programs as exist. In addition, the division may designate estuarine nursery areas and "scientific areas," and shares responsibility with the GLO for the Coastal Preserves Program.

At its option, TPWD may be a party to hearings before the TWC on applications for permits to store, take, or divert water (TX Water Code §11.147(f)). TPWD is specifically authorized to share responsibility with other agencies for studying Texas bays and estuaries to determine the need for fresh water inflow to maintain environmental quality (TX Water Code Ann. §§11.1491, 16.058 Vernon 1988). Through the Texas Natural Heritage Program, TPWD keeps data on the state's sensitive and unique plant and animal life (Fuller, p 82). TPWD has also signed a Memorandum of Agreement with the General Land Office to coordinate the designation and management of coastal preserves.

The Park Division is involved in the construction, management and maintenance of all facilities within the park system including Galveston Island State Park located on Galveston Island (TX Parks and Wildlife Code Ann. §12.001(a)).

The Law Enforcement Division enforces game, fish, and safety laws, especially bag and fishing limits. In addition, state game wardens routinely patrol and investigate water pollution, and illegal taking of state-owned sand, shell, or gravel. They enforce the Public Beaches and Antiquities sections of the Natural Resources Code, the Endangered Species Act, and the Protected Non-game Species Act. The division is specifically charged with upholding water quality and engaging in water pollution enforcement activities (31 TAC ch. 55). TPWD is responsible for upholding water quality; it is authorized to enforce the Texas Water Quality Act. TPWD seeks to enforce prohibitions against unauthorized discharges of waste into or adjacent to waters of the state and TWC rules, orders, or permits regulating discharges when such violations affect the aquatic life or wildlife of the state (Tx Water Code Ann §§26.124(b), 26.129 Vernon). If TPWD personnel discover a violation of the TWQA, they are authorized to request that a permit be revised and may bring suit under

terms of the TWQA (31 TAC 55.4).

Under the federal Emergency Wetlands Recovery Act, TPWD is required to complete a Wetlands Priority Conservation Plan in order to receive Land and Water Conservation Funds. The plan includes guidelines for management, policy, acquisition information, funding, education guidelines, and status and trends in wetlands management. TPWD published this plan as an addendum to the Texas Outdoor Recreation Plan.

Texas Sea Grant

The Texas Sea Grant represents the Texas portion of the federal Sea Grant program, analogous to the Land Grant program in bringing to bear expertise from diverse disciplines on problems relating to the ocean. Sea Grant College programs are established in existing universities; the Texas Sea Grant is at Texas A&M. The program is funded two-thirds by federal money and one-third with matching state funds, which in the case of Texas are appropriated by the Legislature, several counties and cities, foundations, and other colleges and universities. Texas Sea Grant projects comprise research related to coastal management and the ocean, including mariculture, oil spills, ocean dumping, impacts of deepwater ports, marine education, and ecological studies including fisheries, marine chemistry, water quality, and related topics. Projects of special interest to Galveston Bay for 1991-92 include modeling salinity intrusion and toxic materials in the bay; other projects of a more general nature, especially concerning fisheries, are also directly relevant to the bay.

Texas State Soil and Water Conservation Board

The Texas State Soil and Water Conservation Board was established by the Texas Legislature to administer the Texas Soil Conservation Law (Tex. Ag. Code 201). State Board Members are elected by soil and water conservation district directors in each of five geographical divisions of the state. The Board is charged with coordinating the district program for the state and makes technical assistance funds available to districts through a grant program. Local soil and water conservation districts in turn provide technical assistance to farmers to reduce soil erosion and improve land use. In 1985, the legislature added prevention of agricultural nonpoint source pollution to the duties of the SWCB. Under Texas Agricultural and Silvicultural Nonpoint Source Management Program, the SWCB works to reduce pollution and sedimentation in water bodies that are mostly unaffected by urban or industrial pollution. The Board has also established a Nonpoint Source Coordinating Committee. In the Galveston Bay area, projects reduce erosion that may overload the estuary. See the discussion of local districts in Appendix 3 for a fuller description of projects.

Texas Water Commission

The Texas Water Commission (TWC) is the primary state agency having responsibility for protecting surface and groundwater quality. The TWC was significantly reorganized early

in 1992, with changes continuing to be effected at this writing.

TWC is organized into four major offices: Administration, Legal Services and Compliance, Waste Management and Pollution Cleanup, and Water Resource Management. In addition, several smaller offices, including the General Counsel, Hearings Examiner, Public Interest Counsel, Ombudsman, Internal Audit, and Chief Clerk, are subsidiaries to the office of the three commissioners. Finally, the Pollution Prevention and Conservation program is an offshoot of the office of the Executive Director.

Many of the TWC functions most relevant to Galveston Bay lie in the new Office of Water Resources Management, which itself is organized into four divisions: Water Policy, Standards and Assessments, Water Utilities, and Watershed Management. The accompanying diagram illustrates the organization as of March, 1992.

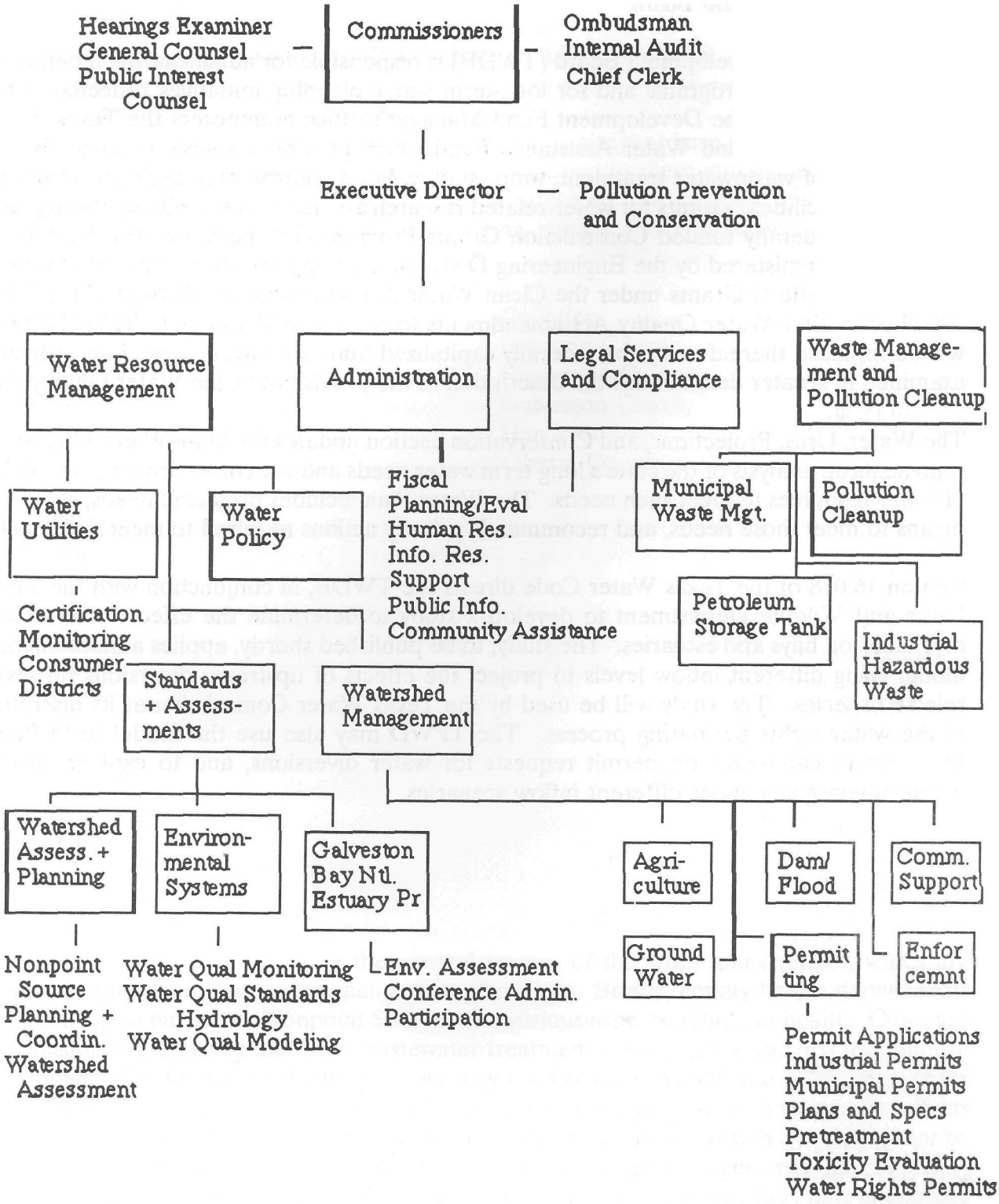
The Water Quality Standards Team in the Environmental Systems Section of the Standards and Assessment Division is responsible for promulgating the State of Texas Surface Water Quality Standards, which consist of general and numerical criteria to protect water quality based on specific use criteria for each classified water body in the state. Assessments of specific use criteria are made (contact recreation, quality of aquatic habitat, etc.) and discharge treatment levels are established depending on the use criteria.

Necessary treatment levels are then mandated through discharge permits coordinated by the Permitting Section in the Watershed Management Division. Presently, applicants seeking discharge permits must obtain both a state and federal discharge permit. The TWC is actively seeking EPA delegation of the National Pollutant Discharge Elimination System (NPDES), and the process of dual permitting will be eliminated upon such delegation. The Permitting Section is divided into several teams: industrial permits, municipal permits, an applications team that coordinates with EPA and performs administrative oversight, a plans and specifications, pretreatment, and water rights. The Section is also responsible for reviewing Corps of Engineer permits under Section 401 of the Clean Water Act to certify that discharges permitted by the Corps will not violate state water quality standards.

The Industrial and Hazardous Waste Division of the Office of Waste Management and Pollution Cleanup coordinates state municipal and industrial hazardous waste, and nonhazardous industrial waste activities in the state. Its permits group handles permitting responsibilities for the storage, processing, and disposal of industrial solid waste, while the enforcement group and corrective action groups ensure compliance and followup. The Pollution Cleanup Section ranks abandoned hazardous waste sites for consideration by the EPA to be included on the Superfund National Priorities List under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. This section also administers a state program to clean up those sites not qualifying for the Priorities List. The section is responsible for emergency response to hazardous waste spills in the state. The predecessor section had been responsible for responding to oil spills, but this responsibility was transferred to the General Land Office in the 72nd Texas

Legislative Section pursuant to the Oil Spill Prevention and Response Act of 1991.

The Field Operations Section in the Office of Legal Services and Compliance maintains fourteen field offices throughout the state which conduct inspections of industrial and municipal wastewater treatment facilities and facilities that generate, process, or dispose of industrial solid waste and hazardous waste. Field offices are also responsible for the Stream Monitoring Program, which performs ambient monitoring of coastal and other surface waters. The District 7 Office,which operates the Division's analytical laboratory, is located in Houston.



Selected Components of Texas Water Commission Organization
March 1992

Texas Water Development Board

The Texas Water Development Board (TWDB) is responsible for administering federal and state water finance programs and for long-term water planning initiatives reflected in the State Water Plan. The Development Fund Manager's office administers the Texas Water Development Fund and Water Assistance Fund which provide a source of loans for the construction of wastewater treatment, water supply, flood control, and regional water and wastewater facilities. Grants for water-related research are also made available through this fund. The federally funded Construction Grants Program and the State Revolving Loan Funds are administered by the Engineering Division. Funding for the Construction Grants Program by Title II Grants under the Clean Water Act was extended through Fiscal Year 1990 by the 1987 Water Quality Act amendments to the Clean Water Act. Title II Grants will be replaced thereafter by the federally capitalized State Revolving Loan Fund which is examined in greater detail under the description of the provisions of the Water Quality Act.

The Water, Uses, Projections, and Conservation Section updates the State Water Plan which represents an analysis of the state's long term water needs and the corresponding availability of water resources to meet such needs. The Water Plan includes projected needs, evaluates means to meet those needs, and recommends priority actions required to meet such needs.

Section 16.058 of the Texas Water Code directs the TWDB, in conjunction with the Texas Parks and Wildlife Department to develop a study to determine the effects of upstream diversions on bays and estuaries. The study, to be published shortly, applies a mathematical model using different inflow levels to project the effects of upstream diversions on seven selected species. The study will be used by the Texas Water Commission at its discretion in the water rights permitting process. The TPWD may also use the model to facilitate Department comments on permit requests for water diversions, and to explore species management goals under different inflow scenarios.

APPENDIX 3:
LOCAL AND REGIONAL AUTHORITIES

This appendix describes several regional and local agencies that have authority over matters affecting the environment of Galveston Bay. In addition to these authorities, the planning and/or health departments of the nearly twenty cities and four counties bordering the bay undertake activities affecting the bay, including zoning and wastewater treatment and discharge. These cities and counties are:

Cities:
Alvin
Anahuac
Angleton
Baycliff
Baytown
Bayview
Deer Park
Dickinson
Friendswood
Galveston
Hitchcock
Houston
Kemah
LaPorte
LaMarque
League City
Pasadena
Texas City

Counties:
Brazoria County
Chambers County
Galveston County
Harris County
Liberty County

This appendix does not describe the general powers of the cities and counties, which are covered in the main text under each action plan topic. Briefly, county health departments regulate septic tanks (see Nonpoint Source) and various aspects of human health. Cities are responsible for ensuring that their wastewater treatment plants meet standards to minimize the impact of point source discharges, and they must obtain NPDES and TWC permits for their treatment plants. Cities are also responsible for developing plans to reduce the effects of nonpoint source pollution. Municipal drinking water demands, which have a high priority, may affect freshwater inflow to the bay. Localities play the largest role in regulating shoreline development through their zoning ordinances; to the extent that they encourage and/or regulate shoreline development, they also affect habitat and species protection.

Chambers-Liberty Counties Navigation District

The Chambers-Liberty Counties Navigation District (C-LCND) was established in 1944 by the County Commissioner's Court of Chambers County. The district is organized according to the provisions of Art XVI, Sec. 59 of the Constitution of the State of Texas, and Articles 8262h, 8247a,and 8247d, Vernon's Texas Civil Statutes. At first, the district was financed through bond and property taxes levied on property in the district. In 1974, the district inherited the power to assess landowners after it was converted to a self-liquidating system under the Texas Constitution. C-LCND is governed by a 3 member board of directors. One member is chosen from each county by the County Commissioners and the swing member is selected by both counties.

The district has undertaken a range of projects both to provide water and use existing water resources. Among the projects are the Port of Liberty, which is used by private companies, Cedar Bayou which is used by U.S. Steel and Houston Lighting and Power as well as other companies, and Smith's Point which is used for commercial fishing, shrimping and oyster harvesting. Lake Anahuac, built by C-LCND, provides a source of water which is sold to rice farmers in the area and to the Trinity Bay Conservation District which furnishes water to consumers in Hankamer, Emminence, Wallisville, Lake Anahuac, East Anahuac, Double Bayou, Smith's Point, and South Bayshore of Anahuac. Water is also furnished by C-LCND to oil companies for their local drilling operations. The district also works in conjunction with the federal Army Corps of Engineers in dredging the Double Bayou and the Trinity River from the 10 mile marker to the Port of Liberty. The district owns at least 170,000 acre feet of water rights and offshore land including the tract from Lake Anahuac to Smith's Point.

Chambers-Liberty Counties Navigation District is one of four navigation districts in the five-county area; the others are Port of Houston Authority (discussed below), Brazoria River Harbor ND, and Galveston County ND #1. See discussion of Water Districts below for additional information.

The Gulf Coast Waste Disposal Authority

The Gulf Coast Waste Disposal Authority (GCWDA) was created in 1969 as a special law conservation and reclamation district responsible for waste management activities. GCWDA's primary jurisdiction includes Chambers, Galveston, and Harris counties. It was granted broad regulatory and enforcement powers, including setting and enforcing water quality standards subject to Texas Water Commission approval; setting standards of operation for all aspects of solid waste handling; promulgating and enforcing rules concerning the disposal of waste from watercraft. However, GCWDA decided not to pursue its broad regulatory powers following a defeated tax provision in 1970. GCWDA's problems are comparable to those of other agencies that must both provide a service and encourage its use while regulating it at the same time.

In 1973, the then Texas Water Quality Board requested that GCWDA implement a regional municipal waste treatment system in the Cypress Creek watershed. GCWDA encountered both practical and political obstacles in attempting to implement the regional system, so it sought and received permission to be released from the responsibility of establishing the regional system. Currently, GCWDA operates eleven municipal wastewater treatment plants and seven water treatment plants serving approximately twenty-four districts and cities. Five of these are large, regional facilities. The Authority owns and operates three industrial wastewater treatment facilities handling liquid waste from over forty-five plants. These facilities are located in the Bayport Industrial District, the Texas City area, and along the Houston Ship Channel. In addition, GCWDA operates a Class I industrial waste disposal facility in Galveston County near Texas City. All of these facilities are subject to the appropriate state and federal permit and monitoring requirements. Finally, the Authority has assisted in financing pollution control by issuing over $800 million in bonds. These bonds have been utilized by the cities of Columbus, Galveston, Houston, La Marque, and League City as well as by many local companies to finance pollution control facilities.

Harris Galveston Coastal Subsidence District

The Harris Galveston Coastal Subsidence District (HGCSD) was created in 1975 by the Texas Legislature in response to increasing damage caused by subsidence in the Houston-Galveston region which is the sinking of the land surface caused by the withdrawal of underground fluids, primarily water. To control subsidence the HGCSD is authorized to regulate the withdrawal of groundwater within Harris and Galveston Counties and has the power to compel a party withdrawing groundwater to use surface water instead if it is available. The district is governed by a 15 member board of directors appointed by local elected officials and is financed through the permitting of water wells. A permit from HGCSD is required in order to drill or operate a well in Harris or Galveston Counties. A fee is paid by the permittee based on the annual allocation of groundwater authorized by the board.

HGCSD has controlled subsidence through a plan reducing groundwater pumpage through conversion to surface water through the year 2020. The District Plan divides the two county area into eight regulatory areas and establishes a time table for each area to reduce groundwater withdrawal to a percentage of total water use. The district monitors subsidence at eleven sites in the two counties. The HGCSD also funds studies covering regional water reuse and regional water supply, and educates the public about subsidence and water conservation.

Harris County Pollution Control Department

The Harris County Pollution Control Department (HCPCD) was initially established in 1953 as the Stream and Air Pollution Control Section of the Harris County Health Department.

In 1971, the section was formally separated from the Health Department and given its present name. HCPCD is directly responsible to the Commissioners Court. The department is divided into five sections: Administration, Engineering, Case Preparation, Laboratory, and Field. It employs a staff of 52 people (15 of whom work in the field office) and focuses on ensuring compliance with wastewater discharge permits, air emissions permits, and municipal landfill permits in Harris County. The department also maintains a 24-hour citizen's complaint hotline which received nearly 2,000 complaints in 1990 alone.

HCPCD maintains its own laboratory to process samples. HCPCD normally samples all permitted municipal wastewater dischargers within the county once every two months. Permitted industrial wastewater dischargers are normally sampled once every three weeks. Parameters analyzed for permitted municipal discharges include BOD, TSS, fecal coliform, pH, chlorine, and ammonia. Analysis of industrial discharges covers all conventional pollutants, as well as all metals. Additionally, the HCPCD takes water samples at nine locations in the Houston Ship Channel once every month, and takes samples on the San Jacinto River with the same frequency at six sites. No analysis for toxic pollutants is performed. In 1990, the HCPCD analyzed 5,754 water samples.

The department's air quality program is less comprehensive than its water program, but does take ambient and source air samples. The HCPCD's solid waste program is directed almost exclusively towards municipal solid waste, with permit evaluations and on-site inspections performed to ensure permit compliance. The department issued over 1,000 violation notices concerning permit violations in 1990. Although the HCPCD cannot assess administrative fines, it does pursue criminal and civil suits through the County and District Attorneys.

Houston-Galveston Area Council

The Houston-Galveston Area Council (H-GAC) is a voluntary association of approximately 150 local governments in the thirteen-county Gulf Coast area. The H-GAC is one of 24 regional planning districts designated by the governor. H-GAC represents the interests of its member governments, provides a public forum on issues of regionwide significance, and promotes regional planning and cooperative solutions to shared problems. H-GAC is also the state-designated solid waste planning agency for the upper Gulf Coast Region.

The Port of Houston Authority

The Port of Houston Authority is a special navigation district which promotes navigation and commerce for the Port of Houston and owns and operates related public facilities along the Houston Ship Channel. Initially established in 1909 by the Texas Legislature, the voters of Harris County approved the Port as the Harris County Houston Ship Channel Navigation District in 1910. The District was given expanded powers concerning fire and safety by the Texas Legislature in 1971, and was given its present name at the same time. The Port of

Houston ranks second in foreign tonnage and third in total tonnage in the United States, and is one of the ten largest ports in the world. The Authority owns 39 general cargo wharves and two liquid cargo wharves which are available for lease. In addition, the Authority owns and operates the following facilities: the Turning Basin Terminal (including the Houston Public Elevator), the Bulk Materials Handling Plant, the Fentress Bracewell Barbours Cut Container Terminal, and the Jacintoport Terminal. The Authority also operates the Malcolm Baldridge Foreign Trade Zone, and owns and operates three fire safety boats.

As the local sponsor of the Houston Ship Channel, the Authority is charged with acquiring, constructing, and maintaining disposal sites for dredged material resulting from maintenance dredging of the Channel. Sections of the Channel are dredged on three year cycles, and the Authority has devoted 5,000 acres for the disposal of dredged materials. Additional sites for disposal must be acquired in the future, especially in the lower middle and lower sections of the Channel. The Authority does not possess any general pollution control authority; however, it does issue permits for structures built in the Channel. Generally, the Corps of Engineers notifies the Authority concerning proposals for work in and along the Channel, and the Authority then analyzes the proposed work from the perspective of navigational safety. The Authority may levy bonds.

The Authority is an active participant in the plan to widen and deepen the Houston Ship Channel. It serves on the Corps of Engineers Inter-Coordination Team for the project. As the local sponsor, it will be responsible for all activities concerning disposal sites for dredge material resulting from the proposed project, which is to take place in two stages: first from the present 40 feet wide/400 feet deep to 45/530 and then to 50/530. Before Congress can approve the project, the Port of Houston Authority must sign a local agreement with the Corps; at present, the two entities disagree about some of the environmental aspects of the proposed dredge material disposal plan.

San Jacinto River Authority

The San Jacinto River Authority (SJRA) has jurisdiction over the San Jacinto River basin. The SJRA must maintain a master plan for the entire basin, serve as the local sponsor for federal water projects in the basin, and provide public services authorized by the legislature. Although it has no formal authority for regulating nonpoint source pollution the SJRA does try to work with the many other agencies and cities that have jurisdiction on and near the river. The SJRA provides the following public services: wastewater treatment, water treatment, flood control, recreation, and reservoir operations.

Soil and Water Conservation Districts

The Texas Soil and Water Conservation Board (see above, appendix 2) has established more than 200 soil and water conservation districts, most of which are coterminous with county

boundaries. Each district is governed by a five-member elected board, all of whose members must be active farmers or ranchers. They coordinate and administer conservation activities within the district with the assistance of a federal agent delegated from the U.S. Soil Conservation Service. In the Galveston Bay area, the four soil and water conservation districts are: Brazoria/Galveston, Chambers, Harris, and Liberty. The last three of these districts are in state soil and water conservation region 4, while Brazoria is in region 3. Local districts are conducting projects that reduce erosion of wetlands and minimize agricultural runoff.

Trinity River Authority

The Trinity River Authority (TRA) has jurisdiction over almost the entire Trinity River basin with the exception of its northernmost section. Created in 1955 by the Texas Legislature, the TRA must maintain a master plan for the entire basin, serve as the local sponsor for federal water projects in the basin, and provide public services authorized by the legislature. Although it has no formal authority for regulating nonpoint source pollution the TRA does try to work with the many other agencies and cities that have jurisdiction on and near the river. The TRA provides the following public services: wastewater treatment, water treatment, flood control, recreation, and reservoir operations. The Authority operates six regional wastewater treatment facilities in the basin in addition to a multitude of additional wastewater and water treatment facilities. Revenue for TRA operations comes from fees for water and wastewater utilities; it may also levy taxes subject to voter approval but has not chosen to do so. To date, the TRA has provided services primarily in the northern two-thirds of the basin.

The TRA does own and operate Lake Livingston, which was constructed to provide a source of water supply for the City of Houston and the lower basin. Under a contractual agreement, the City of Houston maintains rights to 70 percent of the dependable annual yield from the reservoir (1,254,400 acre feet), while the TRA maintains the rights to the remaining portion ((351,600 acre feet). TRA is under contract to three rice irrigation canal companies downstream from Lake Livingston to release up to 207,820 acre-feet of water annually for rice farming. The TRA must manage the water of Lake Livingston to control the intrusion of saltwater up the mouth of the river, releasing sufficient water to prevent saltwater from entering irrigation canals or municipal water intakes. In addition, the Authority operates two recreational projects, including one located at Lake Livingston.

The Master Plan for the basin developed by the TRA contains basin-wide goals, projections concerning future water demands, descriptions of present and future projects, and brief discussions relating to management concerns. The management goals do not assign responsibility for implementation to any of the various independent agencies operating within the basin. Indeed, of the more than 20 major reservoirs on the Trinity River, only Lake Livingston is controlled directly by TRA. The Master Plan does identify the construction of a salt water barrier near the mouth of the Trinity as "one of the most

critically needed and longest delayed projects in the Trinity River Basin (Trinity River Authority, 1989, p.28). The Wallisville Project has been proposed to meet this need, with TRA acting as the local sponsor for the project. Construction on the project was stopped through a court injunction in 1973. This injunction was subsequently lifted in 1987 by the Federal Court of Appeals, and now awaits federal funding (Trinity River Authority, 1990, p. 13). It is not clear, however, if the controversial project will ever be implemented (Browning, Interview, July 23, 1991). The Authority will also play a lead role in the implementation of a basin-wide water quality inventory pursuant to Senate Bill 818, passed in the 72nd Texas Legislature (1991).

Some of the other agencies in the northern, most populated portion of the Trinity River that have responsibility or jurisdiction over the river include Dallas Water Utilities, Tarrant County Water Control and Improvement District #1, Fort Worth Water Department, North Texas Municipal Water District, and the North Central Texas Council of Governments.

Water Districts

Texas law provides for creation of several kinds of independent water districts. Water districts can be created by county commissioners court, city ordinance, the Texas State Legislature or the Texas Water Commission. Chapters 51, 53 and 54 of the Texas Water Code explain the steps to create a water district. Cities often use water districts to develop with minimal expense by annexing an already established community with roads already constructed, sewers and waterlines in place. Water districts are funded by general obligation and revenue bonds. Ad valorem property taxes and revenues from water and sewage treatment services are pledged to pay the bonded indebtedness. Other possible revenue sources include a maintenance tax, stand-by charges, tap fees and loans from the developer. The district must hire a tax assessor-collector to prepare the tax rolls. A major problem with water district operations is the lack of qualified operators for water treatment plants.

There are ten kinds of districts, including Levee Improvement Districts, Navigation Districts (see description of Chambers-Liberty Counties Navigation District above), Drainage Districts, Irrigation Districts, Special Utility Districts, and Underground Water Conservation Districts. The following three kinds of districts are most common in the five-county area surrounding Galveston Bay:

Fresh Water Supply Districts are created to provide for the conservation, transportation and distribution of fresh water and are also allowed to operate sanitary sewer systems.

Originally designed for irrigation purposes,Water Control and Improvement Districts (WCIDs) have the power to provide for domestic and commercial water supply, drainage, sewage disposal, reclamation and conservation. These broad powers make such districts useful tools for development.

Created in 1971, Municipal Utility Districts may provide water, sewerage systems, solid waste collection, drainage, fire fighting, and recreational facilities. For at least the first two years, the developer has full control over the district's operation.

Some districts become financially dormant, meaning that they are not undertaking any activity. The following table describes the status, means of creation, and type of the more than 500 water districts in the five-county area surrounding Galveston Bay.

Table A1: Water Districts in the Five-County Area

Status:	Active	Inactive
Created by:		
Legislature		
MUD	63	22
WCID	20	5
FWSD	4	
DD	2	1
UWD	1	
ND	1	
Other	7	1
TWC		
MUD	260	78
WCID	15	15
County		
DD	10	
MUD	8	1
FWSD	7	
WCID	3	1
ND	3	
Other	1	

BIBLIOGRAPHY

"Administration Proposes Opening Vast Protected Areas to Builders." New York Times, National Edition, August 3, 1991.

Baker, Debra L. and Charmaine Aarons Holder, eds. Texas Environmental Law Handbook. Rockville, MD: Government Institutes, Inc., 1989.

Baldwin, Pamela. Consideration of Economic Factors Under the Endangered Species Act. Washington, D.C.: Congressional Research Service, April 27, 1989.

Barnes, Sarah. "Oil Field Cleanup Legislation Praised." Austin American-Statesman, May 29, 1991, p. C-8.

Bennett, D. W., ed. 202 Questions for the Endangered Coastal Zone. Sandy Hook, New Jersey: American Littoral Society, 1970.

City of Galveston. Tax Reinvestment Zone Program, Annual Report. Galveston, Tex., 1990.

Clean Water Action. The Houston Ship Channel and Galveston Bay: Texas Water Commission and EPA Turn Their Backs. Washington, D.C.: Clean Water Fund Research Center, 1989.

Copeland, Claudia. Clean Water Act Reauthorization. Washington, D.C.: Congressional Research Service, May 21, 1991

Copeland, Claudia. Water Quality: Implementing the Clean Water Act. Washington, D.C.: Congressional Research Service, June 12, 1991.

Corn, M. Lynne. Endangered Species Act Issues. Washington, D.C.: Congressional Research Service, June 17, 1991.

Corn, M. Lynne. Endangered Species Act: The Listing and Exemption Process. Washington, D.C.: Congressional Research Service. May 8, 1990.

Dyer, Dorothy Leclare. "The Coastal Barrier Resources Act: A Review and Evaluation." Professional Report, Lyndon B. Johnson School of Public Affairs, University of Texas at Austin, 1983.

Espey, Huston & Associates, Inc. Houston-Galveston Coastal Subsidence District Water Resource Management Program Phase I. Harris-Galveston Subsidence District. Houston, 1978.

Federal Emergency Management Agency. Mandatory Purchase of Flood Insurance Guidelines. Washington, D.C., n.d. (Pamphlet.)

Gabrysch, R.K. "The Houston-Galveston Region, Texas." In Guidebook to Studies of Land Subsidence Due to Groundwater Withdrawal. New York: UNESCO Studies and Reports in Hydrology 40, 1984. Case History no 9.12.

Galveston Economic Development Corporation. The First Two Years: A Progress Report. Galveston, Texas, 1991.

Germiat, Steven John. An Assessment of Future Coastal Land Loss in Galveston, Chambers, and Jefferson Counties, Texas. Master's Thesis. University of Texas, 1988.

Greater Houston Partnership. 1990 Annual Report. Houston, Texas, 1990.

Gulf Coast Waste Disposal Authority. Land Subsidence in the Houston Gulf Coast Area. Report to the 64th session of the Texas State Legislature. January 1975.

Gulf Coast Waste Disposal Authority. Twentieth Anniversary Report. Houston, Tex., 1989. (Brochure.)

Gulf States Marine Fisheries Commission. The Oyster Fishery of the Gulf of Mexico, United States: A Regional Management Plan. Ocean Springs, Miss.: GSMFC, March 1991. Report 24.

Harris-Galveston Coastal Subsidence District. Subsidence 1990. Friendswood, Tex. (Pamphlet.)

Harris County. Harris County Pollution Control Department: Twenty-Four Hours Service. Pasedena, Texas, 1990.

Howe, Jim. "Section 404 Program Critics Call for Reform." Land Letter, Vol. 10, No. 7 (March 1), 1991.

Kaiser, Ronald. Hand Book of Texas Water Law. College Station: Texas Water Resources Institute, 1985.

Kusler, Jon A. Our National Wetland Heritage: A Protection Guidebook. Washington, D.C.: The Environmental Law Institute, 1987.

LBJ School of Public Affairs, Guide to Texas State Agencies. Austin, Texas: LBJ School, 1991.

Lee, Martin R. Summaries of Environmental Laws Administered by the Environmental Protection Agency. Washington, D.C.: Congressional Research Service, March 14, 1991.

Lynch, Nancy, Assistant Attorney General, Letter to Buck Wynne, Chairman, Texas Water Commission, February 20, 1991.

Masterson, Carl. Regulatory Survey for the Christmas Bay Coastal Preserve. Galveston Bay National Estuary Program, 1991.

May, Janice C. Texas Government. New York: McGraw-Hill Book Company, 1979.

Moyer, Steve. "A Narrow Escape." National Wetlands Newsletter, January/February 1991, pp.5-9.

Nussbaum, Jayne Christine. "Urban Storm Water and Ground-Water Quality." Professional Report, Lyndon B. Johnson School of Public Affairs, University of Texas at Austin, 1991.

Office of the Federal Register, The United States Government Manual 1989/90, Washington, D.C.: U.S. Government Printing Office, 1989.

Perrenod, Virginia Marion. Special Districts, Special Purposes: Fringe Governments and Urban Problems in the Houston Area. College Station: Texas A&M University Press, 1984.

Port of Houston Authority. Port of Houston Authority: 1990 Annual Report. Houston, Texas, 1990.

Public Administration Research Group. "Economic Development and Local Governance of Galveston Bay." (Report prepared by Paul F. Causey.) College Station, Texas, September, 1989.

Railroad Commission of Texas. Water Protection Manual. Austin, Texas, n.d. (Brochure.)

Secretary of the Interior. The Impact of Federal Programs on Wetlands Volume I: The Lower Mississippi Plain and the Prairie Pothole Region: A Report to the Congress. Washington, D.C., October 1988.

Socolof, David Matthew. "Enforcing Hazardous Waste Rules in Texas." Professional Report, Lyndon B. Johnson School of Public Affairs, University of Texas at Austin, 1988.

Texas Air Control Board. TABC Bulletin. March 1991, p. 14. (Newsletter.)

Texas Department of Health. 1988. Rules and Regulations for Public Water Systems. Austin, Texas.

Texas General Land Office. "Protecting Our Heritage: Texas General Land Office Report of 1990 Accomplishments." Austin, Tex., 1990.

Texas General Land Office. State of Texas Coastal Management Program, Preliminary Hearing Draft. Austin, Tex., May 1978.

Texas General Land Office. Draft: Texas Coastal Management Plan. Austin, Tex., 1990.

Texas General Land Office. Coastal Division. "Assessing Wetland Regulations on Texas Coastal Public Lands." Draft Report by Thomas R. Calnan. March 1991.

Texas Parks and Wildlife Department, The Texas Wetlands Plan: Addendum to the 1985 Texas Outdoor Recreation Plan. Austin, Tex., May 1988.

Texas State Auditor, Report on the Hazardous Waste Program of the Texas Water Commission. Austin, Tex., February, 1990.

Texas State Auditor, Report of Procedures for Granting Permits for the Disposal of Hazardous Waste. Austin, Tex., December, 1988.

Texas Task Force on Waste Management Policy. Finding the Answers: The 1989 Report of the Texas Task Force on Waste Management Policy. Austin, Tex., 1989.

Texas Water Commission. Annual Report of the Hazardous and Solid Waste Program. Austin, Tex., 1990.

Texas Water Commission. State of Texas Oil and Hazardous Substances Spill Contingency Plan. Austin, Tex., October, 1988.

Texas Water Commission. State of Texas Water Quality Inventory, 10th edition. Austin, Tex., June, 1990.

Texas Water Commission. Texas Water Commission. Austin, Tex., n.d. (Brochure.)

Texas Water Commission and Texas State Soil and Water Conservation Board. "1990 Update to the Nonpoint Source Water Pollution Management Report for the State of Texas." Austin, Tex., March 1991.

Texas Water Pollution Control Association. Texas Water and Environmental Guide. Austin, Tex.: Austin Publishing, Inc., 1989-1990.

Trinity River Authority. Annual Report: FY1990. Arlington, Tex., 1990.

Trinity River Authority. Trinity River Basin Master Plan. Arlington, Tex., 1989.

U.S. Army Corps of Engineers. 1988. Environmental Quality Procedures for Implementing NEPA. ER-200-2-2. Washington, D.C.

U.S. Congress. House Committee on Merchant Marine and Fisheries. 1990. Coastal Wetlands Management and Restoration: Hearings. 101st Cong., 2nd sess. (September 12).

U.S. Congress. House Committee on Public Works and Transportation. 1988. Administration of Section 404 of the Clean Water Act: Hearings. 100th Cong., 2nd sess. (September 14).

U.S. Congress. House Committee on Public Works and Transportation. 1990. Memorandum of Agreement Between the United States Army Corps of Engineers and the United States Environmental Protection Agency Concerning Wetlands Mitigation Required Under Section 404 of the Clean Water Act: Hearings. 101st Cong., 2nd sess., (February 20).

U.S. Congress. House Committee on Public Works and Transportation. 1989-90. Status of the Nation's Wetlands and Laws Related Thereto: Hearings. 101st Cong., 1st and 2nd sess., (April 12-March 13).

U.S. Congress. Senate Committee on Environment and Public Works. 1987. Controlling and Reducing Pollution From Plastic Waste. 101st Cong., 1st sess., (September 17).

U.S. Congress. Senate Committee on Interior and Insular Affairs. "The Council on Environmental Quality: Responses to a Committee Questionnaire." Washington, D.C., 1977.

U. S. Department of Commerce. Earth is Marine Habitat. Washington, D.C., n.d. (Promotional flyer.)

U.S. Department of Commerce. National Oceanic & Atmospheric Administration. Galveston Bay: Issues, Resources, Status, and Management, NOAA Estuary of the Month Seminar Series No. 13, , Washington, D.C.: NOAA Estuarine Programs Office, 1989.

U.S. Department of the Interior. The Impacts of Federal Programs on Wetlands. Washington, D.C., 1988.

U. S. Environmental Protection Agency. "National Pollutant Discharge Elimination Permit Application Regulations for Storm Water Discharges; Final Rule." Federal Register, Vol. 55, No. 222 (Nov. 16, 1990).

U.S. Food and Drug Administration. National Shellfish Sanitation Program Manual of Operations. Washington, D.C., 1990.

Weisskopf, Michael. "Bush Dees Wetlands Progress but Activist Calls Plan 'Fraud'." Washington Post, August 10, 1991 (reprinted in Austin American-Statesman, August 10, 1991, p. 1).

Wilwerding, Kolleen Mary. "Wetland Management on the Texas Coast: Two Case Studies." Professional Report, Lyndon B. Johnson School of Public Affairs, University of Texas at Austin, 1984.

Wolf, Sidney M. Pollution Law Handbook. New York: Quorum Books, 1988.

Zinn, Jeffery A. and Claudia Copeland. Wetland Issues in the 102nd Congress. Washington, D.C.: Congressional Research Service, June 11, 1991.

Zinn, Jeffrey, Selected Wetland Proposals Introduced in the 102nd Congress. Washington, D.C.: Congressional Research Service, June 6, 1991.

Interviews with:

R.S. Barrett, Assistant Director, Harris County Pollution Control Department, August 7, 1991.

Dan E. Beckett, Texas Water Commission, Water Quality Division, July 25, 1991.

Richard Browning, Trinity River Authority, July 23, 1991.

Brian Cain, U.S. Fish and Wildlife Service, Environmental Specialist, June 27, 1991.

Donald R. Carrol, City Planner, Texas City, June 26, 1991.

Laurene Churnow, Department of Public Safety, Emergency Information Officer, June 18, 1991.

F. William Colburn, Director of Economic Development, Port of Houston Authority, August 7, 1991.

D. K. Daniel, Texas Department of Highways and Public Transportation, June 25, 1991.

Jim Davenport, Texas Water Commission, Water Quality Standards and Evaluation Division, June 19, 1991.

Kent Fuller, Vice President, National Marketing, Economic Development Division, Greater Houston Partnership, August 8, 1991.

Carolyn Good, U.S. Army Corps of Engineers, Environmental Resources Branch, Planning Division, May 30, 1991.

Elliot Gould, City of Houston, Department of Health, Environmental Pollution Control,May 29, 1991.

Guy M. Grossman, Texas Railroad Commission, Oil and Gas Division, District 3 Director, August 8, 1991.

Kevin Hamby and Marie Nelson, Galveston Bay National Estuary Program, May 29, 1991

Rusty Hill, U.S. Coast Guard Marine Safety Office, Marine Environmental Protection Branch, June 26, 1991.

Sandra Hoover, Executive Director, Houston Audubon Society, June 27, 1991.

Myron Knudson, U.S. Environmental Protection Agency, Region VI, July 18, 1991.

William Lauderbeck, President, Galveston Economic Development Corporation, August 9, 1991.

William Longley, Texas Water Development Board, Water Data Collection, Studies, and Planning Division, Environmental Systems Section June 19, 1991.

Richard Lowerre, Attorney, August 13, 1991.

Richard Medina, U. S. Army Corps of Engineers, Environmental Resources Branch, May 30, 1991.

Larry McKinney, Texas Parks and Wildlife Department, Resource Protection Division, Director, June 18, 1991.

Bruce Moulton, Texas Water Commission, Water Rights and Uses Division, Surface Water Section, Assistant Chief, July 11, 1991.

Dan Nanniga, U. S. Army Corps of Engineers, Regulatory Branch, May 30, 1991.

Saadat Syal, Vice President, International Marketing, Economic Development Division, Greater Houston Partnership, August 8, 1991.

Jane Scheidler, Houston Audubon Society, June 27, 1991.

Ted Siaweleski, Planner, Long Range Planning Division, City of Houston Department of Planning and Development, August 8, 1991.

C. Bruce Smith, General Land Office, Coastal/Policy Division, June 17, 1991.

Terral R. Smith, Attorney, Small, Craig and Werkinthin, June 21, 1991.

Rusty Swafford, Marine Biologist, National Marine Fisheries Service, June 26, 1991.

Jim Taylor, Engineer, Harris County Pollution Control Department, August 7, 1991.

Windle Taylor, Railroad Commission, Oil and Gas Division, June 18, 1991.

Joe P. Teller, Gulf Coast Waste Disposal Authority, June 25, 1991.

Richard Thompson, Texas Department of Health, Division of Shellfish Sanitation Control, Director, June 17, 1991.

Jean Wright, Galveston County Health District, Environmental Health Specialist, June 26, 1991.