

**CHAPTER THREE
NATURAL AND LIVING RESOURCE MANAGEMENT**

CHAPTER OUTLINE

Regulatory Issues

- Protection and management of living resources and habitat
- Protection and management of wetlands
- Management of submerged lands
- Surface and ground water extraction
- Oil and chemical spill response

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- Executive Order 11514
- Endangered Species Act
- Fish and Wildlife Coordination Act
- Executive Order 11990
- Federal Water Pollution Control Act
- Emergency Wetlands Resources Act
- Rivers and Harbors Appropriation Act
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- National Flood Insurance Act
- Executive Order 11988
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- Migratory Bird Hunting and Conservation Stamp Act
- Executive Order 11989

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Local Regulations

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- Soil Conservation Service
- National Oceanic and Atmospheric Administration
- National Marine Fisheries Service
- Coast Guard
- Federal Emergency Management Agency

Texas Regulatory Agencies

- Texas General Land Office
- Texas Parks and Wildlife Department
- Texas Water Commission

Local Regulatory Agencies

- Harris-Galveston Coastal Subsidence Dist.
- Harris County
- City of Houston
- City of Pasadena
- City of Deer Park
- City of La Porte

Other Local Agencies

Houston-Galveston Area Council

Non-profit entities

Galveston Bay Foundation

Armand Bayou Nature Center

EXISTING AND POTENTIAL ENVIRONMENTAL IMPACTS

Natural and living resource management involves the protection and efficient utilization of these vital resources. Key issues in the Armand Bayou Coastal Preserve include the protection and conservation of living resources, protection of wetlands and other habitat, and the regulation of surface and groundwater extraction.

The physical characteristics of the watershed have been substantially altered by human activity. One of the most significant impacts has been land subsidence caused by groundwater extraction. Over this century, the watershed has experienced subsidence ranging from up to nine feet in the northern portion to up to five feet in the south. As a result, Armand Bayou has changed from a freshwater stream bordered by wetlands to a brackish tidal lake, nearly devoid of wetlands. The U.S. Fish and Wildlife Service mapped wetlands in the watershed in 1956 and 1979. The 1979 map showed that Armand Bayou experienced a net loss of 91% of its wetland acreage and has only twenty-four acres remaining.

Through the Harris-Galveston Coastal Subsidence District's planning and regulatory efforts, there has been a major shift from ground to surface water use, reducing subsidence to minimal levels. However, within a 5.5-mile radius of the center of the watershed, there are still thirty-eight active wells that pumped 2,483 million gallons in 1989.

Though there are no reservoirs on Armand Bayou and no agricultural or municipal interests which withdraw water, the use of surface water has been a controversial issue in the past. In 1989, the Baywood Country Club proposed to withdraw water to irrigate a golf course. After considerable review of the potential impacts of the project by the Texas Parks and Wildlife Department, the Texas Water Commission issued a permit to withdraw 125 acre-feet of water per year. Potential future demands of water from Armand Bayou are unknown.

There is limited data on the living resources that are specific to the study area. Hence, Armand Bayou's importance as a wildlife habitat is unclear. There have been no reports of submerged aquatic vegetation in Mud Lake or Armand Bayou. There is also no quantitative information on the water birds associated with the bayou and there are no colonial waterbird nesting sites within the watershed. It is possible that the endangered brown pelican and the threatened reddish egret may occasionally appear on Armand Bayou.

However, it would not normally be considered a primary habitat for either species. It is believed that the lower reach of Armand Bayou may be a potentially valuable nursery habitat for certain commercial and recreational finfishes and shellfishes.

The watershed experienced intense land development during the 1960's. However, a restudy of floodplain elevations due to subsidence rendered 800 acres along the bayou as undevelopable. However, aside from floodplain regulations, local land use controls have limited application for habitat management. The City of LaPorte, however, is designated as a bird sanctuary, making it illegal to hunt or trap any birds or wild fowl within the city.

Over 2,100 acres along Armand Bayou have been included in Armand Bayou Park, which was created to preserve the natural characteristics on both sides of the lower reach of the bayou. Additionally, the City of Pasadena is developing a linear park along waterways in the study area.

During the preparation of this report, the question was raised whether or not designation and acceptance of Armand Bayou into the Texas Coastal Preserve Program requires an Environmental Impact Statement to be done. The Texas Parks and Wildlife Department and the Texas General Land Office are the two state agencies involved with the Coastal Preserve Program. The National Environmental Policy Act does not affect the state. Additionally, no federal permit is required and federal monies will not be used to manage the Preserve. Based on these facts, no Environmental Impact Statement is needed. There could be an EIS required for a project that would impact the Preserve if that project meets the criteria of requiring a federal permit or receiving federal dollars for construction.

LEGISLATIVE SUMMARY

Federal Legislation

National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) requires an environmental assessment on any federally funded or permitted project with the potential to impact the natural environment. If potential environmental impacts are ascertained, an Environmental Impact Statement (EIS) must be prepared. The EIS requires documentation of adverse environmental effects, evaluation of alternatives, and an assessment of the relationships between short-term uses of the impacted environmental resource as opposed to its long-term productivity.

Executive Order 11514, as amended by Executive Order 11991

Executive Order 11514 outlined for federal agencies what their responsibilities would be in implementing the National Environmental Policy Act of 1969. The Order also charged the President's Council on Environmental Quality with leading and monitoring the incorporation of national environmental goals into the routine activities of all federal agencies. Aside from

these procedural instructions, the Order called for federal leadership "in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life." By emphasizing broad public disclosure and input, interagency and intergovernmental coordination, and wide-ranging review and reform of federal agency practices, the Order reflected the idealism of NEPA itself. But the Order also pointed out the need for clarity and practicality in environmental matters. Federal agencies must insure that Environmental Impact Statements are useful, concise, to the point, focus on key issues and real alternatives, and do all this with a minimum of paperwork and extraneous data collection. Finally, the Order assigns the Council on Environmental Quality to arbitrate potential conflicts between federal agencies over NEPA implementation.

Endangered Species Act

The Endangered Species Act enables the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) to render a judgement on any activity which will adversely affect an endangered species. This Act also authorizes the development of recovery plans to schedule necessary actions to restore endangered plants and animals to a more secure and stable biological environment.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act provides for natural resource management agencies to have subject matter jurisdiction for other agencies' activities and permits. For example, the FWS would review a dredge and fill permit application for wildlife impacts.

Executive Order 11990

Executive Order 11990 was issued by President Carter to avoid to the extent possible the destruction or modification of wetlands. In general, the order instructs federal agencies to minimize the destruction, loss or degradation of wetlands and to preserve their beneficial uses. The order does not apply to federal permits issued to private parties for activities involving wetlands on non-federal lands.

Federal Water Pollution Control Act (Clean Water Act) and Subsequent Amendments

The Clean Water Act (CWA), Section 404, created the permit program for the discharge of dredged or fill material into navigable waters and adjacent wetlands. This program is administered by the Corps of Engineers with oversight by the Environmental Protection Agency.

Section 401 of the Water Quality Act of 1987, amended the CWA by requiring certification of state agency review of any 404 permit. The Texas Water Commission is the state agency responsible for this certification. The Texas Parks and Wildlife Department (TPWD) and General Land Office (GLO) are also part of the review process.

Section 320 of the Clean Water Act establishes the National Estuary Program (NEP). This section authorized the establishment of the Galveston Bay National Estuary Program and allocated its funding.

Emergency Wetlands Resources Act

The Emergency Wetlands Resources Act (EWRA) provides for the conservation and protection of the wetlands of the United States in order to maintain the public benefits they provide. EWRA requires the cooperation of federal, state and local governments to realize these goals. For this purpose, the TPWD is responsible for completing a plan for wetlands consistent with the National Wetlands Priority Conservation Plan.

Rivers and Harbors Appropriation Act

The Rivers and Harbors Act gives the Corps of Engineers the authority to regulate any type of work in navigable waters of the United States. The primary purpose of this legislation is to protect navigable waters from obstruction or alteration. However, activities permitted under this act may require review under NEPA, Endangered Species, or Fish and Wildlife Coordination.

Federal Emergency Management Act

This Act, which established the Federal Emergency Management Agency (FEMA), provides for floodplain management and the protection of wetlands. This Act provides guidance to states and localities to minimize the destruction, loss, or degradation of wetlands, as well as to restore and preserve the beneficial attributes of floodplains.

The National Flood Insurance Act

The Act makes available flood insurance coverage for citizens of the United States through coordinated efforts of federal, state and local governments. This law was enacted in an effort to alleviate the financial burden placed on the private insurance industry to provide such coverage. Its impact on natural and living resource management pertains to restrictions which must be placed on development in flood-prone areas in order for communities to participate in the program.

Executive Order 11988

Executive Order 11988 was also issued by President Carter to minimize adverse impacts associated with the occupancy and modification of floodplains. In general, the order instructs federal agencies to reduce the risk of flood loss, to minimize the impact of floods on human health, safety and welfare, and to protect the beneficial uses of floodplains. Under this order, federal agencies are to consider alternatives to proposed actions by the agency or allowed by the agency in a floodplain.

Other

The Marine Plastic Pollution Research and Control Act (MPPRCA) determines the regulations for disposal of marine debris. The Migratory Bird Hunting and Conservation Stamp Act (MBHCSA) requires the acquisition of a stamp or permit for the hunting of migrating birds. The MBHCSA also seeks to maintain the conservation of certain species of migrating birds.

Executive Order 11989 was issued by President Carter in 1977 to clarify the authority of federal agency heads to regulate the use of off-road vehicles on public lands under their purview. When off-road vehicles are found to be causing "considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat or cultural or historic resources" of certain public areas or trails, agency heads are authorized to immediately close such areas to off-road vehicles. These closings may continue until adequate mitigation steps have been taken and prevention of renewed damage is assured. Relevant federal agencies are also empowered to identify those public lands which are not suitable for off-road vehicle use at any time and which will remain closed to such use under adopted agency policy.

Texas Legislation and Regulations

Texas Water Code

The Texas Water Code encompasses a number of natural resource management issues. Under the code, the TPWD and the Texas Water Development Board have responsibility, in cooperation with other agencies, to establish and maintain a continuous bay and estuary data collection and evaluation program. This program includes studies and analyses to determine the bay conditions necessary to support a sound ecological environment.

The Water Code also establishes the permitting program for surface water extraction and provides for flood insurance and floodplain management, as set forth under the provisions of the National Flood Insurance Act.

Texas Natural Resources Code

The Texas Natural Resources Code governs the GLO's management of submerged lands, as well as coastal wetlands. The Natural Resources Code also governs oil and gas extraction activities, and also provides for the protection of certain manmade resources, such as archaeological sites.

The Coastal Public Lands Management Act

The Coastal Public Lands Management Act (CPLMA) seeks to preserve the natural resources of coastal public land through management programs. The CPLMA designated the GLO as the lead agency over a management program for developing future objectives, policies, and standards for planning and regulating the use of coastal public land resources.

The Coastal Coordination Act

The Coastal Coordination Act was to provide for a more effective and efficient use of public funds and facilities in coastal resource areas by making the state's existing coastal management processes more visible and accessible to the public. Studies of coastal problems and issues were to be addressed by a council which was created under this Act, but that is presently inactive.

Texas Oil and Hazardous Substances Spill Prevention and Control Act

The Texas Oil and Hazardous Substances Spill Prevention and Control Act establishes the Texas Water Commission (TWC) as the state's lead agency in spill response and authorizes the TWC to issue any rules necessary to fulfill the Act's requirements. The Act also creates a Regional Response Team of federal and state agencies to devote personnel and equipment to be utilized for spill clean-up. However, coordination problems in recent spills in Galveston Bay have raised concerns on the present method for spill response. At least two bills creating new response systems are expected to be presented in the 1991 legislative session.

Local Ordinances

Other than the City of La Porte's Bird Sanctuary designation, there are limited local controls governing natural and living resource management. Local ordinances such as zoning, subdivision controls and building permits could possibly be employed to protect valuable habitats or other sensitive areas. However, there are few examples in Texas of local development regulations addressing living resource issues.

FEDERAL REGULATORY AGENCIES

U.S. Fish and Wildlife Service

The U.S. Department of Interior's Fish & Wildlife Service (FWS) is the agency charged with protecting and conserving fishes, wildlife (birds and most mammals), and their habitats for the benefit of the public. This agency manages the taking of migratory game birds and conducts monitoring and research associated with changes in fish and wildlife populations. Examples of FWS research include surveillance of the effects of pesticides, heavy metals and thermal pollution.

The FWS is also a reviewing agency for Environmental Impact Statements and federal permits. The FWS alone cannot stop a particular action, but it is considered powerful in light of the fact that it can require further review of a project's impacts on wildlife. The review and comment authority of the FWS encompasses a range of federal permitting agencies. Under the Endangered Species Act, the FWS has the authority to render a finding as to the harm that an activity may cause an endangered species and can also take legal action against those parties who threaten endangered species and critical habitats. The FWS provides the same consultations under Section 7 of the Act, which requires that all federal agencies consult with the Department of the Interior on endangered species and critical habitat issues arising from federally-sponsored or permitted projects.

The FWS is also part of the multi-agency Regional Response Team to deal with oil spills. In this capacity, the FWS works to protect, clean up and mitigate impacts to wildlife and provides technical assistance to the lead agency, generally the Coast Guard or EPA.

Wetlands

The FWS has completed the National Wetlands Priority Plan, which provides guidance for identifying the more important, scarce, or vulnerable wetlands. The Priority Plan, as mandated by the EWRA, also required FWS regional offices to create concept plans that address local and site-specific actions. In 1989 the Region II Wetlands Regional Concept Plan was completed. The concept plan included a list of areas in Texas to receive priority consideration for federal and state Land and Water Conservation Funds. However, no areas in Armand Bayou were included in the plan.

U.S. Environmental Protection Agency

The Environmental Protection Agency (EPA) is also a lead agency in wetlands management. Under Section 404 of the Clean Water Act, EPA is required to prepare guidelines in conjunction with the Corps of Engineers to use in issuing permits for the disposal of dredge and fill materials into navigable waters and adjacent wetlands. EPA has oversight authority for administering the permit program as well as enforcement authority. If a determination is made that a discharge of dredge and fill material will adversely affect municipal water supplies, wildlife, recreation areas, or shellfish beds and fishery areas, EPA may prohibit the use of a specific disposal site.

EPA has adopted the goal of the National Wetlands Policy Forum to achieve no net loss of the nation's remaining wetland base. EPA has responsibility for wetland management planning through the Advanced Identification Process. This process establishes a plan for specific areas relative to their wetlands characteristics. The characteristics are assessed and the functional attributes are detailed. The process is used to streamline the permitting process in designated areas and to safeguard pristine areas.

EPA is also a member of the Regional Response Team for oil spills. The U.S. Coast Guard directs response operations in tidal waters and EPA directs clean-up operations in non-tidal waters.

U.S Army Corps of Engineers

The U.S. Army Corps of Engineers (Corps) is authorized under Section 404 of the Clean Water Act to issue and enforce permits for discharge of dredge and fill materials into navigable waters and adjacent wetlands. Permits are issued under guidelines jointly

developed with EPA. Comments on Section 404 permits are provided to the Corps by the U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service under the Fish and Wildlife Coordination Act, and by the Texas Water Commission, Texas Parks and Wildlife Department, and General Land Office, under Section 401 of the Water Quality Act.

The Corps has the responsibility for determination of wetlands. Determinations are typically made upon request by property owners or individuals interested in purchasing property where a wetland designation may be an issue. State or local entities can also request determination. The Corps has an informal agreement with the FWS by which the Corps will invite FWS to participate in wetland determination. For the period 1989 - June, 1990, the Corps has conducted two wetland determinations and evaluated three pipeline crossings in the Armand Bayou watershed.

The Corps has authority under the Rivers and Harbors Act to regulate any type of work in navigable waters. Examples include Corps review of permits for the construction of discharge pipes or piers to determine the impact of the construction on the waterway and adjacent wetlands.

Soil Conservation Service

The United States Department of Agriculture Soil Conservation Service (SCS) assists local governments in creating plans for renewable natural resources, including sediment and erosion control, flood control, reclamation area development, and tree preservation. While it has no regulatory or enforcement authority, the SCS will assist local governments in developing management plans, ordinances, policies or regulations. The SCS coordinates its activities closely with the Harris County Soil and Water Conservation District.

The SCS is also responsible for the mapping and designation of wetlands on agricultural lands, and it inspects those farmers who have completed a wetland conservation plan. The SCS reports any violations of conservation plans to the Harris County Committee of the Agriculture Stabilization and Conservation Service.

National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA) is part of the United States Department of Commerce. The NOAA is responsible for gathering, processing and issuing information on weather conditions, river water weight, coastal tides, and current movement of oceans. In addition, the NOAA issues warnings for tornadoes, floods and seismic seawaves. The NOAA provides current environmental data, ocean surveys and measurements, and technical research publications dealing with earth sciences.

National Marine Fisheries Service

The National Marine Fisheries Service (NMFS), which is part of the NOAA, regulates fisheries management, primarily of offshore species. The NMFS has advisory status under the Fish and Wildlife Coordination Act and National Environmental Policy Act for federal construction or permits in the waters of the United States.

The Endangered Species Act requires the FWS and NMFS to determine if any proposed federal action will have an adverse effect on a threatened or endangered species. The judgment is generally made in consultation between the FWS, NMFS, and the sponsoring agency. Projects which exhibit possible negative impacts on the threatened or endangered species will not receive a federal permit or federal funds.

U.S. Coast Guard

The Coast Guard is a branch of the Department of Transportation. The Coast Guard has jurisdiction within the navigable waters of the Armand Bayou watershed over emergency response to spill contamination and boating safety.

The Coast Guard is the implementing agency for a national contingency plan for oil spill response in tidal waters (EPA directs clean-up in non-tidal waters). As the lead agency, the Coast Guard directs a Regional Response Team, which includes federal agencies such as EPA, FWS, NMFS and the Corps of Engineers. If a spill has public health implications, the Center for Disease Control in Atlanta is requested to join the team. State agencies are represented on the response team by the Texas Water Commission.

As the lead agency and first point of contact, the Coast Guard directs and approves all actions pertaining to clean-up operations. The current spill response policy requires responsible parties to contact clean-up operators to work under the direction of the Coast Guard, while the Regional Response Team approves major actions and provides technical assistance. The Coast Guard has a Marine Safety Office located at the Port of Houston, which houses a strike team. The team's responsibility is to quickly reach the spill site and direct on-site clean-up operations.

In addition to spill response oversight, the Coast Guard enforces marine debris regulations. Marine debris may be reported by the perpetrator or the public, or may be observed by the Coast Guard. Penalties and regulations are defined under RCRA, CERCLA or the MPPRCA.

Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA) is the lead policy and coordination agency for disaster planning and relief. Through the National Flood Insurance Program,

FEMA works with communities to regulate land uses in flood-prone areas. Because of flood plain impacts, FEMA also reviews actions that deal with dredging, shoreline erosion, coastal land use, and wetlands. Primarily FEMA is known for its assistance efforts after hurricanes or floods. However, FEMA also offers relocation assistance after industrial disasters.

TEXAS REGULATORY AGENCIES

Texas General Land Office

The Texas Coastal Public Lands Management Act assigned management responsibilities for coastal public lands to the Texas General Land Office (GLO). The GLO also has regulatory control over stream bottoms and natural resources on coastal public lands and controls all activities which may have an impact on them, including dredging, oil and gas recovery, and shoreline erosion.

Activities such as construction of piers, placement of pipelines, dredging of channels, and mineral exploration activities on state land require prior authorization from the GLO and payment of the appropriate fees. Revenue generated by GLO permits, easements and leases is placed in the Texas Permanent School Fund, administered by the School Land Board.

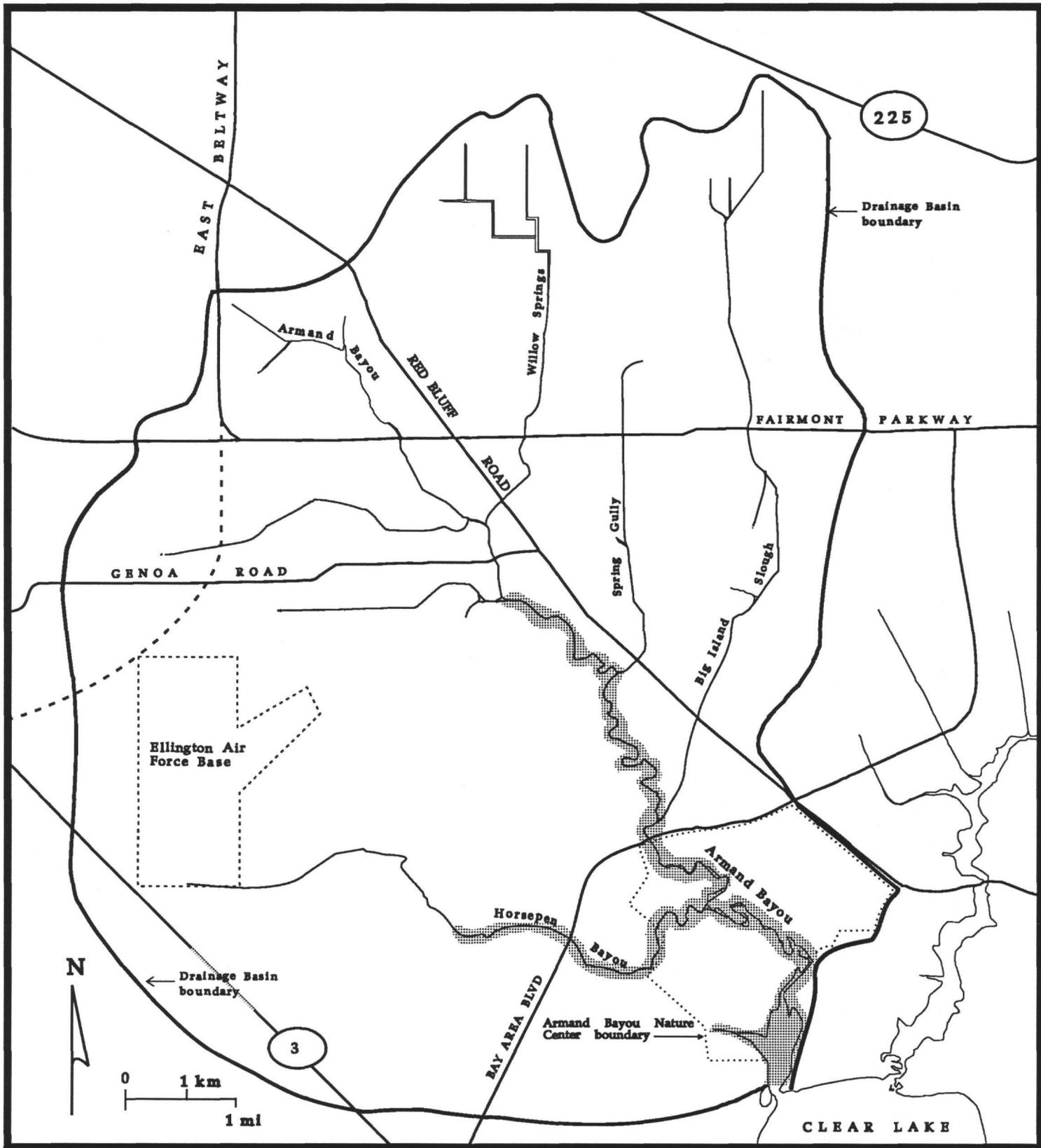
When an application for the use of state lands is received, the GLO conducts an environmental review to determine if the proposed work is an appropriate use of state resources. The review includes assessment of possible alternatives that would minimize adverse environmental impacts. The application is then presented to the School Land Board, and, if approved, a contract between the applicant and General Land Office is prepared.

These contracts typically contain provisions to protect natural resources on state lands and mitigation in instance where environmental damage is unavoidable. For the most part, mitigation is viewed as a last resort, in that it generally occurs after damage has been done.

The map on page 54 shows the approximate boundaries of state-owned lands in Armand Bayou. The GLO monitors activities in the Armand Bayou watershed to prevent unauthorized uses of state-owned lands, and issues permits for activities as discussed above. The Surveying Division of the GLO has prepared maps showing the limits of state ownership in the Armand Bayou watershed, and GLO also maintains maps showing natural resources on state lands, such as oyster reefs, bird rookeries, pipeline crossings, biologic assemblages, and wetlands.

Submerged Lands Management

The GLO submerged land management program includes coordination with other agencies



Armand Bayou Watershed
Houston-Galveston Area Council

General Land Office: State Owned Stream Beds

Current 7/90

- Streets and Highways
- - - Proposed Highways
- Waterways

to track Corps of Engineers permits and to be consistent with other agencies' environmental policies in its actions. One such example is coordination with the TWC in its evaluation of water quality impacts of dredge and fill disposal projects (Clean Water Act Section 401 program). The GLO recently received a grant from EPA for wetlands coordination with the TWC. It is hoped that this project will lead to a Memorandum of Understanding among state agencies on wetlands and perhaps result in the development of joint standards.

Texas Coastal Preserve Program

The Texas Legislature has specifically provided for the GLO to lease appropriate coastal lands to the Parks & Wildlife Department (TPWD) to be managed as preserves. The two agencies have established a cooperative effort which allows for the strengths of each to be used to ensure long-range protection, enhancement and public use of coastal resources. GLO and TPWD have executed a Memorandum of Agreement (MOA) which establishes principles of the program and rules of procedure. The MOA requires that recommendations for Coastal Preserve areas be presented to both the Parks and Wildlife Commission and the School Land Board for inclusion in the program.

Recognizing diverse coastal natural resources and broad public concerns, the preserve program has been developed to accomplish four primary goals.

1. Protect fragile biological communities, including important colonial bird nesting sites.
2. Protect unique coastal areas.
3. Explore methods for recognizing preservation, enhancement, and appropriate public use opportunities.
4. Actively involve all concerned and knowledgeable persons and organizations.

Armand Bayou and Christmas Bay, two highly unique areas of the Galveston Bay system, have been designated as Coastal Preserve Areas. This regulatory study, along with other studies which are underway, will be used in the development of a management plan for the Armand Bayou Coastal Preserve.

Texas Parks and Wildlife Department

The TPWD manages the state's fish, wildlife, and wetland resources. A statewide systems of parks, preserves, and wildlife management areas is supervised by the Department. Under the Texas Coastal Preserve Program described above, the TPWD also manages certain state coastal lands leased to it by the General Land Office. The TPWD reviews and comments on any federal project that has the potential to affect these resources.

The disturbance or taking of streambed material on state-owned lands is regulated by the Department. The TPWD also monitors fish and shellfish populations, fishery harvests, bay

and estuarine resources, and dredge disposal. The TPWD sets policy and makes project review determinations based on the results of this monitoring.

The TPWD Enforcement Division regulates the taking of fish, shellfish, and wildlife. These regulations are enforced by game wardens, who are commissioned peace officers. The TPWD conducts research and assists in improving management practices for water resources and wetlands, as well as for uplands. These programs are intended to protect and enhance wildlife resources.

Wetlands

The TPWD also has a significant management role over wetlands and is the state agency designated to comment on federal Section 404 permits. Under the EWRA, the TPWD is required to complete a plan for wetlands that is consistent with the *National Wetlands Priority Conservation Plan*, in order to receive federal land and water conservation funds. The TPWD completed the *Texas Wetlands Plan: Addendum to the 1985 Texas Outdoor Recreation Plan* in 1988. The plan included guidelines for management, policy, regulations, acquisition, information, funding, and education guidelines. It also covered the status and trends in wetlands management, but it did not include a priority list for acquisition. However, TPWD worked in conjunction with the FWS to complete the *FWS Region II Wetlands Regional Concept Plan*. As mentioned previously, there are no priority wetlands designated in the Armand Bayou watershed.

Nursery Area Designation

The Texas Legislature has delegated authority to the TPWD to regulate the Texas shrimp fishery. A key element of this authority is the protection of designated nursery areas, which are defined as tributary bays, bayous, inlets, lakes and rivers which are proven as significant growth and development environments for postlarval and juvenile shrimp. These areas do not include outside waters, major bays, or bait bays. While Armand Bayou meets these physical requirements, it is not documented as having a significant fishery (*An Environmental Inventory of Armand Bayou*, McFarlane and Shead) and is not a designated nursery area under the TPWD program.

Texas Water Commission

Water Rights Permitting

The Texas Water Commission (TWC) Water Rights and Uses Division processes and evaluates permit applications to use State surface water. For example, the TWC, in cooperation with the TPWD, established low flow criteria in a case where the Baywood Country Club submitted a permit application to withdraw water from Armand Bayou to irrigate a golf course. In accordance with the TWC's permit application process, a public hearing was held and opponents had an opportunity to comment and offer suggestions regarding disposition of the application request.

In general, permit applications to withdraw surface water require a study by the TWC to determine if enough water is available. The applicant must also provide notice to downstream water rights holders and publishes notice of the application. If there is no protest, the permit is presented to the 3-member Texas Water Commission for action. However, if there is a protest, a public hearing date is set by a TWC Hearings Examiner and all parties to the application are notified. The hearing is held to gather information and the examiner prepares a proposal for decision which is presented to the Commission at a regularly scheduled meeting, at which further testimony may be offered.

The TPWD is always a party to these applications and is provided with permit information. (This cooperative arrangement between the TWC and TPWD was formalized by an Interagency Cooperation Contract in 1990.) The TPWD review assists the TWC in determining acceptable low flow conditions to prevent degradation of habitat and water quality by removal of freshwater, which leads to saltwater intrusion.

Dredge and Fill Disposal

The 401 Certification Program (Water Quality Act Section 401) provides for state agency review and comment on applications for dredge and fill disposal. The TWC is the state agency responsible for administering this program, though the TPWD and the GLO are also involved in the review process.

The Corps of Engineers makes the determination as to whether a Section 404 permit is needed for a project. When a 404 permit is required, the Corps issues a joint public notice on behalf of itself and the TWC and requests that the TWC review the application. The TWC review primarily addresses water quality standards. Habitat issues are reviewed by the TPWD and submerged land management issues are reviewed by the GLO.

If there are no comments from state reviewing agencies or the public, the 404 permit application is certified by the TWC and the certification is forwarded to the Corps for final permit action. If there is any concern over a permit application, additional information is sought from the applicant and a site assessment is required. The site assessment is typically involves the Corps, U.S. Fish and Wildlife Service, TPWD and the GLO.

Spill Response

The TWC is the lead state agency on the Regional Response Team for oil and chemical spills. The TWC directs the Texas Spill Response program and administers the State Spill Response fund, which provides assistance for clean-up costs, particularly for chemical spills. The GLO and TPWD are also involved in spill response and mitigation strategies.

There are currently several proposals to consolidate spill response activities, either under the TWC, GLO or a local umbrella organization. Among the considerations is the establishment of a crude oil shipping fee which would help to pay for equipment and staff for spill response efforts. It is expected that these proposals will be filed as bills in the next Texas legislative session.

LOCAL REGULATORY FRAMEWORK

Harris-Galveston Coastal Subsidence District

The Harris-Galveston Coastal Subsidence District (H-GCSD) was created by the 64th Texas Legislature in 1975 to regulate the withdrawal of groundwater within Harris and Galveston Counties. The H-GCSD was established ". . . for the purpose of ending subsidence which contributes to or precipitates flooding, inundation or overflow of any area within the district . . ."

The H-GCSD has policy-making, permitting and regulatory enforcement authority, and has developed a comprehensive long-range plan which sets goals for decreasing groundwater dependence through the year 2020. The long range plan identified eight (8) regulatory areas, and set limits on groundwater withdrawal in each area. Armand Bayou lies within Regulatory Area #1, in which groundwater withdrawal is presently limited to 10% or less of total water use.

H-GCSD permits are required for all individual wells with a casing greater than five inches in diameter. The only exception is for any person who owns just one well less than five inches in diameter. Individuals owning multiple wells must also have an H-GCSD permit.. The H-GCSD periodically monitors elevation changes in the region and has a continuing program to promote conservation of groundwater to reduce withdrawal.

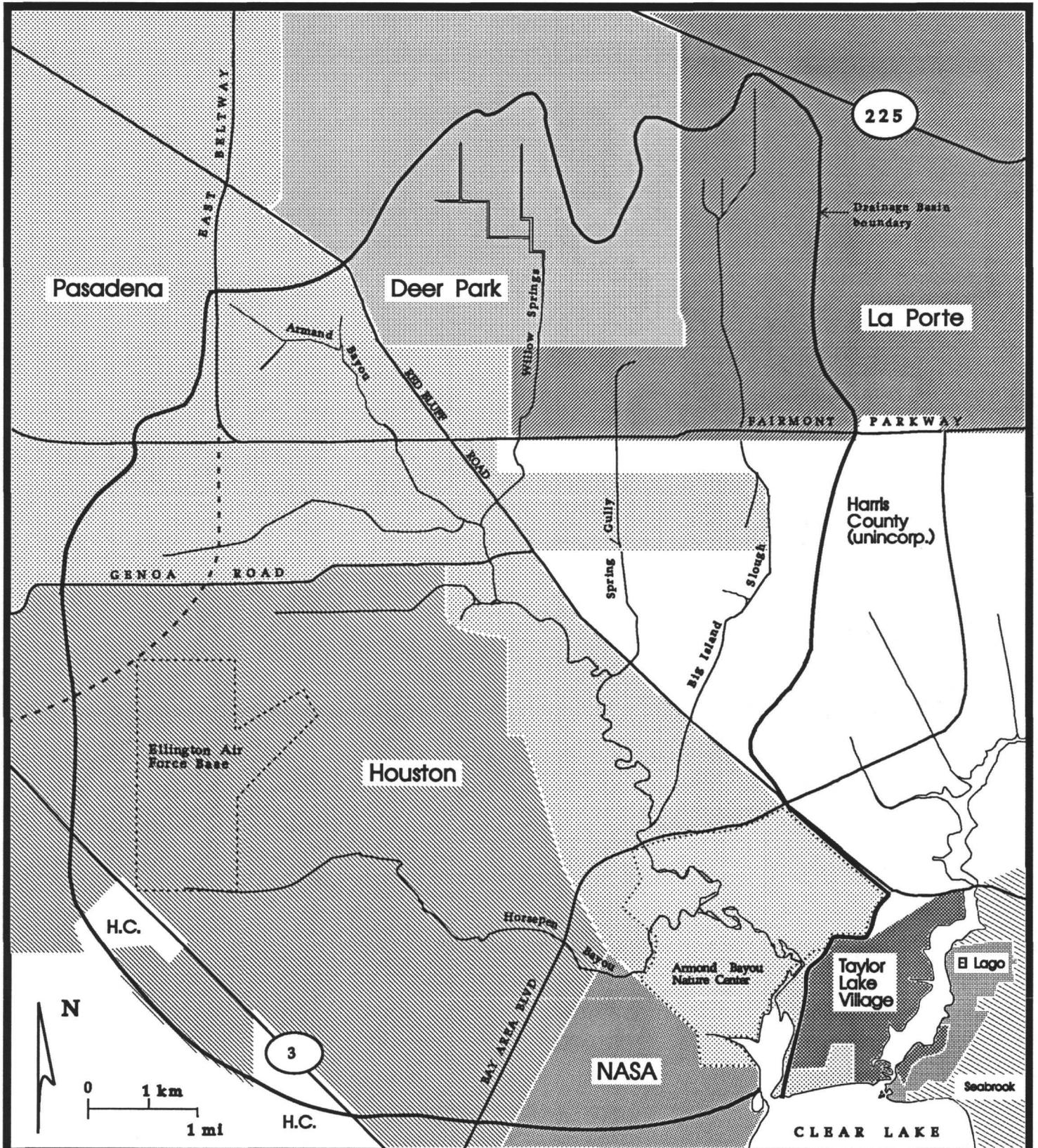
City and County Governments

Policy governing the protection of wildlife, habitat and water resources is generally set at the federal or state level. However, most conservation programs are to some degree impacted by land development, which is primarily regulated by local governments. While local governments in Texas have not traditionally used development regulations for habitat management, zoning, subdivision and construction-related ordinances are a potential tool for bridging gaps in federal and state programs.

Development in the Armand Bayou watershed is regulated by the City of Houston, the City of Pasadena, the City of Deer Park and the City of LaPorte, and Harris County. The jurisdictional boundaries of these local governments are shown on the map on page 59.

City of Houston

The City of Houston encompasses approximately 15,500 acres within the Armand Bayou watershed, including most of Horse Pen Bayou. About one-half of the city territory within the watershed is currently undeveloped. The other half is largely characterized by residential development with higher intensity land uses. These include the NASA Johnson Space



<p>Armand Bayou Watershed Houston-Galveston Area Council</p>	<p>City and County Boundaries</p> <p>— Streets and Highways - - - Proposed Highways ~ Waterways</p>
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Center, the City's Ellington Field airport, and commercial development in the Clear Lake community.

Houston has a capital improvements plan which guides the development of major public infrastructure improvements. Houston does not have a zoning ordinance to specifically regulate the location and intensity of land use. The enforcement of private deed restrictions is employed as a land-use control, but this method only applies to those subdivisions which have deed restrictions in force. The City is also involved only in enforcing those aspects of deed restrictions which govern residential land use.

Houston has a Development Ordinance which requires all land owners who are subdividing tracts of land to file plats. Additionally, all development on unsubdivided tracts requires a development plat. This procedure allows for the uniform extension of roads and public utilities and incorporation of general site design criteria, but again, it does not regulate the type or intensity of the land use.

Flood Plain Management rules and regulations are set in accordance with the Federal Emergency Management Agency. The City of Houston Municipal Code requires the control of filling, grading, dredging, and other development which may increase flood damage. The code also provides a regulatory system for the issuance of permits.

City of Pasadena

The City of Pasadena encompasses approximately 13,000 acres within the Armand Bayou watershed, including most of the main channel of Armand Bayou and small portions of Willow Spring Bayou and Big Island Slough. Most of the area surrounding Armand Bayou itself is residential or undeveloped. The area around Willow Spring Bayou includes undeveloped lands and the Pasadena Rodeo grounds. Big Island Slough abuts a heavy industrial district.

Pasadena has a comprehensive plan which guides capital improvement programming and suggests land development patterns. The plan indicates residential and open space development surrounding the main channel of Armand Bayou. Pasadena has also been acquiring land in this area to develop a linear park system.

Pasadena does not have a zoning ordinance to specifically regulate the location and intensity of land use. However, the enforcement of private deed restrictions is employed as a land use control. This method only applies to those subdivisions which have deed restrictions in force. Pasadena also has development criteria which limit the amount of lot coverage on patio home (50%) and apartment (70%) developments.

Habitable structures located within the 100-year flood plain must be at the flood plain elevation or one foot above the street. The City's building regulations define flood or

flooding as any "overflow or inland or tidal waters and unusual and rapid accumulation of runoff of surface water from any source." The regulations further define floodplain or flood-prone zone as "any land susceptible to being inundated by water from any source." A development permit is required for any construction upon such lands.

The Pasadena Code of Ordinances creates a city Commission on Flood Control and Drainage. This Commission regulates matters relating to flood control and drainage. The Commission inspects drainage and flood control facilities and reports its findings to the Mayor and City Council. The Commission also advises and recommends new programs to the City's elected officials.

City of Deer Park

Deer Park encompasses approximately 3,700 acres within the Armand Bayou watershed, including much of the area around Willow Spring Bayou. Most of the area surrounding Willow Spring Bayou is residential or undeveloped.

The Code of Ordinances of the City of Deer Park establishes zoning regulations and districts in the City, and includes a comprehensive plan. Zoning regulations do not apply to those districts designated as "intensive industrial districts" (areas characterized by uses with offensive noise, smoke, dust, odor, heat or glare), though none of these are located within the watershed. The Zoning Ordinance does address residential and commercial districts. Most of the area immediately surrounding Willow Spring Bayou is zoned single-family residential, though there is also a small general commercial area.

City of La Porte

The City of La Porte encompasses approximately 3,500 acres in the Armand Bayou watershed. Most of the land area directly surrounding Big Island Slough is residential or undeveloped. A portion of the La Porte Municipal Airport is also located within the watershed.

La Porte has a comprehensive plan and also has an eight-category zoning ordinance. Maximum permissible lot coverage under this ordinance ranges from 30% for Heavy Industry to 75% for Townhomes. The Department of Public Works supervises the zoning. Section 22-1 of the municipal code sets forth ordinances governing subdivisions.

In addition, the City of La Porte's Animal and Fowl Ordinance 1065, states that the City of La Porte is designated as a bird sanctuary. Under this ordinance, it is "unlawful to trap, hunt, shoot, or attempt to shoot or molest in any manner any bird or wild fowl." Any violations of this ordinance are investigated by the City of La Porte's Department of Parks and Wildlife.

Harris County

Unincorporated portions of Harris County account for approximately 4,500 acres within the Armand Bayou watershed, including most of the area around Big Island Slough, which contains heavy industry, as well as several small residential and commercial areas in the far western portion of the watershed.

Counties in Texas have no authority to enact land use ordinances. As a result, local land development and usage can only be managed within those portions of the county which are within a municipality's Extraterritorial Jurisdiction (ETJ). The small unincorporated areas in the western portion of the watershed are within Houston's ETJ and fall under the same development requirements that would be necessary within Houston's city limits.

Local Emergency Planning Committees

Local Emergency Planning Committees (LEPC) are in place for each of the communities in the Armand Bayou watershed. The purpose of these committees is to delineate responsibilities and action plans should an emergency occur. In addition, the Bayport Risk Communication Projects (BRCP) has recently been organized. The BRCP is an amalgamation of area LEPC's which includes industry representatives and environmental groups and plays an interagency coordination role.

There are several proposals in development to provide additional spill response capacity at the local level. A private industry group has established a steering committee to develop plans for equipment sharing, funding and coordination for quick response to a spill. Local governments surrounding Galveston Bay have also proposed establishing a four county district which could provide equipment and manpower for spill response, particularly spills in shallow waters. Funding mechanisms for this proposal will likely be presented in the upcoming legislative session.

OTHER LOCAL AGENCIES

Houston-Galveston Area Council

As mentioned previously, the Houston-Galveston Area Council (H-GAC) is a voluntary association of approximately 150 local governments in the 13-county Gulf Coast area. While H-GAC is not a regulatory entity, it does influence the resource management practices of local governments in the Gulf Coast planning region through its environmental planning and outreach activities. H-GAC also 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. Under the Texas Review and Comment

System, H-GAC's Project Review Committee and staff have the opportunity to consult on local projects, ranging from wastewater treatment plants to new park development. Finally, H-GAC focuses more closely on a range of regional environmental issues through its various advisory committees and task forces, all of which make recommendations to H-GAC's Natural Resources Advisory Committee.

NON-PROFIT ENTITIES

The Galveston Bay Foundation

The general purpose of the Galveston Bay Foundation (GBF) is to conserve and enhance the Galveston Bay ecosystem. The GBF brings together diverse interests in a forum for the identification and examination of the wide range of issues in the Bay system. Activities of the GBF include education, lobbying, litigation and initiating research about the Galveston Bay ecosystem. It is a goal of the GBF to develop a consensus when possible. The GBF is governed by a Board of Trustees and has a committee network which addresses different topical program areas, such as permit review and oil spill response.

Armand Bayou Nature Center

The Armand Bayou Nature Center (ABNC) is a preserve and education center encompassing approximately 2,100 acres in the Armand Bayou watershed. The land is owned by Harris County and lies within the city limit of Pasadena. Harris County has leased this land to the ABNC for 100 years for the purpose of education and stewardship. The ABNC is a privately funded non-profit organization whose primary responsibilities include education, monitoring, inter-agency coordination, and emergency response assistance.

ABNC education programs are organized for weekday school programs, the general public and travel/study programs. Its monitoring role includes activities related to water quality management and natural resource management. Examples include weekly seining to investigate fish and invertebrate populations and distribution; monthly cross-section bathymetry surveys and daily observations of visible water color changes. Water quality monitoring occurs also. Seasonal changes in the abundance, diversity and distribution of estuarine fauna are assessed from frequent quantitative seining. The ABNC has also been a major point of citizen contact for water quality issues in Armand Bayou, providing referrals on problems to the appropriate regulatory agency.

