CHAPTER NINE
HABITAT PROTECTION

Galveston Bay consists of a diversity of habitats, all of which contribute to the overall health of the estuary and its continued success as a living resource. In this section we focus on coastal wetlands, one of the most productive of all ecosystems. 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. Over ninety percent of the commercial seafood catch in the Gulf of Mexico is dependent upon an estuarine environment. In addition, wetlands regulate both the quality and quantity of water entering the estuary by filtering pollution and sediment, storing floodwater and replenishing groundwater. Coastal wetlands buffer the impact of storm tides on populated uplands and stabilize shorelines and riverbanks.

Although estuarine species are important ecologically, economically and aesthetically, and coastal areas are under severe pressure for additional development, the regulatory framework for protecting estuarine habitat is weak. Estimates of annual wetlands loss in the continental United States range from 20,000 to nearly 300,000 acres annually. In the past 200 years more than half of the wetlands in the lower 48 states have been drained, paved, filled, or otherwise lost, mostly to agriculture. In Texas, the Parks and Wildlife Department (TPWD) estimates that at least 35 percent of the state's coastal marshlands were lost between the mid-1950s and the mid-1970s. The U.S. Fish and Wildlife Department (FWS) estimates that by 1983 Texas had lost a cumulative total of 52 percent of its wetlands (Dahl and Johnson, 1991).

National declines in estuarine emergent wetlands (70.9 thousand acres from mid-1970s to mid-1980s) were mostly in estuarine emergent salt marshes along the Gulf Coast. This is particularly troubling for Galveston Bay where emergent salt marshes comprise 40 percent of total marshland (*Status and Trends*. p. 10 and p. 15). A National Oceanic and Atmospheric Administration (NOAA) study found that Galveston Bay's seagrasses had diminished by 95 percent from 1956 to 1979. Similarly, the University of Texas Bureau of Economic Geology (BEG) recently affirmed that Galveston Bay has lost 80-85 percent of its marine grasses, and all of the seagrasses on the back side of Galveston Island and in the Seabrook area.[1] BEG cautions that this figure is probably an underestimate since the study excludes the Trinity River Delta. As part of a GBNEP project, BEG is once again mapping Galveston Bay wetlands and will soon publish its findings under the title

[1] Galveston Bay marine grasses were mapped by the Bureau of Economic Geology (BEG) in 1972 and published as the Environmental Geologic Atlas of the Texas Coastal Zone - Galveston/Houston Area. In a recent BEG study comparing the 1972 findings (approximately 5000 acres of marine grasses) with 1989 findings from a USFWS mapping of Galveston Bay, BEG found a loss of 80-85%.

Trends and Status of Wetland and Aquatic Habitats in the Galveston Bay System. FWS is also participating in the study.

In spite of these dramatic losses, wetlands and other valuable habitat remain poorly protected by the present regulatory system, in part because few laws focus on habitat *per se*. Instead, wetlands are protected because of their role in ensuring water quality or in an effort to save migratory waterfowl. This indirect method of regulation, along with weak enforcement and continued pressure for shoreline development, accounts for the continued loss of wetlands. Furthermore, habitat is a very complex idea not completely understood even by scientists, and the political process is poorly designed to take such nebulous and complex systems into account.

FEDERAL REGULATORY FRAMEWORK

No federal law provides a comprehensive framework for protecting wetlands in the way that the Clean Water Act protects water. Instead, federal laws in several different areas indirectly protect wetlands in different ways. Among the earliest federal laws are the National Environmental Protection Act of 1969 (NEPA), which requires environmental impact assessments for all activities involving federal funds permits, and Section 404 of the Federal Water Pollution Control Act of 1972 (FWPCA) and Section 10 of the Rivers and Harbors Act of 1899, which together authorize the dredge and fill permit program described in chapter 6. Several recently-enacted agricultural laws include provisions intended to limit draining of wetlands for farming. Finally, some federal programs are intended to restore and/or create habitat.

Defining Wetlands

Wetlands are transitional areas between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water (less than 6 feet). In coastal areas, salinity plays a critical role in determining the vegetation and other organisms populating wetlands. For this reason, coastal wetlands are often classified according to their salinities. Galveston Bay wetlands include high and low categories of salt, brackish, and fresh marshes, as well as forested wetlands. Frequency of inundation is another method for classifying coastal wetlands and includes categories such as mud and sand flats, beaches and bars, submerged vascular vegetation, disturbed areas, and open water. Yet another categorization distinguishes salt marshes, fresh marshes, forested wetlands, and tidal flats (NOAA 1991-Coastal Wetlands of the United States). Galveston Bay wetlands are dominated by a marsh system comprised of brackish marshes (65-70%), salt marshes (25-30%), and fresh marshes (5-10%). The brackish marsh community is transitional between salt and fresh marshes, and is affected by storm-tidal flooding from bay-estuary-lagoon and Gulf waters, and by fresh-water inundation from rivers, precipitation and runoff, or groundwater. As a result, they are characterized by a large range in salinity, vegetation, and species.

Historically, this diversity made defining wetlands a matter of judgment. In implementing the dredge and fill permit program, the Army Corps of Engineers (Corps) uses varying interpretations in different districts and the supporting agencies also differ in their definitions. Very simply, wetlands are often defined in terms of three characteristics: hydrology, soils, and vegetation. Some regulators require all three factors to be present, while others conclude that a tract is a wetland if two or even just one of the criteria are met. For technical decision making, federal agencies rely on the definition provided in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands which specifies that an area must have hydric soils, and the supporting vegetation and hydrology characteristic of wetlands to qualify as a wetland. These same characteristics are reflected in a statewide definition of wetlands passed by the Texas Legislature in 1989. This legislation defines a wetland to be

> "an area (including a swamp, marsh, bog, prairie pothole, or similar area) having a predominance of hydric soils that are inundated or saturated by surface groundwater at a frequency and a duration sufficient to support and that under normal circumstances supports the growth and regeneration of hydrophytic vegetation" (Texas Water Commission, 1992, p. 76).

In January 1989, the federal manual was revised in a manner which soon became a source of contention. Although the new manual was viewed by some as providing a more consistent application of federal programs with regard to wetlands, others argued that the manual's new definition of wetlands encompassed large areas that did not qualify for protection under the previous definition. The manual was quickly attacked by pro-development and agricultural interests who said its scope was too inclusive because it delineated certain areas that were dry most of the year as "wetlands." In August 1991 the Administration proposed new criteria that would in effect deregulate half the remaining wetlands in the lower 48 states, approximately 50 million acres. The White House Domestic Policy Council's Interagency Task Force on Wetlands and the Vice President's Council on Competitiveness were instrumental in drafting proposed criteria more acceptable to agricultural and development constituencies, but the most direct route for accomplishing a rollback in the wetlands definition was to annul the 1989 manual and return to the 1987 manual.

On August 17, 1991, Congress passed a law containing an unrelated amendment requiring a return to the 1987 wetlands manual (PL-102-104) effective for Fiscal Year 1992. Many other bills were introduced, generally focusing on the manual; some hope to limit the definition of wetlands, while others attempt to keep the general approach of the 1989 wetlands manual, enhance EPA's role in the 404 process and expand the range of activities covered by permits, and provide for more mitigation. In addition, the Clean Water Act is up for reauthorization in 1992, providing an occasion for reconsidering wetlands as well as other water quality issues. At present, the Corps and other agencies are operating under a modified version of the 1987 manual which offers a narrower definition of wetlands, and no procedures for determining the quality of a wetland (an important component for ensuring adequate wetlands protection).

On August 9, 1991, President Bush proposed a "no-net-loss" policy for wetlands including a new definition of affected land. Whereas the now defunct 1989 manual defined 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 modified 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 modified definition removes 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). As data began to come in, environmentalists' worst fears were confirmed: about half the wetlands covered by the 1989 manual would not be covered under the modified definition, especially certain isolated wetlands such as prairie potholes that support migratory birds, hardwoods swamps of the southeast, most of the Florida Everglades, and many other areas (Yost, 1992).

Bush's proposed wetlands program, which was published for public notice and comment in December 1991, 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. Recent proposed changes to the program would exempt certain farmers from the 1990 law barring federal subsidies to producers who drain or otherwise alter wetlands in bad faith. Wetlands that have been farmed six out of ten years would be eligible for exemption as "prior converted croplands." According to the FWS, agricultural land use accounts for 54 percent of conversions from wetland to upland (*Status and Trends*, p. 15). The Agriculture Department estimates that these proposed exemptions could destroy up to 10 million acres of wetlands (New York Times, May 24, 1992, p. 6).

Wetlands Mitigation

As long as the definition of wetlands remains in a state of flux, agencies will be free to interpret laws regarding wetlands protection loosely, and protective programs will remain difficult to enforce. The most obvious example of this dilemma is the interpretation of federal policies regarding mitigation. Wetlands mitigation is the federally required compensation (through restoration or recreation) of wetlands habitat when approved development in a wetlands area results in damage to or loss of the area. Mitigation is largely tied to the Section 404 program under which the Corps permits dredge and fill projects. Although compensation was intended to be used as a last resort, loose interpretations allow the law to be used as an "enabler" for issuing permits in wetlands areas.

By law, Section 404 permit applicants whose proposed projects are located on or near a wetlands area must first design their project to completely avoid damage to the wetlands (by selecting a non-wetland instead, for example). If this is not possible, the applicant is expected to design the project to minimize adverse environmental impacts. Finally, if wetland loss is unavoidable under the proposed project, the applicant must compensate the public for all destroyed wetlands and loss of public values (such as water quality and wildlife) through a

process of restoration or recreation (thereby achieving "no-net-loss"). However, instead of following the proper sequence, the Corps often allows compensation as the first mitigation measure. In February 1990, EPA signed an agreement with the Corps requiring the Corps to follow the mitigation steps in sequence when reviewing Section 404 permits, but, according to one source, the Bush Administration has relieved the Corps from honoring this agreement. This laissez-faire attitude is reinforced by the fact that no two Corps district offices operate alike regarding permit applications.

Another fundamental problem in administering the mitigation process is the accepted practice of substituting quantity for quality. For example, on a project site impacting 10 acres of wetland, if the developer and the Corps agree that the quality of the original habitat cannot be matched acre-per-acre by on-site mitigation then the Corps may rule that the developer can meet his obligations by restoring 20 acres instead of 10. Not surprisingly, on-site restoration is generally preferred by developers because they own the land and can control the project. Yet, under these circumstances, the so-called "restored" wetland often consists of a parcel of land located adjacent to the development site. If dredging and filling continues in the same area, the result is a large developed site interspersed with disjointed wetlands that cannot sustain wildlife. These less than satisfactory outcomes cause critics to view mitigation as a process whereby so-called restoration is in fact a license to destroy and permanently lose valuable habitat.

The compensation alternative to wetlands restoration is creation. Over the last fifteen years, the Corps has led the nation in developing wetlands habitat. Based on its experience, the Corps believes that properly designed artificial wetlands can provide the same functions as natural wetlands. In truth, the science of wetlands creation is less advanced than that of wetlands restoration. It is very difficult to create biologically valuable wetlands where none existed before because natural wetlands are long term biological adaptations that require a complex balance of proper chemical, physical, and biological factors that cannot be created artificially. Other concerns associated with habitat compensation projects include the following: permanent loss of some wetland values when one kind of habitat is allowed to be replaced by another (out-of-kind mitigation); localized loss of wetlands when compensation is conducted at a distance from the impacted area; possible species loss when existing wetlands are "enhanced."

In general, mitigation is considered impractical by developers and environmentalists alike. Developers argue that it burdens their projects with additional time and expense, while environmentalists claim it to be an ineffective approach to wetlands protection. Indeed, a recent EPA audit of wetlands mitigation in the southeastern United States found the program to be largely a failure from both an ecological and an administrative point of view. Administrative problems identified by the EPA include interagency squabbling, understaffing, and poor enforcement.

State administered mitigation programs have also had limited success. A mitigation study conducted in South Texas in 1987 by the Center for Coastal Studies found that a lack of resources limited enforcement and monitoring of

projects where mitigation was recommended from 1975 to 1986 in the nine-county area from Jackson to Cameron (Cobb, 1987). The highest levels of mitigation success were associated with avoidance recommendations or those suggested to ensure water quality. Habitat compensation projects were ineffective in many cases due to vague compensation plans, and poor site selection and preparation. Of the 59 cases evaluated, only 56 percent were correctly implemented; only 47 percent were considered fully successful, and 29 percent failed completely. Unauthorized activities were observed at 31 percent of the sites, usually in the form of unfulfilled permit requirements. The report suggests performance bonds and deed restrictions as methods for ensuring compliance with permit conditions. Completion reports, agency notification prior to site preparation and transplanting, monitoring and self-reporting, and agency site visits would also help with enforcement.

The findings of this study are significant because the areas investigated were coastal marshlands similar to those found in Galveston Bay. Findings include the following: seagrass and marsh habitat creation projects need a greater than one-to-one replacement ratio due to the uncertainty of their persistence; site-excavation should be done two years in advance to give the sediment time to settle; shorelines with high wave activity should be avoided; projects should attempt to recreate the elevation and slope of the nearest naturally occurring marsh; vegetation should be planted above the marsh to decrease or prevent runoff and erosion into the site; circulation channels should be excavated throughout the created marsh to assure flushing and drainage; marsh creation efforts should be required achieve 90-100 percent of the cover of a nearby natural marsh within two years.

Some environmentalists advocate long term recreation of wetlands through a process known as "mitigation banking" or "offsite compensatory mitigation" whereby compensatory habitat is prepared in advance to offset habitat degradation or loss within a given geographic area. Depending on its quality, a bank is assigned a certain number of credits which can then be purchased to fulfill permit conditions requiring compensation. The tract should be far enough away from the dredge site to minimize exposure to any future development, yet close enough that wildlife from the developed site can be gradually introduced to the new site without experiencing too much displacement. This approach is less ad hoc than on-site mitigation and allows the newly created wetland the time to develop properly. Other advantages offered by mitigation banking include larger, higher quality wetlands, and an opportunity to bring together the financial resources, planning, and scientific expertise not available or practical for individual on-site mitigation.

Existing mitigation banks are all different because there is no national policy for them. The EPA does, however, offer a definition as follows:

> "the creation, restoration, or enhancement of wetlands or other aquatic habitats and their functional values expressly for the purpose of providing compensatory mitigation in advance of proposed discharges into waters of the United States, where mitigation cannot be achieved at the site of the project."

In actuality, some banks involve preservation, some creation, and others restoration. In addition, all banking agreements are different between the mitigating party and the manager of the mitigation bank. According to NMFS, mitigation banking involving preservation allows some net loss of habitat, and is not acceptable for offsetting loss of tidal and contiguous wetlands which are all subject to existing regulations. At present, there are 24 mitigation banks in the United States, none of which is located in Texas.

On July 31, 1992 the Galveston District Office of the U.S. Army Corps of Engineers issued a public notice requesting comments on draft interagency guidelines for the development and use of mitigation banks within their jurisdiction. These draft guidelines were jointly prepared by the Corps, EPA, FWS, TPWD, GLO, and TWC, and define mitigation banking as "advanced compensation by creation, restoration, enhancement and/or preservation of a wetland or other aquatic habitats and their functional values." The stated goal is to provide a one-to-one replacement of lost wetland functions and values for the purpose of achieving no-net-loss of wetlands.

MOAs with each mitigation bank will ensure that guidelines are properly implemented, and agencies will be available to assist potential bank operators in developing their specific bank MOA. To be credited the banks must be functioning in advance of project impacts. If a bank is only partially functional, only partial credit will be available. Credits will not be adjusted up or down after the MBRT agrees to the credits even if the bank exceeds or does not meet expectations. A mitigation bank operator will locate, design, and construct the individual bank site; a bank ledger (to be maintained by a bank operator and reviewed by the Corps) will be used to document credits and debits; and credits can only be withdrawn from banks in the same watershed or basin as the project site.

A mitigation bank review team comprised of the agencies that drafted the proposed guidelines will oversee the entire process from site selection to determining the value (credits available) of a particular bank. They will also make periodic inspections and report findings to the Corps. As a condition of approval, the operator must show that when all of the credits have been withdrawn from a bank, it will be protected through a legally binding mechanism.

In addition, the guidelines specify that preferred mitigation strategies are restoration, creation, and enhancement. Preservation (placing a high value wetland under a conservation easement or transferring it from private ownership to a federal or state resource agency that will protect it) is not preferred, presumably because it does not add new wetlands. In-kind, on-site mitigation measures will still be preferred unless the applicant can show that compensatory mitigation from the bank will result in a higher quality wetland and environmental gain. A bank cannot be used if the project's impacts will result in significant degradation of the ecosystem.

While the proposed guidelines appear to be well thought out and arrived at by consensus, it in no way alters the fact that the Corps retains final decision

making power over the mitigation process. That is, the banking program, if adopted, simply serves as another compensation remedy for consideration by the Corps. No matter what its value as a compensation remedy, adherence to the proper mitigation sequence (avoid, minimize, and, *as a last resort*, compensate) is the overarching goal. Given criticism of the Corps in this regard, measures should be taken to ensure that mitigation banking does not become a tool for skirting the proper mitigation sequence. This is particularly true in light of recently published Corps permit procedure guidelines indicating its intention to discuss mitigation possibilities early in the pre-application process.

In the chapter on dredge and fill, we noted that people often apply for a permit after they have conducted the activity for which the permit is required. One problem in enforcing the wetlands protection and mitigation requirements is that the de facto (or after-the-fact) permits often include a compensation requirement far less than what would have been required before the habitat was destroyed. In other words, once the habitat is destroyed, the Corps is at a disadvantage with respect to the developer; it would rather seek cooperation on these delinquent cases rather than assess a fine. By issuing a de facto permit, they can require compensation. The Corps should be firm in insisting that the compensation requirement match that which would have been imposed had the applicant followed the permit process in the first place.

The Greater Houston Partnership is attempting to establish a mitigation bank call the Wetlands Special Area Management Plan (SAMP). Members of the partnership's environment committee believe that the Clean Water Act is not achieving the objective of preserving the environment and at the same time it is impeding economic development. The bank would be managed by a board appointed by the creating government, similar to other special districts discussed in Chapter 8. The size of the mitigation bank would depend on capital raised from members and on the amount of development to be offset.

Some Wetland Protection Laws

As already noted, there are several laws affecting wetlands, but they are not coordinated to address living resources, and none of them is written for the express purpose of protecting wetlands. The Section 404 program, described under the Dredging/Filling chapter, is significant not only because the program represents the primary mechanism for protecting wetlands, but also because of the activities that 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 that impair the functional values of wetlands 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). Some of the activities that escape 404 permitting have done so because the current

definition of "discharge of dredged material" excludes minimal, incidental soil movement during normal dredging operations. New proposed rules published in the Federal Register would close this loophole by no longer excluding from regulation discharges of dredged material (such as those associated with clearing, ditching, channelization and other excavation activities) solely on the basis of the relative quantity. These rules will not need to be implemented on a case-by-case basis because both the Corps and the EPA have determined that such excavation activities necessarily result in some discharge of excavated material, and that such activities destroy or degrade waters in virtually all cases. Thus, 404 permit applicants will bear the burden of demonstrating that a proposed project will not degrade waters. These proposed rules will also regulate pilings which support structures normally built on fill since they serve the same function as fill material. They are discussed further in chapter 6.[2] Despite the weaknesses of the 404 program, it does provide the most direct regulatory means available for protecting Galveston Bay's most critical wetlands.

One important area of concern is the extent to which the new rules cover draining. Even if they do, observers note that the Corps will retain almost complete control over the determination about the need for particular drainage projects to obtain permits because of the diversity of machinery used for draining and the different technical definitions of whether the activity is "draining" and is covered.

Draining in preparation for agricultural use, a cause of wetlands loss especially in non-coastal areas, is specifically exempted from the Section 404 program. However, Congress has attempted to slow such loss in several laws, the most recent of which is the Food, Agriculture, Conservation and Trade Act of 1990. Under its Swampbuster provision, farmers lose eligibility for federal agricultural loans by converting wetlands, while its Wetlands Reserve Program allows the Secretary of Agriculture to pay farms to place wetlands in 30-year or permanent easements. It should be noted that the Swampbuster program explicitly exempts from regulation croplands that were converted prior to December 23, 1985 and are inundated with water less than 15 days during the growing season. The EPA estimates that approximately 60 million acres of agricultural land in the U.S. meet this definition.

The 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. It is not yet clear whether the new proposed rules revising the definition of "discharge of dredged material" will affect draining activities. If such activities result in on-site discharges, they may be subject to the new rules. More than likely, their regulation will be decided by a

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[2] Proposed rules published in the June 16, 1992 Federal Register and drafted by the Corps and the EPA are an attempt to implement a settlement agreement in the federal lawsuit involving section 404 of the Clean Water Act as it pertains to certain waters in the U.S. (North Carolina Wildlife Federation, et. al. v. Tulloch).

series of court rulings. Various other preservation programs are less relevant to Galveston Bay.

One of the goals of TWC's 1991-92 Strategic Plan is to assure there is "no loss" of the state's existing wetlands. This is to be accomplished by review of all federal NPDES permits for compatibility with state requirements. Although Texas has not yet been delegated Section 404 permit authority, all 404 permits require a section 401 certification from TWC. Primary responsibility for Corps certification is in the Watershed Division. 404 permits are also reviewed by the Standards and Assessment Division and by field operations. If a wetland will be detrimentally impacted, TWC has the authority to deny 401 certification or to require replacement of lost wetlands. However, Section 401 does not protect against wetland loss due to activities other than fill material, and TWC rarely denies a 401 permit.

With EPA and matching state funds, TWC is conducting a study to develop procedures for improved wetlands protection under the 401 certification program. The study will assess the impact of 404 projects on Texas waters (including wetlands), will consider measures for improving coordination with other agencies regarding exchange of information, and will seek to improve yardsticks for measuring water quality and wetlands impacts. Final recommendations may include modification of water quality standards, especially as they are defined for wetlands. The study will be ongoing through August 1993, and began with a review of the current process.

Another mechanism for protecting certain wetlands that maintain standing water is to declare them "Outstanding National Resource Waters" (ONRW), a designation that is available through EPA and state antidegradation policy (31 TAC Section 307). ONRWs are high quality or ecologically unique or significant waters. In Texas, any water body designated in the state Water Quality Standards as an ONRW is protected from state and federal activities that may harm the water body, especially increased pollutant loadings. Because designated uses of a water body may be revised through public hearings, the most direct approach to designate a water body as an ONRW is to conduct a public hearing on the Texas Surface Water Quality Standards and apply this designation to the water body in question. ONRW designation is effective upon EPA approval. This option for protecting wetlands will become more significant once Texas receives NPDES permitting delegation. TWC has given some thought to adding a category for Outstanding State Resource Waters to the state's antidegradation policy.

Finally, the Clean Water Act authorizes the EPA and the Corps to designate areas as unsuitable for the deposition of fill under the "Public Interest Determination in Advance" or "Advanced Identification" (ADID) program. ADID is a preventive planning tool available for identifying and protecting wetlands and other valuable U.S. waters from being used as disposal sites. This program is currently grossly underutilized, and should be viewed as an option for protecting habitat under the CCMP. ADID has the potential for saving time and money by steering development to non-sensitive areas. Thus far, Bolivar Flats (north of Port Bolivar) is the only known subject of an ADID study in Texas.

Two Federal Agencies

Two federal agencies with important responsibilities relating to wetlands and habitat protection have offices in the Houston Area and spend considerable time working with issues of concern to Galveston Bay: the National Marine Fisheries Service in the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce and the U.S. Fish and Wildlife Service. This section describes the agencies as well as the diverse statutory mandates they implement.

National Marine Fisheries Service. The primary statutory duties of the National Marine Fisheries Service (NMFS) consist of influencing other agencies: The Fish and Wildlife Coordination Act requires that NMFS comment on the effect on marine life and marine habitat of proposed federally funded or permitted activities undertaken under several other federal laws, especially the Clean Water Act, the Rivers and Harbors Act, and the Endangered Species Act, which is discussed in more detail in the following section. NMFS also executes responsibilities under several other federal laws, including the Marine Protection, the Research and Sanctuaries Act, the National Environmental Policy Act (NEPA), and the Magnuson Fishery Conservation and Management Act which requires that habitat be considered in all Fishery Management Plans. The Magnuson Act is discussed further in Chapter 10 on species.

Habitat conservation is a main objective of NMFS. Through its Habitat Conservation Program, NMFS is working with the Corps to create or enhance marsh areas in coastal bays and estuaries. A National Habitat Conservation Policy (NHCP) was issued in 1982, setting forth twelve strategies to protect habitat. Due to funding limitations, NMFS has focused on four of these strategies: implementing joint regional and center planning, increasing research efforts, influencing other agencies, and involving the Fishery Management Council.

NMFS maintains a field branch in Galveston that falls under its southeast region. The Galveston Field Branch of the Habitat Conservation Division employs three biologists, a student intern, and a secretary. The field branch reviews permits for the entire Texas coast including Galveston Bay. However, all endangered species reviews for the NMFS southeast region are conducted in the regional office located in St. Petersburg, Florida. On-site investigations of permit applications under review are usually performed by a private contractor.

In addition to reviewing permit applications, NMFS operates the Southeast Fisheries Center Galveston Laboratory. Along with research conducted in the Gulf of Mexico, the Center sponsors scientific research on biological and ecological components of the estuarine environment. Among current projects are marshgrass restoration studies, and benthic community studies. In addition, GBNEP is funding a series of NMFS by-catch studies.

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 the Galveston Bay area are handled by the Ecological Services office in Houston. The Service also administers the Brazoria and Anahuac National Wildlife Refuges which adjoin Galveston Bay. 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 dredge and fill permits and federal water resource development projects. FWS also administers the Partners for Wildlife program oriented toward restoring and protecting privately owned wetlands. Through Partners for Wildlife, FWS develops cooperative agreements with private landowners and pays them to restore a destroyed wetland and then protect it for a designated period of time (usually 10-20 years). Candidates are solicited via a public education campaign and selected based on FWS criteria. This cost-share program is the only one active in Texas in the last couple of years. Eight wetlands were involved in the program in 1991.

Like NMFS, FWS must review most federally funded or permitted activities under the Fish and Wildlife Coordination Act. FWS is a member of the multi-agency section 404 permit review group that meets bi-weekly in the Houston area. In reviewing permits, both FWS and NMFS follow the mitigation guidelines of the Council on Environmental Quality (40 CFR 1508.20). Agencies first attempt to avoid any impact on wetlands; second, they attempt to keep the impact to a minimum; and only last do they allow mitigation for habitat losses. Because they believe that the Corps does not always follow these same guidelines, the agencies would like this hierarchy to be established by law or regulation; they would also prefer formal recognition of the fact that wetland restoration is generally thought to be more successful than wetland creation when mitigation is the only alternative.

FWS has responsibilities under four federal laws specifically relating to wetlands:

- Under the 1986 Emergency Wetlands Resources Act, FWS must prepare a National Wetlands Priority Conservation Plan. The plan lays the basis for state and local governments to acquire high-priority wetlands, based on a national ranking system, using revenues from the Land and Water Conservation Fund. It also identifies wetlands that can be protected through measures other than direct acquisition. The Region II Wetlands Regional Concept Plan, which was completed in 1989, covers the Galveston Bay area and identified the Hoskins Mound area as a high-priority wetlands site. This site was acquired by FWS and is now part of the Brazoria National Wildlife Refuge.

- The Coastal Barrier Improvement Act of 1990 requires FWS to determine boundaries and develop maps of the Coastal Barrier Resources System, which must be updated every five years. This system was established by the Coastal Barrier Resources Act of 1982 and prohibits federal assistance and expenditures for projects located on a coastal barrier that is part of this system. Follets Island at the south end of Galveston Bay is included in this program, as is Bolivar Peninsula. The agency must be consulted prior to any federal expenditure or activity in an area included in the coastal barrier system.

The Coastal Wetlands Planning, Protection, and Restoration Act of 1990 authorizes funding of wetlands restoration projects. The law requires FWS to determine the status, trends and condition of Texas' wetlands and to update and digitize a wetlands inventory for Texas. The mapping effort will begin this year. By law, Louisiana is the primary beneficiary of this Act, but a coastal wetlands restoration cost-sharing program is available to all coastal states. To date this cost-sharing program has not been utilized by in the Galveston Bay area.

- Finally, the Water Resources Development Act of 1990 requires FWS to cooperate with the Corps and EPA in developing a wetlands action plan for achieving no-net-loss of the nation's remaining wetlands. The FWCA is the authority under which the FWS comments on Corps 404 permit applications and which gives them the authority to comment on wetlands. FWS has an MOA with the Corps which specifies the commenting procedures.

In addition, the following laws and treaty relating to migratory waterfowl attempt to protect wetlands needed by these and other migratory birds:

- The Migratory Bird Treaty Act (MBTA), which is implemented by FWS, provides broad protection to migratory birds, particularly during reproduction. However, wetlands utilized predominantly as wintering grounds and migratory stop-overs, which describes Galveston Bay's wetlands, are not protected under the regulations.

- The North American Wetlands Conservation Act authorizes Congress to appropriate up to $15 million a year in cost share projects with state and private efforts to protect and restore wetlands. About half the money will be spent in Mexico and Canada. Funds come in part from the investment of unobligated Federal Aid to Wildlife Restoration Act Funds and from fines and penalties for violations of the MBTA. Funds are overseen by the Migratory Bird Conservation Commission (Secretaries of the Department of Interior, Transportation, and Agriculture, two Senators and two Representatives from Congress).

- The North American Waterfowl Management Plan supports cooperative efforts between regulatory agencies and conservation groups to create economic incentives to encourage private landowners to conserve important waterfowl habitat. The plan also supports research and land acquisition to protect and improve waterfowl habitat. Some funds are provided through the Coastal Wetlands Planning, Protection and Restoration Act and the North American Wetlands Conservation Act. FWS owns and manages two protected waterfowl habitats in Brazoria County—the Brazoria National Wildlife Refuge and the San Bernard National Wildlife Refuge. They also manage Anahuac Wildlife Refuge in Chambers County. Private groups, including Ducks Unlimited, the Nature Conservancy, and the Audubon Society, have purchased or leased wetland property in the bay area and are managing these

lands. These groups' resources constitute a potential basis or match for additional acquisitions.

Within FWS, the Department of Fish and Wildlife Enhancement provides regulatory review of land and water alteration activities that may impact fish and wildlife. The mission of the Habitat Resources Program of the Ecological Services Division is especially closely related to the concerns of this section: to conserve, protect, and enhance fish and wildlife and their habitats. The Bay and Estuary Program within the Coastal Ecosystems Program of Fish and Wildlife Enhancement carries out FWS' coastal legislative responsibilities and attempts to coordinate all FWS mandates on a comprehensive watershed-wide basis.

FWS maintains a Clear Lake Field Office near Galveston Bay. Two staff members are assigned to the Galveston Bay National Estuary Program (GBNEP). The office is represented on the Management Committee, the Citizens Advisory Committee, and the Scientific and Technical Advisory Steering Committee, and participated in a bay bottom characterization study. FWS contributed over half the funding ($120,000) for this project. FWS is conducting the bay-bottom characterization for GBNEP with internal funding supplemented by EPA and state funds. Their role is one of community outreach and habitat restoration and improvement (including an 800 acre habitat enhancement project. They spend a significant amount of time educating grade school students on the environmental sensitivities of the bay, and have produced a video on the bay system which helps them in this role. This video will also be distributed through the GBNEP Speakers Bureau. Other FWS staff members in Clear Lake review section 10/404 permits, NPDES permits, and endangered species issues.

Proposed Legislation

Because the importance of habitat is only now being fully understood, no federal law provides regulatory authority specifically to protect it. The primary mechanism for protecting habitat at the federal level is review by NMFS and FWS of all federally funded or permitted activities and the Endangered Species Act. However, the permit-granting agencies are not required to alter permits in light of these comments. An alternative approach is to provide incentives for people to protect wetlands; the agriculture laws, for example, penalize farmers who drain wetlands by limiting access to other federal funds. A third option, especially effective but difficult because of its cost, is purchase of wetlands and creation of preserves. Overall, the fragmented nature of the habitat protection laws limits their effectiveness, a pattern echoed in state law as well.

Different camps have generated proposed legislation in response to their concerns over changes in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands. Several bills pending in Congress address the issue of wetlands, some enhancing protection and others limiting the definition of wetlands and otherwise attempting to reduce what their sponsors believe is an excessive regulatory burden. The Wetlands No-Net-Loss Act (H.R. 251) would revise Section 404 of the Clean Water Act, including provisions to

- protect a broader range of wetlands by adding draining, dredging, and other activities to the fill activities now covered by the permits;
- increase permit fees to reflect actual administrative costs;
- avoid or minimize adverse impacts on wetlands during the 404 review;
- establish a Wetlands Preservation Account using fines for violations of CWA section 404 permits and the Land and Water Conservation Fund;
- require an inventory and management plan for all government owned wetlands; and
- establish an Office of Wetlands Identification and Preservation within the USFWS.

This bill also amends the Fish and Wildlife Coordination Act, giving USFWS and NMFS more authority over CWA section 404 applications.

In contrast, the Wetlands Protection and Regulatory Reform Act (H.R. 404) calls for no-net-loss of wetlands, but it narrows the definition of wetlands and establishes a classification system allowing lower priority wetlands fewer restrictions. It also allows more exemptions, removes the veto authority of EPA and transfers section 404 review to the states. The Comprehensive Wetlands Conservation and Management Act (H.R. 1330) amends section 404 to allow more exemptions, broadens the scope of activities that can be conducted under a general permit, removes EPA's veto authority, and allows for compensation to landowners for their wetlands. It also establishes a mitigation banking program.

If any of these bills passes, the framework for wetlands protection will be better defined—but whether it becomes more or less stringent depends upon which direction Congress and the Administration take.

STATE PROGRAMS FOR HABITAT PROTECTION

The Coastal Management Plan for State-Owned Coastal Wetlands (S.B. 1054) calls for no overall net loss of state-owned coastal wetlands. It is still under review just how much of the wetlands acreage in Texas this law will cover, but the Coastal Management Division of GLO will soon be submitting a proposal to the Coastal Coordination Council in this regard. The act defines "coastal wetlands" as those owned by state agencies underlying or adjacent to tidal waters, and includes a provision for an inventory of state-owned coastal wetlands as well as an inventory of sites for compensatory mitigation, restoration, and acquisition. It also calls for mitigation banking guidelines, and a reduction of nonpoint source pollution to wetlands. Unfortunately, the legislature did not appropriate any funds for implementing this act, and state government will have to devise innovative fundraising techniques before benefiting from its provisions.

Other recent state efforts to strengthen current wetland protection include a definition of wetlands in the TWC 1991 revision of the Surface Water Quality Standards. In addition, wetlands funding from the EPA for FY 1991-92 is being used to work on permit coordination with TWC and TPWD, establish mitigation policies, and create a database for wetland information. GLO hopes to develop a set of comprehensive management recommendations for protecting coastal wetlands and establish a Mitigation Policy Committee composed of

representatives from a number of state agencies that will develop mitigation guidelines. GLO is also studying nonregulatory ways of protecting coastal wetlands.

State programs for habitat protection rely heavily on federal law and are therefore similarly fragmented. However, because Texas is not a participant in the Federal Coastal Zone Management Program, it lacks any binding agreement with federal agencies on wetland management issues, although, as noted, the 1987 Water Quality Act also requires federal consistency. This failure to recognize the importance of wetlands by the state legislature has also led to a dearth of state regulation for their protection and has contributed to the continuing loss of wetland habitat. In addition, what programs do exist have been delegated to different state agencies. This fragmentation of authority has, inevitably, reduced the effectiveness of these programs.

State agencies with authority relating to wetlands include the Texas General Land Office (GLO), the Texas Parks and Wildlife Department (TPWD), the TWC, the Texas Historical Commission and Antiquities Committee, and the Texas Health Department. TPWD reviews various permits for their effects on habitat. GLO manages all state-owned public lands, which includes all submerged lands extending 10.3 miles into the Gulf of Mexico, and, in concert with other agencies, may acquire wetlands for preserves. Here we first describe the responsibilities of these two agencies, then we outline two programs that offer the most potential for wetlands' protection: the North American Waterfowl Management Plan and the Coastal Preserve Program. (See chapter 6 for protection afforded under the Clean Water Act 404 permitting program.) Figure 9-1 on the following page shows existing federal and state preserves.

General Land Office

The General Land Office (GLO) manages all public lands in Texas. An essential tension in the agency's mandate is created by the fact that revenues from state-owned lands accrue to the Permanent School Fund. Thus GLO must obtain a fair monetary return to the state at the same time that it protects the state's natural resources. Habitat protection and related activities for Galveston Bay are centered in GLO's Coastal Division, which employs 13 people. Three staff members review activities on state-owned land for the entire Texas coast, a total of 4.5 million acres.

Among the state-owned public lands managed by GLO are submerged lands from the mean high tide line seaward to the three-marine-league line in the Gulf of Mexico. GLO issues easements, leases and permits for various uses of state-owned submerged lands and collects fees for them, which become part of the Permanent School Fund. As part of the permit process, the agency may place stipulations on the activities proposed by lessee or permittee, including environmental requirements. Since there are no regulations governing such stipulations, however, the responsibility lies entirely with the staff to ensure that they are included each time.

To take an extreme example (that has not occurred), GLO could lease an area to TPWD for a coastal preserve under the Texas Coastal Preserves Program and also lease the mineral rights or exploration rights to an oil and gas company for the same area. Although other agencies, especially TPWD, are notified when leases are granted, none of them has any review power. Thus GLO has very strong control over state lands unconstrained by legislation mandating environmental considerations. While the present administration works strenuously to protect the environment generally and habitat in particular, a future administration may be less zealous. (Pipelines and wells in the bay, spills from which could compromise shoreline habitat, are discussed in more detail in chapter 5.)

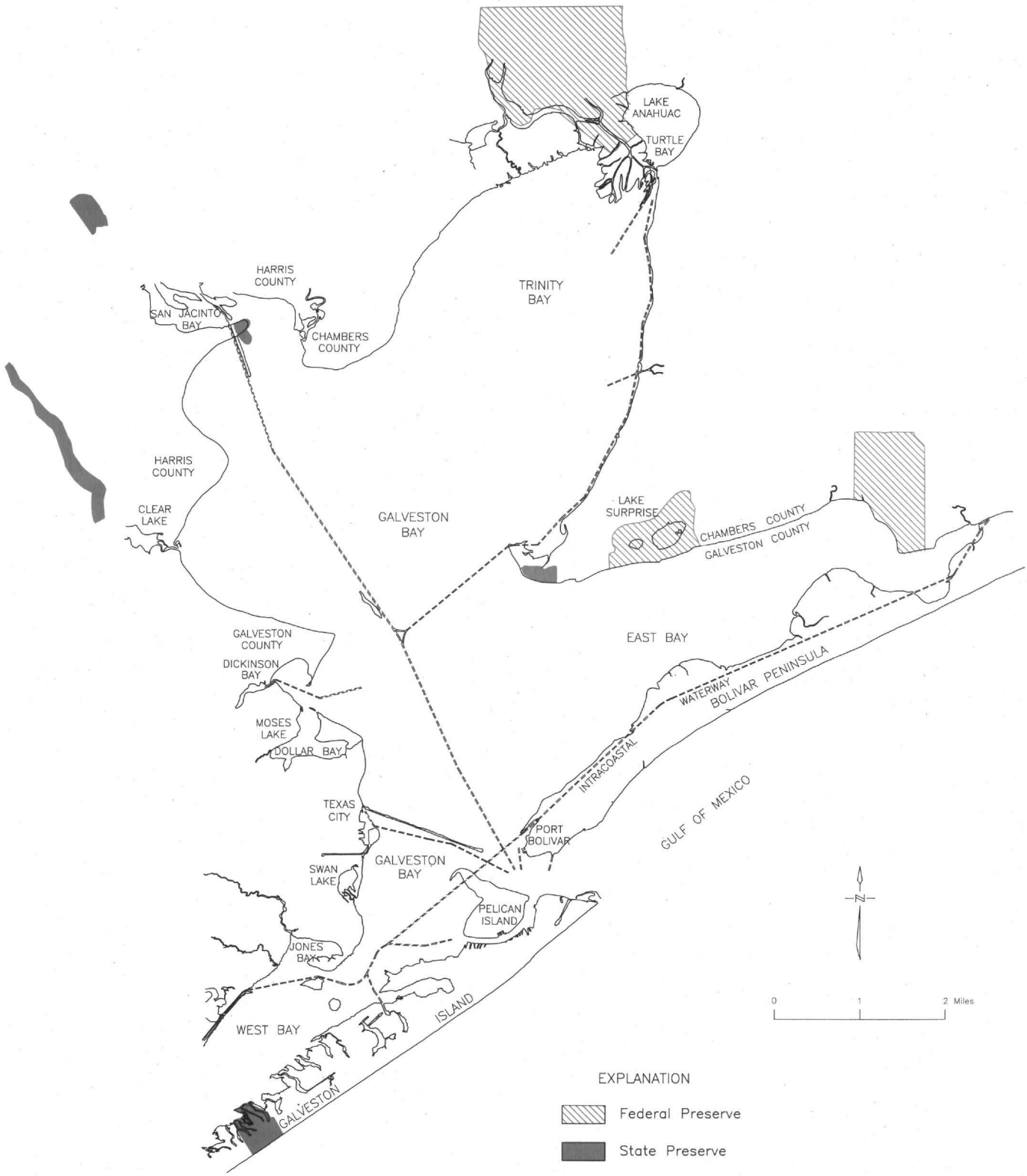
Fishing cabins are one type of GLO lease which results in environmental or ecological degradation yet has no pre-issuance review by state environmental agencies such as TPWD. GLO will soon be administering a new statewide "Cabin Management Plan" designed to mitigate the pollution that emanates from approximately 500 cabins constructed on coastal public lands. Any cabin constructed on state-owned property is considered to be a "state-owned" cabin. Policy and administrative rules for the program are still in draft form. Specific provisions envisioned for the final management plan include: measures to mitigate damage to wildlife, vegetation (especially sea grass), and water quality; cabin construction and site selection standards; removal of derelict structures; and regulatory coordination. Proper disposal of cabin-related sewage is of particular concern to GLO officials who will be working with TDH to select and activate the most appropriate technology for handling cabin sewage. Criteria for technology selection include the type of treatment, the possible adverse health and environmental impacts of the technology, construction difficulties, energy needs, operational difficulties, cost, and safety. Policies emphasizing an equitable distribution of permits and expeditious handling of public inquiries aim to foster maximum public participation in the program.

Another kind of lease granted by GLO is for bird sanctuaries. The National and Houston Audubon Societies have been granted surface leases on several tracts of state-owned submerged land.

GLO, along with all the other agencies, reviews Section 404 applications to determine if an easement across state-owned submerged land will be required. It also administers a program of state dredge and fill permits, which is discussed in Chapter 6. The State Coastal Wetland Acquisition Act authorizes GLO to rank wetlands and make recommendations to TPWD on which ones should be acquired. In principle, TPWD then goes to the legislature and requests funding for acquisition. However, this authority has never been used, and no wetland has been acquired under this act to date. Apparently the legislation has been the subject of turf battles and confusion over the authority for wetlands acquisition. Moreover, there are no funds available at the state level for wetlands acquisition. Since acquisition programs appear more feasible at this time than passing legislation which directly protects wetlands, funds to implement this act should be immediately sought. However, consideration should be given to the wisdom of placing a wetlands ranking system under the authority of an agency headed by an

Figure 9-1

Federal and State Habitat Preserves in Galveston Bay



Source: Texas Parks and Wildlife Department

elected official. A program as important as defining and prioritizing wetlands for acquisition by the state should be sheltered from dramatic shifts in political climates.

In 1992 GLO conducted a draft survey of wetlands acquisition efforts in Texas and other states. Responses from 37 states revealed an array of approaches including but not limited to the following: conservation stamps, bonds, state income tax checkoffs, special tax districts, conservation easements and land trusts, tax incentives, documentary stamp taxes, and earmarking a portion of oil spill restoration funds for purchasing wetlands. In several cases, private sector fundraising efforts are matched with state funds. Programs such as environmental license plates serve the dual purpose of raising public awareness and funds. According to the draft survey, Florida has a particularly successful wetlands acquisition program which is funded primarily through documentary stamp taxes and a real-estate sales tax. Developers apparently support the program because they realize its importance for preserving the amenity values of real estate. Annual purchases through the Florida program equal approximately $350 million. To date, two million acres have been purchased.

In the 1991 session, the Texas Legislature expanded the authority of the GLO with respect to habitat. SB 1571 made GLO the lead agency in developing a long-term plan for the comprehensive management of coastal public land. In effect, it allows Texas to join the federal Coastal Zone Management Program, under which the National Oceanic and Atmospheric Administration (NOAA) in the U.S. Department of Commerce provides federal assistance to states that develop an approved coastal management plan. Because all federal- or state- funded or permitted activities must be consistent with the Coastal Zone Management Plan when it is adopted, the plan will in effect increase regulatory oversight of many activities that affect habitat. Early in 1992, GLO submitted to NOAA the first of the documents needed to establish a Coastal Zone Management Program—an application for a grant to undertake the research, inventory, and regulatory steps leading to submission of a final coastal plan. While some argue that the CZM can only minimize loss in approximately one-quarter of the state's wetlands (since it only applies to publicly owned coastal wetlands) others argue that the territorial jurisdiction of the CZM is still under review and could be more far-reaching than previously thought.

Texas Parks and Wildlife Department

The mission of the Texas Parks and Wildlife Department (TPWD) is both to preserve and protect the state's natural resources and to provide the greatest possible opportunity for their enjoyment by man. TPWD is one of the agencies that reviews dredge and fill permits; it also reviews water quality permits. TPWD works closely with the U.S. Fish and Wildlife Service to protect species and their habitat under the provisions of the Endangered Species Act. It also has a land acquisition program and is responsible for ranking wetlands for acquisition under the National Wetlands Priority Conservation Plan.

The Resource Protection Division, with a staff of 66, oversees most of the activities related to habitat protection (and species protection, considered in chapter 10). It 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. In addition, Chapter 86 of the Texas Parks and Wildlife Code regulates the removal of sand, gravel, marl, shell or mudshell in all areas below mean high tide line, authorizing TPWD to permit the taking of bed and bottom materials from the state's waters if no other state or federal permit is required.

TPWD also works closely with the U.S. Fish and Wildlife Service on state endangered species protection, and its Natural Heritage Program keeps data on the states species of special concern. The Coastal Preserves Program conducts bay and estuary studies and is developing a GIS database with the information gathered.

The North American Waterfowl Management Plan (NAWMP), which is funded by federal, state and private funds, allows TPWD to acquire and manage land used by North American waterfowl. Of seven habitat-related NAWMP joint ventures in the United States, three include Texas, and one includes Galveston Bay. TPWD owns and manages three protected waterfowl habitat areas in Brazoria County: Bryan Beach State Park (878 acres/50 percent habitat), Peach Point Wildlife Management Area (11,377/80), and Christmas Bay State Park (501/75).

Management activities include building water control structures and levees to prevent salt water intrusion, one of the greatest threats to wetlands. In some areas, the Intracoastal Waterway has resulted in a lens of salt water migrating under the freshwater zone. The death of saltwater-sensitive vegetation is followed by soil erosion, which is intensified by the wave action generated by barges.

Coastal Preserves Program

GLO and TPWD jointly manage the Coastal Preserves Program, which was founded in 1987. Because the primary goal of the GLO is revenue generation, the lands are leased to TPWD for management as preserves. However, many other state and local government agencies are involved, and this makes the development of a management plan very difficult. It is particularly difficult to write a management plan for navigable waters and enforce restrictions on public use, unless such activities can be shown to have specific harmful impacts. In addition, the actions of adjacent landowners may have significant impacts, such as compromising water quality.

Currently the process of developing a management plan involves characterizing the habitat, identifying the governmental powers available to manage it and determining the problems that need to be addressed. So far, two such preserves are associated with Galveston Bay: the Armand Bayou Coastal Preserve located around a tributary on the western shore of the bay, and Christmas Bay located at the southwestern extreme of Galveston Bay. Armand Bayou is a heavily impacted

area. Its main problems include water quality degradation from urban runoff and salt water intrusion as a result of up to 9 feet of subsidence. The management plan may have to be more of a restoration plan. Christmas Bay is a sheltered area in the southernmost tip of Galveston Bay, bounded by Follets Island. Its problems include the possibility of diseases in the seagrasses and overharvesting of quahog (a mollusk).

EVALUATION

Protecting habitat is synonymous with protecting the economic and environmental health of Galveston Bay. Relevant habitats range from the bay-bottom to water of varying salinities to forests. In this section, we focused on wetlands, which play an especially important role in maintaining estuarine productivity, serving as nursery areas for many fish and shellfish, supplying nutrients and organic matter to the estuary, and helping to regulate both the quality and quantity of water entering the bay.

Although many human activities result in the destruction of wetlands, few are regulated. Dredging and filling in wetland areas is partly regulated by the Corps (see chapter 6). However, it has been estimated that these regulated activities amount to less than 20 percent of the activities that result in wetlands destruction. In addition, under the 404 program, there is virtually no follow-up once a permit is issued; not only may permitted projects not fulfill their obligations to restore or mitigate wetlands, but scofflaws are encouraged not to bother getting a permit in the first place. Wetlands are also threatened by erosion, boat wakes, and shoreline development, which are discussed in chapters 12 and 8. The conclusion in those chapters is also that the regulatory framework is rather weak.

Habitat protection is also compromised by the lack of resources—both money for land acquisition and staff time for regulatory review and enforcement. TPWD feels this problem very acutely right now: With an increasing environmental sensitivity at the Corps and TWC, the agency sees a chance to be more effective in modifying permits and protecting wetlands. Although the TPWD's Resource Protection Division has expanded from 16 to 40 people since 1985, with 70 positions in the new budget, its responsibilities have expanded more. The TPWD budget has not increased proportionately to its expanded responsibilities, and there is currently a push to remove all funding from General Revenues.

The essential difficulty is that so far there are no comprehensive laws comparable to the Clean Water Act whose purpose is to protect wetlands or habitat. Instead, habitat protection is a by-product of other goals (such as protecting endangered species or migratory waterfowl), or one goal among many to be promoted at the same time (as in dredge and fill permits). Like water quality, wetlands are affected by a wide variety of human activities, and without a more comprehensive approach, wetlands are diminished a little bit at a time.

The reason that the regulatory framework is patchy is that the importance of wetlands has come to be understood relatively recently; before that, they were regarded as "swamps" to be drained and "made productive" whenever possible.

The current federal debate over the definition of wetlands reflects both this conflicting view of wetlands' utility and the growing concern about government regulation of land use. Resolution of the debate may not come for a year or so.

Meanwhile, states are not bound only by the federal wetland definition. Unfortunately, past experience suggests that the Texas Legislature is unlikely to adopt a stronger stance than the federal government requires. However, the Coastal Coordination Council could put into place a plan that implicitly embodies a relatively strong definition of wetlands (it would not help the much-endangered prairie potholes) that would guide state and local projects; when the CZM program is in place, moreover, it would limit federal projects as well.

In short, absent comprehensive wetlands legislation or the even better option of massive purchase of wetlands by governmental authorities, which is unlikely at either the federal or state levels in the present political and financial climate, the authority inherent in the CZM and in the Coastal Coordination Council (and the less broad consistency provisions of the Water Quality Act) is almost the only way Texas can minimize wetlands loss. To go along with this new authority, the Coastal Coordination Council and GBNEP must develop creative means for defusing public outrage at stringent land-use controls. One means, mitigation banks, serves several important purposes by ensuring larger contiguous wetland areas, offering very small owners some viable means of fulfilling their obligations, and providing some public oversight of the location of permanent wetlands.

SUMMARY EVALUATION: **HABITAT PROTECTION**

1. Problem. Wetlands, bay bottom, other habitats are by definition necessary for continued productivity of the bay. Wetlands and other habitats declining due to growing population.

2. Authority. No comprehensive law directed to protecting habitat or wetlands. Endangered Species Act can protect habitat of relevant species; Clean Water Act Section 404 and Rivers and Harbors Act Section 10 indirectly aid wetlands: see chapter on Dredge and Fill.

3. Capacity. Low. National Marine Fisheries has 3 biologists to review 3000 permits per year. General Land Office has 3 to review all activities on 4.5 million acres of state-owned submerged coastal lands.

4. Policy. Federal policy appears to be to narrow the definition of wetlands in order to limit burdens on individual property-owners. Congress now considering laws that could go either way. GLO has a strong pro-wetlands stance now but this is a result of present personnel rather than statute and could easily change.

5. Technical and environmental results. Continued habitat loss.

6. Barriers and problems.
a. GLO's primary mandate is to maximize revenue from state-owned lands, creating an incentive to give use permits rather than protecting habitat.
b. Inadequate funds for land purchase, which is the only effective method presently available for ensuring continued protection of habitat.
c. The combination of fragmented and indirect authorities and low capacity along with the extreme importance of wetlands in cleansing the water and providing nursery habitat makes wetland loss one of, if not the, most important problems facing Galveston Bay.

7. Recommendations.
a. Buy wetlands wherever possible.
b. Increase fees for use of other state-owned lands to take the pressure off GLO to raise revenue from wetlands leasing.
c. Institute the Coastal Zone Management Program as quickly as possible to gain the authority to insist that all projects are consistent with the coastal plan.

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