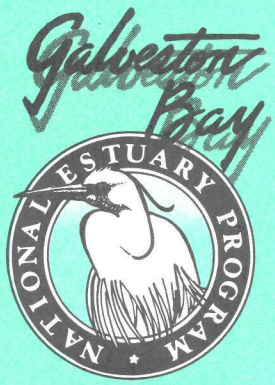
Regulatory Effectiveness Study for the Armand Bayou Coastal Preserve



Galveston Bay
National Estuary Program
GBNEP-13
December 1991

Regulatory Effectiveness Study for the Armand Bayou Coastal Preserve

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Regulatory Effectiveness Study for the Armand Bayou Coastal Preserve

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The Galveston Bay National Estuary Program

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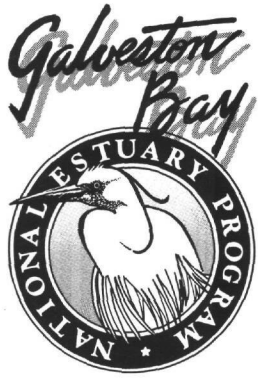

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PREFACE

The National Estuary Program (NEP) was established by the Water Quality Act (WQA) of 1987. The Act authorizes the Administrator of the United States Environmental Protection Agency (EPA) to convene Management Conferences to develop Comprehensive Conservation and Management Plans (CCMPs) for estuaries of national significance that are threatened by pollution, development or overuse.

Galveston Bay was named for priority consideration for inclusion in the NEP in the Water Quality Act. The Governor of Texas submitted a Supplemental Nomination for Galveston Bay in May 1987. EPA accepted the nomination and initiated the Management Conference for Galveston Bay in July 1988. A cooperative agreement between Texas and the U.S. EPA was signed in October 1988, enabling developmental work to begin on the Galveston Bay National Estuary Program (GBNEP). (A Management Conference overview and member directory is available from the GBNEP Program Office.)

The GBNEP received approval for an Action Plan Demonstration Project from EPA's Office of Marine and Estuarine Protection in July 1989, and EPA Region 6 provided funding in September 1989. Such projects are designed to show near-term positive actions by National Estuary Programs. Under the GBNEP project, two new coastal preserves, Armand Bayou and Christmas Bay, were created under the existing joint Texas General Land Office (GLO)/Texas Parks and Wildlife Department (TPWD) Coastal Preserves Program. Armand Bayou, the focus of this regulatory survey, was recommended for Coastal Preserve designation due to its importance as an aesthetic and educational resource.

This report contains a description and evaluation of essential regulatory activities governing Armand Bayou and its watershed. This report will be used in management planning for the preserve, and will also contribute to the baseline regulatory data for developing the Galveston Bay Comprehensive Conservation and Management Plan. A companion report was prepared for the Christmas Bay Coastal Preserve.

This study was conducted by the Houston-Galveston Area Council and Duane Windsor, Ph.D., of Rice University, under contract to the Galveston Bay National Estuary Program.

REGULATORY EFFECTIVENESS STUDY
for the
Armand Bayou Coastal Preserve

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Houston-Galveston Area Council

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EXECUTIVE SUMMARY

Given the range of topics covered in this report, the overview diagram on the next page was developed to serve as a more concise substitute for the narrative that would normally appear in an Executive Summary.

The headings in the diagram correspond to the chapters in the Regulatory Effectiveness Study. These particular areas of environmental management were chosen for evaluation in this study based on the *Priority Problems List* developed by the Galveston Bay National Estuary Program (GBNEP) and the findings of the *Environmental Inventory of the Armand Bayou Coastal Preserve* (Publication 8 in the GBNEP publication series). Under each heading in the diagram is a brief list of management concerns. These reflect the Summary of Findings which lead off each chapter in the report. The evaluation process also resulted in a set of action recommendations for each management topic. These recommendations all revolve around the key elements of effective management:

- clear policies and priorities -- especially in the face of limited funds
- adequate resources and authority for meaningful program implementation
- sufficient information and knowledge to support management decisions and anticipate problems, and
- coordination across programs and among involved agencies

Overview of Armand Bayou Management Concerns

OVERALL
- Limited preserve area
- Inadequate awareness of coastal preserve program
- Inter-agency coordination
- Lack of baseline data
- Inadequate environmental monitoring
- Effective enforcement
- Continuing "pilot area" role for coastal preserve
- Consideration of preserve status in permitting and project review
- Regional mechanisms under Galveston Bay National Estuary Program

Point Source Discharges
- Competing water quality programs (NPS)
- *Data inadequacy*
- Effectiveness of permitting methods to achieve environmental protection objectives
- *Monitoring inadequacy*
- *Coordination*
- Political influences
- Increasingly technical nature of regulations
- Complexity of estuary systems
- Regionalization
- *Uncertainty about coastal preserve program implications*
- *Inadequate agency resources*

Storm Water Runoff
- Adjustment process from point source focus
- Uncertainty surrounding NPDES storm water program and TWC Municipal Water Pollution Control and Abatement Program
- Administrative burden of new programs
- *Inadequate data on nonpoint source impacts*
- Long-term monitoring of management practices

Armand Bayou Coastal Preserve

Habitat Protection
- Lack of independent authority for resource agencies
- *Inadequate agency resources*
- *Inadequate data*

Wetlands Protection
- *Inadequate agency resources*
- "No net loss" implementation
- State and local roles
- Equity/property issues
- Inadequate public awareness
- *Inadequate data*

Illicit Waste Disposal
- Intractable "hit and run" problem
- Difficulty of enforcement and successful litigation
- Dependence on citizen complaints
- *Opportunities for greater coordination*

* *Italics indicate common management themes.*

Before focusing on the individual management areas, the effectiveness study first provides a broad-brush overview and assessment of the existing framework for coastal preserve management. The report then suggests the following general management recommendations:

1. The management process should begin with recognition of the inherent limitations of the Coastal Preserve program.
2. The lead agencies in the Coastal Preserve program should improve inter-agency understanding of the program's scope and implications.
3. Preserve managers should determine how coastal preserve management will be affected by anticipated regional mechanisms for the entire Galveston Bay system.
4. Preserve managers should recognize and take advantage of the particular management roles and capabilities of other agencies.
5. Preserve managers should recognize and address the lack of baseline data to guide management efforts.
6. Effective preserve management will depend on the development of a comprehensive preserve monitoring system.
7. Administrative penalties and other flexible enforcement mechanisms should be applied effectively in coastal preserves and surrounding areas.
8. Coastal preserves such as Armand Bayou should continue to be used as "pilot" areas for environmental research and management initiatives.

Aside from the report elements already described, the effectiveness study also builds on the earlier Regulatory Survey report (GBNEP Publication 10) by reviewing the key agencies and programs which may be applied to coastal preserve management. These details are summarized in Management Framework diagrams which appear in each chapter.

INTRODUCTION

Purpose

The purpose of this study is to determine the effectiveness of the programs which comprise the environmental management framework for the Armand Bayou Coastal Preserve. Common sense suggests that the basic question in evaluating effectiveness would be to measure how well each program is meeting its environmental management objectives. However, this type of strictly objective measurement is not feasible in the Armand Bayou watershed because environmental trend data is incomplete and management objectives have not been defined for each regulatory program.

Rather than a strictly objective approach, this report assesses the appropriateness of existing regulatory mechanisms for dealing with the environmental problems facing Armand Bayou. Agencies with responsibility for environmental regulation in the preserve have been described in terms of legal authority (legislation and rules), resources (budget and staff), and administrative priority (agency policy). By comparing this framework with current or potential environmental problems, regulatory gaps and insufficiencies have been identified, as well as overlaps and opportunities for enhanced interagency coordination. Based on this analysis, action steps for improved regulatory effectiveness have been recommended.

The findings and recommendations of this study will be utilized in ongoing management planning for the preserve. This report and the companion document for Christmas Bay are also "pilot studies" for a regulatory effectiveness assessment covering the entire Galveston Bay system.

Scope

The scope of this report is to evaluate the effectiveness of the major environmental regulatory programs governing the Armand Bayou Coastal Preserve and its watershed. The overall management framework is assessed and specific program evaluations have been conducted in the following categories of environmental regulation:

- point source discharges
- storm water runoff
- protection of wetlands
- protection of living resources and habitat
- illicit waste disposal

These categories were selected because each included activities identified in the Galveston Bay National Estuary Program (GBNEP) *Priority Problems List* and the *Environmental Inventory of the Armand Bayou Coastal Preserve* as presenting existing or potential environmental problems for the preserve or the surrounding watershed.

Study Area Description

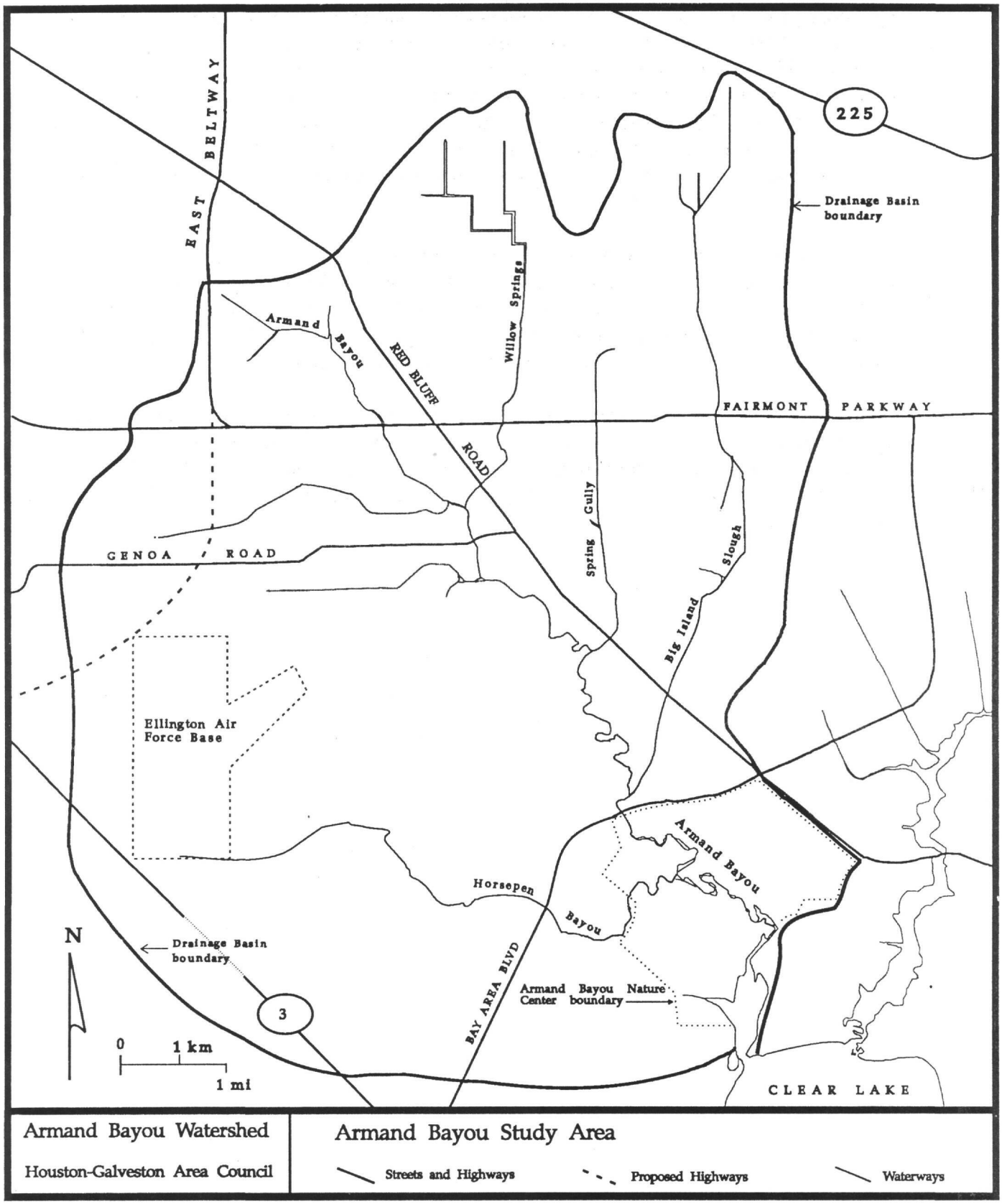
The study area for this report is the 40,647-acre Armand Bayou watershed, shown on the following page. The Armand Bayou Coastal Preserve and the popular Armand Bayou Park and Nature Center comprise a relatively small portion of the total study area. While the Bayou and its immediate surroundings are largely undeveloped, the watershed contains or is bordered by several major urban activity centers, including the NASA Johnson Space Center, the Bayport petrochemical complex, the Clear Lake oilfield, and the City of Houston's Ellington Field airport.

The environmental problems affecting Armand Bayou are significant. The water quality of the Bayou is poor, and continued degradation is possible due to existing and potential pollutant discharges. Development in and around the watershed has generated pollutant loadings from stormwater runoff as well. Subsidence has caused the loss of the majority of the wetlands contiguous to the Bayou and has extended the tidal influence. The loss of wetlands and extended tidal influence has also changed the variety of flora and fauna in the study area. Potential risks to water quality, habitat and public health are also posed by the threat of improper disposal of hazardous materials from surrounding industrial development.

However, despite its poor water quality and other physical limitations, there is strong public sentiment for preserving Armand Bayou because of its aesthetic and educational value. More important from an ecological standpoint is that the bayou has the last vestiges of ecotypes which existed before the area was developed. Armand Bayou now serves as rare habitat for fauna amid an urbanized and industrialized region. The short-term challenge in managing the preserve appears to be halting the degradation of water quality and habitat. Future management objectives will determine what longer term environmental rehabilitation measures will be necessary.

Methodology

Based on the results of the *Environmental Inventory of the Armand Bayou Coastal Preserve* and the GBNEP *Priority Problems List*, the key environmental problems facing Armand Bayou were identified. The *Regulatory Survey for the Armand Bayou Coastal Preserve* provided information on the authority of the federal, state and local agencies to regulate the activities contributing to these problems. Using this background information, a series of individual survey instruments were designed for interviewing key staff of the agencies involved in environmental regulation.


EAST BELTWAY
225
Drainage Basin boundary
Armand Bayou
RED BLUFF ROAD
Willow Springs
FAIRMONT PARKWAY
GENOA ROAD
Spring Gully
Big Island Slough
Ellington Air Force Base
Armand Bayou
Horsepen Bayou
N
Drainage Basin boundary
3
0 1 km
1 mi
BAY AREA BLVD
Armand Bayou Nature Center boundary
CLEAR LAKE
Armand Bayou Watershed
Houston-Galveston Area Council
Armand Bayou Study Area
Streets and Highways
Proposed Highways
Waterways

The purpose of the interviews was to explore in greater detail the components of the regulatory process. Interviewees were asked to respond to questions on the adequacy of the legal authority, resources and administrative priority associated with their regulatory program. Where deficiencies or barriers to program effectiveness were noted, follow-up questions were asked to determine the root causes. The objective of this method, when used in successive interviews, was to reveal consensus opinions. The findings in the report reflect statements that were repeated several times within the same agency or across agencies. The text of the report also indicates times when opinions differed and there was not a clear consensus.

Assessments of major programs included interviews with field office, enforcement and management staff, where possible. (Appendix B contains a list of the divisions within each agency in which staff were interviewed.) This approach was taken to identify internal as well as interagency barriers to regulatory effectiveness. To stimulate frank responses, interviewees were assured that their responses would be kept confidential.

Based on the findings of the research and interviews, a series of management recommendations for the Armand Bayou Coastal Preserve were prepared and are included in this report. These recommendations constitute action steps for effective coastal preserve management under the framework of the Galveston Bay National Estuary Program.

FIGURE 1: Agency Acronyms

FEDERAL	
ASCS	Agricultural Stabilization and Conservation Service
CORPS	Army Corps of Engineers
EPA	Environmental Protection Agency
FWS	Fish & Wildlife Service
NMFS	National Marine Fisheries Service
SCS	Soil Conservation Service
STATE	
GLO	Texas General Land Office
RRC	Railroad Commission of Texas
SWCB	Texas Soil and Water Conservation Board
TACB	Texas Air Control Board
TDH	Texas Department of Health
TPWD	Texas Parks and Wildlife Department
TWC	Texas Water Commission
TWDB	Texas Water Development Board
REGIONAL	
H-GAC	Houston-Galveston Area Council
LOCAL	
HCPC	Harris County Pollution Control Department

Chapter One
MANAGEMENT OVERVIEW

The Texas Coastal Preserve program basically provides the opportunity for a single designated agency to practice careful micro-management *within* selected, and relatively small, areas along the Texas Gulf Coast. This management responsibility falls on the Texas Parks and Wildlife Department (TPWD) under the lease provisions of the Texas Coastal Preserve program. The Texas General Land Office (GLO) retains ultimate responsibility for the state-owned land within the preserve. But in its role as overseer of all of the state's coastal public lands, the General Land Office, like other key agencies, can hardly afford to focus its management resources on such a tiny portion of its total jurisdiction. That role will be undertaken by TPWD, which will act as preserve manager. Agencies such as the Railroad Commission of Texas, the U.S. Army Corps of Engineers, the Texas Water Commission, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the Texas Department of Health, and many others, retain independent authority over actions that could directly impact the coastal preserves -- either from within or outside the preserve boundary.

There are two major omissions in the Coastal Preserve program. First, it does not contain an explicit set of policy objectives and standards that could provide specific guidance on micro-management. Rather, TPWD is to develop a separate management plan for each preserve area nominated to the program. Second, the coastal preserves ultimately are dependent on their surrounding watersheds and airsheds. There is no coherent management framework for these adjacent areas. Instead, there is a haphazard collection of federal, state and local regulatory entities with their own existing responsibilities and jurisdictions. The smallest of these -- cities and the county -- have jurisdictions which may actually abut or encircle the small coastal preserve area. Other agencies operate on much broader scales, statewide or nationally, but may have field offices or local representatives who implement their programs in the area.

Therefore, given the realities of existing regulatory mechanisms, what the management planning process must do first is answer several fundamental questions:

- what exactly is to be "managed" within the preserve?
- who are the current "managers" of these targeted activities?
- will this require any changes in existing regulatory procedures?
- if so, how will this be accomplished?

- will any new programs or regulatory tools be needed specifically for the coastal preserve?

During the time that this report was being prepared, TPWD staff were completing a preliminary management plan for the Armand Bayou Coastal Preserve. However, the basic questions listed above had not yet been answered, especially with regard to overall management objectives. Under these circumstances, the challenge for this study was to clarify what "regulatory effectiveness" really means as applied to the newly-designated coastal preserve. The report attempts to do this by following up on the second question above: what can the existing "managers" contribute specifically to coastal preserve management based on their larger responsibilities in the area?

The *Regulatory Survey for the Armand Bayou Coastal Preserve* already identified who the management agencies are, where they obtain their regulatory authority, and how they apply this authority through permitting, monitoring and enforcement programs. This evaluation report once again turns the spotlight on the agencies, this time emphasizing the manager's perspective: How are agency mandates carried out? Do the agencies have adequate tools and resources to meet these mandates? What obstacles prevent the agencies from being more effective? The underlying aim was to identify any pressing concerns that not only might affect agency management in general, but also could pose problems when it comes time to apply these broad agency programs to the particular needs of the Armand Bayou Coastal Preserve.

Most of these agencies already regulate or influence certain activities in the area. The goal of this planning process is to explore how the existing authority and capabilities of the agencies might be brought to bear within the targeted area to meet certain management objectives. The Texas Parks and Wildlife Department has a rich and complex collection of regulatory and resource entities to call upon for assistance in managing the coastal preserve and the larger watershed beyond its boundaries. However, those assisting entities have little experience with or conception of how to work with a coastal preserve. Management experience, policy objectives, and policy standards will therefore have to be developed. The basic strategy is not one of enhanced regulatory authority but rather of inter-agency coordination.

Armand Bayou will prove to be a difficult environmental management problem compared to other potential coastal preserves. The key aspect of the problem is that environmental rehabilitation, rather than protection, is a likely objective.

General Recommendations for Preserve Management

Recommendation 1

The management process should begin with recognition of the inherent limitations of the Coastal Preserve program. Coastal preserves are small areas that are largely influenced by "upstream" and external activities. The Parks and Wildlife Department and the General Land Office hope to influence "nearby activities," but the mechanisms for doing so are not known, aside from possible inter-agency initiatives and voluntary agreements with private landowners. From the outset, preserve managers should distinguish between those elements that they can control and those factors beyond the preserve boundary that they may be able to influence but cannot control directly. They also must note those activities which remain under the jurisdiction of other agencies no matter where they occur. This initial assessment will help to indicate the scope and difficulty of the management problem, as well as the limitations faced by preserve managers.

Recommendation 2

The lead agencies in the Coastal Preserve program should improve inter-agency understanding of the program's scope and implications. Most agency personnel interviewed for this study either were hearing about the Coastal Preserve program for the first time or had little idea of how it will affect them, if at all. Effective inter-agency communication and coordination are essential to an integrated environmental management task. The lead agencies must involve other agencies throughout the planning and implementation process. An early task in management planning should be the identification of all agencies with potential roles to play, and a decision on how they will be brought into the process. The climax of the process should be the distribution of draft and final preserve management plans for inter-agency review and comment. The General Land Office and the Texas Parks and Wildlife Department are relying on this and other coastal preserve reports, as well as the overall work program of the Galveston Bay National Estuary Program, to boost both public and agency awareness of the Texas Coastal Preserve program.

Recommendation 3

Preserve managers should determine how coastal preserve management will be affected by anticipated regional mechanisms for the entire Galveston Bay system. The lead agencies should monitor the ongoing planning work of the Galveston Bay National Estuary Program to determine how its eventual proposals for Baywide management will affect activities and regulated actions within coastal preserves. Preserve managers and Bay managers will face many of the same challenges and dilemmas, but on different scales. A close working relationship will be essential.

Recommendation 4

Preserve managers should recognize and take advantage of the particular management roles and capabilities of other agencies. Each agency that potentially can make a contribution to preserve management should be classified in terms of its legal powers, regulatory authority, monitoring programs, and enforcement role. Preserve managers must understand which agencies can take direct regulatory action, which can only advise other lead agencies, and which are more field- or policy-oriented. They also should appreciate which agencies have the practical ability to intervene, based on their resources and internal priorities.

Recommendation 5

Preserve managers should recognize and address the lack of baseline data to guide management efforts. The entire series of coastal preserve reports has documented the lack of site-specific data on various environmental aspects of the preserves. Recognizing resource limitations, preserve managers should assess their data needs, set priorities, and establish a multi-year data acquisition program that will provide a base for further refinement of the coastal preserve management plan.

Recommendation 6

Effective preserve management will depend on the development of a comprehensive preserve monitoring system. Nearly every aspect of preserve management will require some type of field monitoring, whether it be monitoring of water quality, wetlands status, or waste disposal. Preserve managers will need appropriate, reliable information to evaluate problems and measure progress. The preserve management plan should contain a conceptual design of an efficient, multi-purpose method for monitoring environmental conditions in the coastal preserve. Preserve managers also should consider the feasibility, perhaps several years into the management program, of preparing periodic status reports on preserve conditions and management results.

Recommendation 7

Administrative penalties and other flexible enforcement mechanisms should be applied effectively in coastal preserves and surrounding areas. Preserve managers should emphasize responsive, proven enforcement tools that stand the best chance of obtaining prompt compliance and pollution abatement.

Recommendation 8

Coastal preserves such as Armand Bayou should continue to be used as "pilot" areas for environmental research and management initiatives. The Galveston Bay National Estuary Program has provided the Texas Coastal Preserve program with a much higher profile than it otherwise would have had. Preserve management planning, in turn, has served as a model for Baywide planning. This mutually beneficial relationship should continue. Coastal preserves also should be used by state agencies hoping to improve their environmental management capabilities.

Chapter Two
POINT SOURCE DISCHARGES

Summary of Findings

1. *Agency managers are deeply concerned that the combination of lean government budgets and expanding regulatory mandates for their agencies will create an unbearable administrative burden, force undesirable trade-offs, and -- worst of all -- threaten twenty years of water quality progress achieved through effective point source regulation.*

2. *Regulatory agencies are worried about deterioration in the quantity and quality of water quality data.*

3. *Some critics believe that there are inherent weaknesses in traditional engineering-based approaches to point source discharge permitting which undermine environmental protection objectives.*

4. *There is broad agreement that stream monitoring is the most direct method for assessing water quality progress, but extensive monitoring is costly and difficult to defend in tight budgetary times.*

5. *There are clear opportunities for better coordination of point source regulatory efforts between state agencies and between state and local agencies.*

6. *Some Texas Water Commission staff express concerns about the occasional permit case that is perceived by the public and the staff -- whether rightly or wrongly -- as being overshadowed by political considerations.*

7. *The authorization of administrative penalties for the Texas Water Commission was a significant accomplishment in itself, and the speedier imposition of penalties for discharge violations has proven to be an effective enforcement tool in many cases.*

8. *Streams, bays and estuaries are complex, dynamic natural systems, and regulatory agencies can never achieve perfect knowledge and understanding of them. This fact underscores the importance of prior research and problem identification to insure effective regulatory action.*

9. *Aside from the economic incentives to "regionalize" wastewater treatment, agency staff emphasize the management benefits of plant consolidations.*

10. *Regulation of point source discharges is not a static process, so agencies must be flexible.*

11. *Agency staff are uncertain what impact the designation of Armand Bayou as a Texas Coastal Preserve may have on existing point source regulatory procedures in the watershed.*

The involved agencies are generally satisfied with the legal authority that they possess and the policy role they play in point source regulation and monitoring. Concerns arise over the inadequacy of resources to implement point source control policies in an effective fashion, especially as new regulations in other management areas put additional strain on agency resources. There are also clear opportunities for improved inter-agency coordination of point source programs, especially in the area of enforcement. Another much-repeated concern involves discrepancies in jurisdiction between the Texas Water Commission and the Texas Railroad Commission and the water quality problems that can result from inadequate regulation of oil and gas-related discharges.

Action Recommendations

Action: *The involved agencies should work together, under the lead of the Texas Water Commission, to develop a comprehensive strategy for effective water quality monitoring in Armand Bayou and its tributaries.*

Involved Agencies:

- Texas Water Commission
- U.S. Geological Survey
- U.S. Environmental Protection Agency
- Texas Department of Health
- Railroad Commission of Texas
- Texas Parks and Wildlife Department
- Texas General Land Office

Rationale: Maintenance of superior water quality presumably will be one of the objectives of the Coastal Preserve program at Armand Bayou. Agencies concerned with water quality must have appropriate and adequate data to recognize problems, document trends, and recommend necessary corrective actions. The preserve monitoring strategy should reflect an inter-agency assessment of existing monitoring efforts for Armand Bayou under the Statewide Monitoring Network, future monitoring objectives under the Coastal Preserve program (including the need for more

extensive upstream monitoring), specific data needs, and funding requirements to meet these monitoring objectives. The agencies also should explore the potential contributions of citizen monitoring and local government monitoring. Technical assistance and guidance should then be provided. The Texas Water Commission should build on existing efforts to coordinate state agency monitoring programs and standardize techniques to encourage data-sharing. The agencies might use Armand Bayou and other coastal preserves as "pilot" areas for staff training, testing of new monitoring techniques and equipment, and evaluation of monitoring approaches.

Action: *Administrative penalties should be carefully applied to insure compliance with point source discharge regulations in the vicinity of Armand Bayou.*

Involved Agencies:
- Texas Water Commission
- U.S. Environmental Protection Agency

Rationale: Administrative penalties have proven effective and are now a key feature of statewide point source regulations. They also can be an effective tool for protecting coastal preserve areas. Agencies calculate their penalties based on a variety of factors. The involved agencies should consider whether discharge violations in or near a coastal preserve should be penalized at a higher rate than otherwise would be assessed. They also should explore other enforcement options that could be used when administrative penalties would not be effective, especially to address minor violations. One concern with the existing penalty approach is that most of the revenues go back into the state's general fund. Interested parties should investigate the feasibility of having some portion of penalty revenues earmarked for coastal preserve programs, such as ongoing enforcement or routine water quality monitoring. EPA and Texas Parks and Wildlife Department staff have expressed their support for this idea.

Action: *The involved agencies should capitalize on the Coastal Preserve program as an opportunity to improve inter-agency coordination of point source programs.*

Involved Agencies:
- Texas Water Commission
- U.S. Environmental Protection Agency
- Railroad Commission of Texas
- Texas Parks and Wildlife Department
- Texas General Land Office

Rationale: The involved agencies should develop formal cooperative agreements for point source activities that would benefit from improved coordination, such as data collection, monitoring, permit review, and enforcement. Such agreements could be implemented on a temporary basis in the vicinity of a coastal preserve. The lessons learned from this experience could then be used to write improved agreements for statewide implementation. The General Land Office and the Parks and Wildlife Department should work with the Texas Water Commission to establish formal notification procedures for permit applications in the vicinity of a coastal preserve. The Water Commission should notify each agency's Coastal Preserve Coordinator when a proposed or renewing discharge may affect a coastal preserve.

Action: *A formal policy review should be completed to determine how Armand Bayou's coastal preserve status will affect routine point source regulatory procedures in the area.*

Involved Agencies:

- Texas Water Commission
- U.S. Environmental Protection Agency
- Railroad Commission of Texas

Rationale: The involved agencies agree that coastal preserve status should be a consideration in point source discharge permitting. But definite policies and procedures must be established to guide agency staff. For example, EPA staff noted that more stringent permit requirements may be appropriate in the vicinity of a coastal preserve. Other individuals raised the possibility of special use designations or higher standards for waters in, or flowing into, a coastal preserve. It may be necessary to conduct an intensive water quality study and an evaluation of current permits in each coastal preserve area to assess the need for regulatory action beyond existing efforts. This review process should outline various regulatory options and their potential effectiveness. It also should explore under what conditions the permitting agencies would allow no further effluent discharges in the area. EPA staff have expressed their support for the type of formal policy review suggested here, although they advise that the purposes of such a review be clearly defined in advance. [After reviewing the draft of this report, EPA Region 6 staff offered the following comments: "... under NPDES permitting procedures coastal preserve status would have no direct effect on permits. However, applicable water quality standards can and do impact wastewater discharge permits. In order to further address NPDES permit issues in Armand Bayou, the Texas water quality standards should be revised. If the bayou was designated in the standards as

an outstanding national resource water, no increased wasteloads from point sources would be allowed." These are precisely the types of policy-related findings that should be made by each involved agency and communicated to their own staff and to the other agencies. Otherwise, the coastal preserve program will remain a very narrow environmental management effort confined primarily to the Texas Parks and Wildlife Department.]

Action: *The regulatory agencies must be given adequate funding for existing point source programs as well as for new water quality management initiatives.*

Involved Agencies:

- Texas Water Commission
- U.S. Environmental Protection Agency
- Railroad Commission of Texas
- Galveston Bay National Estuary Program

Rationale: The work of the Galveston Bay National Estuary Program will help to highlight funding priorities and shortfalls in existing water quality management agencies. The Estuary Program also can promote the need for adequate funding to improve management effectiveness, especially in the critical area of water quality monitoring. EPA has called for much more comprehensive coverage of minor dischargers under an NPDES permit program administered by the state of Texas, but the Texas Water Commission will need sufficient resources to meet this objective. EPA staff also see a need for increased funding of point source permitting and enforcement functions in their own agency and the Water Commission. If the state and federal governments cannot afford or are not willing to devote more resources to point source regulation, then the involved agencies should decide how resources might be targeted to especially sensitive areas such as coastal preserves. In addition, agency managers must give their field staff clear guidance on whether coastal preserve areas should receive extraordinary attention in terms of monitoring, compliance inspections and other field activities.

Armand Bayou Management Framework:
POINT SOURCE DISCHARGES

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
EPA	1. Clean Water Act: - Water quality standards (Sec. 303) - NPDES permitting (Sec. 402) - Water quality management (various sections) - NPDES enforcement (Sec. 309) - Monitoring (Sec. 106) - Construction grants (various sections)	1. U.S. Congress: - statement of national goals and policy in Clean Water Act 2. EPA Administrator: - Code of Federal Regulations 3. Regional Administrator, Region 6	1. Guidance and funding of state and local water quality management planning 2. Review and approval of state water quality standards 3. NPDES permitting, monitoring and enforcement 4. NPDES toxicity limitations and technical assistance on toxics reduction and regulation 5. Technical support for state discharge permitting programs 6. Permit tracking, compliance monitoring and field investigations 7. Oversight of state water quality monitoring programs 8. Management of EPA and state water quality data with STORET 9. Oversight of municipal pretreatment programs 10. Oversight of state-delegated funding programs for sewage treatment improvements	1. Water Management Division (Dallas): - Water Quality Branch (State Programs and Technical Sections) - Permits Branch (Municipal, Industrial, Toxics Control and Admin. Issuance Sections) - Enforcement Branch - Construction Grants Branch 2. Environmental Services Division (Dallas) - Surveillance Branch (Facilities Compliance and Environmental Analysis Sections)

Armand Bayou Management Framework:
POINT SOURCE DISCHARGES

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
TWC	1. Texas Water Code, Chapter 26	1. Texas Water Code: - statement of public policy 2. Texas Water Commission: - TWC rules in Texas Administrative Code - State Surface Water Quality Standards 3. TWC Executive Director 4. TWC guidance documents	1. State water quality management planning 2. State Surface Water Quality Standards: - designation of beneficial water uses and criteria - antidegradation policy 3. Permitting of municipal and industrial discharges - implementation of state water quality standards (toxics, antidegradation) 4. State Water Quality Monitoring Network: - transfer of data to EPA's STORET database - biennial Texas Water Quality Inventory 5. Monitoring of self-reporting data from permittees 6. Compliance inspections and field investigations 7. Enforcement actions: - compliance conferences - mandatory enforcement based on permittee data - enforcement hearings	1. Executive Director 2. Water Quality Division: - Water Quality Standards and Evaluation Section - Wastewater Permits Section - Wastewater Enforcement Section 3. Field Operations Division: - District 7 Office (Houston) 4. TWC Analytical Laboratory (Houston) 5. Office of Hearings Examiner 6. Legal Division

Armand Bayou Management Framework:
POINT SOURCE DISCHARGES

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
TWC (continued from page 23)			- Commission orders and administrative penalties - stipulated (performance-based) penalties - litigation 8. EPA/TWC Enforcement Agreement 9. "75/90" rule for mandated expansion of treatment capacity 10. Regionalization strategy 11. Special field studies and intensive surveys	
RRC	1. Texas Natural Resources Code, Chapter 91 2. Texas Water Code, Chapter 26 3. Texas Health & Safety Code, Chapter 361: - Texas Solid Waste Disposal Act (Memorandum of Understanding requirement for RRC, TDH, TWC)	1. Railroad Commission - Statewide Rules for Oil, Gas and Geothermal Operations - Statewide Rule 8 (Water Protection)	1. Statewide Rules and RRC orders 2. Permitting of wastewater discharges from oil and gas operations 3. Adoption of Statewide Rule 77 (Discharges to Waters of the State) in anticipation of NPDES delegation by EPA 4. Field monitoring and routine compliance inspections	1. Director, Oil & Gas Division (Austin) 2. District 3 Office (Houston)

Armand Bayou Management Framework:
POINT SOURCE DISCHARGES

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
RRC (continued from page 24)			5. Self-reporting system (quarterly discharge reports to District office) 6. Investigation of complaints and of TPWD referrals under an Interagency Notification Plan for Pollution Response 7. Administrative enforcement steps, including administrative penalties and permit revocation 8. Civil and criminal enforcement actions through the Texas Attorney General's Office. 9. Emergency and minor permits from Director of O & G Division 10. RRC/TDH/TWC Memorandum of Understanding 11. Participation on Texas Groundwater Protection Committee and Toxic Substances Coordinating Committee	

Armand Bayou Management Framework:
POINT SOURCE DISCHARGES

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
HCPC	1. Texas Water Code, Chapter 26 2. Harris County Commissioners Court resolutions	1. Harris County Commissioners Court 2. HCPC Director	1. Routine sampling of permitted discharges 2. Unannounced site inspections of discharge facilities 3. Limited stream monitoring 4. Identification of unpermitted discharges 5. Review of draft permits for discharges 6. Investigation of citizen complaints 7. Civil and criminal enforcement actions	1. HCPC Director 2. Field Investigators 3. Laboratory Analysts 4. Harris County Attorney 5. Harris County Commissioners Court

Management Concern:
POINT SOURCE DISCHARGES

Background

Point sources of pollution emanate from a single defined source -- in the public's mind, usually from the end of a pipe. Examples include effluent discharges from sewage treatment plants and wastewater discharged from industrial sites. Control of these critical discharges has been a top priority of federal, state and local governments since the 1972 passage of the Federal Water Pollution Control Act Amendments, better known as the Clean Water Act. Much of the progress which has been made toward cleaner water over the last two decades has been attributed to regulatory programs that target point sources.

Despite vastly improved methods and capabilities for regulating point sources of pollution, the fact remains that this activity involves direct, concentrated discharges to the nation's waters. As a result, regulatory programs *must* be effective to insure that water quality is not degraded by permitted and proposed discharges into local water bodies.

Nature of the Problem at Armand Bayou

Several recent studies have raised concerns about the poor water quality of Armand Bayou. Some degree of degradation was certainly possible given the dramatic changes in population and land use in the watershed since 1960. The bayou now receives more than six million gallons of treated effluent each day. While consolidations have reduced the number of treatment plants in the watershed from six to three, the total volume of discharges has continued to rise. The proposed expansion of the City of Houston's Metro Central facility to 50-mgd capacity has sparked a debate over the merits and potential impacts of substantial wastewater importing into the watershed. Critics are concerned that inadequate stream monitoring programs will be slow to detect any deterioration in Armand Bayou water quality which may result from such significant increases in discharge volumes.

Key Management Agencies

U.S. Environmental Protection Agency (EPA)

EPA is the lead agency guiding nationwide water quality management, primarily through its funding support and oversight of state water quality programs. It is EPA's responsibility to insure that the states and nation are progressing toward the fundamental goal of restoring and maintaining the chemical, physical and biological integrity of the nation's waters. While the Clean Water Act establishes a goal of zero discharge of pollutants, the practical philosophy behind implementation is that point source

regulations should result in the elimination of adverse impacts from point sources to designated uses of the nation's waters. This should also lead to a level of water quality that will promote human health and the viability of fish and wildlife resources. EPA has four primary tools to achieve its mandates under the Clean Water Act:

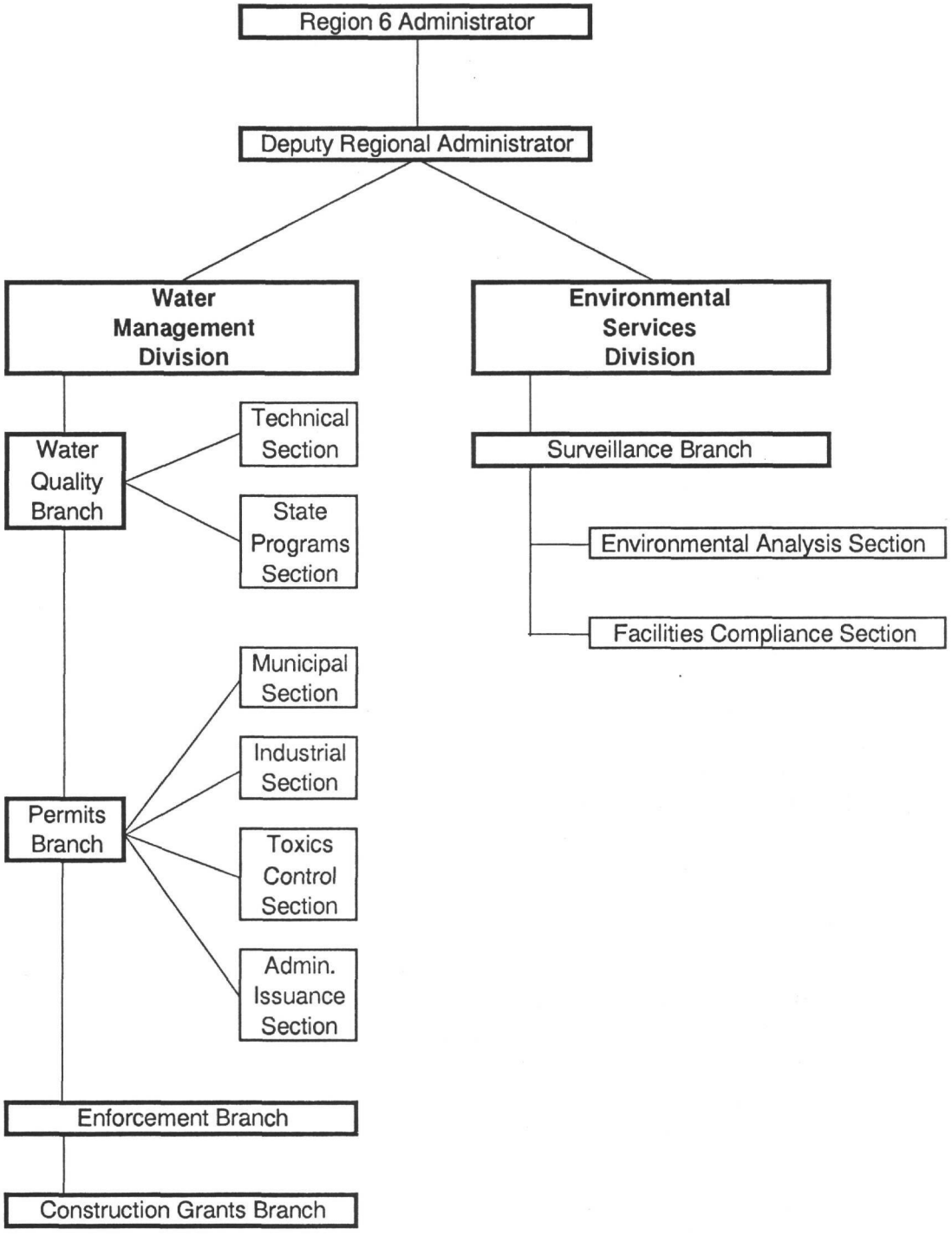
- national clean water standards and implementing regulations
- a national permit program for point source discharges
- federal funding support for enhancement of local sewage treatment capabilities
- support of state water quality planning and management programs

EPA Region 6 personnel administer the agency's water quality and point source programs in Texas. A Regional Administrator manages Region 6 operations in Dallas. He is one of 10 regional administrators who report to the agency's Administrator, based at EPA headquarter in Washington, D.C. The Administrator of EPA and a Deputy Administrator are appointed by the President with the advice and consent of the U.S. Senate. EPA Region 6 covers Texas, Louisiana, Arkansas, Oklahoma and New Mexico. Figure 2 on the next page provides an illustration of the Region 6 program areas that are involved with or supportive of point source regulation. The Water Management Division is the most important of these. One of its chief functions is to advise the Regional Administrator on appropriate goals, objectives and priorities for regional water quality management and point source control efforts.

The Technical Section of the Water Quality Branch helps the Texas Water Commission to develop surface water quality standards for the state. These standards are the first step in implementing the Clean Water Act. The states must review and, if necessary, revise their water quality standards at least once every three years. The Technical Section reviews a draft of the revised standards before TWC distributes them for public hearing and comment. After TWC responds to public input and adopts a new version of the water quality standards, it must seek EPA approval of the updated standards through the Technical Section. If EPA finds that the state's proposed standards are not consistent with national goals under the Clean Water Act, it is authorized to set different standards for the state if the state does not make satisfactory revisions on its own.

The Water Management Division's Permits Branch supervises the necessary administrative, technical and scientific work that goes into issuing an EPA discharge permit under the National Pollutant Discharge Elimination System (NPDES). NPDES permits are required for all pollutant discharges into waterways from specific point sources. This includes outfalls from industry; municipal sewage treatment plants; certain agricultural, forestry, mining and fishing operations; and certain other commercial activities. NPDES permits are issued for five-year periods. The Permits Branch administers the permitting process in each state unless it has been delegated to an EPA-approved state program. EPA still conducts NPDES permitting in Texas, although

FIGURE 2: EPA Program Areas Involved in Point Source Regulation



delegation to the Texas Water Commission is expected at some future date pending further negotiation. It is also possible that discharge permitting for oil and gas operations will be delegated to the Railroad Commission of Texas if EPA conditions can be met. EPA's Permits Branch assumes an oversight and guidance role once permitting is delegated to a state.

The national permitting system includes the following elements:

- nationwide effluent limitations and performance standards for point source discharges
- use of "best practicable technology" and at least secondary treatment of sewage at all publicly-owned sewage treatment plants
- use of "best available technology" for treatment of industrial wastewater
- freedom of the states to set more stringent permit requirements than EPA's maximum guidelines
- prohibition of toxic pollutant discharges in toxic amounts

The Municipal Section of the Permits Branch issues permits for public treatment facilities while the Industrial Section issues permits for commercial and specialized outfalls. In addition to their technical and administrative functions, both sections provide consultation to state agencies, municipalities and industries. The Toxics Control Section develops toxicity limitations for NPDES permits in line with state water quality standards. The Section helps state agencies address toxics concerns, and it works with municipalities and industries to reduce the toxicity of effluent. The Section also oversees municipal pretreatment programs. The Administrative Issuance Section, aside from providing administrative support for EPA's permitting activities, performs internal monitoring of EPA and state permitting activities. It recommends and takes steps to insure that issued permits are meeting agency goals and standards. This Section also makes referrals to the Enforcement Branch as needed.

The Enforcement Branch monitors NPDES permit compliance through scientific and administrative means, including self-reporting data from permittees, as well as through active field investigations of permitted discharge sites. Data on permit requirements and compliance is managed with an EPA database known as the Permit Compliance System (PCS). Compliance staff review and verify all technical and economic data that will be used in enforcement actions or to initiate legal proceedings against an alleged violator. This group also manages the review, evaluation and resolution of permit violations.

While all of the activities described so far are based within the Region 6 Water Management Division, it is EPA's Environmental Services Division that oversees all ambient and source-related monitoring programs (although EPA generally conducts little

ambient water monitoring). The Division's Surveillance Branch coordinates these monitoring efforts in Texas and the region. The Environmental Analysis Section provides oversight of state water quality monitoring and also conducts its own monitoring as needed. State monitoring data is sent to the Section to be added to the Region 6 STORET database. The Facilities Compliance Section performs monitoring and investigative activities at permitted facilities.

The Construction Grants Branch of the Water Management Division supervises two financing mechanisms for local sewage treatment projects: a federal grant program delegated to the states and a revolving loan fund which allows states to make low-interest loans to local governments. These programs are administered by the Texas Water Development Board in Texas, with TWC reviewing and approving all project plans and specifications. The federal construction grants can cover up to 75% of the cost of planning, improving or building sewage treatment plants and sewers. Amendments in 1977 authorized grants covering up to 85% of construction costs if the facility will use innovative or alternative wastewater treatment processes and techniques. While the 1977 amendments delegated the grant program to the states, Congress still must determine the distribution of grant funds among the states. The primary duty of each state is to rank potential projects based on the severity of the pollution problem, the population served, and other factors. The highest priority projects go to EPA's Region office for final review and funding approval. The grant program will soon be phased out and replaced by the state revolving loan funds, which already are operating. These loans also support local treatment facility improvements. Any construction work which is financed through these EPA programs must be consistent with water quality management plans prepared under the Clean Water Act, with special emphasis on regionalization of treatment capacity. Aside from financing guidance, the Construction Grants Branch also provides technical assistance to state, regional and local agencies and internal assistance to the Water Quality Branch. Areas of expertise within the Branch include innovative/alternative treatment systems, conventional and advanced processes, sludge management, and land acquisition and facility relocation.

Finally, EPA provides several types of federal funding support for development of state and local pollution control strategies. As the administrator of EPA's Water Quality Management Program, the State Programs Section provides general guidance and assistance to state agencies such as the Texas Water Commission. The Technical Section offers its expertise in various specialized areas of water quality management, including standards development, permitting and monitoring. Through these cooperative EPA/state efforts, agencies such as TWC are able to develop comprehensive management programs for water quality protection and enhancement.

Texas Water Commission (TWC)

The Texas Water Commission is the lead state agency on water quality matters. The Texas Water Code authorizes TWC to adopt state surface water quality standards and other rules necessary to protect the state's waters, as mandated by the federal Clean Water Act. The Water Code states that:

> It is the policy of this state and the purpose of this subchapter to maintain the quality of water in the state consistent with the public health and enjoyment, the propagation and protection of terrestrial and aquatic life, the operation of existing industries, and the economic development of the state; to encourage and promote the development and use of regional and areawide waste collection, treatment, and disposal systems to serve the waste disposal needs of the citizens of the state; and to require the use of all reasonable methods to implement this policy.

Agency policy, implementing rules, and regulatory decisions are made by the three-member Texas Water Commission. The Commissioners are appointed for six-year terms by the Governor with the advice and consent of the Texas Senate. Point source regulatory efforts are the responsibility of TWC's Water Quality Division, which is one of six regulatory divisions within TWC that report to the agency's Executive Director. The Division's Water Quality Standards and Evaluation Section oversees the development of state water quality standards and supervises the state water quality monitoring network. The Wastewater Permits Section manages the discharge permitting process for municipal and industrial sources. The Wastewater Enforcement Section monitors these discharge facilities and carries out enforcement steps as needed. TWC's Field Operations Division supports the point source permitting and monitoring program through its network of 15 District offices across the state. The District 7 Office is based in Houston, as is the TWC analytical laboratory. TWC is currently expanding its laboratory capacity and moving the facility into the same building that houses the District 7 Office. This will allow closer contact between lab personnel and field staff to coordinate routine work, special studies and field methods.

The Water Commission takes the usual approach to point source regulation that has been implemented across the nation over the last two decades. First, it develops surface water quality standards which formalize the state's objectives by defining the desirable water uses in particular stream segments and the general and numerical criteria that must be met to maintain those uses. Next, it develops and implements pollution control strategies, including permitting of point source discharges, that will help to insure attainment of state water quality objectives. The rigidity of permits in a segment is based on the sensitivity indicated by the water quality standards. Throughout the process, the agency monitors both in-stream water quality and the quality of effluent from point source discharges. This field work enables the agency to take enforcement action against unacceptable discharges. It also helps TWC to evaluate the appropriateness of its existing water quality standards and make needed adjustments. The standards are reviewed and, if necessary, revised every three years as required by the Clean Water Act. This process includes public hearings and official responses to comments received. The new standards, once approved by the U.S. Environmental Protection Agency, are published in the Texas Administrative Code.

Since 1988, the standards have included an "antidegradation" policy that spells out how the Commission will proceed when presented with proposed actions that would increase pollutant loads to state waters. The policy mainly focuses on discharges that have the potential to impair existing stream uses or water quality, but it also calls for cost-effective and reasonable Best Management Practices to address nonpoint sources of stream degradation. The antidegradation policy is designed to provide three increasingly stringent "tiers of protection" for state waters. The first tier requires that existing uses be maintained and protected. The second level calls for the protection of actual water quality where that quality exceeds normal fishable/swimmable criteria. Significant reductions in water quality are only allowed if necessary for "important social and economic development." The third and most protective tier safeguards the state's highest quality waters, which are identified as "outstanding national resource waters." These are located within or adjacent to national parks and wildlife refuges, state parks, wild and scenic rivers designated by law, and other designated areas of exceptional recreational or ecological significance. No reductions in the quality of this water is allowed. Armand Bayou is now a "designated area" under the Texas Coastal Preserve program, but its current water quality probably would not qualify it as an outstanding national resource.

TWC's discharge permitting is coordinated with EPA in several ways. First, under an EPA grant, the Water Commission writes a draft NPDES permit for smaller discharges regulated by EPA. TWC does this at the same time that it is conducting its own technical review of the application and developing a draft state permit. In cases where EPA writes its own NPDES permit, TWC still can provide data on the quality and characteristics of the receiving waters. EPA permits also must be consistent with TWC's Water Quality Management Plan for the state, and the resulting discharge must not undermine state surface water quality standards. TWC certifies that these requirements have been met by EPA by reviewing each NPDES permit and issuing a state certification, conditional certification, or denial. Finally, EPA's permitting staff utilize wasteload evaluations performed by TWC for certain stream segments.

TWC has developed internal standards and procedures for implementing the state water quality standards through its own point source permitting process. While it still must evaluate applications on a case-by-case basis, TWC has attempted to create a consistent approach and framework for permit evaluation. This effort has included the preparation of guidance documents for internal and external use. TWC's technical review period for new permits starts with a site-specific assessment and an examination of background and upstream loads. This initial phase provides the first indication of how the draft permit will need to be written. The decision on the need for an assessment is made in Austin by the Wastewater Permits Section, but the District always has the option of doing one on its own if it is concerned about the receiving waters or particular discharges. Although the District has only limited time and resources to do this type of study, headquarters staff find these field assessments to be extremely helpful. Field staff have extensive training and assessment procedures are well-established to insure that consistent and reliable biological methods are used.

Technical staff examine the in-stream uses, analyze potential impacts of the discharge, consider the applicability of the antidegradation policy, and begin to develop appropriate effluent limitations based on their findings. They also may have considerable information to work with if a wasteload study has ever been done for the relevant segment. Computerized stream models are used to evaluate discharge impacts based on the nature of the effluent and the receiving waters. Field staff conduct site inspections and examine the precise location of the proposed discharge. They also note any problems with the application and provide comments on the draft permit. TWC's regionalization policy requires that the staff highlight opportunities for consolidation of wastewater treatment. TWC's technical reviews increasingly include a toxicological analysis to pinpoint any possible threats to human health or fish and shellfish sanitation from effluent sources. The staff also consider organics and metals in the effluent, although no hard data may be available in the case of a new discharge. If toxicity remains a concern, then TWC can require quarterly or semi-annual testing once the facility is operating. This is usually reserved for major industrial outfalls and domestic plants discharging at least 1 MGD. The objective is to study the beneficial effects of dilution and determine whether water quality standards are at risk. The decision to impose chemical or biological limitations on a major discharge also is a risk-based decision for agency staff. Based on this comprehensive analysis, the permit staff bring the review procedure to a close by exploring treatment system options. Any of the staff's preliminary conclusions may be contested or revised during the public hearing phase.

Upon receiving an application, the Permits Section has 75 working days to prepare a draft permit for the Commission. This period actually must be shortened by approximately 10 days to allow time for inter-agency, intra-agency and District comments. The deadline can always be extended at the request of the applicant, and the clock is put on hold whenever the staff needs additional information. Each industrial engineer within the Permits Section prepares about 30 draft permits a year, while a municipal engineer writes approximately 85 annually. TWC's permit review process constantly evolves, especially after the adoption of new water quality standards and additional technical requirements. Permitting staff note that the process will have to be updated again prior to NPDES delegation from EPA.

Once a permit is issued, TWC monitors the effluent periodically and also receives mandatory self-reporting data from the permittee. The Statewide Water Quality Monitoring Network keeps track of in-stream quality using permanent stations and random samples. TWC maintains a long-term monitoring station in Armand Bayou at Bay Area Boulevard. This location is sampled quarterly for a variety of chemical parameters and for fecal coliform bacteria. An intensive survey of Armand Bayou water quality was last conducted in 1987. State monitoring data is forwarded to EPA for entry into its STORET database. Summaries of this data are compiled every two years and published by TWC in the *Texas Water Quality Inventory*.

TWC staff have between 4000 and 5000 discharge permits to monitor in Texas at any given time. Staff attempt to make an annual compliance inspection of each facility. Although the permittee can anticipate when it is time for the yearly TWC visit, he is

given only a few days' notice, which is not enough time to correct or hide major violations. But these routine visits are announced to give facility managers reasonable time to arrange their schedules and compile the necessary operational records for TWC inspectors. Surprise inspections normally are reserved for follow-up investigations at problem sites. During either type of site visit, TWC staff can quickly spot operational or maintenance problems, and solids or other visual signals may be evident in the effluent.

The self-reporting system allows an automated approach to detecting violations. A computer search of permittee data identifies permit parameters that have been exceeded by 40% or more for four consecutive months. This type of work can be done in Austin, as opposed to violations detected through field investigation. Enforcement hearings are mandatory for permit holders who are substantially out of compliance for four consecutive months. These are conducted by TWC's Office of Hearings Examiners and can result in a Commission order or an administrative penalty. In the case of a less significant violation, if efforts to resolve the matter at the District level are not successful, then the case is referred to Austin enforcement staff for formal action.

Such referrals to TWC's Wastewater Enforcement Section are known as Enforcement Action Requests. Aside from the District offices, these requests are received from elsewhere in the agency and also in less formal fashion from other agencies and private citizens. A coordinator is assigned to each case that requires investigation. The staff begin by studying the history and performance records contained in the facility file. Next, they examine past self-reporting data to determine whether the violation is part of a chronic pattern or only a recent occurrence. If the problem cannot be resolved through a straightforward Notice of Violation letter, then an informal "pre-hearing" session is scheduled with the permittee to gather information. During this meeting, the nature and cause of the problem is discussed, and the permittee is told where the enforcement action is headed -- anywhere from additional paperwork requirements to penalties and major mitigation. This meeting also leads to preliminary technical recommendations and the identification of any studies that should be required of the permittee, such as a groundwater contamination study.

After the investigative work is completed, a conference is held between TWC enforcement, water quality and legal staff. The investigation and conference discussion result in a report to the Executive Director. This report classifies the violation as extreme, moderate or minor. Factors that affect this classification include the "extent and gravity" of the situation, as indicated by the degree of departure from TWC rules, and the impact or hazard it created, as documented through fish kill investigations and similar studies in the receiving waters. The conference participants may recommend that administrative penalties be assessed as high as $10,000 per day. The actual amount is determined using a matrix that allows some flexibility in the size of the penalty based on certain factors. Specifically, the penalty may be adjusted upward as much as 20% based on:

- a history of non-compliance

- the degree of culpability (the permittee's ability to prevent the violation)
- the economic benefit (the "profit from polluting")
- "as justice may require" to deter future violations (this is based on the attitude and cooperativeness of the permittee, but it is rarely used because it is subjective)

The administrative penalty also may be adjusted downward as much as 20% based on the good faith efforts of the permittee before and after the violation occurred. The Executive Director's report contains the final penalty amount as recommended by the staff. TWC also has the option of using "stipulated" penalties. These provide a positive incentive for compliance by making it possible for the administrative penalty to be reduced based on the violator's performance in resolving the problem. It is up to the permittee to accept this alternative. His liability may be less under this approach, but the penalty is automatic if his performance is not up to par. This option also is more of a burden for enforcement staff because it requires more monitoring and paperwork than a basic penalty. If the Executive Director approves the staff enforcement report, then the Legal Division prepares a draft of the proposed Commission order. A settlement conference is then held with the permittee, in which he must agree to the final penalty amount and the required compliance steps. A mutually acceptable settlement is the key since the overriding goal of the enforcement process is correction of the violation, preferably by the party that caused it. A successful settlement also avoids costly and time-consuming litigation. Following the Commission's approval of an order, it is the enforcement staff's responsibility to track compliance.

The Water Commission coordinates its enforcement efforts with EPA through a state/federal enforcement agreement. In addition to written agreements, EPA and TWC staff communicate informally on compliance matters. TWC also works periodically with the Railroad Commission of Texas, the Texas Department of Health, the Texas Parks and Wildlife Department, the various river authorities, and local districts.

TWC has one other tool that helps to encourage dischargers to anticipate their expansion needs and maintain adequate treatment capacity. This is the agency's "75/90" rule. Under this rule, discharge flows are monitored to detect when certain critical thresholds have been reached. When a plant surpasses 75% of its permitted flow for three consecutive months, the permit holder must begin long-term expansion planning. This allows adequate time to explore financing options, including federal grants and low-interest state loans through the Texas Water Development Board. The rule's purpose is to promote advanced planning, avoid plant overflows, and prevent hasty and costly treatment plant construction. In extreme cases where effluent flow goes above 90% for three months, the permittee must begin the expansion process immediately and arrange rapid financing. This regulatory strategy especially benefits cities by forcing them to improve their long-range planning of municipal treatment capacity.

Railroad Commission of Texas (RRC)

The Railroad Commission is an agency unique to Texas. Although the Texas Water Commission is recognized as the lead state agency for water quality protection, the RRC has specific responsibility for prevention of surface and groundwater pollution from activities associated with oil and gas development. Pollution prevention is only part of the RRC's overall regulation of the oil and gas industries in Texas. It also oversees oil and gas production, transportation and conservation.

The Texas Water Code authorizes the RRC to issue permits for wastewater discharges resulting from the exploration, development or production of oil and gas. Discharges approved by the RRC must not reduce the quality of the receiving stream below the surface water quality standards established by the Texas Water Commission. The aim of the RRC's permitting program is to prevent and abate oil and gas-related water pollution through point source regulation. Each issued permit must contain reasonable conditions to keep the waste of oil, gas and geothermal resources from reaching or impairing the state's waters.

The agency is guided by the three-member Railroad Commission, whose members are elected on a statewide basis. The Oil and Gas Division is the largest branch of the agency, and it is responsible for point source permitting and enforcement. The Director of the division is appointed by the Commission. The RRC has 12 districts across the state. Armand Bayou is located within District 3, which is based in Houston and covers the southeastern portion of the state along the upper Texas coast.

In addition to its permitting power under the Texas Water Code, the RRC has authority to adopt and enforce rules and orders under the Texas Natural Resources Code. RRC rules appear in the Texas Administrative Code, and the RRC also publishes them in *Statewide Rules for Oil, Gas and Geothermal Operations*. Like other state rule-making agencies, the RRC adopts its rules according to the Administrative Procedures and Texas Register Act. Agency rules are updated as needed, and all of the existing rules relating to water pollution were revised at some time during the 1980s. Statewide Rule 8, entitled "Water Protection," is the RRC's primary statement of its water pollution prevention strategy. Section 8(b) states that "no person conducting activities subject to regulation by the Commission may cause or allow pollution of surface or subsurface water in the state." The rule also contains the necessary provisions for RRC permitting and enforcement of point source discharges.

Permit applications are submitted to the Commission in Austin and to the appropriate District Office. The Director of the Oil and Gas Division may require an applicant to supply whatever technical information is needed to confirm that the proposed discharge will not cause water pollution. The applicant must notify all surface owners of waterfront tracts between the discharge point and one-half mile downstream. If any of these tracts lie within the corporate limits of a city, then the city clerk or other official also must be notified. In certain cases, the director may require that a river authority or other interested groups receive notice as well. The Texas Parks and Wildlife Department

(TPWD) also reviews and comments on applications when it has concerns. Those agencies and individuals who were notified have 15 days from the date of the application filing to register a protest of the proposed action with the Commission. The Director may administratively approve an application which is not contested. But if the Director decides against administrative approval, or if protests are received, then the applicant may request a public hearing that will allow a hearings examiner to review the permit request. The Director may order a public hearing independently if he determines that this will best serve the public interest. After the hearing, the hearings examiner recommends a final action by the Commission. (For renewals of existing permits, no public notice of the application is required, and the Director may administratively approve the request. The conditions for a public hearing are the same as above.)

The RRC has adopted a new Statewide Rule 77 that contains the necessary provisions to allow the RRC to assume NPDES permitting authority from the U.S. Environmental Protection Agency for oil and gas-related discharges. This rule, entitled "Discharges to Waters of the State," would require more comprehensive monitoring of permitted discharges by the RRC. The rule will take effect upon EPA delegation of NPDES authority to the state of Texas, which is expected at some future date.

The RRC's current field monitoring program emphasizes random sampling, with a goal of visiting each permitted site at least once a month. Under an Interagency Notification Plan for Pollution Response drafted by the Texas Parks and Wildlife Department, TPWD field staff assist with monitoring of discharge sites and refer any apparent problems or violations to the RRC. The RRC conducts field investigations in response to these referrals and any other complaints it receives. In addition to these measures, the RRC requires dischargers to monitor for oil and grease content and submit quarterly reports to the District Office. Any irregularities detected through this self-reporting system also may trigger an RRC site inspection.

The Texas Natural Resources Code outlines the penalties and remedies for violations of RRC rules and permit conditions. The RRC's first enforcement step is to send a notice of violation letter. This letter explains the nature of the problem to the permittee, provides instructions for prompt compliance, and alludes to more substantial enforcement measures should the violation continue. Like TWC, the RRC is authorized to assess administrative penalties of up to $10,000 per day to resolve violations. Factors that may influence the actual size of the penalty include the past performance record of the permittee, the severity of the current violation, the public hazard involved, and the good faith efforts of the permittee to correct the problem. In the most serious cases, the RRC can request that the Texas Attorney General's Office initiate a civil action to recover penalties or obtain an injunction. If an individual willfully commits a violation, or does so with criminal negligence, then criminal proceedings also are possible. The RRC also has power under Statewide Rule 8 to modify, suspend or terminate permits for good cause after public notice and a hearing opportunity. Rule 8 describes six specific factors as constituting "good cause":

- pollution of surface or subsurface water is occurring or is likely to occur as a result of the permitted operations
- waste of oil, gas or geothermal resources is occurring or is likely to occur as a result of the permitted operations
- the permittee has violated the terms and conditions of the permit or Commission rules
- the permittee misrepresented any material fact during the permit issuance process
- the permittee failed to give the notice required by the Commission during the permit issuance process
- a material change of conditions has occurred in the permitted operations, or the information provided in the application has changed materially

The Director of the Oil and Gas Division has some flexibility to respond to unusual situations. He may issue an "emergency permit" valid for up to 30 days if he determines that "expeditious issuance of the permit will prevent or is likely to prevent the waste of oil, gas or geothermal resources or the pollution of surface or subsurface water." Emergency requests are made through the District Office and no notice is required. For extreme emergencies, the Director may accept a verbal application, verbally authorize an action, and issue a written permit after the fact. The same rules for permit modification, suspension or revocation apply. The Director also is authorized to issue a "minor permit" when he finds that only a minor amount of wastewater will be discharged and it will not impair water quality. Minor applications are submitted to the District Office and require public notice unless the Director waives this rule. Minor permits also are valid for 30 days. When a minor permit is issued without notice, the Director may modify, suspend or revoke the permit at any time for good cause without notice or hearing.

The RRC maintains a Memorandum of Understanding (MOU) with TWC and the Texas Department of Health, as required by the Texas Solid Waste Disposal Act. This mandate from the 67th Legislature in 1981 was intended to clarify agency jurisdictions in waste management and regulation, as well as to promote efficient administration and avoid duplication of efforts. The current MOU was signed in December 1987 and replaced the original MOU of January 1982. In between the two, the agencies gained experience in working under the MOU and determined where further improvements and coordination were needed. The Legislature also added new clarifying language to the agencies' enabling statutes. In addition to the MOU, the RRC also coordinates its activities with those of other agencies through its representation on the Texas Groundwater Protection Committee, which developed a statewide Groundwater Protection Strategy, and the Toxic Substances Coordinating Committee, which wrote an inter-agency coordination plan to address toxics pollution and regulation.

Harris County Pollution Control Department (HCPC)

The Texas Water Code authorizes local governments to inspect and monitor those public and private facilities within their jurisdiction that hold Texas Water Commission discharge permits. City and county agencies also may enforce the conditions of state-issued permits. The Texas Health and Safety Code grants similar authority to local governments for local air emission sources (Texas Clean Air Act) and for local landfills and waste disposal facilities (Texas Solid Waste Disposal Act).

The Harris County Pollution Control Department has supervised this function for the county since it was created by the Commissioner's Court in 1953. While the state statutes were meant to encourage local government assistance for state agencies with limited field staff, HCPC also emphasizes its role as the most accessible level of government for citizens with pollution complaints or concerns. HCPC staff also must be prepared to respond to the requests and inquiries of the county's elected officials. The department's current staffing includes an appointed Director, 12 laboratory personnel and 15 field investigators. Other personnel are involved in case preparation, data analysis and other duties, giving the department a total staff of 52. The agency maintains a flexible staffing approach which allows it to shift personnel between functions as needed.

Chapter 26 of the Water Code outlines three basic inspection activities that local agencies may undertake:

- monitoring attainment of state water quality standards in local waterbodies
- identifying unpermitted discharges, and
- monitoring local permit compliance

HCPC performs limited in-stream monitoring of water quality, preferring to focus its resources on sampling of actual discharges from sewage treatment plants and industrial facilities. However, the agency does attempt to monitor nine points along the Houston Ship Channel at least once each month, and it samples six points on the San Jacinto River between Lake Houston and the Ship Channel. The Water Code encourages local governments to make recommendations to the state on appropriate surface water quality standards for area streams based on the results of local sampling.

HCPC has the same power as TWC to enter property. Field investigators make unannounced site visits to inspect facilities, observe operations, and take samples from discharge points for testing. HCPC staff make approximately 5000 - 6000 site visits per year, and lab personnel perform some 150,000 analytical tests annually as a result of this field work. HCPC has about 150 industrial discharges in its jurisdiction that it attempts to monitor every few weeks. Samples are collected from sewage treatment plant outfalls roughly every other month, although the department would prefer to sample more frequently. Like other monitoring agencies at the state and federal levels, HCPC is

increasingly mindful of toxics and metals in sampled discharges. Irregularities and permit violations are reported to TWC.

The Water Code gives HCPC legal standing to pursue independent civil and criminal actions against alleged violators. Like the Water Commission, HCPC may file suit in District Court to argue for injunctive relief, civil penalties, or both. This action may be taken in response to a violation or in anticipation of one. But considerable preparation must be done before a case goes to court. Unacceptable sampling results trigger further field investigation and lab analysis. If a violation is confirmed, the Director signs a notice of violation letter which details the situation and requests a response on how the permittee will correct the problem. Staff also examine whether the violation was an unusual lapse, perhaps caused by extenuating circumstances, or part of a pattern of non-compliance. Although most violations detected by HCPC are minor, the agency must decide whether to use litigation if its preliminary enforcement steps are not effective. At that point, the County Attorney is notified and a case is developed using HCPC field data and investigative findings. If a record of non-compliance can be documented, then the Harris County Commissioners Court is asked to authorize a lawsuit against the alleged violator. Such authorization by the local governing body is required under the Water Code. Upon approval of a resolution, the County Attorney prepares a legal brief and requests that the case be placed on the District Court docket. The Water Code refers to TWC as a "necessary and indispensable party" to any local lawsuit. Its required involvement is sometimes delegated to the Texas Attorney General's Office. HCPC staff say that the state has been more active in recent years and has become more knowledgeable about local cases.

In addition to its monitoring of current permitholders, HCPC reviews and comments on new applications for TWC discharge permits. HCPC staff review 400 - 500 draft permits each year. The staff advises TWC on potential problems and downstream impacts based on their knowledge of the vicinity. The agency also has standing to appear at TWC hearings as needed.

Management Evaluation Findings

1. *Agency managers are deeply concerned that the combination of lean government budgets and expanding regulatory mandates for their agencies will create an unbearable administrative burden, force undesirable trade-offs, and -- worst of all -- threaten twenty years of water quality progress achieved through effective point source regulation.*

   A basic water quality "infrastructure" has been built over the last two decades, resulting in significant momentum toward cleaner water. Agency managers emphasize that the existing procedures for development of water quality standards, permitting of discharges, and monitoring and enforcement to insure compliance are in place, functioning and largely successful. (One significant exception, say critics, is the Texas Railroad Commission's "tidal disposal permits" for produced waters in

coastal streams, bayous, and other areas with limited flushing.) Their greatest fear is that new areas of regulation, while welcome and much needed, will divert attention from and even lead to cutbacks in the current water quality infrastructure.

Agencies already have had to streamline their operations in response to earlier state and local budget shortfalls. They are concerned that they will not receive sufficient funding and staff for these new tasks and will be forced to shift resources from existing agency functions. They point out that many of the latest programs will require the hiring of specialized staff, not to mention the additional record-keeping and administrative demands involved. Increased complexity in the laws and regulations also tends to add to the time pressures already faced by technical staff.

The Texas Water Commission's District staff cite one example of potential slippage. Each year they must complete a certain number of inspections as a condition of their federal funding from the U.S. Environmental Protection Agency. The Water Commission has attempted to go beyond these minimum federal requirements and achieve 100% inspection coverage of all permitted facilities. However, the District staff estimate that they went down to 75% coverage during 1990 in anticipation of an expanding workload. The staff also emphasize that they must always use their resources first to complete their mandated tasks -- to "make the numbers," so to speak. Any remaining time and funds can then be devoted to follow-up work, in-depth studies, and complaint investigations. It is the "little things" the staff manage to do that will be squeezed out if their worst fears about agency funding are confirmed.

The Water Commission's Wastewater Permits Section also had a busy year in 1990. Due to the permit workload, a conscious decision was made to start carrying a backlog of applications to be reviewed. The Permits Section did not believe that it was being as thorough in its permit reviews as it needed to be, and this was a source of frustration for the staff. While promptness is still a priority, the staff have been instructed to emphasize high-quality permits over timely but inadequate permits. According to the permit staff, the area that will suffer most under the backlog is permit renewals. They do not expect any serious problems except that the longer it takes to process a renewal, the longer those facilities will be operating below the latest standards. The key for management is that renewal applications are predictable -- they come in as existing permits near expiration -- but applications for new permits cannot be anticipated. The underlying concern is that such a backlog had to be accepted even *before* NPDES delegation to the Water Commission.

At the local level, Harris County Pollution Control staff speak of the increasing burden of hazardous waste regulation and the cost in both time and money of responding to illegal dumping. The department would prefer to devote more resources to stream sampling, lab analysis, and special studies relating to point source impacts -- things that it was able to do much more extensively and effectively in the past.

While EPA Region 6 staff appreciate these resource limitations, they say that NPDES delegation will require that TWC substantially increase its permitting, compliance and enforcement staff. They also expect the effectiveness of NPDES permitting to increase after delegation since TWC has considerable experience in issuing permits to and monitoring a variety of dischargers. TWC staff have noted that consolidation of permitting authority under TWC will simplify the process for the regulated community by eliminating the need to apply to both TWC and EPA. Region 6 staff point out that EPA will continue to perform a regulatory compliance review on every discharge permit that the TWC intends to issue. EPA will also provide NPDES enforcement support, primarily by continuing to conduct its own spot inspections and by initiating enforcement actions in cases where state action has not been appropriate or effective.

[EPA Region 6 staff, after reviewing the draft of this report, emphasized that they disagree with this finding. They noted: "There have been increasing resources devoted to nonpoint source programs in recent years, but these have not been provided at the expense of resources traditionally available for management of point sources." EPA staff concluded that there is an apparent difference of opinion between their position and the concerns of staff at other agencies about future trends in funding and legislative support.]

2. *Regulatory agencies are worried about deterioration in the quantity and quality of water quality data.*

Texas Water Commission staff are increasingly having to make regulatory decisions without a comfortable base of supporting data. In fact, some local pollution control officials question how the Water Commission can make judgements on water quality with current data inadequacies. Reductions in federal funding and mounting pressures on state legislatures have constrained data and research budgets and even led to cutbacks in some areas. Agency managers faced with tight budgets of their own have had to make tough choices. Data programs have not fared well under such forced priority-setting.

However, managers are now realizing that such neglect of data collection and analysis programs has been costly. Data inadequacies are reaching a critical point in some agency operations. In response, TWC's Wastewater Permits Section now includes many more questions on its application for discharge permits, including numerous items that require much more documentation than in the past. This has shifted the information and data-gathering burden from the permitting agency to the applicant. This change makes the process more difficult for new applicants who do not have existing performance data to submit as would an applicant for renewal. But EPA supports such efforts to "internalize" the costs of pollution prevention among those who potentially contribute to the problem. TWC's Permits Section also welcomes and utilizes any background information that District staff can provide, although their ability to contribute in this way may be limited, as noted above. Despite criticism from environmental advocates, the permit staff say that they are

maintaining a "conservative" approach -- no permitting standard is lowered unless the applicant can provide convincing data and field testing of his own.

While managers sometimes accuse their technical staff of never being satisfied with any amount of data, the managers agree that there is a definite need, especially in newer and more complex areas of regulation such as toxics, advanced wastewater treatment, and nonpoint source pollution.

3. *Some critics believe that there are inherent weaknesses in traditional engineering-based approaches to point source discharge permitting which undermine environmental protection objectives.*

These critics emphasize the differences between biological methods, which are more dependent on field investigations, and "arm chair," engineering-based reviews of proposed discharges. The latter method relies on engineering models which analyze mixing zones, wasteload evaluation results, and other technical information. Water quality staff then use the models as an analytical tool to assess and predict stream conditions and discharge impacts. While the computer models used by permitting agencies are increasingly sophisticated, the critics point out that the models do not include critical parameters such as nutrients and toxicants and therefore do not adequately predict biological impacts. They say that, under current regulatory practices, it is common for permit criteria to be created and followed, yet the receiving waters still demonstrate moderate to severe impacts. A related problem is that the application of water quality standards using only a few select parameters has not prevented the degradation of receiving waters. The critics also target the lack of methods to determine cumulative ecosystem loadings for appropriate parameters.

Agency staff point out that the next best alternative to stream modelling would involve intensive field monitoring, which, as discussed elsewhere, is too costly to justify. Texas Water Commission staff note that while modelling is imperfect, it is still predictive whereas monitoring is reactive and only reveals problems that already have occurred. And while inadequate monitoring limits the amount of empirical data that is available for use in the models, technical staff can take advantage of sampling data that permittees may be required to submit under the terms of their discharge permit. Wasteload projections prepared by TWC and other agencies also are helpful to the modelling process. However, critics maintain that the overriding problem with current engineering models is that they do not include all parameters that exert impacts in the actual receiving waters.

Given budgetary realities, technical staff must do what they can to build up a base of knowledge about a stream or water body. They admit that it is often a learning process. Over time, staff come to understand how a particular stream responds to discharges and what its limits are. Unfortunately, this is a prime example of what is lost through frequent staff turnover.

4. *There is broad agreement that stream monitoring is the most direct method for assessing water quality progress, but extensive monitoring is costly and difficult to defend in tight budgetary times.*

Each phase of the point source regulatory process -- from standard-setting to permitting to enforcement -- depends on field data to some extent. Texas Water Commission staff agree that existing monitoring efforts are clearly inadequate, and they have been hurt even more by recent cutbacks. In the case of Armand Bayou, the current amount of monitoring is considered to be especially low given the number of permitted discharges into that segment. The result is insufficient data to monitor trends, assess impacts, and draw scientific conclusions. Infrequent and spatially dispersed monitoring also limits TWC's ability to detect sudden contamination of water bodies. The agency must rely on its self-reporting system, under which permit-holders are required to report unintended, unpermitted discharges. This is not a guaranteed system, and its use for enforcement purposes underscores the importance of receiving reliable data from permittees. TWC's enforcement staff add that, without adequate monitoring data, it makes it more difficult for them to trace and prove negative stream impacts from an alleged violator. Harris County Pollution Control staff emphasize the need to have a solid base of evidence for successful prosecution of violators.

A key obstacle to expanded monitoring is simply its cost. Regular monitoring is a time-consuming and labor-intensive process. These factors are exascerbated by the sheer size of TWC districts and the number of streams and water bodies that must be covered by limited personnel. A more formidable barrier, according to agency managers, is the very nature of the program. Stream monitoring is a long-term, esoteric agency function with ambiguous benefits. This makes it very difficult to defend before a Legislature that is already under extreme budgetary pressures. Legislators quickly want to know how a program contributes to solving some problem, but any discussion of monitoring and its uses requires a lengthy, and probably unsatisfying, explanation. Even more damaging is the fact that it may take five to ten years, or even longer, for a body of monitoring data to become useful. Under these circumstances, stream monitoring programs are vulnerable to quick budget cuts and diminishing political support. Yet critics maintain that poor system design is as much a factor in inadequate monitoring as is diminished funding support. (For example, they note that current monitoring strategies do not allow for effective tracking of cumulative ecosystem impacts related to particular parameters.)

The dilemma is that agency staff view stream monitoring as the best, most direct way to gauge the effectiveness of water quality programs. But current levels of monitoring often do not yield sufficient data to allow such judgements. Faced with these difficulties, agencies must look to other measures of progress. Self-reporting data is a starting point, as mentioned above. Agencies also try to tap into the data resources of other agencies and institutions, such as universities. There are also gross indicators of water quality, such as reductions in fish kills or even the return of fish to a water body that previously had been too polluted to support aquatic life. In

addition, field staff can make certain preliminary judgements about water quality just by looking at a water sample. More sophisticated options include the biological analysis of certain sample species to check for the presence of contaminants, a method increasingly being used in tidal streams. Unfortunately, while biological/ecological analysis can be cheap compared to chemical analyses, it also can be time-consuming for field personnel. In addition, while it often is a very effective indicator of impacts to receiving waters, biological sampling remains a *gross* indicator because findings in the field are not easily related to individual permit criteria. Besides it own field techniques, TWC is also exploring more effective use of river authorities and other existing entities in the data collection process. Finally, illegal discharges can normally be discovered through fish kills, citizen complaints, and sometimes by sheer coincidence in the field.

In addition to these efforts, an inter-agency group in Austin is exploring the possibility of instituting standardized sampling methods and coordinated staff training between relevant state agencies. This group includes representatives of TWC, the Texas Parks and Wildlife Department, the General Land Office, and the Texas Department of Health, and the EPA also is sitting in. Staff emphasize that coordination of sampling always has been difficult because of the different data needs and regulatory concerns of the various agencies. For example, TPWD tends to do more random sampling compared to TWC's fixed-location monitoring. TWC also focuses on water quality itself while other agencies are more concerned with the impacts of water quality variations. Nonetheless, the Water Commission has been able to pattern some of its gear and techniques after those of TPWD. The hope is that this standardization of techniques and training will promote greater sharing of data and inter-agency assistance in sampling.

Some people place great faith in the ongoing development of a statewide citizen monitoring network under the supervision of the Texas Water Commission. It is seen as the best opportunity to increase the flow of valid data from the field. By training citizens to do voluntary field work, TWC officials believe that they can take advantage of local knowledge of waterways and increase the agency's visibility through citizen involvement. But some staff are hesitant about citizen-based programs, primarily for the same types of reasons that undercut monitoring in the state budget process. Effective monitoring requires a long-term and unflagging commitment. Each new monitoring point that is established must be maintained and checked regularly over a period of years for the resulting data to be meaningful. Aside from the question of motivation, these staff members are concerned that volunteers will lose interest if rewards -- in the form of improved stream conditions -- are not soon evident, for whatever reason.

EPA staff advise local governments to protect their own interests by doing as much local monitoring as they can afford, especially upstream and downstream from potential problem discharges. Rather than rely on the irregular sampling of other agencies, cities should aggressively monitor on their own to protect their investments in treatment plants and technology and to establish the need for

pretreatment of certain discharges and for enforcement action against others. EPA also points out that state water quality agencies can "internalize" the cost of monitoring by requiring municipal and industrial dischargers to handle more of the burden themselves, something that TWC already does through its permit conditions.

[EPA Region 6 staff, following their review of the draft of this report, expressed concern about the "strong emphasis on inadequate monitoring data as a primary regulatory issue." They offered the following comments: "We agree that more data is needed and will be useful in ultimately solving problems in the Armand Bayou and Christmas Bay Coastal Preserves. However, some of the problems (dissolved oxygen fluctuations in Armand Bayou) and causes (nutrients/point sources/nonpoint sources) are fairly obvious, indicating that some corrective actions can and should be taken soon. We do not agree with a primary focus on monitoring needs at the expense of a more action-oriented focus."]

5. *There are clear opportunities for better coordination of point source regulatory efforts between state agencies and between state and local agencies.*

At the state level, the consensus appears to be that inter-agency coordination and communication was more effective under the former Texas Water Quality Board, one of the predecessors of the Texas Water Commission. All of the relevant agencies had representatives on this board, and they met on a regular basis. By comparison, agency staff indicate that communication between some key agencies is almost non-existent today. The use of inter-agency advisory committees on various projects and studies is one sign of improvement. There also is more attention to coordination of field activities, such as joint TWC/TPWD investigations of fish kills. But the difference remains that these contacts are sporadic and narrowly focused compared to the routine cooperation under previous arrangements.

A more fundamental problem at the state level, according to critics, is that there is a significant discrepancy between permit criteria of the Water Commission and the Texas Railroad Commission. They point out that discharges permitted by the RRC are not sampled frequently enough, receiving water impacts are not monitored, wasteload evaluations are not conducted, toxicity testing is not required, and parameters other than oil and grease are not analyzed. The result, say the critics, is that receiving waters in the vicinity of produced water discharges routinely exceed water quality standards, leading to toxic impacts in a number of cases.

Potential coordination of monitoring, data-gathering, and enforcement efforts also appears to be lacking between the Texas Water Commission and local pollution control agencies. There is a clear overlap to the extent that the various agencies are monitoring and inspecting the same sites. Local agencies also base their enforcement actions on the requirements of state-issued permits. For this reason, TWC staff are concerned that they do not always receive notice of violations from local enforcement agencies. When agencies do refer violation cases to one another, it appears that they only intend to pass the enforcement work along, not work

together on it. It is apparent that local pollution control agencies and TWC District staff prefer to resolve as many local violations on their own as they can. While this independence does not promote coordination, it does allow state enforcement personnel to reserve their energies for the major cases that cannot be handled locally. Finally, the Water Commission and EPA also would prefer to have greater access to the wealth of data collected by local agencies during their near-monthly sampling of permitted discharge facilities. Permitting and enforcement staff especially value the insights and field knowledge of local pollution control agencies.

Even at the local level it appears that earlier instances of successful coordination have since faded away. Staff at the Harris County Pollution Control Department speak of a "gentlemen's agreement" a number of years ago that had the County collecting water samples and the City of Houston performing the lab work and returning the results to the County. This arrangement benefitted both parties because the County was relatively rich in field staff while the City had superior lab facilities. Unfortunately, this cooperative effort collapsed when the City of Houston decided to start billing the County for lab time and the County balked. It appears that funding considerations ended up killing a workable city/county pollution control partnership, even though the agencies probably duplicate efforts and spend even more today by operating independently. HCPC staff also emphasize the need to "heed your own bosses," which limits the ability of some agencies to enter into such agreements, especially with other levels of government.

Although the results of TWC water quality monitoring are sent to EPA for use in its STORET water quality database, agency staff believe that other aspects of TWC monitoring and EPA oversight could be coordinated more effectively.

6. *Some Texas Water Commission staff express concerns about the occasional permit case that is perceived by the public and the staff -- whether rightly or wrongly -- as being overshadowed by political considerations.*

Politics are an inevitable part of a permit issuance system that depends on a board of political appointees for final decisions. What worries some staff members are the damaging effects on morale that can result from controversial cases. Technical staff have obviously made a commitment to public service, but they can be lured away at almost anytime by the higher rewards of private-sector employment, especially in major job markets such as the Houston or Austin areas. It is feared that such frustration only contributes to the "brain drain" that already plagues many public agencies. What is notable is that these complaints appear to reflect a sincere concern for the agency's reputation before the public and a personal commitment to effective environmental protection.

The Water Commission's permit staff are more concerned about pressures they receive from citizens who are unhappy with the process. Too often TWC's critics do not seem to understand that the staff cannot hold up a permit -- they can only make recommendations to the Commissioners. Staff suggestions and the conclusions of

the hearings examiner are not always heeded, but the staff takes heart from those instances where substantial changes have been made to permits based on staff input. In addition, permit staff say they sympathize with the field staff, whose first concern is the difficulty of enforcing a borderline permit. When the staff sense that a controversial permit is going to be approved despite staff findings of potential significant impacts, they sometimes offer the Commission a minimum set of permit provisions that should be included in the event of an approval. In general, the staff emphasize that state and federal laws require them to write permits that will uphold state water quality standards. The new antidegradation policy contained in the water quality standards also constrains the Commission. Unfortunately, the staff often must deal with charges of incompetence from critics who rail against the alleged failures of TWC "bureaucrats." It is this emotionalism during and after hearings, and the lack of simple respect from some members of the public, that can undermine the enthusiasm of agency staff.

Staff also worry that the increasingly technical nature of the regulatory process creates another barrier between agencies and the lay public. As a result, agencies must devote more time to developing readable narratives and explanations of regulatory procedures.

7. *The authorization of administrative penalties for the Texas Water Commission was a significant accomplishment in itself, and the speedier imposition of penalties for discharge violations has proven to be an effective enforcement tool in many cases.*

Enforcement staff are pleased with their relatively recent authority to impose administrative penalties on point source violators. Prior to the authorization of these penalties in 1985, the Water Commission had only two options for dealing with violations: negotiate a compliance schedule and settlement, or initiate legal action against uncooperative, repeat, or large-scale violators. Both paths could be time-consuming and were vulnerable to stalling and delaying tactics. The process also depended on the voluntary cooperation of the violator. Only after giving the offender a chance to negotiate and be cooperative could TWC pursue legal action. At that point, of course, TWC was at the mercy of an overloaded court system and a state Attorney General's office with a substantial caseload of its own.

With its new authority, TWC now has a powerful tool to encourage more prompt compliance and meaningful negotiation. Aside from taking effect much faster than earlier enforcement remedies, administrative penalties are flexible. Penalties can be adjusted to reflect any extenuating circumstances surrounding the violation as well as good faith efforts on the part of the violator to resolve the situation. Stiff administrative penalties also draw attention, both from the violator and from the regulated community and the public. Local pollution control officials agree that administrative penalties give the state much more leverage in enforcement compared to their own reliance on lawsuits. Aside from the typical grinding pace of the judicial system, officials say that pollution cases are not receiving the preferential court scheduling that they once did. They note, however, that this sometimes can

work to their advantage since companies may be motivated to settle quickly, resolve the matter, and limit their costs. But local pollution control officials still would prefer even quicker resolution of state-enforced point source violations. Because of the continued emphasis on negotiation and cooperation, they are concerned that the enforcement process still takes time, especially when court action finally becomes necessary after unsuccessful negotiations.

Concerns also are heard about the "closed-door" nature of TWC compliance negotiations and settlement conferences. Some environmental advocates argue for a more open process, with earlier and more frequent opportunities for public input. As it stands, citizens and interest groups must wait for the matter to reach the Commission before they can have any official input. These critics complain that by this point the settlement often is effectively in place and only needs summary approval by the Commission. The public is at a great disadvantage by not knowing what issues were discussed during the negotiations and what conclusions already were reached. The burden is on the opposition to establish why the outcome of a lengthy negotiation and settlement should be revisited or further delayed. Despite these criticisms, TWC enforcement staff are committed to their view that contested enforcement hearings would not yield much different results. They note that TWC pursues clear enforcement objectives and places a high priority on mitigation. Most of all, they fear any added delay in gaining effective compliance.

TWC staff worry most about the small percentage of cases where administrative penalties are ineffective. These occur at either end of the point source spectrum: small towns that would only be devastated by a sizable fine, and major dischargers who are relatively unfazed by penalties that can only reach a maximum of $10,000 per day. Enforcement staff wish that they could boost the fines in these latter cases, and they are wary of the potential violator who, after weighing his relative costs, may conclude that he is better off paying the "price" to continue polluting.

Enforcement staff frequently hear the argument that money set aside to pay fines could be better spent on mitigation efforts to bring a discharge into compliance. While staff reject this reasoning, they are concerned that most of the monies collected through administrative penalties now go into the state's general revenue, with only a small percentage going back into enforcement. The staff would prefer to see more of the money channeled toward projects to benefit the local community that was impacted by the pollution, as well as for general environmental education.

8. *Streams, bays and estuaries are complex, dynamic natural systems, and regulatory agencies can never achieve perfect knowledge and understanding of them. This fact underscores the importance of prior research and problem identification to insure effective regulatory action.*

Agencies and their critics -- and even colleagues within the same agency -- sometimes disagree on even the most fundamental questions: In what ways do point source discharges impact natural systems? How effective are existing regulatory

strategies in minimizing negative impacts? Is progress being made toward improved water quality? Agency staff point out that even such crucial terms as "pollution" and "progress" are interpreted differently.

This is the challenging technical environment in which regulatory agencies must operate. Individuals within and outside the regulatory framework have varying levels of expertise and field knowledge. Where some people are unwilling to draw conclusions in the absence of sufficient data, others are quick to theorize about cause and effect and then demand regulatory action, despite criticism about oversimplification. It is this uncertainty and lack of consensus that is increasingly leading agencies (and others) to demand solid scientific support for regulatory policies and strategies.

Armand Bayou provides a fitting example. Agency staff point out that the Armand Bayou stream segment is already protected by some of the most stringent point source discharge requirements in the state, especially with regard to municipal treatment plants. The area also benefits from a regional waste disposal authority which treats industrial wastewater. Yet, there is evidence that Armand Bayou water quality is still poor. Different people have different ideas of what the problem might be, so a key first step must be intensive study to confirm specific problems that can be addressed effectively through regulation. Because of the way that agencies are organized, they also must know *who* should take action. For example, point source staff emphasize that they can only become involved if a permitted facility is behind the problem.

TWC staff confirm that the Bay system's complexity and dynamism also complicates the selection of sampling sites and frequency. Perennial disagreements over sampling strategy, combined with inadequate funding to allow coverage of all desired sites, makes advanced planning of monitoring efforts crucial.

[Upon their review of the draft of this report, EPA Region 6 staff offered the following comments: "Focus on the complexity of the system and the need for ever-better technical information can result in potentially endless delay of actions. Certainly there is a need for sound technical information. However, in some cases, relatively simple information is sufficient to document a problem, and to some extent, causes as well. Existing information fairly clearly documents that there is a dissolved oxygen problem in Armand Bayou, and it is at least partially caused by nutrient inputs. Furthermore, Armand Bayou is a small, sluggish water body, with limited ability to assimilate organic waste and nutrients. Therein lies much of the environmental problem for Armand Bayou."]

9. *Aside from the economic incentives to "regionalize" wastewater treatment, agency staff emphasize the management benefits of plant consolidations.*

The Clear Lake City Water Authority and the Gulf Coast Waste Disposal Authority have spearheaded the consolidation of small treatment plants in the Clear Lake area.

In addition to the potential economies and technical superiority of regional facilities, agency staff point to the management advantages of regionalization:

- better-trained, round-the-clock staffing at large facilities versus small domestic plants
- fewer total discharges into receiving streams, which automatically limits the number of locations where mistakes or unpermitted discharges can be made
- fewer facilities for regulatory staff to monitor, allowing better coverage of permitted discharges (Harris County Pollution Control staff also cited this, saying that they would prefer to sample treatment plant outfalls more often than they currently can afford)

These plusses take on even greater importance during times of restrained government spending. Texas Water Commission staff also emphasize that operators of sewage treatment plants across the state are continuing to upgrade their facilities and make them capable of advanced levels of treatment. Regionalization contributes to this trend by encouraging the phasing out of older, inferior plants and the targeting of investment to state-of-the-art regional plants.

10. *Regulation of point source discharges is not a static process, so agencies must be flexible.*

All phases of regulation -- including standard-setting, permitting, and enforcement -- must adjust to dynamic stream conditions, emerging pollution control technologies, and changing environmental objectives. Therefore, ongoing evaluations of the process should probably focus on how well and how quickly the regulatory agencies make such adjustments. A key factor is the quantity and quality of data and reliable knowledge that the agencies can tap to make intelligent adjustments. To the extent that agencies do not believe that they have adequate resources, such adjustment is hindered. Agency flexibility also depends on the ease of internal communication, especially from the field to headquarters. The Water Commission's permit staff emphasize that any special concerns raised by District personnel during the review process become priority items before a final decision is made.

As another example of ongoing adjustment, the Permits Section points to the frequent revisions it must make to its discharge permit application form. The form underwent a major overhaul in 1988 after new, more complex state water quality standards were adopted. Another revision was needed just over a year ago to incorporate new informational needs, and another version of the application form is anticipated soon to reflect the latest NPDES requirements. Newer applications also inquire more extensively about existing service areas and nearby facilities to

evaluate regionalization opportunities, which reflects an increasing policy concern for consolidation and efficiency in wastewater treatment.

Flexibility appears to be greatest among local pollution control agencies since they can shift their enforcement staff and energies relatively quickly. This is a reflection of their limited role -- they are not saddled with permitting, standard-setting, or policy-making responsibilities.

11. *Agency staff are uncertain what impact the designation of Armand Bayou as a Texas Coastal Preserve may have on existing point source regulatory procedures in the watershed.*

Staff are not sure whether Coastal Preserve status will lead to a restriction of activities, including point source discharges, which would normally be permitted. One possibility is that permit application reviews and permit conditions will somehow become more strict within a Coastal Preserve -- a change that some staff would favor. It is also possible that current opportunities for resource agency comments on permits might somehow be formalized, perhaps to highlight the input of the Texas Parks and Wildlife Department, with its habitat protection perspective. These are the types of issues that are already being discussed between the Texas Water Commission and the Parks and Wildlife Department. TWC permit staff emphasize that under no circumstances should a point source discharge harm aquatic life. However, critics maintain that this happens frequently under current permitting methods. They argue that biological impacts, which are especially critical in estuaries and coastal waters, cannot be addressed adequately with engineering models, a few traditional standards and permit criteria, and a lack of cumulative impact assessment.

Most staff agree that it is difficult to comment on the Coastal Preserve program when they know so little about it. Agency managers predict that, at least in the short run, the designation will have little effect on their day-to-day operations and existing programs. They are eager to see what the Parks and Wildlife Department will propose in its draft management plan for the Preserve. Then they will be able to evaluate the Coastal Preserve concept more carefully. In the meantime, some question the value of such a limited preserve area. They also wonder whether upstream activities will be impacted by the new program if the quality of the flow entering the preserve is to be a priority.

Some see the Coastal Preserve program as an opportunity to focus greater attention on discharge problems at oil and gas sites. TWC's District staff see it as yet another layer of protection for Armand Bayou. They also emphasize that, aside from the extraordinary attention paid to Armand by the state, District staff are especially aware of the bayou since many live and work near it and are active at the Armand Bayou Nature Center. Harris County Pollution Control staff suggest greater attention to major dischargers and to all tributary activities upstream from the Preserve, including nonpoint source runoff.

Chapter Three
STORM WATER RUNOFF

Summary of Findings

1. *The existing water quality management framework is focused primarily on point source regulation, so the involved agencies are still adjusting to a new, expanded, and more complex management role.*

2. *The greatest concern surrounding the NPDES storm water program is whether the management agencies are prepared for the administrative burden they will face.*

3. *The complexity of the NPDES storm water program is being compounded by the degree of uncertainty surrounding various aspects of the program.*

4. *There is concern that the management agencies do not have adequate data on nonpoint source pollution -- or on how certain activities contribute to runoff contamination -- to undertake effective regulation.*

5. *The Texas Water Commission's Municipal Water Pollution Control and Abatement Program is expected to bring important benefits in the area of nonpoint source pollution, but the agency still has not resolved what the program will require of Texas cities.*

The U.S. Environmental Protection Agency is still in the early stages of implementing its storm water permitting rules as mandated by the Water Quality Act of 1987. Local governments are scrambling to adjust to this new water quality management framework. EPA recently moved back its group application deadlines, reportedly at the request of a number of U.S. senators who were concerned that affected governments and industries in their states needed more time to determine their status under the new rules, possibly organize groups, and prepare their NPDES (National Pollutant Discharge Elimination System) applications. The current rules focus primarily on the procedures for obtaining an NPDES permit, so there is still much to be learned about how local management programs will operate once permits are issued.

Many cities and counties have existing laws which prohibit non-permitted discharges or dumping of waste into water bodies, storm sewers, drainage channels and similar facilities. But under the NPDES permitting program, EPA is calling for much more elaborate local management strategies that will draw many more elements of urban society into the task of *preventing* storm water pollution rather than responding to it. It is the complexity and expected cost of this mandate that worries local government officials and staff. Some also worry that the demands of storm water management will divert resources and attention away from established point source programs, which will always be an essential part of water quality management. The local strategies that emerge probably will emphasize voluntary compliance through "non-structural" techniques, such as educational programs and promotion of Best Management Practices. However, some degree of regulation also is likely. Nonpoint source specialists have long advised that fundamental changes in individual "polluting behavior" would be necessary to make significant progress toward improved urban water quality.

Several of the largest governments in Harris County have organized a task force of key personnel to guide their jurisdictions through the permitting process. Harris County and the cities of Houston and Pasadena are studying their options under the NPDES program, and it appears that at least the county and the City of Houston will join together in a group application. Because Pasadena and Houston account for a large portion of its watershed, Armand Bayou will be among the first areas in the nation where NPDES storm water management strategies are implemented.

Some water quality managers see the current clamor over storm water regulation as a replay of initial reactions to fledgling point source controls two decades ago. These optimists emphasize the importance of a long-term perspective. Great difficulties were predicted for point source regulation, and some even considered Clean Water Act implementation unworkable or of questionable value. They believe there is little doubt today that point source controls were a worthy investment. The challenge at this stage is to convince local elected officials, business owners, developers and individual citizens that they all have a role to play in pursuing pollution-free water.

Despite the anxiety and confusion generated by EPA's storm water regulations, the greater challenge in coming years will be the control of truly diffuse nonpoint source pollution that is *not* captured by drainage systems. The storm water program should be a significant first step toward learning how to address these dispersed pollution sources.

Action Recommendations

Action: *Local storm water management programs that receive approval under the NPDES program should be required to develop advanced pollution prevention measures and practices in the vicinity of environmentally sensitive areas such as the Armand Bayou Coastal Preserve.*

Involved Agencies:

- U.S. Environmental Protection Agency
- Texas Water Commission
- Harris County
- City of Houston
- City of Pasadena
- City of Deer Park
- City of La Porte

Rationale: The overriding purpose of the NPDES program is to improve the quality of urban storm water that is discharged from point sources. Discharges into critical segments, such as those identified as worthy of special protection through the Texas Coastal Preserve program, should receive even closer scrutiny. It is essential that local agencies which are responsible for developing and administering storm water management programs be made aware of Armand Bayou's preserve status. These agencies should work with preserve managers to determine where extraordinary pollution control measures are warranted in the vicinity of the bayou and its tributaries. If stream segments in Coastal Preserves are to be protected by the highest possible water quality standards, then presumably these areas will require the most innovative and effective pollution prevention methods.

Action: *Local storm water management plans affecting the Armand Bayou Coastal Preserve should include provisions for long-term monitoring of management practices and pollution prevention techniques.*

Involved Agencies:

- U.S. Environmental Protection Agency
- Texas Water Commission
- Harris County
- City of Houston
- City of Pasadena
- City of Deer Park
- City of La Porte

Rationale: The same point has been emphasized for agricultural Best Management Practices, wetlands mitigation, and other environmental protection strategies: long-term field monitoring and evaluation is crucial to insure that pollution prevention strategies have been effective. If their effectiveness diminishes over time, then the protection measures must be flexible so that they can be adjusted in light of changing circumstances. Monitoring also should be used to document successes and communicate proven pollution prevention techniques through conferences and water quality publications. It also would be

helpful to be able to measure the contribution of various prevention methods to the attainment of water quality objectives.

Action: *The management agencies should use the Armand Bayou Coastal Preserve as a "pilot" area for the testing of storm water management practices and techniques.*

Involved Agencies:

- Texas Parks and Wildlife Department
- U.S. Environmental Protection Agency
- Harris County
- City of Houston
- City of Pasadena
- City of Deer Park
- City of La Porte
- Houston-Galveston Area Council
- Armand Bayou Nature Center

Rationale: Through this effectiveness study and other projects, Armand Bayou has been used as a model for eventual Bay-wide management planning. The Bayou also serves as a valuable tool for environmental education, primarily through the work of the Armand Bayou Nature Center. As emphasized elsewhere, the preserve area can continue to function as a "proving ground" for environmental protection strategies. For example, Best Management Practices for the control of nonpoint source pollution might be developed and tested here before they are implemented elsewhere. Other innovative techniques, such as filtering of effluent through existing or constructed wetlands, also might be evaluated in the preserve. In this way, the Coastal Preserve program can contribute to broader environmental enhancement rather than benefitting only the limited area within each preserve.

Action: *Preserve managers should determine nonpoint source data needs in the Armand Bayou Coastal Preserve and strategies for obtaining that data.*

Involved Agencies:

- Texas Parks and Wildlife Department
- Texas Water Commission
- U.S. Environmental Protection Agency

Rationale: Various reports have documented the need for an intensive study of Armand Bayou's stream segments. The *Environmental Inventory of the Armand Bayou Coastal Preserve* called for an investigation of toxics in the area's water and sediment. The *Inventory* also offered the specific recommendation that an additional monitoring station be added to the segments and that

monthly sampling be conducted for 2-3 years to establish a useful baseline of water quality information for the bayou (although EPA staff warn that prompt action to prevent water quality decline should not be postponed in the interim). EPA staff note that a logical next step would be to conduct a wasteload study that results in a reliable Total Maximum Daily Load calculation for the bayou. However, they emphasize that this would require a commitment of funds and an agreement between TWC and EPA on such a study through the usual water quality management planning process. In the meantime, preserve managers should work with water quality and habitat protection agencies to establish clear objectives for monitoring and data collection at Armand Bayou.

Armand Bayou Management Framework:
STORM WATER RUNOFF

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
EPA	1. Water Quality Act of 1987 2. Clean Water Act	1. U.S. Congress: - statement of national goals and policy in Clean Water Act 2. EPA Administrator: - Code of Federal Regulations - Guidance documents 3. Regional Administrator, Region 6	1. NPDES storm water permits for separate storm sewer systems, discharges "associated with industrial activity," and other targeted storm water discharges: - evaluation of local storm water management programs 2. Development of general permits for lowest-priority discharges 3. Pre-application meetings with NPDES applicants 4. Outreach efforts: - informational seminars, staff presentations and workshops - technical assistance - guidance materials 5. Identification of a single representative by both EPA and the applicant to facilitate the permitting process 6. Required reports on the nature and extent of the storm water problem and local government management options 7. National Water Quality Inventory	1. Permits Division (Washington, D.C.) 2. Water Management Division (Dallas): - Storm Water Unit

Armand Bayou Management Framework:
STORM WATER RUNOFF

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
TWC	1. Texas Water Code, Chapter 26	1. Texas Water Code: - statement of public policy 2. Texas Water Commission: - TWC rules in Texas Administrative Code - State Surface Water Quality Standards 3. TWC Executive Director 4. TWC guidance documents	1. Eventual assumption of NPDES storm water permitting authority from EPA 2. Incorporation of storm water management requirements in point source discharge permits 3. Nonpoint Source Water Pollution Assessment Report for the State of Texas 4. Nonpoint Source Water Pollution Control for the State of Texas: Recommendations for the Future 5. Municipal Water Pollution Control and Abatement Program: - storm water & nonpoint source management components 6. State Surface Water Quality Standards 7. Statewide Water Quality Monitoring Network: - biennial Texas Water Quality Inventory 8. Nonpoint source studies and field research	1. Executive Director 2. Water Quality Division: - Water Quality Standards and Evaluation Section 3. Field Operations Division: - District 7 Office (Houston) 4. TWC Analytical Laboratory (Houston) 5. Nonpoint Source Advisory Committee

Management Concern:
STORM WATER RUNOFF

Background

Nonpoint source pollution is often described as the great remaining challenge for federal and state water quality agencies. The point source regulatory programs mandated by the Clean Water Act and other environmental legislation have substantially improved wastewater treatment in the United States and reduced the impacts of effluent discharges. But diffuse sources of pollution continue to impair water quality. Through the federal Water Quality Act of 1987, Congress formally recognized what many studies had established: most contaminated urban runoff eventually is captured by storm sewer systems and is discharged from point source outfalls. So Congress required that storm sewer discharges be treated like other point sources of pollution under the Clean Water Act's successful National Pollutant Discharge Elimination System (NPDES).

While regulation of storm water quality will not address all forms of nonpoint source pollution, it will target a number of crucial pollutants that reach receiving waters via storm sewers. These pollutants include oil and grease from roads and parking lots, pesticides and fertilizers from lawns, de-icing salts and chemicals from roads and airports, sediments from construction sites and resource extraction, as well as industrial wastes and materials, heavy metals, fecal coliforms, suspended solids, nutrients, floatables, grass clippings and leaves, litter and debris, and runoff from landfills, junkyards, spills and improper waste disposal. Another key concern is illicit connections to the storm sewer system that allow untreated sewage and other wastes to flow directly to water bodies. The U.S. Environmental Protection Agency advises that "removal of non-storm water discharges to storm sewers presents opportunities for dramatic improvements in the quality of storm water discharges."

Nature of the Problem at Armand Bayou

EPA headquarters staff have described Houston and Harris County as perhaps the most challenging storm water management scenario in the United States. Many of the factors that led to this conclusion also are evident in the Armand Bayou watershed. For example, the 60-square-mile watershed receives 48 inches of average annual rainfall, and storm intensities can vary greatly over time and between places. Heavy downpour events and more routine rainfall contribute to the estimated 80,000 acre-feet of annual freshwater inflow to Clear Lake from the watershed. There are numerous creeks and drainage ditches in the area that can carry pollutants to Armand Bayou, Clear Lake and beyond. But it is estimated that 1.8 million gallons of storm water was discharged from *point sources* in the watershed in 1989 (*Environmental Inventory of the Armand Bayou Coastal Preserve*, McFarlane and Shead). Most of the watershed is within the city limits of four cities: Houston, Pasadena, La Porte and Deer Park. It also contains three operating Municipal Utility Districts. Although the watershed's flat terrain is not fully

developed, 38% is devoted to residential and commercial uses and 6% to industrial uses. Ongoing development and the spread of impervious cover have altered the delivery of storm water to the Bayou from the surrounding area. Concerns about polluted storm water already have affected development planning in the watershed, such as the use of detention basins to reduce pollutant loadings. These are an important tool for management of storm water quality since most other flood control improvements are designed to increase the speed and volume of storm water that can be moved downstream, allowing less time for infiltration and settling and removal of pollutants.

Previous studies have noted that Armand Bayou water quality remains poor despite advanced regulation of point source dischargers. The bayou already receives more than 6 million gallons of treated effluent each day, and increased volume is expected. The watershed also contains a diversity of land uses, including golf courses, oil and gas development, two airports, and other uses that are considered prime sources of storm water contaminants. As a result, Armand Bayou presents much more of an *urban* scenario for water quality management than will be true of most other Texas Coastal Preserves.

Key Management Agencies

U.S. Environmental Protection Agency (EPA)

Prior to the Water Quality Act of 1987, the only significant federal provision for addressing nonpoint source pollution was the Section 208 areawide planning requirement of the Clean Water Act. States were expected to take a lead role on nonpoint source matters through their water quality management functions. EPA originally exempted storm sewer discharges from the NPDES permitting program, but a court order forced EPA to address them. EPA then proposed a general permit approach. No major progress was made before Congress clarified federal storm water regulation with the Water Quality Act. The Act states that "it is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through the control of both point and nonpoint sources of pollution." Section 405 of the Water Quality Act establishes a tiered approach to storm water permitting. The first permits will be required for:

- discharges already subject to a permit
- discharges from separate municipal storm sewers serving a population of 100,000 or more
- discharges "associated with industrial activity," or
- any discharge that EPA determines to be contributing to a violation of state surface water quality standards or which is a significant contributor of pollutants to waters of the United States

The new NPDES permitting provisions apply only to those discharges composed *entirely* of storm water. In the storm sewer system category, for example, only separate storm sewer systems are covered, and not combined sanitary and storm sewer systems (which presumably hook into a treatment facility). Other types of point source discharges already are covered by the NPDES program. This first tier of storm water dischargers must receive NPDES permits by October 1, 1992, and they must be in full compliance within three years.

EPA's final rule on storm water permitting, published in the *Federal Register* on November 16, 1990, established a two-phase application process for separate storm sewer systems. The associated application deadlines differ based on the system's size classification. "Large" storm sewer systems are those that serve 250,000 or more persons. "Medium" systems serve at least 100,000 and less than 250,000. (All remaining "small" storm sewer systems must seek permits after the October 1992 deadline, but EPA has not yet issued application instructions or deadlines for smaller municipalities or system operators.) Part I requires information on the discharger's existing storm water management efforts and the means available for controlling pollutants in storm water discharges. The first stage also requires that managers of storm sewer systems perform field screening of major outfalls to detect illicit connections. EPA classifies storm water outfalls based on their diameter and the size of the area they drain. Applicants probably will be expected to analyze local drainage areas and document population and land use trends in each. "Large" systems must submit their Part I applications by November 18, 1991 (one year after publication of EPA's final rule), while applications for "medium" systems are due by May 18, 1992 (18 months after publication). In Part II, the applicant must collect a limited amount of representative system data and propose a comprehensive storm water management program. The applicant also must demonstrate adequate financial and administrative capability to implement the management program. "Large" systems must complete Part II by November 16, 1992 (two years after publication), while "medium" systems have until May 17, 1993 (30 months after publication). Those elements of the proposed management program that EPA considers essential to pollution abatement will become conditions of the eventual NPDES permit. EPA encourages permittees to go beyond the minimum federal requirements included in the permit and implement the most ambitious pollution prevention strategy that they can support.

In addition to the urban storm sewer systems described above, EPA's permitting rules also apply to certain enterprises that generate storm water "associated with industrial activity." This terminology may seem convoluted, but it is needed since not only private industry, but also public agencies, may be involved in activities that can be classified as "industrial" (e.g., public airports, solid waste collection and disposal, etc.). EPA explains that its "industrial activity" permit requirements are aimed at those discharges "from any conveyance that is used for collecting and conveying storm water, and which is directly related to manufacturing, processing, or raw materials storage areas at industrial plants." EPA estimates that about 100,000 facilities nationwide are affected by this part of the storm water regulations. Such activities that can affect storm water quality may be discharging into a local storm sewer system or directly into waters of the United States. Those that discharge into a large or medium system must notify the system operator of

certain basic information concerning their operations. What is significant about this portion of the regulations is that *any* municipality or government agency -- not just those serving more than 100,000 persons -- may be required to obtain a permit for its "industrial activity" discharges before the October 1992 deadline. The regulations specify the types of activities, based on Standard Industrial Classification (SIC) code, that EPA considers to be associated with "industrial" activity. Specific examples of these include:

- hazardous waste treatment, storage or disposal facilities
- landfills, land application sites, and open dumps that receive industrial wastes
- certain recycling facilities
- the following transportation facilities: vehicle maintenance, equipment cleaning, or airport de-icing areas of railroad, mass transit, school bus, trucking and courier services, postal service, water transportation, and airport facilities
- sewage treatment plants treating domestic sewage, or any other sewage sludge or wastewater treatment device or system, used in the storage, treatment, recycling, and reclamation of sewage (including land used for the disposal of sludge located within the confines of the facility) with a design flow of 1.0 MGD or more or required to have an approved pretreatment program
- certain warehousing and storage establishments where materials are exposed to storm water

It may not always be clear whether a public sector activity falls under one of the identified SIC categories, but EPA leaves it to the involved government agency to make the SIC determination. EPA points out that portions of sites that are separate from the "industrial" activity, such as office buildings and accompanying parking lots, are generally not considered part of the industrial activity for permitting purposes unless the drainage from that area somehow mixes with the "industrial" runoff.

The storm water regulations provide three application options for discharges associated with industrial activity. The first and most demanding is the individual permit application. For administrative reasons, EPA hopes that as many applicants as possible will link up with similar dischargers in their area and submit group applications. It is not yet clear whether groups who pursue this second option will receive some form of a shared permit or whether each group member will receive an individual permit. It probably will depend on the characteristics of each group. The final option is the simplest since applicants must merely file a brief Notice of Intent that they wish to be covered by a general permit for storm water discharges. However, this option may involve the most risk because EPA's proposed general permit is still being reviewed

internally as well as by the Office of Management and Budget (OMB). If a general permit is not approved by the October 1992 deadline, NPDES applicants may be forced to submit an individual or group application.

The initial application deadlines for "industrial activity" permits were recently extended six months by EPA's Administrator. Concerns had been raised about the number of applicants scrambling to meet the EPA timetable, especially in light of the changes made from the 1988 proposed rule. Individual applications now are due May 18, 1992, instead of November 18, 1991 (one year after publication of EPA's final rule). The deadline for Part I of group applications was moved back from March 18 (four months after publication) to September 30, 1991. Part II of group applications still will be due in May 1992. (Any facility that is rejected by EPA as a group participant will have one year to re-apply as an individual applicant.) The deadline for group applications is still eight months earlier than for individual applications. But the incentive to meet this tighter schedule is that group application requirements are less onerous for each participant compared to filing individually. If EPA receives approval for its general permit, it will at that time establish a date by which Notices of Intent (to be covered by the general permit) must be submitted. Dischargers who seek coverage under the general permit are not required to submit an individual or group application, although, as mentioned above, there is some risk involved in case the general permit is delayed indefinitely.

EPA is still formulating its strategy for issuing permits to "industrial" dischargers once their applications are processed. It hopes to establish a tiered approach that will allow it to issue general permits to facilities of least concern and concentrate on specific permits for the highest-priority dischargers. Under this approach, EPA would proceed from "baseline" permitting for the majority of dischargers to watershed permitting, then to industry-specific permitting, and finally to facility-specific permitting. EPA's regulations outline "generally applicable requirements" for all industrial activity permits and then provide specific requirements for particular activities, such as construction, mining, and oil and gas operations. These permits will rely first on technology-based controls and then, if necessary, on water quality-based controls.

EPA Region 6 personnel administer the agency's water quality and point source programs in Texas and also will oversee NPDES permitting for storm water discharges. A Regional Administrator manages Region 6 operations in Dallas. He is one of 10 regional administrators who report to the agency's Administrator, based at EPA headquarter in Washington, D.C. The Administrator of EPA and a Deputy Administrator are appointed by the President with the advice and consent of the U.S. Senate. EPA Region 6 covers Texas, Louisiana, Arkansas, Oklahoma and New Mexico. As it does in point source regulation, EPA's Water Management Division will play the lead role in storm water permitting. One of the division's chief functions is to advise the Regional Administrator on appropriate goals, objectives and priorities for regional water quality management. The division's Permits Branch has established a 4-person Storm Water Unit to administer the new NPDES permitting program. EPA's Permits Division in Washington, D.C., is responsible for implementing the stormwater program nationwide. Region 6 storm water staff will specialize in municipal or industrial permitting, just as their point source

colleagues do. In addition, each staff member will establish contacts with particular cities and industries. One person has been assigned to coordinate the Houston/Harris County application process. Region 6 has requested that every affected city designate one staff member as a liaison to EPA on the storm water program. The staff hope to arrange a pre-application meeting with every NPDES applicant. The staff also have been involved in intensive outreach efforts, including workshops, informational seminars and staff presentations at various events. EPA also hopes to work with the Texas Water Commission to sponsor additional seminars in the state, although all of these efforts are limited by agency travel and staff budgets. EPA headquarters staff plan to supplement these regional outreach efforts with nationwide guidance documents for staff and applicants.

The federal storm water rules published to date focus more on the mechanics of applying for an NPDES storm water permit and not as much on what will be required of a permittee. However, it is known that system operators and other dischargers must develop a comprehensive management strategy for reducing pollutant levels in discharged storm water. The purpose of the phased application timetable is to give dischargers sufficient time to develop appropriate local methods for cleansing storm water. EPA will issue or deny NPDES permits based on its assessment of the storm water management program proposed by each applicant. The permittee then will have an initial period to implement and test the approved management strategies.

EPA does not consider the regulations a traditional "end of pipe" approach because the quality of the discharge will only be used an an indicator of the permittee's success in storm water management. The emphasis is on the pollution prevention strategies themselves. Dischargers must demonstrate that they have identified and targeted the most serious sources of storm water contamination. The regulations require that each storm sewer system reduce pollution to the "Maximum Extent Practicable" (MEP). While EPA provides no clear definition of this standard, it is understood that cities and other storm water dischargers must make every reasonable effort to minimize pollutant content and insure that their outfalls do not cause a deterioration in the water quality of receiving streams. EPA wants a results-oriented program, and it will leave it up to each permittee to suggest the best method for achieving MEP results -- "to write their own permit," as some EPA staff like to say. The general guidance that EPA has provided refers to "management practices, control techniques, and system, design and engineering methods and other provisions appropriate for the control of such pollutants." EPA has considerable flexibility to shape local management programs as it sees fit to achieve water pollution abatement objectives. EPA will use the results of outfall monitoring to re-evaluate local storm water programs and revise issued permits when they come up for renewal. But some local governments continue to worry that EPA eventually will mandate treatment of storm water in the worst cases and that this effectively will turn the program into an end-of-pipe regulation. EPA understands these concerns but responds that permittees have the opportunity to avoid treatment requirements by doing as much as they can to minimize pollutants before they reach the storm sewer system.

The rationale behind the regulations is that there are various activities on land that can indirectly affect nearby water bodies, and rainfall is the vehicle that transfers those impacts to receiving waters. When that rainfall is collected and conveyed to point source outfalls by an urban storm sewer system, then the sewer system becomes a more manageable focus of regulation since it concentrates and carries pollutants toward identifiable discharge points. The regulations are designed to motivate sewer system operators to identify and control those sources of pollution that introduce the most serious pollutants into "managed" urban storm water. These pollutants can enter the system directly through illicit connections or illegal disposal or indirectly through dispersed urban runoff that enters the system through catch basins and infiltration. The challenge for storm water managers, aside from eliminating illicit connections, is how to identify and best regulate those highest-risk, dispersed sources of contaminated runoff.

In addition to illicit connections, EPA's priorities under the storm water program include:

- strict controls on certain perennial sources, such as household hazardous waste dumped into storm drains
- control of pesticides (especially those that persist through treatment and still show up in downstream waters) and prevention of improper applications by highway departments, parks and recreation staff, commercial lawncare firms, and homeowners
- sediment and erosion controls, during and after construction
- other forms of runoff control, as needed, for industrial, commercial and residential areas

Local governments in Harris County that are affected by the initial storm water regulations have organized a task force of key staff to consult with EPA, identify common management problems and concerns, and possibly develop a group application for Harris County's major storm water discharges. The task force includes representatives of Harris County, the City of Houston, and the City of Pasadena. Houston and Harris County both must meet the earlier deadlines for "large" systems, so Pasadena, as a "medium" system, may decide to go its own way. The participants are still not certain whether they will end up sharing a discharge permit or will be permitted individually by EPA. However, the task force members are attempting to learn as much as they can about EPA's requirements so that they may report back to their respective superiors and elected officials on how to proceed. The City of Houston intends to employ consultants to assist with the technical work required for the NPDES application. Another function of the task force is to coordinate with any other "enclave cities" or "inter-related" dischargers that EPA considers to be part of the overall storm sewer "system" in the county.

Details on EPA's plans for monitoring and enforcement of storm water permits are not yet known, though they are likely to be patterned after the agency's existing NPDES

strategy for traditional point source discharges. This probably will include some degree of self-monitoring and reporting by permittees, periodic compliance inspections, and the usual in-stream monitoring of water quality performed principally by the Texas Water Commission, with targeted monitoring by EPA. EPA will focus on enforcing the requirements of its NPDES permits, while the permittees themselves will be expected to enforce their own local rules and pollution prevention standards that are the basis of their approved storm water management program.

Finally, the Water Quality Act of 1987 required that EPA prepare two reports on storm water issues. One report will examine the nature and extent of storm water pollutants, and the other will explore local government options for managing storm water quality. EPA headquarters staff plan to complete these reports by the end of 1992. It is expected that application requirements for all remaining storm sewer systems will be promulgated after these reports are completed.

Texas Water Commission (TWC)

Although the Texas Water Commission has not had an established, comprehensive mechanism for addressing discharges of polluted storm water, TWC's permitting staff have frequently made improved storm water management a condition of routine permits for point source discharges. This is most often the case with industrial dischargers. TWC will have to prepare for more formal regulation of storm water discharges in Texas when it assumes NPDES permitting responsibility from EPA. TWC officials have indicated that, like EPA, they hope to issue general permits to the majority of dischargers so that they can concentrate on those that are causing the greatest water pollution problems.

Both TWC and the Texas Soil and Water Conservation Board are authorized by the Texas Water Code to develop regulations aimed at reducing nonpoint source pollution. Rather than a regulatory approach, however, both agencies have focused more on management planning, public education, and promotion of Best Management Practices. Cooperation between the agencies on nonpoint source issues reached a peak over the last few years as they responded to the federal mandates contained in the Water Quality Act of 1987. The Act required each state to prepare a nonpoint source assessment report and a statewide management program. TWC coordinated the input of various state and local agencies in preparing these reports while the Soil and Water Conservation Board examined the nonpoint source impacts of agriculture and silviculture. Neither of the Armand Bayou stream segments was identified in the state assessment report as being significantly impacted by nonpoint source pollution. TWC's Nonpoint Source Advisory Committee drafted and ranked fourteen strategies for improving management of nonpoint source pollution in the state. The recommendations fell under three general categories: education, best management practices, and monitoring and data. The committee estimated that the entire package would cost $3.5 million in the first year of implementation and $1.5 million in each successive year.

Until NPDES delegation occurs, TWC's Municipal Water Pollution Control and Abatement Program offers the best opportunity for Texas state government to become involved in storm water pollution control. The program is designed to guide local governments (those serving at least 5,000 residents) as they develop comprehensive strategies for addressing the entire range of activities in their jurisdiction that have the potential to cause ground or surface water pollution -- whether from point or nonpoint sources. The program, when implemented, will affect all four cities in the Armand Bayou watershed: Houston, Pasadena, La Porte and Deer Park. A bill passed in the late 1960s (Senate Bill 835) first called for a Municipal Water Pollution Control and Abatement Program in Texas. But this bill produced little action because it had no provisions for state agency guidance or review of local plans. House Bill 1546, passed in 1989, clarified the program's requirements and the authority of the Texas Water Commission to implement it and approve local plans. However, the program remains on hold while TWC determines how to proceed. One stumbling block is how to finance the program. Many cities opposed TWC's proposal that municipalities collect fees and return 5% of that revenue to the state to cover administrative costs. EPA is supportive of the program because it will mesh nicely with EPA's vision of state and local leadership in storm water management and nonpoint source pollution abatement. One existing example of this in the Houston area is a nonpoint source "solutions and alternatives" report prepared by Clean Houston's Clean Bayou Task Force at the request of Mayor Kathryn Whitmire.

TWC policy, implementing rules, and regulatory decisions are made by the three-member Texas Water Commission. The Commissioners are appointed for six-year terms by the Governor with the advice and consent of the Texas Senate. Point source regulatory efforts and nonpoint source management are the responsibility of TWC's Water Quality Division, which is one of six regulatory divisions within TWC that report to the agency's Executive Director. The Division's Water Quality Standards and Evaluation Section oversees the development of state water quality standards and supervises the state water quality monitoring network. These key state-level functions provide the framework for setting storm water management objectives and monitoring the progress of nonpoint source control efforts. It is not yet known how TWC might change or expand its existing Permits and Enforcement Sections to administer the NPDES storm water permit program following delegation from EPA. The Pollution Abatement Unit will oversee the eventual implementation of the Municipal Water Pollution Control and Abatement Program. TWC's Field Operations Division supports existing point source permitting and monitoring through its network of 15 District offices across the state. The District 7 Office is based in Houston, as is the TWC analytical laboratory. TWC is currently expanding its laboratory capacity and moving the facility into the same building that houses the District 7 Office. This will allow closer contact between lab personnel and field staff to coordinate routine work, special studies and field methods.

TWC field staff point out that if more extensive treatment of industrial storm water is required as a result of EPA's new NPDES permits, then the Gulf Coast Waste Disposal Authority will be the logical entity to perform this service in the Armand Bayou

watershed. They note, however, that even the Authority cannot handle excessive storm water volumes during periods of extreme wet weather. In anticipation of upcoming storm water management programs, the field staff also are studying golf courses as a potential source of excessive nutrient loadings from fertilizer and herbicide use. This is a particular concern in the vicinity of Armand Bayou because of a handful of new and existing courses in the area.

Management Evaluation Findings

1. *The existing water quality management framework is focused primarily on point source regulation, so the involved agencies are still adjusting to a new, expanded, and more complex management role.*

   Environmental advocates believe that effective prevention of storm water contamination will require regulation -- or at least guidance -- of a multitude of dispersed activities not normally "managed" by water quality agencies. A similar example that was mentioned is air quality management in southern California, where state and local agencies have had to adopt "micro-management" techniques, including regulating such mundane activities as backyard barbeque grills, to achieve regional air quality objectives. Both Congress and EPA officials know that advanced stages of pollution abatement will require changes in long-standing social habits and behavioral norms. Attempts to influence "polluting behavior" are likely to be controversial because they will cause conflicts with economic and individual preferences. But water quality managers emphasize that dispersed, individual contributions to pollution, when considered cumulatively, are the most critical remaining source of water degradation. Extensive public education will be needed to raise awareness of the problem and focus attention on the options for improving storm water quality. TWC's Nonpoint Source Advisory Committee suggested using the highly successful "Don't Mess With Texas" anti-littering campaign as a model for nonpoint source education. In Houston, TWC field staff point to the bayou system as a valuable educational tool: after each substantial rainfall, trash and debris are visible in every bayou, especially along the banks and in the overhanging trees as the water recedes. These types of educational efforts will be especially crucial if "pollution prevention" is to be achieved and costly, "after-the-fact" storm water treatment avoided.

   In many ways, this is still unfamiliar ground for water quality agencies such as the Texas Water Commission. That is why agency managers sometimes are sensitive about how to proceed on storm water management. They are not sure that an "end of pipe" regulatory approach would be any more welcome, but they feel that they will be walking a fine line in pollution prevention, almost to the point of telling individuals what they can and cannot do. They want to minimize any feeling that they are dictating to the public or going too far with their regulations. Some observers have pointed out that this might be an easier job for a general

environmental agency, one that could emphasize the entire range of unacceptable human impacts on the environment that must be brought under control.

An important feature of EPA's storm water permitting program is that it is designed to allow time for these types of management adjustments, although some critics would contend that it is not enough. The application process is phased to allow time for local policy and strategy development. The regulations then call for three years of experimentation and evaluation before local storm water management programs must achieve full compliance with their NPDES permits.

2. *The greatest concern surrounding the NPDES storm water program is whether the management agencies are prepared for the administrative burden they will face.*

The storm water program is considered a major challenge for all levels of government, especially local governments, at a time when they are facing a variety of other management dilemmas and urban crises. EPA officials know that their own agency will have to manage a huge volume of NPDES applications, especially for public and private discharges "associated with industrial activity." In anticipation of this administrative burden, EPA is emphasizing group applications and general permits over individual approaches. EPA hopes to keep the storm water regulatory process as simple as possible, and cost-effectiveness will be one of the key criteria when local management strategies must be selected during the permit-writing phase.

Concerns continue to be expressed about inadequate staff and funding at both EPA and the Texas Water Commission to handle their storm water mandates. EPA Region 6 has formed a new Storm Water Unit, but many observers doubt that a four-person staff will be sufficient for the task. Referring to the Management Framework table, EPA staff made the following assessment of their own agency's ability to implement various aspects of the program:

- The goal of permitting separate storm sewer systems is "manageable" with available resources.
- The goal of permitting discharges associated with industrial activity can only be achieved using the "baseline" general permit due to the number of facilities involved.
- The goal of evaluating local storm water management programs -- and of developing general permits for the lowest-priority discharges -- is "severely constrained" by available agency resources. According to EPA staff, "essentially there are no resources to do these. The situation is similar to EPA's current low priorities on minors." Under the circumstances, EPA can only afford to evaluate local storm water management programs for cities with populations of 100,000 persons or more.

- The goal of sponsoring such outreach efforts as seminars, presentations, workshops, technical assistance and guidance materials is also "severely constrained." EPA reports that there are no funds or positions available to provide this support.

Staffing levels at TWC for eventual NPDES permitting are not yet known, but judging from current state budget constraints, there is concern that TWC also will be unable to devote adequate resources to storm water permitting and management. TWC managers agree that there has long been a need for greater equity in water quality regulation. So much of the regulatory burden has been on point sources of pollution while nonpoint source contributions have continued. But TWC officials say that it is important to strike a point/nonpoint balance now and avoid going too far the other way and neglecting successful point source programs.

EPA officials recognize that state and local governments are facing a typical dilemma: a congressional mandate without funds for implementation. These officials emphasize that the key for local governments is to minimize their costs by focusing on pollution prevention to avoid the need for treatment. Traditional "end of pipe" treatment is too costly since it requires extensive capital investment and intensive treatment processes. Alternative "treatment" strategies should be attempted first, provided that they are even necessary after the key early abatement steps -- such as elimination of illicit connections -- have been taken. These alternative approaches primarily involve the incorporation of pollution control measures into existing flood control facilities. This might include strategic placement of appropriate pollution-filtering vegetation, utilization of existing or constructed wetlands, or construction of detention basins (i.e., backing water up in certain parts of the drainage system to allow pollutants to settle or be removed by some technique). EPA advises that the first step is to ask how much treatment is actually needed in flood control bottoms? Then, what are the best techniques for removing toxics, metals, organics, and other targeted pollutants? These pollution prevention measures should interfere only marginally with flood control objectives. The key for the future is to include these prevention capabilities in all new flood control facilities. EPA staff suggest linking flood control facilities with public parks to create "greenbelt" areas that will cleanse storm water during wet weather and provide public open space the rest of the time. However, one practical problem that must be resolved is the question of who will assume responsibility for the operation and maintenance of storm water detention basins once they are constructed?

While EPA appreciates the position of cities, it also wants cities to recognize that they are the major water pollution sources, despite the popular belief that industry is the chief culprit. EPA officials say that many urban areas in the United States are not treating their waste adequately, and runoff from various urban activities compounds chronic water pollution. EPA is proceeding with a "whatever it takes" approach under the NPDES storm water program. Cities are urged to explore all options for pollution prevention. They must take stock of all urban activities that

unreasonably impact the environment. As for industries, both public and private, Congress declared that they should "treat" their own storm water before discharging it to the municipal system or the receiving stream. The end goal of all dischargers should be the delivery of clean storm water to receiving streams so that water quality standards can be achieved. Nothing has changed as far as what is expected of EPA and all other government agencies and citizens under the Clean Water Act. What is new, or at least is being emphasized more forcefully than ever under the current Administrator, is that environmental regulation should reflect a weighing of risks, a setting of priorities, an intelligent allocation of resources, and a constant concern for effectiveness and meaningful results.

EPA has little sympathy for local governments that either do not appreciate the impacts of pollution generated in urban areas or are not moving to reduce those impacts. Region 6 officials emphasize that many of the pollution problems of Galveston Bay and other coastal areas can be traced to upstream, urban sources. In all areas of regulation, EPA is attempting to "internalize" the costs of pollution and regulation. The difficulty of the urban storm water program is that it is the polluting behavior of countless individuals -- "people pollution" -- that is the problem. EPA is placing the burden on cities, which in turn must find ways to discourage their residents and businesses from polluting. This will require extensive public education and "non-structural" methods.

EPA staff admit that their agency is looking for a complete cultural change in many urban areas, not only on storm water issues, but on the overall treatment of the environment, whether it involves waste minimization, reduced energy use, or other behavioral changes. They are relying on the promise of technology, noting that numerous pollution prevention options already exist. It is mainly a matter of raising awareness of the need for these techniques and the alternatives that are available. EPA urges cities and others to take advantage of its in-house expertise and technical assistance capabilities.

3. *The complexity of the NPDES storm water program is being compounded by the degree of uncertainty surrounding various aspects of the program.*

What most concerns cities, counties and other potential applicants is that they are not certain what will pass muster for an NPDES storm water permit. They seem to be frustrated even more by what they perceive as a lack of sufficient answers from EPA on how to proceed. There also is disagreement over the expected cost impacts of the NPDES application process, as well as the costs of implementing local management programs. Some observers have raised the prospect of a storm water fee on homeowners and commercial property, speculating that it might be based on the amount of impervious cover on a parcel.

EPA staff have attempted to reassure applicants that the NPDES application requirements, while complicated, are not meant to be draconian or inflexible. EPA expects municipalities and other applicants to make their best reasonable effort at

following the permit application rules. Then EPA will negotiate with each applicant concerning the completeness and adequacy of its proposed storm water management and pollution abatement strategy. The bottom line is that the applicant must show an appreciation of the regulation's basic purpose: identification and control of sources of storm water pollution. At a minimum, this must include:

- disconnecting illicit discharges to remove raw sewage from the storm sewer system
- reducing industrial pollution in the storm sewer system
- if discharge quality is still unacceptable, implementing controls on additional sources of contamination (these will vary depending on the jurisdiction and the nature of its pollution problem, but it is possible that regulation of the use of certain pesticides and lawn fertilizers will be a starting point in many places)

The applicant must demonstrate good faith efforts to comply with the application requirements. For example, EPA staff have pointed out that when the regulations call for the selection of 5-10 representative sampling points, the applicant should propose no fewer than 10 since EPA and the applicant will have to agree on the 5-10 best locations for eventual sampling.

EPA staff say that too many cities are being distracted by the notion that the federal government is going to force them to adopt "socially disruptive regulations" and interfere with private activities that they never have had to address before. EPA believes that cities are ignoring the basic question: how do they want to pay to remove contaminants from storm water before it is discharged? They can choose prevention, or they can commit to traditional "end-of-process" treatment. EPA staff say that those cities that have looked at the "bottom line" understand the trade-offs involved. Pollution prevention programs, such as those expected under the storm water permitting program, admittedly have high up-front costs. But these costs must be compared to the long-term savings from reduced treatment requirements. EPA views it as a "pay now, or pay later" decision for cities.

There also has been some confusion among municipalities as to how enforcement will occur under the storm water program. There actually will be two layers of enforcement. Cities must enforce the requirements and standards of their local storm water management programs, such as erosion control rules for construction sites. EPA will focus on the performance of the permitholders -- the cities and other stormwater dischargers who are responsible for reducing pollutant levels in storm water. The Texas Water Commission will assume this enforcement responsibility upon delegation of NPDES authority to the state. As always, state and federal water quality agencies request the ongoing assistance of municipalities in helping them to identify permit violations and illegal pollutant discharges.

Unfortunately, many affected local governments still do not fully understand their options and responsibilities under the program. For example, some are concerned about their individual liability under a group application should one member of the group fail to perform as required. EPA has attempted to resolve these and many other questions through special workshops designed specifically for municipal applicants. Even EPA's storm water specialists admit that they have much to learn about how the new NPDES program will operate. One staff member who has been making almost daily presentations on the program says that at nearly every event he is confronted with questions and issues that even EPA has not yet considered. EPA staff emphasize that the NPDES storm water program is "not set in stone" and likely will evolve and be dynamic just like all of EPA's programs. The point to keep in mind, they say, is that the storm water program is another major step toward attaining the Clean Water Act's ambitious goals.

4. *There is concern that the management agencies do not have adequate data on nonpoint source pollution -- or on how certain activities contribute to runoff contamination -- to undertake effective regulation.*

Agency managers agree that if more money suddenly were available to them through the budgetary process, one of their first priorities would be the acquisition of much more extensive data on nonpoint source pollution. They see a definite need for better understanding of cause and effect and of the long-term and short-term impacts of contaminated storm water and dispersed runoff. The agencies seek any information that will help them to clarify nonpoint source pollution problems, craft more effective regulations, insure that the highest-priority issues are being addressed by the regulations, and determine whether regulations are even needed in certain cases or whether a more efficient use of resources is possible. Agency managers also know that their staff must be knowledgeable about local and regional pollution factors and variations between places. One manager emphasized that regulatory agencies should not automatically ban activities because they contribute to pollution. Instead, the agencies should study them, determine what specific aspects of an activity cause problems, and then regulate those particular elements. The same philosophy comes into play when discussing the difficulty of regulating land use in certain parts of the state. While EPA and TWC officials believe that traditional land use ordinances, such as zoning and subdivision controls, are an important storm water management option, they caution that they are only one of many options. The more important question is how important they are to local nonpoint source management strategies, given local circumstances and attitudes. Many agency staff believe that it is more important to emphasize a performance-based approach that focuses on the specific polluting impacts of land development. Examples of this approach include erosion and sediment controls during and after construction and the design and maintenance of landscaped on-site detention ponds for storm water. Some TWC staff conclude that it may be too late for traditional land use regulation to make much of a difference in an area that has undergone the degree of prior development that the Armand Bayou watershed has. Instead, they point to the need

for basic nonpoint source monitoring data and additional information on toxics and other priority pollutants in Armand Bayou.

5. *The Texas Water Commission's Municipal Water Pollution Control and Abatement Program is expected to bring important benefits in the area of nonpoint source pollution, but the agency still has not resolved what the program will require of Texas cities.*

   TWC officials report that the proposed Abatement Program has had many demands placed on it by diverse groups who want to see it do many things. One manager theorizes that the program has attracted so much interest from environmental advocacy groups because it represents one of the first truly statewide, grass-roots environmental improvement programs in Texas. Unfortunately, they say there is much less enthusiasm to help TWC arrive at a funding method that will be workable and politically palatable.

   TWC officials are aware of the growing pressures on cities, which are part of the "regulated community" under a number of mandated federal and state water quality programs. The Abatement Program is intended to continue the transition toward a "pollution prevention" emphasis in environmental management, as opposed to traditional "command and control" regulations. In line with EPA philosophy, the program will encourage rational problem identification, effective field assessment and data-gathering, development of risk-based management strategies, and continuous evaluation and refinement of management efforts. TWC officials agree that this is the best way to minimize the costs of environmental regulation and insure an optimal allocation of limited municipal and state agency resources.

Chapter Four
WETLANDS PROTECTION

Summary of Findings

1 *Agency staff warn that they cannot be expected to be effective in their wetlands protection efforts without adequate funding support.*

2 *Guidance on nationwide implementation of the "no net loss" concept" is expected soon. In the interim, there is no comprehensive resource policy for wetlands on a par with other types of environmental regulation, which greatly handicaps agency efforts to avert wetland losses.*

3 *State and local governments have essential roles to play in wetlands protection.*

4 *More than most types of environmental regulation, wetlands protection troubles some agency staff because of the fundamental equity issues it raises.*

5 *All of the involved agencies emphasize the need for increased public awareness of wetland functions and value, and of government capabilities (and efforts) to protect these sensitive areas.*

Wetlands protection is a dynamic area of regulation, which forces agencies to monitor the situation carefully and track numerous proposed changes in federal and state conservation strategies. Despite the intense degree of interest in the subject, management agencies still have few tools to work with beyond the Clean Water Act's Section 404 permitting requirement for dredge and fill disposal. Even this provision is now under fire in Congress. EPA Administrator William Reilly noted in recent Congressional testimony that the Section 404 program, while deserving some credit for slowing rates of wetlands loss, has also been "cumbersome and frustrating for the regulated community without necessarily being environmentally effective in protecting wetlands." Officials with the U.S. Army Corps of Engineers also emphasize that Section 404 alone will not allow for implementation of the "no net loss" concept. While the debate continues on how to improve federal conservation mechanisms, regional planning efforts and nationwide wetlands inventories have set the stage for more effective public acquisition strategies. But state agencies are awaiting federal assistance due to their own resource

limitations. Some agency officials emphasize the challenging management task ahead of them once "wet" areas are acquired, especially if publicly-owned wetlands sites are small and scattered.

Numerous agencies now are involved in the wetlands protection issue in some way. For those agencies which do not have direct regulatory powers and are not involved in land acquisition and management, the greatest frustration is not being able to influence independently those actions that potentially could harm valuable wetlands resources.

Action Recommendations

Action: *Armand Bayou's coastal preserve status should be a key consideration in any type of permitting or proposed activity in the Armand Bayou watershed that potentially could affect its wetlands resources.*

Involved Agencies:
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- Texas Parks and Wildlife Department
- Texas General Land Office
- Texas Water Commission
- Railroad Commission of Texas

Rationale: The involved agencies should determine whether existing procedures for notification of the Texas Parks and Wildlife Department are sufficient to insure that it has an opportunity to communicate coastal preserve management concerns during the permitting process. The coastal preserve management plan should identify general concerns as well as specific environmental constraints that may be encountered in particular areas of the preserve based on surveys of the area's resources.

Action: *Any move at the state level to adopt and implement a "no net loss" policy for wetlands protection must be accompanied by prompt and effective guidance to state agencies and local governments, as well as by careful coordination among them.*

Involved Agencies:
- Texas General Land Office
- Texas Parks and Wildlife Department
- Texas Water Commission

Rationale: The "no net loss" concept is still not fully understood even among technical staff of the involved agencies. The Parks and Wildlife Department will need definite guidance on how to implement the policy in coastal preserves. In fact, preserve areas might serve as useful models of the policy's application in targeted protection efforts. The preserve management plan should include some

consideration of the implications of a "no net loss" policy for preserve management. Given the limitations of the preserve area, such a study should examine the degree of dependence between wetlands found within the preserve and those that are part of larger systems beyond the preserve boundary. The Resource Management Code maintained by the General Land Office, along with its internal mitigation policy, should be recognized as a model for advanced assessment procedures, field inventories, impact anticipation, and mitigation planning

Action: *An intensive survey of existing wetlands resources should be undertaken in the Armand Bayou watershed to guide preserve management planning.*

Involved Agencies:

- Texas Parks and Wildlife Department
- U.S. Fish and Wildlife Service
- Texas General Land Office
- U.S. Environmental Protection Agency
- National Oceanic & Atmospheric Administration
- Bureau of Economic Geology (Univ. of Texas)
- other interested agencies and organizations

Rationale: A comprehensive environmental monitoring strategy for the coastal preserve should include methods for tracking variation and change in wetlands resources. But routine monitoring must be preceded by a careful inventory of existing conditions. This effort can pick up where earlier wetlands inventories at Armand Bayou have left off. Preserve areas also might be used to test the long-term effectiveness of various mitigation techniques since monitoring of mitigation projects in the field has proven difficult.

Action: *State agencies responsible for wetlands conservation either must receive sufficient funding to be effective or must receive guidance from the Legislature on where to focus their limited funds.*

Involved Agencies:

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

Rationale: New authority for wetlands protection at the state level must be accompanied by adequate funding for conservation programs. If the state cannot afford an extensive acquisition program of its own, then it should at least support the work of the involved agencies to prepare effective planning documents and protection strategies that will make the state eligible for federal acquisition funds. Establishment of acquisition priorities also will be essential if resources are to remain limited. Adequate resources

for long-term monitoring and enforcement of mitigation plans also should be a concern, especially since staff of the Environmental Protection Agency and Corps of Engineers report inadequate staffing and funds to support federal enforcement functions.

Armand Bayou Management Framework:
WETLANDS PROTECTION

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
CORPS	1. Clean Water Act, Section 404	1. U.S. Congress 2. Code of Federal Regulations: - Corps Final Rules 3. Corps Regulatory Branch, Washington, D.C.: - Regulatory Guidance Letters - Memoranda to the Field	1. Permitting of dredge and fill discharges in"waters of the United States": - review based on EPA-developed 404(b)(1) environmental criteria - public interest review - coordinated resource agency input - general permits and Letters of Permission in some cases 2. Corps/EPA Memoranda of Agreement on jurisdiction, enforcement and mitigation 3. Field monitoring and inspections, with inter-agency assistance 4. Enforcement: - cease and desist orders - compliance investigations - voluntary mitigation agreements - "after-the-fact" permits - administrative orders - administrative penalties - civil and criminal proceedings 5. Wetlands determinations and delineations 6. Technical assistance and expert testimony on wetlands matters	1. Galveston District: - District Engineer - Regulatory Branch (Evaluation Section, Compliance Section) 2. Office of Counsel 3. U.S. Department of Justice

Armand Bayou Management Framework:
WETLANDS PROTECTION

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
EPA	1. Clean Water Act, Section 404	1. U.S. Congress: - statement of national goals and policy in Clean Water Act 2. EPA Administrator: - Code of Federal Regulations - "no net loss" policy 3. Regional Administrator, Region 6	1. Policy support and oversight of Corps Section 404 permit program 2. Development of 404(b)(1) environmental criteria for Corps permit reviews 3. Veto authority over Corps Section 404 permit approvals under certain conditions 4. EPA/Corps Memoranda of Agreement on jurisdiction, enforcement and mitigation 5. Enforcement: - warning letters seeking voluntary compliance - compliance investigations - review of Corps "after-the-fact" permits - administrative orders - administrative penalties - civil and criminal proceedings 6. Advanced Identification studies 7. Joint development with Corps of Federal Manual for wetlands identification and delineation 8. Draft Regional Priority Lists	1. EPA Region 6 (Dallas): - Environmental Services Division (Federal Activities Branch, Technical Section) 2. Office of Wetlands Protection 3. Office of Criminal Investigation 4. U.S. Department of Justice

Armand Bayou Management Framework:
WETLANDS PROTECTION

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
FWS	1. Fish and Wildlife Coordination Act 2. Emergency Wetlands Resources Act	1. U.S. Congress 2. U.S. Department of the Interior 2. FWS Director: - partnership policy for voluntary conservation 3. Southwest Region Director (Region 2, Albuquerque)	1. Resource agency on Corps Section 404 permitting and other federal actions 2. Direct management of wetlands under the National Wildlife Refuge System 3. National Wetlands Priority Conservation Plan and Regional Concept Plans to guide acquisition efforts and suggest management approaches for lower-priority wetlands 4. National Wetlands Inventory and status reports to Congress 5. Joint Ventures to protect wetland habitats under the North American Waterfowl Management Plan 6. Technical assistance and expert testimony on wetlands matters 7. Advisory letters and referrals of violations to regulatory agencies 8. Public education and outreach activities	1. Ecological Services Division 2. Clear Lake Field Office 3. Refuge managers 4. Enforcement agents

Armand Bayou Management Framework:
WETLANDS PROTECTION

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
NMFS	1. Fish and Wildlife Coordination Act 2. Endangered Species Act 3. National Environmental Policy Act (NEPA) 4. Magnuson Fishery Conservation and Management Act 5. Marine Mammal Protection Act 6. Marine Research, Protection and Sanctuaries Act	1. U.S. Congress 2. U.S. Department of Commerce: - National Oceanic and Atmospheric Administration (NOAA) 3. Southeast Region Director	1. Review and comment on federal actions and federally-funded or permitted projects 2. Environmental assessments and EIS reviews, especially to evaluate impacts on endangered and threatened species 3. Monitoring of activities and factors affecting estuaries, fisheries and habitats 4. Tracking of proposed projects, follow-up investigation of permitted actions, and documentation of environmental damage 5. Interagency coordination activities 6. Technical assistance and expert testimony on habitat matters	1. NMFS Southeast Region: - Habitat Conservation Division 2. Galveston Field Branch Office: - Area Supervisor and staff 3. NMFS laboratories (Galveston, TX, and Beaufort, NC)

Armand Bayou Management Framework:
WETLANDS PROTECTION

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
TPWD	1. Texas Parks and Wildlife Code	1. Texas Parks and Wildlife Commission: - Agency policy statement 2. Executive Director 3. Texas Outdoor Recreation Plan (TORP) and Texas Wetlands Plan addenda	1. Lead state resource agency on wetlands matters: - permit reviews (participation in Corps joint reviews) - environmental assessments 2. Texas Wetlands Plan (to keep state eligible for federal land acquisition funds) 3. Direct management of wetlands in state parks, preserves and wildlife management areas (wetlands given high priority in state land acquisition programs) 4. Permits for disturbance or taking of streambed and bay bottom material 5. Management plans for Texas Coastal Preserve program 6. Documentation of environmental damage and use of litigation to seek compensation and mitigation 7. Technical assistance and expert testimony on wetlands matters 8. Inter-agency violation referrals 9. Public education programs	1. Resource Protection Division 2. Wetland Resources Coordinator 3. Texas Natural Heritage Program 4. Seabrook Marine Lab 5. TPWD game wardens

Armand Bayou Management Framework:
WETLANDS PROTECTION

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
GLO	1. Texas Natural Resources Code	1. Texas Natural Resources Code: - statement of public policy 2. School Land Board: - statement of agency policy in Texas Administrative Code - Rules and Regulations 3. Texas Land Commissioner: - agency plans - agency goals	1. Management of state-owned coastal public lands 2. Rules and environmental standards for projects on state-owned land 3. Resource agency on wetlands matters (environmental assessments) 4. Resource Management Code for advance assessment of environmental constraints on state-owned land 5. Texas Coastal Management Plan: - "no net loss" policy for state wetlands protection efforts - wetlands inventories - State Wetlands Conservation Plan, to be prepared by TPWD and GLO - inter-agency agreements - funding and acquisition options 6. Texas Coastal Preserve program 7. Leases of state-owned land for wetlands research 8. Draft Mitigation Policy	1. Resource Management program area: - Coastal Division - Coastal Preserves Coordinator 2. Upper Coast Field Office (La Porte) 3. Office of General Counsel

Management Concern:
WETLANDS PROTECTION

Background

The U.S. Environmental Protection Agency has described wetlands as "the collective term for marshes, swamps, bogs and similar areas that often develop between open water and dry land." The U.S. Fish and Wildlife Service refers to wetlands as the most productive ecosystem in North America. Numerous sources outline the many benefits of wetlands, including:

- filtering of pollutants, which improves water quality
- storage of floodwater, which reduces property damage from severe storms and also contributes to water quality by allowing sediments to settle and pollutants to dilute
- protection of shorelines from erosion by absorbing wave energy, and buffering of coastal population centers from the brunt of tropical storms
- replenishment of groundwater supplies
- propagation of fish and wildlife by serving as a rich habitat, which also supports recreational fishing and hunting and commercial fishing
- promotion of ecological research and education by serving as a natural "laboratory"
- stabilizing influence on climatic change
- protection and buffering of sensitive estuary systems

Wetlands represent less than 5% of the total land area in Texas, but they are critical to the state's environmental quality and "biodiversity." The extensive salt and freshwater marshes along the Texas Gulf Coast provide all of the benefits listed above and also are put to such consumptive uses as cattle grazing. The Fish and Wildlife Service reports that most every endangered species in its Southwest Region either depends on wetlands for its survival or spends some portion of its life cycle there. The threats to wetlands, and the factors behind their rapid loss in this century, reflect the entire range of human activity in urban and rural areas. Some of these factors are:

- alterations of natural hydrology, such as drainage ditches and storm sewers, to protect developed land
- pollution from industry, agriculture, shipping and urban areas

- saltwater intrusion and other impacts of navigational channel dredging, including spoil disposal
- groundwater depletion and land subsidence
- inadequate freshwater inflow due to upstream water supply and flood control projects
- impacts of oil and gas development and power plants
- modified drainage to serve agriculture
- development of recreational dwellings and rural road networks
- general sea level rise and coastal erosion

In general, it is the increased level of human activity in coastal areas that is affecting wetlands and the entire coastal environment. These impacts heighten as land less suitable for development is drawn into use at the fringe of expanding urban areas. (Top officials of the U.S. Army Corps of Engineers pointed out in recent Congressional testimony that delays and difficulty in the wetlands permitting process are increasingly due to the less-than-ideal nature of the land being proposed for development.) One source points out that man has done more to alter wetlands in the last century than nature did over many previous centuries to create them. In its report *Wetlands Losses in the United States, 1780s to 1980s*, the Fish and Wildlife Service estimates that Texas has lost nearly 8.5 million acres of wetlands since colonial times. Only Florida experienced a greater loss at 9.3 million acres. Despite this trend, Texas still ranks among the top four states in wetlands acreage with 7.6 million acres remaining. As wetlands are lost, those that remain gain in value, and numerous public and private interests in the state are intent on preserving this natural heritage and economic resource.

Unfortunately, there is no comprehensive regulatory mechanism for wetlands protection. The Section 404 permitting requirement for dredge and fill disposal under the Clean Water Act helps to limit one obvious impact on wetlands, especially through the Corps' policy of impact avoidance and minimization. In addition, Section 401 of the Act requires that any discharge into state waters to be authorized by a federal permit (such as a Section 404 dredge/fill permit) must be certified by the state as complying with state water quality standards. This certification requirement provides an avenue for states to become involved in wetlands protection. (EPA has instructed state water quality agencies on how to regulate wetlands using their water quality standards. Voluntary state efforts to date will become mandatory in 1993. The Texas Water Commission is preparing to implement EPA's regulatory mandate by including wetlands in the definition of state waters and developing specific standards for wetland areas, including antidegradation policies.) Executive Order 11990, issued by President Carter, instructs federal agencies to avoid to the extent possible the destruction, degradation or modification of wetlands. This order establishes a general wetlands conservation standard for projects on federal land, but the policy does not apply to federally-permitted projects on non-federal lands undertaken by private sponsors.

Critics and agency personnel agree that, under existing law, there is little to stop a landowner from draining or clearing wetlands to prepare them for other land uses. Only under federal agricultural law are there disincentives to persuade landowners not to convert or eliminate wetlands on private property. Outside of Texas, other states and some local governments have begun to develop their own conservation strategies for wetlands, and many have proven effective. Similar programs are being explored in Texas and should be spurred on by the recent passage of coastal protection bills (Senate Bills 1053 and 1054) that require the development of a state conservation plan for state-owned coastal wetlands under a "no overall net loss" policy. In the meantime, the wetlands issue continues to generate confusion, uncertainty, and even controversy.

Nature of the Problem at Armand Bayou

The most significant impact to Armand Bayou's wetland resources has already occurred and is irreversible. This was the combination of land-surface subsidence and rising water levels that progressed over a period of decades. "Drowned" in the process were much of the wetlands that had bordered what was once a narrow stream. The dramatic change in the character, extent, and tidal influence of Armand Bayou has resulted in the loss of more than 90% of the freshwater marsh that previously lined the stream's banks and curves. As reported in the *Environmental Inventory of the Armand Bayou Coastal Preserve*, the bayou had only 24 acres of wetlands remaining by 1979, and most of these were of a different variety than earlier vegetation. There is only limited knowledge of wetland conditions in the area more than a decade later, especially in the remainder of the watershed away from the bayou and its tributaries. What is known is that areas contiguous to Armand Bayou are now flooded intermittently due to the altered stream conditions. The remaining wetlands also are confronted with the poor water quality in the bayou, which tests their ability to weather extreme conditions.

The key management question regarding Armand Bayou is how best to assess the extent and significance of its remaining wetlands, especially in terms of their possible habitat value. Preserve managers then must consider whether the loss of these wetlands also is inevitable or if protective measures are warranted (and would be feasible). Unfortunately, few local preservation options are currently available in Texas aside from direct public acquisition. Nonetheless, it is an opportune time for this type of resource inventory and evaluation since wetland concerns are receiving unprecedented attention in the current state legislative session. The work of the Armand Bayou Nature Center also has helped to raise awareness of local wetland resources and their importance.

Key Management Agencies

U.S. Army Corps of Engineers (Corps)

Section 404 of the Clean Water Act places the Corps of Engineers, along with the U.S. Environmental Protection Agency, at the center of federal wetlands regulation. The

Corps has gradually assumed this type of role as a result of environmental legislation and judicial rulings. The Corps' traditional approach to regulating activities in U.S. waters focused mainly on navigation concerns. But the 404 program goes farther by aiming to protect the nation's waters from indiscriminate discharges of soil, sand, gravel and dredged material capable of causing pollution. The Corps now performs a full "public interest review" of most projects to balance water protection and utilization needs.

The expansive definition of "waters of the United States" as used in the Clean Water Act makes the Section 404 program applicable to proposed actions in wetlands as well as to more obvious open-water projects. Section 10 of the Rivers and Harbors Act of 1899 authorized the Corps to establish a permit program for certain activities in the *navigable waters of the United States*. But the Clean Water Act applies the 404 permit program to *waters of the United States*, which is the navigable waters "plus their tributaries and adjacent wetlands and isolated waters where the use, degradation, or destruction of such waters could affect interstate or foreign commerce." It should be emphasized, however, that the vast majority of wetlands losses -- those resulting from natural processes and agricultural activity -- are not affected in any way by the Section 404 program. As a result, the Section 404 program is considered by some a limited, "back-door" approach to wetlands protection. This has spurred the current efforts in Congress and elsewhere to craft a comprehensive resource policy for wetlands comparable to other areas of environmental regulation.

The Corps of Engineers and EPA jointly administer the Section 404 program, with EPA focusing on policy aspects and the Corps on day-to-day implementation. The Corps' Section 404 permitting authority was established by Congressional amendments to the Federal Water Pollution Control Act in 1972. Section 301 of the Act prohibits the unpermitted discharge of any pollutants into waters of the United States. Section 404 then classifies dredged and fill material as pollutants when they are discharged into U.S. waters.

Activities in the Christmas Bay watershed which fall under the Corps' Section 404 jurisdiction are regulated by the agency's Galveston District. The District is one of five in the Southwestern Engineer Division, which covers all of Texas, New Mexico and Oklahoma and portions of Louisiana, Arkansas, Missouri and Colorado. The Division headquarters is located in Dallas. Each Division and District has an arm of the Corps' nationwide Regulatory Branch. Each Branch within the Corps is comprised of specialized Sections. In the Corps hierarchy, Section Chiefs report to Branch Chiefs, Branch Chiefs to the District Engineer, District Engineers to the Division Engineer, and Division Engineers to the Chief of Engineers in Washington, D.C. The Chief of Engineers manages the entire agency under the direction of the Secretary of the Army. Within the Galveston District's Regulatory Branch, the Evaluation Section processes 404 permit requests, and the Compliance and Special Actions Section monitors the performance of permittees. In cases where a potential applicant is not sure whether he needs a permit, the Evaluation Section make the determination and notifies the individual.

The Secretary of the Army has delegated his permit-issuing authority under Section 404 to the Chief of Engineers, who in turn authorized his Division and District Engineers to manage the 404 program. This delegation of authority reflects a philosophy of decentralized management within the Corps. The top echelons of the agency provide guidance to the divisions and districts and then serve in an oversight capacity as Corps programs are implemented. Corps District staff refer to the Department of the Army regulations (in the Code of Federal Regulations) as their "Bible." Regulatory guidance letters provide additional clarification of agency policy and practices. The Corps leadership also distributes Memoranda to the Field on important topics, such as a recent restatement of Corps policy regarding agricultural activity on prior converted wetlands. Revisions to Corps regulations are developed through formal rule-making procedures, with opportunity for public comment.

With every application it reviews, the Corps considers the following general criteria:

- the relative extent of the public and private need for the proposed activity
- the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed activity, and
- the extent and permanence of the beneficial and/or detrimental effects which the proposed activity is likely to have on the public and private uses to which the area is suited

The Corps also must examine any specific impacts in a wide range of areas, including: conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, floodplain values, food and fiber production, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, the needs and welfare of people, and considerations of private ownership. For this formidable task, the Corps relies not only on its own technical staff, but on the entire network of experts in other federal and state agencies. It is important to note that, aside from the Corps, numerous federal and state resource agencies also can influence proposed discharge projects indirectly through their required comments on Corps permit applications. The Texas Water Commission, as the state's lead water quality agency, can have a very direct influence over Corps permits under Section 401 of the Clean Water Act. This section requires that the state certify each permit before it is issued. When the state certifies a permit, that means that the proposed discharge will not undermine state water quality standards and will not cause significant impacts. The Corps may not issue a permit without the state certification unless the state waives the requirement.

In addition to the Corps' normal "public interest" review, the Section 404 program requires that the Corps evaluate a proposed discharge site against the criteria of Section 404(b)(1). These criteria were developed by EPA in consultation with the Corps. The

EPA guidelines attempt to minimize discharge impacts, and they prohibit a discharge when less environmentally damaging, practicable alternatives exist. Even if a project complies with the criteria, the Corps still may deny a permit if the project is found to be contrary to the public interest for any reason. One specific question that the Corps asks when an applicant proposes to alter wetlands is whether the project is dependent on the particular site and cannot feasibly be relocated. The District Engineer also must conduct additional studies in certain situations, such as when endangered species may be affected by a project. (The National Environmental Policy Act provides another means of wetlands protection and impact evaluation through its Environmental Impact Statement and public review requirements for federally-sponsored projects.) The resource agencies which review Corps permit applications often coordinate their evaluations and work toward a unified response. These agencies include EPA, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Texas Parks and Wildlife Department. The Corps must give full consideration to resource agency input, but it may issue a discharge permit over the objections of the other agencies.

The Corps' standard permit is one that is processed through typical review procedures and involves a case-by-case evaluation of proposed activities. This process often includes a Public Notice, an opportunity for a public hearing, and consideration of comments received. Under prescribed circumstances, the District Engineer is authorized to use less time-consuming, alternative methods for approving proposed activities. The more well-known is the "general permit," which has been the subject of criticism from those who prefer to see case-by-case evaluations in most all instances. Under a general permit, formal processing of a permit application may not be needed because the Corps already has authorized certain activities in advance by issuing a nationwide or regional permit to the public at large. However, a Public Notice, an opportunity for public hearing, and decision documentation still must be completed by the staff, and some reporting may be required of the project sponsor. For example, a Corps nationwide permit allows the discharge of dredged and fill materials into lakes less than 10 acres in size, measured to include any adjacent wetlands. The rationale behind general permits is that they cover activities that have been found to involve no significant short-term or cumulative impacts in a particular region or nationwide. However, the permittee still may have to meet certain conditions to qualify for the general permit. The District Engineer also may use a Letter of Permission (LOP) to approve small or routine projects with minor impacts and minimal agency or public objections. LOPs are the fastest alternative to a standard permit because a Public Notice is not required , meaning that the public at large is not notified of the project application.

Listed below are the usual steps for processing a standard individual permit:

1. Optional pre-application consultation
2. Receipt of permit application at District Office
3. Public Notice within 15 days of receiving all information

4. Comment period of 15-30 days, depending on nature of activity
5. Review by Corps, resource agencies, special interest groups and the public (site visit by staff)
6. Consideration of comments received
7. Inter-agency consultation, if necessary
8. Requests for additional information, if necessary
9. Public hearing, if necessary
10. District Engineer issues permit or denies application with statement of reasons

Each application is guided through this process by an assigned project manager. The manager coordinates all of the necessary work and also may negotiate modifications to the project to meet Corps conditions. District Engineers are authorized by the Secretary of the Army to impose any conditions they see fit on an issued permit. The Corps may call a public hearing if any of the comments it receives raise substantial issues which cannot be resolved informally or require additional information. The Corps urges all who are unsure about Corps jurisdiction to contact the District early in project planning to receive a written determination of whether a Corps permit will be needed. This may include a visit to the project site by Corps personnel. To avoid costly delays and ensure regulatory compliance, the Corps also encourages informal pre-application meetings between applicants and Corps staff prior to submission of a permit application, especially on large and more complex projects.

The Corps uses a standard application form for all of its permits. The reason for this is that all proposed activities first must be evaluated to determine which of the regulatory programs they fall under and what type of permit will be needed to authorize the work. Additionally, most applications go through the same basic review process, no matter which type of permit is needed. The application requests information on the proposed activity; its sponsor; its purpose; its location; any nearby waterbodies; adjacent property owners; any other federal, state, interstate or local approvals needed; any provisions for discharge of dredged or fill material; and whether any portion of the project is already in progress or completed. The Corps also requires three types of drawings with each application: a vicinity map, a project plan, and an elevation or cross-section view.

Although there is no formal deadline for Corps decisions on permit applications, it is agency policy to try to approve or deny an application within 60 days. More complex technical or legal situations may require more time, as may controversial cases that generate many more comments for staff review, require close coordination between agencies, and perhaps warrant multiple site visits. In all cases, the Corps takes as much time as it needs to insure that the quality of the review is not compromised. Reviews of applications involving a Public Notice typically are finished within four months, with most requiring only 60 days. A formal Public Notice involves notification of all relevant federal, state and local agencies, adjacent property owners, and the general public. These

groups are given an opportunity for review and comment on the proposal, as well as the chance to request a public hearing on the matter. In comparison, a straightforward Letter of Permission normally takes only 30 days.

The Corps reports that only 3% of all permit requests are denied nationwide. Most disapprovals involve applicants who refuse to change the design, timing or location of the proposed activity in line with Corps recommendations. The sponsors of a disapproved project may redesign their plan and resubmit their application. The Corps often points out regulatory factors for applicants to weigh in the design process, as well as urging consideration of alternatives when conflicts arise. The Corps also suggests ways to eliminate the need for a permit through careful siting of activities near water and minimization of project impacts. The results of 404 reviews are contained in a monthly status report issued by the Corps.

Inter-agency agreements established under Section 404(q) allow the resource agencies to request higher-level review within the Department of the Army of a District Engineer's permit decision. This internal review must be requested within specified time limits and under certain conditions. These conditions include insufficient coordination by the district, the emergence of significant new information, or a perceived need for policy-level review of nationally important issues. The Assistant Secretary of the Army for Civil Works considers these requests. EPA has the authority under Section 404(c) to veto a Corps permit approval under certain conditions. It may invoke this veto authority at any time, even if an application is not pending. The Corps and EPA have signed Memoranda of Agreement on jurisdiction, enforcement and mitigation issues in hopes of minimizing inter-agency disagreements. The MOA on mitigation establishes the following conservation-based sequence:

- analysis of acceptable, practicable alternatives (the applicant must demonstrate that the project is dependent on the site in question and that the sensitive area cannot be avoided)
- reduction of impacts (such as minimization of grading)
- as a last resort, provision of compensating mitigation for unavoidable impacts (possibly by creating, enhancing or developing wetlands on or off the site)

Any member of the public, either an applicant or another interested party having standing, may challenge a Corps permit decision in court. Such cases usually are based on charges that the Corps did not comply with procedural requirements, did not observe 404(b)(1) guidelines, or did not adhere to its own permit regulations. Dissatisfied applicants often must resort to litigation because the Corps regulations do not provide for any form of administrative appeal if an internal review determines that the District Engineer followed all required procedures.

Corps personnel are trained in surveillance and inspection techniques so that they may detect unauthorized activities and permit violations. The Corps is assisted by other monitoring agencies and the public. The District Engineer may issue a cease and desist order if a violation still is in progress. Staff conduct an investigation so that the District Engineer may decide what administrative or legal steps are necessary. The District Engineer also evaluates the need for "expeditious corrective measures" to protect life, property or a significant public resource. Appropriate mitigation steps can be administratively ordered or pursued through legal action. The Corps' consideration of remedies and enforcement measures sometimes is coordinated with state and federal resource agencies.

When enforcement action is necessary, either because of a permit violation or failure to obtain a permit, the Corps prefers to pursue a voluntary, mutually agreeable solution with the alleged violator. In some cases this may include requiring him to restore the disturbed site to its pre-project condition or finance the cost of such work. If the violation is not significant and the activity would have been authorized by the Corps under the appropriate procedures, then the project sponsor may be allowed to apply for an "after-the-fact" permit. The Corps' enforcement strategy is tailored to the seriousness of the violation and the cooperativeness of the project sponsor. Litigation, when necessary, is handled by the Corps' Office of Counsel. Cases also may be referred to EPA to channel through its enforcement mechanisms. The most damaging violations or hostile violators are referred to the U.S. Department of Justice for prosecution. Criminal charges are filed when punitive action and/or deterrence is considered necessary to insure the integrity of the permit program. Civil actions are used to secure site restoration when attempts at voluntary compliance have failed. Penalties for violation of Corps regulations may range from minimum fines to imprisonment in the most extreme cases. The Water Quality Act of 1987 authorized the Corps to assess administrative penalties for violations of issued permits. (EPA assesses penalties for unauthorized discharges of dredged and fill materials.) The District Engineer determines the size of the penalty based on the types of factors mentioned above. The District Engineer also may modify, suspend or revoke permits when necessary.

The Corps responds to written requests for wetlands determinations. The Corps now uses a unified federal method for determinations that is based on a manual developed jointly by the Corps and EPA in 1989, with support from the U.S. Fish and Wildlife Service (FWS) and the U.S. Soil Conservation Service (SCS). Prior to the approval of the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands*, each of the various field agencies had its own approach to wetlands determination. The new manual reflects the Corps' "tri-parameter" approach to determinations: the necessary hydric soils, hydrophytic vegetation, and hydrology must be present before federal personnel may conclude that a site contains wetlands. Unlike the previous Corps manual, however, the joint federal manual allows one or more of the parameters to be assumed from the presence of others under certain circumstances. The manual has been through a one-year trial period of use, and the involved agencies are compiling staff comments and suggestions for an expected revision of the manual. The Corps also assists other agencies with determinations, including the FWS, and the SCS on agricultural sites affected by the

Food and Security Act of 1985. After a determination is made, agency staff also may use their skills to delineate the extent of the wetlands. This may be critical to establishing a buffer around the periphery of a wetlands area or in evaluating how much of a parcel is not "wet" and suitable for sensitive development. Finally, staff determine what type of permit, if any, the applicant will need from the Corps.

U.S. Environmental Protection Agency (EPA)

EPA is the lead agency in monitoring nationwide progress toward achieving the Clean Water Act's goals. The overriding goal of the Act is "fishable, swimmable" water, which is to be achieved by restoring and maintaining the chemical, physical and biological integrity of the nation's waters. The inclusion of wetlands as "waters of the United States" is what draws EPA into wetlands protection The maintenance of water quality and other important elements of wetlands is considered an integral part of EPA's mission under the Clean Water Act. The Bush Administration and EPA have adopted the goal of the National Wetlands Policy Forum to work toward "no net loss" of the nation's remaining wetlands.

As discussed in the previous section, the permit program for discharges of dredged and fill materials into the nation's waters is currently the chief federal tool for wetlands protection, despite its limitations. This program is authorized by Section 404 of the Clean Water Act, and the Corps of Engineers and EPA jointly administer it. The aim of the Section 404 permit review process is to minimize the negative environmental impacts of these discharges.

Wetlands protection is primarily the responsibility of EPA's Environmental Services Division, although other parts of the agency may become involved with the issue from time to time. The Federal Activities Branch is part of the Division, and its Technical Assistance Section supervises EPA's 404 work program. The Environmental Services Division of EPA Region 6 is one of four regulatory divisions which report to the Regional Administrator. Region 6 covers Texas, Louisiana, Arkansas, Oklahoma and New Mexico. The Region 6 office is located in Dallas. EPA's ten regional administrators report to the agency's Administrator, based at EPA headquarters in Washington, D.C. The Administrator of EPA and a Deputy Administrator are appointed by the President with the advice and consent of the U.S. Senate.

EPA staff refer to four basic steps in wetlands protection:

1. Definition
2. Inventory
3. Hierarchy of protective measures, and
4. Evaluation

EPA is among the key agencies which assist the Corps of Engineers in determining whether particular sites fall under the federal wetlands definition. (EPA plays more of an

oversight role in many aspects of wetlands regulation compared to field-oriented agencies.) The federal code defines wetlands as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." As mentioned in the discussion of the Corps of Engineers, a joint Corps/EPA federal manual now guides official identification and delineation of wetlands. EPA oversees federal wetlands management planning through its Advanced Identification process. Under this program, EPA conducts intensive surveys and attempts to assess the function and value of particular areas in order to safeguard the most valuable sites more effectively in the permitting process. EPA has drafted Regional Priority Wetlands lists as a result of its field research, and these lists were consulted by the U.S. Fish and Wildlife Service for its own priority planning under the Emergency Wetlands Resources Act.

EPA has identified the following approaches to wetlands protection:

- Acquisition: through fee simple purchase or acquisition of an easement, private or public management entities can directly control wetlands sites as conservation areas, sanctuaries or refuges.
- Economic incentives: tax deductions may be authorized to encourage land sales or donations to conservation groups.
- Economic disincentives: the government may withhold certain benefits that encourage activities disruptive to wetlands. The chief example is the "swampbuster" provisions of the Food and Security Act of 1985 (the 1985 federal farm bill). This Act disqualifies farmers from receiving any Department of Agriculture benefits in a year in which they have cleared and drained wetlands for crop use. Before the passage of this Act, federal farm programs actually were an incentive for wetlands filling since they subsidized the cost of private land conversion.
- Regulation: the existing tools include Section 404 permits, civil and criminal penalties for violations, and possible mitigation requirements to correct violations. (Federally-sponsored projects which potentially impact wetlands are affected by the National Environmental Policy Act, which requires the development and review of Environmental Impact Statements to assess the significance of identified impacts.)
- Private options: these include citizen involvement in and support of private conservation initiatives; use of best management practices and sensitive project design

on privately-owned land containing wetlands; private open space planning, purchases and donations, and citizen participation in the Section 404 permit review process.

Section 404 authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for dredge/fill discharges at specified disposal sites. It requires the EPA Administrator to prepare guidelines in conjunction with the Secretary of the Army for use in issuing permits. The Secretary of the Army may override the EPA guidelines should there be adverse economic impacts on the site. The EPA Administrator may prohibit the use of a disposal site if he determines that a discharge will adversely affect municipal water supplies, wildlife, recreation areas, or shellfish beds and fishery areas. District Engineers may issues general permits for dredge/fill discharges. EPA's response to the Corps of Engineers on 404 permit reviews is coordinated with those of the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Texas Parks and Wildlife Department. The Corps of Engineers must give full consideration to resource agency input, but it may issue a discharge permit over the objections of the other agencies. EPA Region offices that wish to appeal a Corps decision must communicate their complaint to EPA headquarters according to the procedure outlined in Section 404(q). EPA may veto a Corps permit approval under certain conditions outlined in Section 404(c). It may invoke this veto authority at any time, even if an application is not pending.

The Clean Water Act authorizes EPA to take appropriate enforcement action to assure Section 404 compliance, including any necessary information-gathering to establish the need for intervention. EPA's first response to a wetlands violation is an informal warning letter which summarizes the 404 program and seeks voluntary compliance. Section 308 allows EPA to require the submission of information by a suspected violator. Failure to respond to an EPA information request can result in additional penalties. If necessary, EPA may issue an administrative order to require that a discharger cease an ongoing violation or refrain from committing future violations. Amendments to the Clean Water Act in 1987 gave EPA authority to assess administrative penalties for unauthorized discharges of dredged and fill materials. (The Corps of Engineers assesses penalties for violations of the conditions of an issued permit.) Penalties for minor violations may not exceed $25,000, while major penalties may total up to $125,000. In either case, the daily penalty during the time that a violation continues may not surpass $10,000. Violations which are beyond the scope of EPA's administrative remedies are referred to the U.S. Department of Justice for civil litigation. The Office of Criminal Investigation handles those cases which warrant criminal charges.

In addition to these direct enforcement measures, EPA also plays its usual oversight role should the Corps choose to consider an "after the fact" permit for an unauthorized action. EPA can recommend that the Corps issue a permit subject to project modification, issue one subject to partial site restoration, or deny a permit and order complete restoration of the site. If an EPA office does not concur with the Corps' decision, it can pursue the usual appeal and veto procedures through EPA headquarters. EPA and the Corps have

signed Memoranda of Agreement on enforcement and mitigation issues in hopes of minimizing inter-agency disagreements. The agencies establish enforcement priorities by weighing the gravity and environmental significance of the alleged violation. Violations are evaluated in terms of the precedent they may set, whether they are part of a pattern of violations, whether the violator reaped any financial benefit from the action, and what magnitude of damage was done. In areas where numerous wetlands violations have been documented, EPA may decide to use its Advanced Identification resources to conduct an intensive study, educate the local community about federal regulations, and attempt to minimize future violations.

EPA has acknowledged that Section 404 alone does not afford adequate protection for wetlands. The agency established an Office of Wetlands Protection in 1986 to coordinate the development of a national protection strategy with other federal agencies, state and local governments, developers, environmental groups, the scientific community, and the public. The "no net loss" concept may become the centerpiece of this effort, depending on the pending recommendations of the Domestic Policy Council. In the meantime, the Office is attempting to raise public awareness and increase citizen participation on wetlands issues.

U.S. Fish & Wildlife Service (FWS)

The Fish and Wildlife Service is the lead federal agency responsible for conserving, protecting and enhancing the nation's fish and wildlife populations and their habitats. Major FWS concerns include migratory birds, endangered species, certain marine mammals, and freshwater and anadromous fish, such as salmon. The Service is a branch of the U.S. Department of the Interior, which is the principal federal entity concerned with conservation. The Department manages most of the nation's federally-owned public land. Its "Take Pride in America" campaign encourages stewardship and citizen involvement in conservation.

FWS is interested in wetlands primarily because of their habitat value and importance as incubators of larval and juvenile organisms. Some valuable wetlands areas are under direct FWS control and management through the agency's National Wildlife Refuge System. The 12,199-acre Brazoria National Wildlife Refuge preserves coastal marsh areas in the vicinity of Christmas Bay that serve as wintering habitat for migratory waterfowl. FWS also monitors and draws attention to wetlands degradation and losses caused by conversions to agriculture and other uses.

The Ecological Services Division of FWS is most involved in wetlands matters because of its habitat conservation focus, but other divisions such as Fisheries and Refuges also address the issue in their programs. The Fish and Wildlife Service is guided by a Director who reports to the Secretary of the Interior. FWS has seven regional offices, and each Regional Director reports to the FWS Director in Washington, D.C. Region 2, known as the Southwest Region, is based in Albuquerque and covers Texas, Arkansas, Oklahoma and New Mexico. In addition to a national research facility, FWS has more than 700 field units and installations, including its refuges, research labs, field offices and

law enforcement offices. A field office for the Houston-Galveston area is located in Clear Lake. Most professional staff of the agency are fish and wildlife biologists or specialists in related disciplines. The Service also trains refuge managers and enforcement agents. The Youth Conservation Corps is jointly administered by FWS, the National Park Service, and the U.S. Forest Service. The Corps provides summer jobs for youths at wildlife refuges, research labs and other field sites. FWS also recruits volunteers for its various locations.

The Fish and Wildlife Coordination Act authorizes FWS to review and comment on federally-sponsored projects and permitted activities with the potential to impact habitats and fish and wildlife resources. FWS has been very active in addressing impacts to wetlands under this authority. Aside from project review, FWS also serves as a resource agency by providing expert biological advice to federal agencies, states, private industry and citizens. Field office personnel highlight potential development impacts on habitats and urge protective strategies of avoidance, minimization and mitigation. The conservation provisions of various agricultural laws direct FWS to work with agriculture and soil conservation agencies who help farmers and ranchers to develop protection plans for wetlands on private lands. This activity fits in well with FWS's partnership policy, under which it emphasizes cooperative conservation initiatives with private landowners, public agencies, corporations, conservation groups and citizen volunteers.

Congress assigned FWS a central role in wetlands conservation with the 1986 passage of the Emergency Wetlands Resources Act. The Act required FWS, acting for the Secretary of the Interior, to prepare a National Wetlands Priority Conservation Plan. The plan was to set the framework for high-priority wetlands acquisitions, as called for in the Act. Acquisitions by the states and the federal government would be financed with Land and Water Conservation Fund revenues (the fund was created by the Land and Water Conservation Fund Act of 1965). The plan also would identify wetlands that could be protected through less direct measures than acquisition. The National Priority Plan required each FWS Region to prepare a Regional Wetlands Concept Plan that would specify conservation priorities even further within each state. The National Plan established threshold criteria to guide each Region in its wetlands assessments and priority-setting. The criteria promote acquisition of those sites that are representative of a declining wetland type, have significant functional values, and are threatened with loss or degradation. The highest priority is given to wetlands whose "benefits cannot be maintained or realized except through acquisition." States may modify the threshold criteria to meet their own needs, but this must not result in standards that are below the minimum federal criteria unless the state can justify the change.

The Region II Wetlands Regional Concept Plan was completed in 1989. The Region plan identified one area within the Christmas Bay watershed -- the 32,000-acre Hoskins Mound area -- as a high-priority wetlands site for possible acquisition. Wetlands proposed for acquisition as a result of the plan must be evaluated and ranked on a national priority scale through FWS's Land Acquisition Priority System (LAPS). Funded projects are then subject to public review and comment under the requirements of the National Environmental Policy Act. Acquisition can occur through fee simple purchases,

perpetual easements, leases, deed restrictions, donations and exchanges. Throughout the process, FWS has coordinated its work with interested and affected public and private organizations. This has enabled FWS to compare its rankings to the wetlands priorities established by other groups, including the Texas Parks and Wildlife Department. FWS will continue to update the plan and priority lists as new information is collected.

FWS has a network of labs and field stations that support its fish and wildlife management research. The agency formed a National Wetlands Inventory Group under its Special Projects Branch to oversee the necessary mapping, data collection and field work required for the National Wetlands Inventory. This project enables FWS to monitor wetlands losses and analyze and report on national trends. In 1990 the agency published *Wetlands Losses in the United States, 1780s to 1980s*. This was the first of two reports that Congress asked the agency to prepare under the North American Wetlands Conservation Act of 1989. Following this historical trend report, FWS next will prepare a report entitled *Status and Trends of Wetlands and Deepwater Habitats in the Coterminous United States*. The Emergency Wetlands Resources Act requires that FWS update the status and trends report every 10 years.

Another initiative that draws FWS into wetlands protection is the North American Waterfowl Management Plan. A 1986 agreement between the Canadian and U.S. governments launched this joint conservation effort. Mexico recently signed an agreement to lend assistance. The plan aims to protect and increase waterfowl populations principally by targeting more than six million acres of critical wetlands on which these species rely. After an initial research and planning phase, the management plan now is being implemented in specific habitat areas through Joint Ventures. These ventures involve public-private partnerships for wetlands preservation. The Gulf of Mexico Joint Venture area stretches from Alabama to Texas, and conservation projects in this area are intended to protect some 386,000 acres of vital habitat by 2000. Aside from land acquisitions, joint venture participants also develop economic incentives to influence land use practices, negotiate agreements with private landowners, support improved water management, and sponsor wetlands and habitat research. This national (and international) project is one example of the ways in which FWS personnel lend their expertise through technical assistance and direct management programs.

FWS staff assist federal and state enforcement agencies by watching for violations while in the field, making referrals, and monitoring required mitigation work. The agency may send advisory letters to point out violations and supply information on applicable federal laws and regulations. FWS also works with other agencies through various committees and special projects. Finally, the agency demonstrates its commitment to public education by sending representatives to speak before citizen and business groups, by hosting teacher workshops, and by leading field trips with such groups as the Cub Scouts.

National Marine Fisheries Service (NMFS)

Protection of critical habitats, including coastal wetlands, is an integral part of insuring the health and maintenance of fisheries and species under NMFS jurisdiction. However,

like the U.S. Fish and Wildlife Service and the Texas Parks and Wildlife Department, NMFS serves only in an advisory capacity during reviews of federally-funded or permitted activities in waters of the United States. NMFS staff must work with lead agencies, such as the U.S. Army Corps of Engineers on Section 404 dredge/fill discharge permits and EPA and the Texas Water Commission on wastewater discharge permits, to insure thorough environmental reviews and minimization of adverse impacts. NMFS has review-and-comment authority under the Fish and Wildlife Coordination Act, the National Environmental Policy Act, and the Clean Water Act.

The National Marine Fisheries Service is part of the National Oceanic and Atmospheric Administration (NOAA), which is under the U.S. Department of Commerce. Galveston Bay falls within the agency's Southeast Region, which stretches from Texas to North Carolina and includes Puerto Rico and the U.S. Virgin Islands. The Southeast Region's Habitat Conservation Division has a field branch office in Galveston, where an area supervisor and other staff are based. Because of their limited expertise on water quality matters, local NMFS staff seek technical assistance from agency chemists at the NMFS laboratory in Beaufort, North Carolina, when reviewing major discharge applications. The staff review only the most significant discharge proposals because of limited resources. Aside from the impacts of wastewater effluent in estuaries, a major concern that NMFS shares with other agencies is the adverse effects on habitats of nonpoint source pollution and other byproducts of human activities.

While NMFS staff provide formal notice to other agencies of their findings and recommendations on proposed projects, they also communicate informally with other resource agency staff on a regular basis. Staff also attend interagency coordination meetings and participate in on-site inspections as needed. In addition to tracking proposed actions and permit applications, staff monitor how NMFS recommendations are received by lead agencies and to what extent they are implemented in actual projects and permitted actions. Follow-up investigations are conducted in the field as resources and staff time allow. NMFS disseminates the results of its monitoring activities and field research through *Marine Fisheries Review* and other journals. Staff would prefer to report information for individual estuaries or even portions of estuaries, but resource limitations make this level of detail impossible, so only gross figures are provided for states and Corps of Engineers districts. NMFS staff also see a need to keep a more comprehensive record of minor actions on which the agency does not officially comment.

Texas Parks & Wildlife Department (TPWD)

The Texas Parks and Wildlife Code gives TPWD primary responsibility for protecting the state's fish and wildlife resources. One of the most important ways that the department does this is by protecting habitats, and wetlands are among the most important in both upland and coastal areas. TPWD becomes involved in wetlands protection in a variety of ways, some direct and others indirect.

The department is guided by the nine-member Texas Parks and Wildlife Commission. The Commission establishes agency policy, and earlier this year it approved a new staff-developed agency-wide environmental policy. The policy contains a general statement of TPWD's overall responsibility. Protection of the state's "unique biodiversity" is the highest agency priority. This will help to focus attention on wetlands as a principal source of diversity. The new policy also intends that agency operations, such as parks and preserve areas, serve as models of proper natural resource protection. Most importantly, the policy is meant to guide TPWD staff in their day-to-day activities. An Executive Director manages the agency, and a continuing reorganization has changed the arrangement of agency divisions and branches that report to him. The Resource Protection Division remains the principal one regularly involved in wetlands issues. According to TPWD staff, there are five persons within the agency who deal with wetlands on a daily basis -- three in field posts and two in administrative positions in Austin. TPWD has designated one staff member as the agency's Wetland Resources Coordinator, and this individual also contributes to the management planning process for the Texas Coastal Preserve program as the department's Coastal Preserves Coordinator. TPWD clearly is a field-oriented agency,with more than half of its staff assigned to field locations. In addition to parks and management areas, TPWD has 28 field offices around the state. The Houston-Galveston area has a number of staff locations, including the Seabrook Marine Laboratory located directly on Galveston Bay.

As the state's lead agency for recreation planning, TPWD must maintain the *Texas Outdoor Recreation Plan (TORP)*. The federal Emergency Wetlands Resources Act of 1986 required that TPWD add an addendum to the TORP to identify wetlands as an important outdoor recreation resource. TPWD completed this task in 1988, entitling its addendum the *Texas Wetlands Plan.* This plan kept Texas eligible for federal recreational acquisition funds through the Land and Water Conservation Fund (LWCF). The federal Act mandated that the state plan be consistent with the National Wetlands Priority Conservation Plan. However, the state plan does not list specific high-priority wetlands areas to guide acquisition because the U.S. Fish and Wildlife Service (FWS) had not yet completed its priority planning for the national and regional wetlands plans. Instead, TPWD identified broad geographic areas for consideration. The Texas plan also provides general policy guidance, encourages citizen involvement in wetlands planning, and instructs that all state acquisitions which use federal funds be guided by the *TORP*, the TORP Action Program, and the state's LWCF grant project selection procedure. The *Texas Wetlands Plan* was approved by the Governor and the National Park Service following extensive public and agency review across the state.

In addition to this planning role, TPWD is the state's lead resource agency on wetlands matters. The agency has little direct regulatory authority over wetlands areas, but it participates regularly in inter-agency permit review meetings sponsored by the U.S. Army Corps of Engineers at its Galveston District Office. The agency estimates that it reviews and comments on roughly 1000 Section 404 dredge/fill discharge permits each year. It also figures that TPWD staff visit more wetlands sites in the state than any other agency in the course of reviewing and monitoring permitted activities. In the absence of independent regulatory authority, TPWD must do its best to document instances of

environmental damage and seek compensation from the responsible party. If TPWD cannot persuade the relevant action agencies to take enforcement steps against uncooperative violators, then it may decide to pursue litigation on its own. The Texas Legislature has instructed TPWD to be aggressive in both of these areas -- persuasion and litigation.

The one area where TPWD does have direct authority is through its permit program for the disturbance or removal of streambed and bay bottom material such as sand, gravel or shell from state-owned streambeds and marine bottoms. TPWD can play an active role in wetlands protection if an applicant proposes to undertake this activity in such areas. TPWD also has direct responsibility for wetlands when they are part of the State Park System or in a TPWD wildlife management area or preserve. On-site wetlands are a key consideration in TPWD master plans for park development and in management plans for other TPWD holdings, including coastal preserves leased from the Texas General Land Office. Wetlands protection is a factor in the state's planning for new park and preserve acquisitions, especially since these areas then can be used for state-sponsored wetlands research. Other ways in which TPWD promotes wetlands protection include:

- field monitoring and biological research, which supports the development of Best Management Practices for wetlands areas
- public education programs
- advisory duties for various special projects, inter-agency committees, and technical assistance programs (these activities allow TPWD staff to promote the themes of wetlands avoidance and restoration), and
- acquisition of wetlands through purchases and creation of wetlands on existing lands

TPWD's Environmental Contaminants staff contribute to wetlands protection by evaluating the impacts of proposed point source discharges, reviewing proposed state water quality standards, investigating environmental damage from pollution, pursuing mitigation by polluters, and working with dischargers in hopes of achieving voluntary prevention of impacts. Environmental Assessment staff review and comment on various project plans and related Environmental Impact Statements. This may include water supply projects that have implications for freshwater inflow into estuaries, or routine dredging and spoil disposal operations that can affect wetlands. Assessment staff advise project sponsors on ways to minimize wetlands impacts. Endangered Resources staff conduct research and field investigations to identify critical areas where scarce agency resources should be devoted to protect threatened or endangered species, and this often involves vital wetlands habitat. The staff also assess development impacts on wetlands and protected species. TPWD administers the Texas Natural Heritage Program, which was created in 1983 to inventory and manage data on sensitive and unique natural resource areas in the state. Staff involved in impact assessments turn to the Heritage Program for essential information.

Finally, more than 400 TPWD Game Wardens are in the field and can report violations of wetlands regulations to the appropriate agencies. These commissioned peace officers are joined by regular TPWD staff in monitoring activities that may impact wetlands.

Texas General Land Office (GLO)

The General Land Office is responsible for managing the state's interest in 20.5 million acres of land in Texas. Because the state has extensive holdings along the Gulf Coast, the GLO plays a lead role in protecting coastal marshes and wetlands. Internal agency policy and philosophy also have enabled GLO to become more active in wetlands protection than in the past when the conservation burden was on the Texas Parks and Wildlife Department.

Under the Texas Natural Resources Code, GLO has the dual responsibility of generating revenue through permitted uses of state land while also protecting the long-term viability of those lands. The GLO carries out the latter duty by requiring all activities on state-owned land to meet established environmental standards.

General Land Office programs are guided by the three-member School Land Board and the elected Texas Land Commissioner, who chairs and is one of the three members of the Land Board. The Land Commissioner's office produces a four-year internal agency plan with agency-side goals and objectives to guide staff activities. A recent reorganization created eight "program areas" within the GLO. Wetlands protection activities are primarily the responsibility of the Resource Management staff. A Coastal Division within the Resource Management program area oversees coastal wetlands issues. The division includes a newly-hired wildlife biologist who will serve as GLO's Coastal Preserve Coordinator. GLO's General Counsel has an attorney assigned to coastal matters. Administrative staff are based at GLO's Austin headquarters, while field activities are carried out from GLO's Upper Coast and Lower Coast Field Offices. The Christmas Bay area is monitored by Upper Coast field staff based in La Porte.

GLO recently completed its first *Texas Coastal Management Plan*, as mandated by the 71st Texas Legislature in 1989 (under Senate Bill 1571). Wetlands protection was one of the principal issues addressed by the plan. In preparing the plan during 1990, GLO brought together an 84-member Coastal Management Advisory Committee, a federal agency task force, and a state agency task force. The agency sponsored a series of workshops as well as multiple public hearings at sites along the Texas coast. This process led to numerous recommendations to address such concerns as: wetlands loss, degradation, inter-agency coordination, public education, appropriations, and wetlands enhancement and restoration. Among the highlights are:

- Establishing a state goal of no overall net loss of wetlands, based on acreage and function, that will be consistent with the federal definition. GLO calls for the

creation of an implementing framework, with TPWD taking the lead in monitoring and enforcement.

- Conducting regular, standardized wetlands inventories to monitor losses and mitigation efforts.
- Adopting a State Wetland Conservation Plan for coastal public lands. The plan would promote the "no net loss" goal and establish procedures for achieving it. GLO calls for coordination between itself, TPWD, and the Texas Water Commission in preparing the plan, with TPWD taking the lead in its preparation.
- Requiring preparation of long-range navigational dredging and spoil disposal plans to assure adequate wetlands protection.
- Completing studies and taking actions to insure that upstream water supply projects do not adversely impact coastal wetlands.
- Examining the possibility of a formal coordination mechanism among state agencies on wetlands issues.
- Requesting that the federal government establish a National Wetlands Information Center.
- Coordinating agency protection policies and eventually drafting inter-agency Memoranda of Agreement.
- Promoting funding mechanisms and other land protection techniques such as conservation easements.

GLO successfully promoted two coastal management bills -- Senate Bills 1053 and 1054 -- during the recent state legislative session (the 72nd Texas Legislature). These bills provide for implementation of the Coastal Management Plan by "fine-tuning" existing coastal statutes and expanding GLO's management authority. The bills direct GLO and TPWD to prepare a wetlands plan for coastal public lands, promote a "no net loss" policy, and work toward priority wetlands acquisitions through TPWD.

In addition to its long-range planning duties, GLO's Resource Management program routinely monitors wetlands impacts by conducting environmental assessments of activities proposed on state land. GLO also supports internal wetlands research and studies by TPWD and other agencies. The School Land Board may lease state-owned lands for such research, just as it leases areas to TPWD under the Texas Coastal Preserve program. The coastal preserves themselves are an effective GLO tool for wetlands protection in targeted areas, with TPWD developing a management plan for each preserve. GLO regularly offers field assistance to other agencies, but it does not have the same level of field resources to contribute as do other agencies. As a result, GLO focuses on policy and planning and then advises other agencies on possible protection steps, such as acquisition priorities for TPWD.

GLO continues to consider its own draft mitigation policy for unavoidable environmental damage caused by projects on state-owned lands. The agency has proposed a mitigation ratio of 3:1, which is more demanding than the more typical 2:1. The draft policy also sets out a preferred sequence of mitigation steps, and it directs that mitigation requirements be written into GLO leases and easement contracts as a condition of project approval. Finally, the policy indicates a preference for mitigation on state-owned lands when possible. If mitigation must occur on private land, then GLO requires that it be granted a perpetual conservation easement for access to the mitigation site.

GLO's Resource Management Code is designed to signal project sponsors and developers of state-owned land of potential environmental constraints on their activities, such as the presence of critical habitat or wetlands. A multi-agency assessment process supervised by GLO supports the development of standardized codes and an associated database. The codes, which are linked to individual tracts, give permittees advance knowledge of probable agency concerns, allowing them to modify their plans in advance and prepare acceptable mitigation steps if necessary.

Management Evaluation Findings

1. *Agency staff warn that they cannot be expected to be effective in their wetlands protection efforts without adequate funding support.*

   Agency staff say that there is a universal need for more field staff, but especially in the area of wetlands regulation and conservation. They are concerned that "top-heavy" agencies may not be capable of effective wetlands protection. As in so many areas of environmental regulation, wetlands protection specialists say that they do what they can with the resources they have.

   Staff for the Corps of Engineers say that wetlands enforcement activities have been short-changed in recent years, but the situation is improving now. Yet, despite an increased emphasis on compliance and mitigation, the Galveston District still has limited resources for field monitoring. The District has only six field biologists in its Compliance Section, and staff say that they will need more help to be effective in enforcement. But they believe that their dilemma has been recognized because they apparently will be receiving additional positions soon. Staff emphasize that such lags in problem recognition by management must be anticipated and resources must be managed carefully during these interim periods of inadequate staffing. The Corps should be able to boost its resources with a new fee schedule for its services. Processing of individual Section 404 permits now requires a $10 fee, while commercial and industrial sites require a $100 fee. The applicant does not pay the fee until the Corps issues a permit, so the Corps does not receive a payment when a permit is denied or the application is withdrawn. Staff list this as their only complaint with the new fees because they must devote the same amount of time and

resources to a review whatever the eventual outcome. An expanded fee schedule for site visits and wetlands determinations (based on acreage) is expected later this year.

Staff at the Texas Parks and Wildlife Department report that a new Executive Director has brought increased support for the Resource Protection Division. Commitment of more staff and resources to the division is meant to give it a higher profile at the regional level across the state. In general, though, TPWD staff worry that their agency and others are still too reactive when its comes to wetlands protection. They say that there are countless environmental concerns for the staff to become involved with but limited time and resources. As a result, agency staff tend to move from subject to subject, touching on things but never getting as deeply involved as they probably should. The challenge for the staff is to set priorities effectively -- to "pick your fights," as one person said -- but still maintain a "presence" on a range of issues. Staff members also point out that it is nearly impossible for public agencies to satisfy so many different constituencies, each with their own priorities. Despite EPA's promotion of a risk-based approach to environmental management, agency staff still must respond to elected officials, media, citizens, and other divisions of their agency, even when they know that they are wasting time and energy on concerns that are low on the priority scale. Dealing with these "brushfires" and being "tugged and pulled" in so many different directions keeps staff from focusing on longer-term projects and issues.

The Texas General Land Office also sees a need for more field staff to devote to wetlands protection. GLO recently was able to add an extra person to each of its field offices to assist with permit reviews and environmental assessments. The agency actually has shifted permitting paperwork to the field level because of these new resources away from headquarters. Agency officials would prefer to set aside more staff time for monitoring the cumulative effects of permitted actions on state lands. Unfortunately, even under the Texas Coastal Preserve program, neither GLO nor TPWD has adequate resources to prepare or sponsor elaborate management plans. GLO at least tries to identify significant problems and suggest possible solutions, as in the *Texas Coastal Management Plan*. GLO staff refer to the plan as another agency activity that was mandated by the Legislature without any additional resources. In it, GLO calls for TPWD to prepare a State Wetlands Conservation Plan, even though it knows that TPWD will need additional funding to complete such a project.

In addition to their internal resource needs, agencies point to the scarcity of funds for direct wetlands acquisition by all levels of government. GLO is considering placing a $100 million bond package on the November ballot to finance parkland and wetlands acquisitions and other preservation activities. If approved, these funds could be used as a state match for federal land acquisition funds that may be authorized as a result of wetlands protection legislation now under consideration in Congress. But EPA staff note that the competition will be intense among coastal states and others seeking wetlands funds. States will have to demonstrate a sound resource management package and effective planning and priority-setting

mechanisms. GLO is calling for close coordination between itself, TPWD, and the U.S. Fish and Wildlife Service to insure that Texas meets federal requirements. The added benefit for GLO is that all of these activities will help to implement the *Texas Coastal Management Plan* as well.

2. *Guidance on nationwide implementation of the "no net loss" concept" is expected soon. In the interim, there is no comprehensive resource policy for wetlands on a par with other types of environmental regulation, which greatly handicaps agency efforts to avert wetland losses.*

The President's Domestic Policy Council, through its Inter-Agency Task Force on Wetlands, has been studying implementation of the "no net loss" concept by federal agencies. EPA and the Corps of Engineers both have representatives on the Task Force. Officials at EPA Region 6 point out that the Council has gone well beyond its mandate after sponsoring a series of public meetings across the country. The Council received extensive input from the various regulatory and resource agencies, private industry, environmental organizations, and the public. The Council's meetings encouraged debate not only on "no net loss," but on what the key issues really are in wetlands management and how they should be addressed by the relevant agencies, each with their unique perspectives. The Council's work continues, and EPA staff do not know when it will report its findings and offer recommendations.

For the time being, according to Corps staff, "no net loss" will be just a goal and not an operating policy. Staff say that the agencies cannot take action until they receive guidance. But the agencies already are moving in that direction through their coordination of mitigation policies and other aspects of wetlands regulation under Memoranda of Agreement and Understanding. It is expected that the final implementation strategy for "no net loss" will emphasize both regulatory and non-regulatory approaches. The Council also was asked to examine regional differences in the nature of wetlands loss, state and local government involvement, the key role of private conservation groups, the need for improved coordination of Section 404 permitting and other environmental laws such as NEPA, the feasibility of market-based strategies, and the importance of effective mitigation policies, including possible mitigation banking.

The Texas General Land Office is promoting "no net loss" as an appropriate policy for wetlands protection on state-owned public lands. Several bills before the Legislature would formalize this policy and direct state agencies to observe it in their activities. But some Texas Parks and Wildlife Department staff caution that all of the involved parties will need a clear definition of "no net loss" and a better idea of how the policy will be applied in practice. GLO began this clarification process in its *Texas Coastal Management Plan* by using the term "no *overall* net loss" of wetlands. It also said that the policy should be based on wetlands acreage and function. TPWD staff emphasize the difficulty of quantifying the value of wetlands.

They are not certain how unknown values can be traded to offset "losses" and demonstrate wetlands "gains."

3. *State and local governments have essential roles to play in wetlands protection.*

The Texas General Land Office and the Texas Parks and Wildlife Department are hoping to expand state government involvement in wetlands protection. Federal agencies welcome this trend, but agencies such as the Corps say that federal/state coordination will be essential to avoid duplication of efforts and insure complementary programs. The staff also note that federal agencies have developed considerable expertise in the wetlands area and can be of help to state agencies as they initiate their own wetlands inventories, mitigation research, and other activities. Ultimately, the Corps of Engineers would prefer to transfer Section 404 permitting responsibility (in non-navigable waters) to suitable state programs. In the meantime, the Corps says that initiatives such as the Texas Coastal Preserve program allow the states to communicate their conservation priorities to federal agencies. In the Galveston Bay area, Armand Bayou and Christmas Bay will be more quickly recognized as environmentally sensitive areas, and this will be a definite consideration in permitting, according to the Corps. TPWD has emphasized this factor in its management planning, and GLO also intends to scrutinize all permitted activities proposed for the Coastal Preserves and other sensitive coastal areas. Some TPWD staff even call for state veto authority over projects that could cause significant damage to the Texas environment.

GLO officials believe that it was important for the state to complete a coastal management plan to show that it had not forsaken planning and policy development when it rejected the Coastal Zone Management approach. They regret missing out on more than a decade of federal funding, but they hope that the state's new plan will help to attract more federal assistance and funding for coastal projects, including wetlands protection. Their principal concern is whether the federal government will be able to maintain its commitment to coastal programs just as Texas has finally begun to do its part.

State agency staff say that they will need guidance on upcoming state wetlands policy, whether it deals with water quality, mitigation sequencing, acquisition priorities, or any other aspects of wetlands protection. TPWD staff advise that any state policy be concise, easily understood, enforceable, and acceptable to the public. They also say that if a state protection program is to be effective, it must remain free of politics and meddling once a policy is agreed upon. There is some concern about GLO taking the lead in an area where it is at a disadvantage in terms of staffing and experience. But others emphasize the need for strong leadership in any type of environmental regulation in Texas due to its fragmented collection of regulatory agencies. One advantage that Texas has in the wetlands area, according to TPWD staff, is the combination of outdoor recreation planning and fish and wildlife functions under one agency. These were two areas of concern that had to be coordinated under the requirements of the federal Emergency Wetlands Resources

Act, so Texas was well-positioned to begin its mandated wetlands planning. Some agency staff recommend close duplication by the state of existing federal protection measures. They definitely do not want the state to do any less and be left behind, but they also caution against getting too far ahead of nationwide initiatives and risking loss of public support for conservation efforts. They call for prompt development of state policy to minimize the time before meaningful protective action is taken. (In the meantime, some emphasize the need for more effective use of the state's authority to certify federally-permitted actions in wetland areas under Section 401 of the Clean Water Act. This water quality certification process is carried out by the Texas Water Commission in Texas. There is criticism that the 401 process is only an "administrative exercise" in Austin, with little coordination of proposed permits and other information within TWC.)

GLO envisions local governments as the ultimate "base" for wetlands and coastal conservation initiatives in Texas. This would seem to focus attention on municipalities unless Texas counties are granted more authority in land use and environmental matters. The challenge for state agencies, according to GLO, is to anticipate and confront diversity in local values, interest, resources and capabilities. The state will have to help local governments organize and ready themselves for upcoming state and federal wetlands mandates. Local elected officials also will need the support of their constituents to launch an effective local protection program. Wetlands advocates suggest close attention to successful local government strategies in other states. For example, municipalities in some eastern state address wetlands issues as part of their routine development review process. Local protection ordinances establish buffer requirements and minimum setbacks from wetlands. Municipal zoning also may require that an applicant exclude "wet" portions of a site from the calculation of minimum lot area. Perhaps the most important contribution a local government can make is to carry state and federal wetlands inventories to the micro level by identifying and mapping environmentally sensitive areas of the community.

4. *More than most types of environmental regulation, wetlands protection troubles some agency staff because of the fundamental equity issues it raises.*

Staff from numerous agencies speak of frustrated landowners who are being told by their government that activities they did routinely in the past on their private property no longer are allowed. For example, society traditionally encouraged the draining or filling of "swamps" to put those areas to "beneficial" use. But now society is telling landowners that "wetlands" are valuable and should be "protected." Property owners view this as unfair regulation of private property rights. The property rights issue is a serious concern for some staff because they worry that government regulations are impinging on the "little man," the individual landowner who bought his property in good faith and now -- with no formal notice -- is seeing it being "taken," although he may not be able to make that claim in a legal sense. The property owner often is faced with a lack of alternatives once his property is identified as containing wetlands. Adding to his frustration is the fact that most

wetlands are not valuable enough, or sufficiently at risk, to justify an outright government purchase, even if the government had the funds to do so.

In many cases in rural or suburban areas, absentee property owners have been paying taxes on land for years, holding the property as an investment or waiting for development opportunities. Now they are discovering that they cannot develop because of wetlands -- in some instances, they cannot even drive a fence post. So agency staff emphasize that everyone involved in wetlands regulation has to appreciate the level of aggravation and confusion among some landowners, especially when they see so many state and federal agencies clamoring over a single issue. The U.S. Soil Conservation Service has hired public information specialists to improve agency communications and public relations on the wetlands issue, and others are following suit.

Agency staff also stress the difficulty of even raising the idea of land use regulation in some parts of Texas. Aside from the usual philosophical opposition, there also is the fact that Texas is so large, its wetlands and other natural resources are so widespread, and so much of its land is under private ownership. Add to that the traditional, deep-rooted rural and urban opposition to land use controls in the state, and agency staff say that the whole notion of comprehensive wetlands protection in Texas becomes more worrisome and challenging.

EPA staff say that lawmakers and regulatory agencies must recognize that many developers and landowners just want guidance on how they can use their investment. At the same time, the property owners must have some patience because it will take time to develop a reasonable, enforceable, effective approach to wetlands regulation. EPA staff believe that the arrival and growth of federal funding to the states for conservation planning, coastal programs, and land acquisition should gradually help to ease tensions over the wetlands issue.

5. *All of the involved agencies emphasize the need for increased public awareness of wetland functions and value, and of government capabilities (and efforts) to protect these sensitive areas.*

Agency staff say that even after the surge in attention to wetlands in recent years, the public and private entities involved in wetlands protection still must do a better job of communicating the severity and implications of wetlands loss. They note that the effectiveness of their programs is reduced by a basic lack of knowledge among the public of agency jurisdictions and regulations regarding wetlands. There is concern that wetlands regulations are being applied inconsistently and that enforcement is too reactive and selective since the agencies rely so heavily on complaints and random field observations. Too often project sponsors and even local agencies reviewing a project do not know that a Corps of Engineers permit is required. Corps officials note that controversies over wetlands in the Houston area, such as the City of Houston's westside airport site and problems with the Grand Parkway's proposed route, have helped to raise public awareness of wetlands regulations. EPA staff

caution critics not to assume that citizens do not respect the law. EPA views it as an awareness problem requiring extensive "non-regulatory" efforts by all levels of government to improve wetlands education and outreach. EPA staff believe that it is up to their agency to expend as much effort on the non-regulatory approach as is being spent on direct regulation. Staff at other agencies call for higher-profile, nationwide initiatives for wetlands awareness. Some also would like to see greater attention drawn to violations of wetlands regulations. While some see a need to encourage greater public involvement in the regulatory process, others note that numerous opportunities for public input already exist. As with most types of environmental regulation, they say that it will require devoted advocates who are willing to make a long-term commitment to learning how the process works and following its results. These individuals must monitor regulatory activities routinely to detect problems and point out inconsistencies. Staff at the Texas Parks and Wildlife Department emphasize that citizens must appreciate what the various agencies can and cannot do with regard to wetlands. They say that too often they hear the argument: "Why doesn't the government just buy it?" TPWD staff believe that the key to effective wetlands protection is the ability of public agencies to convince private landowners of the critical need for voluntary conservation of wetlands.

The involved agencies are very aware of the need for expanded contacts between conservation agencies and the public. There also is a bit of agency image enhancement involved. Corps staff report improved public relations by their agency in recent years following the creation of a District Public Affairs Office and the publication of a quarterly newsletter. Corps staff also are enthusiastic about sponsoring or attending public informational meetings upon request. At the state level, the Texas Parks and Wildlife Department has established a new Conservation Communications Division, and the General Land Office stays in touch with coastal residents through its coastal management planning, the recreational cabin program, and its various volunteer events. The agencies refer to an "environmental awareness cycle" that they know is reaching another peak in the United States. They hope to capitalize on the current upside of the cycle while also attempting to flatten the cycle and keep public interest high over time.

Agency staff believe that they face a particular challenge in Texas because of what they perceive as an economic development mindset. Judging from other populous states, they say that Texas should have a much higher level of environmental sophistication than it does. They sense a higher regard for coastal wetland resources in other states, and they say that state governments are more active in those cases as a result. Staff members complain that there is no such consensus for action in Texas. Some theorize that it is the state's size and abundant resources that lulls citizens into underestimating the extent of environmental degradation in Texas. They say that the same logic can be applied to Galveston Bay. The agencies worry about environmental short-sightedness in Texas and a lack of appreciation for the total environment. While some are optimistic that there is a "silent majority" of passive environmentalists in the state, they are concerned that official conservation

efforts do not generate more obvious support among Texas citizens and their elected leaders.

Chapter Five
HABITAT PROTECTION

Summary of Findings

1. *Resource agencies play a key role in highlighting habitat protection needs, but they would prefer to have independent regulatory authority to control and prevent damaging activities.*

2. *Staffing and resource constraints limit the ability of management agencies to gain knowledge about the habitats and species they are charged with protecting.*

This chapter is an extension of the previous one since wetlands are among the most significant coastal habitats. Most of the findings and recommendations in the last chapter also apply here, and vice versa. This chapter attempts to point out some general concerns in the broader area of habitat protection.

Numerous agencies can affect habitats through their own activities and the private activities they regulate. Foremost among these in Texas is the General Land Office, which must manage literally millions of acres of state-owned land, much of it along the Texas Gulf Coast. But this chapter focuses on the key agencies at the state and federal levels that are directly responsible for fish and wildlife protection: the U.S. Fish and Wildlife Service and the Texas Parks and Wildlife Department. As resource agencies, these specialists must do their best to convince lead agencies that certain conditions or mitigation steps should be required of a permitted activity. At the same time, they are responsible for managing lands and waters already brought under direct public control through park, preserve, refuge and management area acquisitions. Staff at the resource agencies believe that they often are effective in influencing and altering the way that projects are implemented, but they would prefer to have some form of independent veto authority over lead agency actions to insure that the most serious risks to habitats are addressed.

Action Recommendations

Action: *Preserve managers should sponsor a comprehensive survey of Armand Bayou habitats and fish and wildlife resources.*

Involved Agencies:
- Texas Parks and Wildlife Department
- U.S. Fish and Wildlife Service
- other interested agencies and organizations

Rationale: The major management problem in the area of habitat protection, aside from resource limitations, appears to be insufficient information. Preserve managers must have adequate information to be effective in their management planning. They also must consider where the preserve boundary artificially divides a habitat area, indicating the need for management activity outside the preserve boundary as well. (This is especially important given Fish and Wildlife Service warnings about habitat fragmentation.) The *Environmental Inventory of the Armand Bayou Coastal Preserve* was a starting point for this effort. Preserve managers should consider the range of data sources and resource entities (especially universities and private conservation organizations) that can assist with such a survey. Perhaps the most crucial coordination should occur between TPWD and the Fish and Wildlife Service. Preserve managers also should pursue additional funding and legislative support for these types of efforts as part of the implementation process for the *Texas Coastal Management Plan*.

Action: *The involved agencies should insure that Armand Bayou's coastal preserve status is a key factor in the entire spectrum of permitting and regulatory programs that can affect preserve habitats.*

Involved Agencies:
- Texas Parks and Wildlife Department
- Texas General Land Office

Rationale: The involved agencies should continue to use the Galveston Bay National Estuary Program as a means of raising agency awareness of the Texas Coastal Preserve program. They also should insure that preserve managers have adequate opportunities to review and comment on actions that have implications for Armand Bayou habitats or preserve management.

Armand Bayou Management Framework: HABITAT PROTECTION

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
FWS	1. Fish and Wildlife Coordination Act 2. Endangered Species Act 3. Federal Aid in Wildlife Restoration Act (Pittman-Robertson) 4. Federal Aid in Sport Fisheries Restoration Act (Dingell-Johnson) 5. National Environmental Policy Act (NEPA)	1. U.S. Congress 2. U.S. Department of the Interior 2. FWS Director: - partnership policy for voluntary conservation 3. Southwest Region Director (Region 2, Albuquerque)	1. National Wildlife Refuge System (Brazoria): - land management activities - enforcement of migratory bird hunting regulations and endangered species laws - fish and wildlife monitoring - Duck Stamp program to fund land acquisitions 2. Environmental assessments and rendering of biological opinions on federal projects 3. Federal grants for state habitat acquisition and management programs 4. Recovery plans for endangered and threatened species 5. National Recreational Fisheries Policy and major initiatives for nationally significant fisheries 6. National Contaminants Biomonitoring Program 7. Habitat damage assessment after environmental disasters	1. Ecological Services Division 2. Clear Lake Field Office 3. Refuge managers 4. Enforcement agents

Armand Bayou Management Framework:
HABITAT PROTECTION

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
TPWD	1. Texas Parks and Wildlife Code	1. Texas Parks and Wildlife Commission: - Agency policy statement 2. Executive Director 3. Texas Outdoor Recreation Plan (TORP) and Texas Wetlands Plan addenda	1. Lead state resource agency on fishery and habitat matters: - permit reviews - environmental assessments - recommendations on in-stream flows and freshwater inflows to estuaries 2. Direct management of habitat in state parks, preserves and wildlife management areas 3. State waterfowl stamp program and use of federal grant monies to acquire valuable habitats 4. Permits for disturbance or taking of streambed and bay bottom material 5. Management plans for Texas Coastal Preserve program 6. Documentation of environmental damage and use of litigation to seek compensation and mitigation 7. Technical assistance and expert testimony on habitat matters 8. Enforcement of game and fish and water pollution regulations	1. Resource Protection Division 2. Fisheries and Wildlife Division 3. Public Lands Division 4. Law Enforcement Division: - TPWD game wardens 5. Texas Natural Heritage Program 6. Seabrook Marine Lab

Armand Bayou Management Framework:
HABITAT PROTECTION

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
NMFS	1. Fish and Wildlife Coordination Act 2. Endangered Species Act 3. National Environmental Policy Act (NEPA) 4. Magnuson Fishery Conservation and Management Act 5. Marine Mammal Protection Act 6. Marine Research, Protection and Sanctuaries Act	1. U.S. Congress 2. U.S. Department of Commerce: - National Oceanic and Atmospheric Administration (NOAA) 3. Southeast Region Director	1. Fisheries management planning and implementation 2. Population maintenance efforts for targeted species 3. Review and comment on federal actions and federally-funded or permitted projects 4. Environmental assessments and EIS reviews, especially to evaluate impacts on endangered and threatened species 5. Monitoring of activities and factors affecting estuaries, fisheries and habitats 6. Tracking of proposed projects, follow-up investigation of permitted actions, and documentation of environmental damage 7. Interagency coordination activities 8. Technical assistance and expert testimony on habitat matters 9. Enforcement coordination with U.S. Coast Guard and other agencies 10. Emergency response and assessment	1. NMFS Southeast Region: - Habitat Conservation Division 2. Galveston Field Branch Office: - Area Supervisor and staff 3. NMFS laboratories (Galveston, TX, and Beaufort, NC)

Management Concern:
HABITAT PROTECTION

Background

Coastal habitats nationwide are at risk because of increasing population and human activity near the shoreline. Citizens are given mixed signals by government: environmental laws and coastal protections on the one hand, and development encouragement and public infrastructure investment on the other. The degree of coastal regulation also varies from state to state, as does public demand for conservation measures.

Habitats lose their viability as they are divided by road networks and encroached upon by scattered development and the environmental pollution that all too often accompanies human settlement and industry. At risk is the natural support system for a diversity of species. But also threatened are some of the very resources that sustain coastal economies: fisheries, scenic vistas and other tourism features, recreational hunting and fishing sites, and other elements. Ultimately, the entire estuary system becomes vulnerable if its natural buffer is degraded.

Nature of the Problem at Armand Bayou

Armand Bayou's physical characteristics have changed dramatically during the last century as a result of man's activities in the area. According to the *Environmental Inventory of the Armand Bayou Coastal Preserve*, "the bayou has changed from a wetland-bordered freshwater stream to a brackish tidal lake nearly devoid of wetlands." The region's rapid industrial and residential development led to substantial increases in groundwater withdrawals. The result was widespread land-surface subsidence in coastal areas near Galveston Bay. The Armand Bayou watershed averaged 5-7 feet of subsidence since the early 1900s, causing Mud Lake (the southernmost portion of Armand Bayou) to expand to more than three times its size since the mid-1950s. Lost in the process were several hundred acres of wetlands along the bayou, which have been replaced by much smaller marshes of a different variety. Although this subsidence has diminished in recent years as a result of greater awareness and improved management of groundwater resources, Armand Bayou is a much different environment today for fish and wildlife.

Aside from rising water levels, ongoing development has altered drainage patterns in the vicinity and made necessary flood control improvements that can substantially increase the rate and volume of flow in the bayou. Compounding these habitat threats is the bayou's poor water quality. The volume of wastewater effluent discharges into Armand Bayou and its tributaries continues to rise, and nonpoint source pollutant loadings are a growing concern as well. On the positive side, the creation of Bay Area Park and the

Armand Bayou Nature Center have helped to buffer the bayou and its habitats from the impacts of nearby development.

Although Armand Bayou is not believed to be a primary habitat for any threatened or endangered species, it is known to support a variety of fish and wildlife. Unfortunately, there is little information on this flora and fauna, though inferences have been made from studies of Clear Lake. The *Environmental Inventory* noted that the lower reaches of Armand Bayou may well be a valuable nursery habitat for certain commercial and recreational finfish and shellfish.

The central management task is to assess the value of Armand Bayou's remaining habitats in light of the various changes. Then, realistic goals must be set for the potential rehabilitation of habitats in the preserve and the surrounding watershed. There also may be opportunities to improve management of habitats already under public ownership.

Key Management Agencies

U.S. Fish & Wildlife Service (FWS)

The Fish and Wildlife Service is the lead federal agency responsible for conserving, protecting and enhancing the nation's fish and wildlife populations and their habitats. Major FWS concerns include migratory birds, endangered species, certain marine mammals, and freshwater and anadromous fish, such as salmon. The Service is a branch of the U.S. Department of the Interior, which is the principal federal entity concerned with conservation. The Department manages most of the nation's federally-owned public land. Its "Take Pride in America" campaign encourages stewardship and citizen involvement in conservation. In addition, FWS promotes a partnership policy under which it emphasizes cooperative conservation initiatives with private landowners, public agencies, corporations, conservations groups and citizen volunteers.

The entire FWS organization is involved with habitat conservation and management issues, led by the Ecological Services Division, the Fisheries Division, and the Refuge Division. The Fish and Wildlife Service is guided by a Director who reports to the Secretary of the Interior. FWS has seven regional offices, and each Regional Director reports to the FWS Director in Washington, D.C. Region 2, known as the Southwest Region, is based in Albuquerque and covers Texas, Arkansas, Oklahoma and New Mexico. In addition to a national research facility, FWS has more than 700 field units and installations, including its refuges, research labs, field offices and law enforcement offices. A field office for the Houston-Galveston area is located in Clear Lake. Most professional staff of the agency are fish and wildlife biologists or specialists in related disciplines. The Service also trains refuge managers and enforcement agents. The Youth Conservation Corps is jointly administered by FWS, the National Park Service, and the U.S. Forest Service. The Corps provides summer jobs for youths at wildlife refuges, research labs and other field sites. FWS also recruits volunteers for its various locations.

Many valuable habitat areas are under direct FWS control and management through the agency's National Wildlife Refuge System. The nation's flyways for waterfowl are a principal focus of the Refuge System. Refuge sites also provide relatively safe haven for threatened and endangered species, as well as for native plants and many species of resident mammals, fish, insects, amphibians, and reptiles. The Department of the Interior's "Duck Stamp" program (formerly the Migratory Bird Hunting and Conservation Stamp program) enables citizens to contribute to the expansion of the Refuge System by purchasing the stamps at post offices and many refuge sites. The Department also requires that every waterfowl hunter age 16 or older carry a stamp while hunting, and the stamps may be used for entry to refuges that charge visitor fees. Duck stamp revenues go directly toward federal land acquisition activities. FWS reports that since 1934, the Duck Stamp program has financed the addition of nearly 4 million acres of wetlands and other habitats to the Refuge System.

The Service administers two other laws that provide direct funding for habitat acquisition and management activities: the Federal Aid in Wildlife Restoration Act and the Federal Aid in Sport Fisheries Restoration Act. These are more popularly known as the Pittman-Robertson Act (wildlife) and the Dingell-Johnson Act (fish). These laws authorize federal grants to state fish and wildlife agencies using revenue collected from federal excise taxes on purchases of recreational hunting and fishing equipment. More recent amendments have increased the amount of funding for the programs by expanding the number of products covered by excise taxes. FWS distributes the funds based on a formula that considers the state's land area and its number of hunting and fishing licenses.

The Fish and Wildlife Coordination Act authorizes FWS to review and comment on federally-sponsored projects and permitted activities with the potential to impact habitats and fish and wildlife resources. FWS has been very active in addressing impacts to wetlands and other habitat under this authority. Aside from project review, FWS also serves as a resource agency by providing expert biological advice to federal agencies, states, private industry and citizens. Field office personnel highlight potential development impacts on habitats and urge protective strategies of avoidance, minimization and mitigation. FWS also works closely with the National Marine Fisheries Service and other resource agencies on evaluations required under the National Environmental Policy Act (NEPA) and the Endangered Species Act. These acts enable FWS to render a biological opinion on any activity that will adversely impact an endangered species. An FWS judgement cannot stop a project directly, but it may delay or change it by requiring additional study. Under the Endangered Species Act, FWS works with other agencies and involved parties to develop recovery plans when specific actions are needed to boost the population of listed species. Habitat protection and intensive management are key steps in many recovery efforts. FWS also plays an important role in emergency response to environmental disasters by assessing damage to fish and wildlife habitats and supervising mitigation steps.

FWS monitors and draws attention to habitat degradation and reductions caused by pollution and encroaching development. The Service also tracks recreational activity

related to habitats and wildlife by conducting the National Survey of Fishing, Hunting and Wildlife-Associated Recreation every five years. Using data from the 1985 survey, FWS estimated that these recreation activities contributed $55.7 billion to the U.S. economy. FWS has a network of labs and field stations that support its fish and wildlife management research. The agency's National Contaminant Biomonitoring Program allows Service personnel to assess the impacts of pesticides, chemicals, heavy metals, hazardous waste and other pollutants that may intrude into habitat areas.

The North American Waterfowl Management Plan is another FWS initiative aimed at effective habitat protection. A 1986 agreement between the Canadian and U.S. governments launched this joint conservation effort. Mexico recently signed an agreement to lend assistance. The plan aims to protect and increase waterfowl populations principally by targeting more than six million acres of critical wetlands on which these species rely. After an initial research and planning phase, the management plan now is being implemented in specific habitat areas through Joint Ventures. These ventures involve public-private partnerships for habitat preservation. The Gulf of Mexico Joint Venture area stretches from Alabama to Texas, and conservation projects in this area are intended to protect some 386,000 acres of vital habitat by 2000. Aside from land acquisitions, joint venture participants also develop economic incentives to influence land use practices, negotiate agreements with private landowners, support improved water management, and sponsor wetlands and habitat research. These efforts are critical because the conversion of wetlands to agriculture is one of the leading causes of habitat loss, especially during drought periods. This national (and international) project is one example of the ways in which FWS personnel lend their expertise through technical assistance and direct management programs.

In addition to its preservation of habitats on land, the Service sponsors major initiatives to protect and restore nationally significant fisheries. A National Recreational Fisheries Policy guides FWS actions to conserve and improve the nation's recreational fisheries as well.

FWS staff assist federal and state enforcement agencies by watching for violations while in the field, making referrals, and monitoring required mitigation work. The agency may send advisory letters to point out violations and supply information on applicable federal laws and regulations. However, the agency's primary enforcement focus is on wildlife protection laws and illegal trade. FWS also works with other agencies through various committees and special projects. Finally, the agency demonstrates its commitment to public education by sending representatives to speak before citizen and business groups, by hosting teacher workshops, and by leading field trips with such groups as the Cub Scouts.

Texas Parks & Wildlife Department (TPWD)

The Texas Parks and Wildlife Code gives TPWD primary responsibility for protecting the state's fish and wildlife resources. One of the most important ways that the

department does this is by protecting and monitoring wetlands, uplands and other essential habitats.

The department is guided by the nine-member Texas Parks and Wildlife Commission. The Commission establishes agency policy, and earlier this year it approved a new staff-developed agency-wide environmental policy. The policy contains a general statement of TPWD's overall responsibility. Protection of the state's "unique biodiversity" is the highest agency priority. The new policy also intends that agency operations, such as parks and preserve areas, serve as models of proper natural resource protection. Most importantly, the policy is meant to guide TPWD staff in their day-to-day activities. An Executive Director manages the agency, and a continuing reorganization has changed the arrangement of agency divisions and branches that report to him. All of TPWD's program-oriented divisions are involved in habitat protection, including the Public Lands Division, the Fisheries and Wildlife Division, the Resource Protection Division, and the Law Enforcement Division. TPWD has designated one staff member as the agency's Coastal Preserves Coordinator to coordinate activities with the Texas General Land Office and supervise the preparation of management plans and programs for the Texas Coastal Preserve program. TPWD clearly is a field-oriented agency,with more than half of its staff assigned to field locations. In addition to parks and management areas, TPWD has 28 field offices around the state. The Houston-Galveston area has a number of staff locations, including the Seabrook Marine Laboratory located directly on Galveston Bay.

Aside from its statewide recreation planning duties, TPWD is the state's lead resource agency on fish and wildlife matters. The Fisheries and Wildlife Division protects habitats by monitoring and regulating populations, implementing land management practices (along with the Public Lands Division), and investigating damage from pollution and other man-made factors. The Resource Protection Division concentrates more closely on environmental impacts and project evaluations. The Law Enforcement Division enforces game and fish laws and also targets water polluters to support state water quality objectives. In the absence of independent regulatory authority, TPWD must do its best to document instances of environmental damage and seek compensation from the responsible party. If TPWD cannot persuade the relevant action agencies to take enforcement steps against uncooperative violators, then it may decide to pursue litigation on its own. The Texas Legislature has instructed TPWD to be aggressive in both of these areas -- persuasion and litigation.

The one area where TPWD does have direct authority is through its permit program for the disturbance or removal of streambed and bay bottom material such as sand, gravel or shell from state-owned streambeds and marine bottoms. TPWD can play an active role in habitat protection if an applicant proposes to undertake this activity in such areas. TPWD also has direct responsibility for habitats that are part of the State Park System, TPWD wildlife management areas, or state preserves. TPWD uses federal grant monies and revenue from the state's waterfowl stamp program to acquire sensitive habitat areas. The department also regulates areas that are critical to the state's shrimp fishery by assigning a "nursery area" designation. Nursery areas are tributary bays, bayous, inlets,

lakes, and rivers which are known to provide a rich growth and development environment for postlarval and juvenile shrimp. The designation does not apply to outside waters, major bays, or bait bays.

Other ways in which TPWD promotes habitat protection include:

- field monitoring and biological research to guide habitat management activities
- review of proposed actions that require federal or state permits or the preparation of an environmental impact statement, and participation in hearings and other proceedings related to project review and environmental assessment
- recommendations on the scheduling of in-stream flows and freshwater inflows to estuaries
- public education programs, and
- advisory duties for various special projects, inter-agency committees, and technical assistance programs

Chapter 81 of the Texas Parks and Wildlife Code authorizes various types of management areas and preserves under TPWD supervision, including the designation of "scientific areas for the purposes of education, scientific research, and preservation of flora and fauna of scientific or educational value." Coastal preserves such as Armand Bayou are prime candidates for scientific area designation. TPWD also administers the Texas Natural Heritage Program, which was created in 1983 to inventory and manage data on sensitive and unique natural resource areas in the state. Staff involved in impact assessments turn to the Heritage Program for essential information.

Finally, more than 400 TPWD Game Wardens are in the field and can report violations of environmental regulations to the appropriate agencies. These commissioned peace officers are joined by regular TPWD staff in monitoring activities that may impact habitats and wildlife.

National Marine Fisheries Service (NMFS)

The chief responsibility of the National Marine Fisheries Service is fisheries management, primarily of offshore species as well as marine mammals, endangered sea turtles and marine fishes. NMFS duties related to marine recreational fisheries overlap somewhat with those of the U.S. Fish and Wildlife Service (FWS) and the Texas Parks and Wildlife Department (TPWD), while its commercial fishery programs also overlap to some extent with those of TPWD.

The National Marine Fisheries Service is part of the National Oceanic and Atmospheric Administration (NOAA), which is under the U.S. Department of Commerce. Galveston

Bay falls within the agency's Southeast Region, which stretches from Texas to North Carolina and includes Puerto Rico and the U.S. Virgin Islands. The Southeast Region's Habitat Conservation Division has a field branch office in Galveston, where an area supervisor and other staff are based. Because of their limited expertise on water quality matters, local NMFS staff seek technical assistance from agency chemists at the NMFS laboratory in Beaufort, North Carolina, when reviewing major discharge applications. The staff review only the most significant discharge proposals because of limited resources. Aside from the impacts of wastewater effluent in estuaries, a major concern that NMFS shares with other agencies is the adverse effects on habitats of nonpoint source pollution and other byproducts of human activities.

Protection of critical habitats, including coastal wetlands, is an integral part of insuring the health and maintenance of fisheries and species under NMFS jurisdiction. However, like the U.S. Fish and Wildlife Service and the Texas Parks and Wildlife Department, NMFS serves only in an advisory capacity during reviews of federally-funded or permitted activities in waters of the United States. NMFS staff must work with lead agencies, such as the U.S. Army Corps of Engineers on Section 404 dredge/fill discharge permits and EPA and the Texas Water Commission on wastewater discharge permits, to insure thorough environmental reviews and minimization of adverse impacts. NMFS has review-and-comment authority under the Fish and Wildlife Coordination Act, the National Environmental Policy Act, and the Clean Water Act.

Under the Magnuson Fishery Conservation and Management Act, fishery management plans are prepared and implemented, based on national standards, with the objective of achieving and maintaining the optimum sustainable yield from each targeted marine fishery. The Magnuson Act is significant in the area of habitat protection because it requires that each fishery management plan examine the significance of habitat to the fishery, as well as the potential impacts of any alterations to the habitat. NMFS manages species which are primarily harvested in offshore federal waters (those included in the United States' 200-mile Exclusive Economic Zone, or EEZ) such as Gulf shrimp. The Marine Mammal Protection Act requires NMFS to insure that populations of targeted species are maintained at sustainable levels to prevent their long-term depletion. The Endangered Species Act enables NMFS to protect endangered marine mammals, sea turtles and marine fishes from human-caused death, injury or harrassment. (This is an area of overlapping authority between NMFS and FWS. For example, FWS is responsible for endangered and threatened sea turtles when they are on land). NMFS joins the Fish and Wildlife Service in determining whether a proposed federal action will have an adverse impact on any threatened or endangered species. This judgement typically is made in consultation between these agencies, the lead agency, and other resource agencies such as the Texas Parks and Wildlife Department. A final piece of federal legislation which affects NMFS is the Marine Research, Protection and Sanctuaries Act.

While NMFS staff provide formal notice to other agencies of their findings and recommendations on proposed projects, they also communicate informally with other resource agency staff on a regular basis. Staff also attend interagency coordination

meetings and participate in on-site inspections as needed. In addition to tracking proposed actions and permit applications, staff monitor how NMFS recommendations are received by lead agencies and to what extent they are implemented in actual projects and permitted actions. Follow-up investigations are conducted in the field as resources and staff time allow. NMFS disseminates the results of its monitoring activities and field research through *Marine Fisheries Review* and other journals. Staff would prefer to report information for individual estuaries or even portions of estuaries, but resource limitations make this level of detail impossible, so only gross figures are provided for states and Corps of Engineers districts. NMFS staff also see a need to keep a more comprehensive record of minor actions on which the agency does not officially comment.

NMFS staff work primarily with the U.S. Coast Guard to enforce federal habitat and species protection laws. They also advise other federal and state agencies of regulatory and permit violations that fall under their jurisdiction. NMFS joins other resource agencies in responding to emergency incidents such as oil spills and releases of hazardous materials. Along with the Fish and Wildlife Service and the Texas Parks and Wildlife Department, NMFS advises the lead response agency on potential impacts to living marine resources and their habitats and assists in determining the extent of environmental damage.

Management Evaluation Findings

1. *Resource agencies play a key role in highlighting habitat protection needs, but they would prefer to have independent regulatory authority to control and prevent damaging activities.*

   The Corps of Engineers credits fish and wildlife and land and water management agencies with being very successful in communicating their concerns and influencing federal regulatory processes, such as those governing the Houston-Galveston Navigation Channels project. (Some observers of the inter-agency team for the ship channel project believe that that group has set a new standard for cooperative technical advisory groups.) Lead agencies such as the Corps value input from numerous agencies so that they can weigh a mixture of viewpoints and arguments. But TPWD staff wish that there were some appeals mechanism that they could use, as federal resource agencies do, to request higher-level review of lead agency decisions. They emphasize that there always will be disagreements because environmental risk assessments are based more on individual perceptions than on scientific findings, especially where data is inadequate. In the absence of some form of veto power, however, resource agency staff believe that their ability to force further review and study makes a difference in project evaluations and gives them influence with lead agencies and project sponsors. Adverse resource agency comments and testimony can signal a lack of consensus among management agencies and boost public controversy surrounding a project. It also can lend support to potential lawsuits by private conservation groups, and resource agency

staff sometimes are called as witnesses. Federal resource agencies also emphasize that they always want to know where their state counterparts stand on issues. They believe that their recommendations carry more weight when state resources agencies concur.

Habitat protection agencies say that regulators of discharges, waste disposal, air emissions and other critical activities must do a better job of implementing and enforcing their rules to prevent habitat degradation. Agency staff say that a particular concern is the need for monitoring and assessment of cumulative impacts on habitats. Without their own authority, resource agencies must appeal to project sponsors to accept and honor voluntary agreements to minimize impacts from their activities. The agencies' only alternative is to pursue costly and slow litigation in cases where they can demonstrate potential damage to habitats. Staff also point out that resource agencies headed by politically-appointed boards tend to fluctuate in their priorities and commitment to certain programs. Staff in resource agencies sometimes need the support of the very highest officials of their agency to pursue a critical issue, but that support cannot always be counted on.

2. *Staffing and resource constraints limit the ability of management agencies to gain knowledge about the habitats and species they are charged with protecting.*

TPWD staff say that their agency does not have adequate resources to monitor fish and wildlife populations effectively, especially non-game species. They say that monitoring of habitats is even less frequent, aside from rare, short-duration studies such as those being done for the Galveston Bay National Estuary Program. EPA staff agree with this assessment of existing monitoring capabilities, saying that much more extensive monitoring of living resources and habitats is needed. They point out a particular need for improved monitoring of sediment quality.

One specific example that was mentioned involves the state Toxic Substances Coordinating Committee, which is chaired by the Deputy Commissioner of the Texas Department of Health and includes representatives of the Railroad Commission of Texas, the General Land Office, the Parks and Wildlife Department, the Texas Water Commission, and the Texas Department of Agriculture. These involved agencies are hoping to coordinate fish sampling activities to check for the presence of toxics, but TDH's request for $1.3 million was cut by the Legislative Budget Board. Agency officials say that statutes exist calling for chemical monitoring and research in Texas habitats, but state agencies are not receiving the necessary funding to carry out the task.

Agency staff note that it is difficult to visualize the "big picture" habitat issues when they are so busy dealing with day-to-day "brushfires." Their overriding concern is that habitat management agencies are still reacting rather than planning effectively for habitat protection. Some agency personnel also expressed concern that so many competing environmental initiatives are being launched simultaneously. The staff find it difficult to keep up with so many studies and special projects, and they

question whether the various initiatives are being coordinated in any way and are making their goals and intentions clear. This leads some to call for better "networking" among resource agency staff and between agencies at different levels of government. They say that resource agencies need to have a better understanding of who the players are in the various state and federal regulatory processes and how to maximize their own influence.

Finally, resource agencies again are looking to local governments to accept the important assignment of pinpointing valuable habitat areas within their own communities. They also urge cities and counties to improve local public education efforts regarding habitat values and general environmental concerns.

Chapter Six
ILLICIT WASTE DISPOSAL

Summary of Findings

1. *The basic nature of illegal dumping makes it a difficult problem to combat.*

2. *The "shallow pockets" of fly-by-night dumpers often limits the amount of damages that can be recovered through litigation.*

The involved agencies do what they can with the resources they have to respond to illegal dumping, especially with regard to addressing citizen concerns while emphasizing to the public the extreme difficulty of their enforcement task. The bottom line is that agency managers know they can never eliminate the problem completely. There always will be disreputable firms and individuals that lack the ethics or the community-mindedness to ignore the incentives to dump waste illegally. However, some agency officials believe that illegal dumping is not the most severe of environmental threats, provided that hazardous substances are not involved. Nevertheless, dumped materials often are a highly visible sign of "pollution" to a more environmentally-sensitive public. As a result, local agencies must maintain their ability to respond as promptly and effectively as possible under the circumstances.

Action Recommendations

Action: *The involved agencies should explore the need for more formal coordination of their individual response, investigation, and enforcement activities.*

Involved Agencies:
- Texas Water Commission
- Texas Department of Health
- Harris County Pollution Control Department
- Cities
- U.S. Environmental Protection Agency

Rationale: The Armand Bayou watershed provides a fitting example of the multiple, and sometimes overlapping, jurisdictions involved in

illegal dumping response and investigation. There are four cities, the county, several state agencies, and the EPA (in extreme cases) which may be involved. It is a top-down system: EPA deals mostly with the states and only rarely with local agencies; state and local personnel sometimes coordinate their activities, and county and city staff continue to study how they might work together more effectively, with more substantial funding support from the state. The agencies should determine whether any or all of them would benefit from establishing formal mechanisms to coordinate their activities more closely.

Action: *The involved agencies should consider ways to enhance existing mechanisms for receiving and responding to citizen complaints.*

Involved Agencies:

- Texas Water Commission
- Texas Department of Health
- Harris County Pollution Control Department
- Cities
- U.S. Environmental Protection Agency

Rationale: Citizen reporting is clearly one of the most valuable sources of information on illegal dumping activity. The agencies should determine how this communication might be facilitated, especially to encourage citizens to report suspicious activity as quickly as possible. The idea was raised of designing effective public service announcements to make children and adults aware of the problem and educate them on the important role they can play. Such announcements also should highlight the key agencies and numbers to call. In addition, the agencies should monitor the efforts of the City of Houston's environmental health division to encourage community-based environmental programs.

Armand Bayou Management Framework:
ILLICIT WASTE DISPOSAL

AGENCY	AUTHORITY	POLICY	STRATEGY	ACTORS
HCPC	1. Texas Water Code, Chapter 26 2. Texas Health and Safety Code, Ch. 341, 343 and 365 (Texas Litter Abatement Act) 3. Harris County Commissioners Court resolutions	1. Harris County Commissioners Court 2. HCPC Director	1. Field surveillance 2. Investigation of citizen complaints and problems observed in the field 3. Civil and criminal enforcement action 4. Coordination with municipal and state agencies on clean-up procedures	1. HCPC Director 2. Field Investigators 3. Laboratory Analysts 4. Harris County Attorney 5. Harris County Commissioners Court

Management Concern:
ILLICIT WASTE DISPOSAL

Background

This chapter focuses on random dumping, as opposed to long-term accumulation of waste at an established commercial site (especially abandoned hazardous waste sites that are addressed through the Superfund program) or unauthorized disposal practices at a permitted waste handling facility. Although these other activities are equally challenging for regulatory agencies in terms of monitoring and being able to prove wrongdoing, the illegal dumping problem is especially frustrating for the involved agencies because of its "hit and run" nature.

Illicit disposal activity may include everything from a lone barrel dumped along the roadside to worn-out household appliances, abandoned automobiles and debris scattered on a vacant site, liquid wastes pumped into streams or manholes, and used motor oil and other household hazardous wastes poured into storm sewer catch basins. A chief concern near populated areas is the potential threat to public health from illegally dumped materials. The dangers of hazardous wastes are obvious, especially in cases where they are dumped at the end of a dead-end street in a residential neighborhood and children at play are unaware of the risk. More ordinary solid wastes are primarily a visual blight, although accumulated trash may quickly attract insects and rodents and pose a health and safety threat as well. Whatever the category of waste, natural areas often are degraded by dumping, and pollutants from the waste may be carried to nearby streams or cause contamination of ground water resources.

The challenge for the involved agencies is that they are always in a reactive mode, unless by coincidence their field personnel happen to spot an illegal dumper in the act, which is rare. The system relies upon citizen reporting of suspicious activities. While this is a valuable source of information for the agencies, it often places them in the position of having to demonstrate some type of progress to the concerned citizen, even if there is little information or evidence with which to work. Clean-up also must be done promptly in cases where dangerous materials are involved or valuable resources are threatened. This places a burden on government agencies since it often will take them much longer to track down the responsible party, and even then they are not guaranteed of receiving any damage payments.

The key management dilemma is how to overcome the costs and inconvenience that are an inevitable part of many legal waste disposal methods, particularly so that the least scrupulous waste handlers are not tempted by the incentives to dump waste illegally. It may be an unavoidable problem, which means that the management agencies must focus on facilitating citizen reporting and maintaining superior response capabilities.

Nature of the Problem at Armand Bayou

There is little information on the extent and significance of illegal dumping activity in the Armand Bayou watershed. Anecdotal evidence suggests that it is a particular concern of city and county agencies that must deal with the problem on a regular basis. This primarily involves county pollution control staff and municipal health personnel. But City of Pasadena public works staff also have reported ongoing cases of vacuum trucks dumping wastes directly into the city's manhole network.

The major concern is that the Armand Bayou watershed still includes much vacant, undeveloped land that is in close proximity to extensive industrial and urbanized areas. If the desire to dump illegally is present, the conditions are right: unlighted roads, isolated sites, and unincorporated areas that are covered by a widely-dispersed county sheriff's patrol. Unfortunately, the conditions for environmental pollution also are ideal, especially due to the high water table in the Armand Bayou watershed and surrounding coastal areas where ground water contamination is always a possibility. Numerous natural streams and man-made drainage channels in the area also increase the chance that an isolated dumping incident can cause impacts far downstream, which, in the case of Armand Bayou, means Clear Lake and possibly Galveston Bay.

Key Management Agencies

Harris County Pollution Control Department (HCPC)

The Harris County Pollution Control Department joins local, state and federal agency investigators in responding to reports of illegal dumping activity. Which agency responds first and assumes the lead role depends on where the materials are dumped, the nature of the materials, and the seriousness of the situation.

Together with municipal environmental health personnel, HCPC considers itself the first point of contact for citizens affected by illegal dumping. The department responds to citizen complaints, routinely investigates dumping incidents, and pursues enforcement action against responsible parties in those instances when a solid case can be assembled. HCPC coordinates with state and federal agencies in the most serious cases involving hazardous or other formidable types of waste.

The combination of the Texas Water Code and the Texas Health and Safety Code enables HCPC to combat dumping of waste on land and water. Chapter 26 of the Water Code prohibits unauthorized discharges of pollutants into "waters of the state." A violation may occur even if materials are not dumped directly into a water body since pollutants may be transmitted to surface water or seep into ground water. Chapter 365 of the Health and Safety Code, known as the Texas Litter Abatement Act, covers most other forms of unauthorized waste disposal that are not addressed by the Water Code or other laws. This includes dumping refuse on or near a highway, as well as from a boat or motor vehicle into the state's inland or coastal waters. The Water Code allows HCPC to

pursue civil or criminal penalties against violators. A civil suit may result in an injunction and/or penalties of $50 to $10,000 per day of the violation. Criminal prosecution of a misdemeanor charge may result in a penalty of $10 to $10,000 per day. In a suit that is initiated by a county, the penalties are divided equally between the state and the county. The Health and Safety Code also allows a county or district attorney to bring suit to obtain an injunction or penalties. Violation of the Texas Litter Abatement Act is a criminal offense. What is notable about the Abatement Act is that persons who are (or will be) affected by illegal dumping also may file suit against the violator. Other chapters of the Health and Safety Code enable local authorities to require the abatement of public nuisances, which includes many forms of illegal dumping and accumulation of trash on private property. Various civil and criminal enforcement tools are available if an initial written notice does not result in a clean-up of the site within a reasonable amount of time.

The Harris County Pollution Control Department was created by the Commissioner's Court in 1953. While the state statutes were meant to encourage local government assistance for state agencies with limited field staff, HCPC also emphasizes its role as the most accessible level of government for citizens with pollution complaints or concerns. HCPC staff also must be prepared to respond to the requests and inquiries of the county's elected officials. The department's current staffing includes an appointed Director, 12 laboratory personnel and 15 field investigators. Other personnel are involved in case preparation, data analysis and other duties, giving the department a total staff of 52. The agency maintains a flexible staffing approach which allows it to shift personnel between functions as needed.

HCPC may file suit in response to a violation or in anticipation of one. But considerable preparation must precede any court action. Although most violations detected by HCPC are minor, the agency must decide whether to use litigation if its preliminary enforcement steps are not effective. At that point, the County Attorney is notified and a case is developed using HCPC field data and investigative findings. State statutes require that the Harris County Commissioners Court authorize lawsuits against alleged violators. Upon approval of a resolution, the County Attorney prepares a legal brief and requests that the case be placed on the District Court docket. The statutes also require that the appropriate state agency become a party to any local suit. The required involvement of the agencies is sometimes delegated to the Texas Attorney General's Office.

Other Involved Agencies (TWC, TDH)

Under the Texas Water Code, the Texas Water Commission has primary responsibility for pursuing enforcement action against firms and individuals who illegally discharge pollutants into streams and water bodies. The Water Commission's field offices provide the agency's first level of response to citizen complaints on a range of matters, including illegal dumping. The Field Operations Division receives public and official violation reports and coordinates TWC's investigation and response. The Water Commission's literature instructs citizens to call an Austin hotline or the nearest TWC district office. A complaints coordinator based in Austin maintains records of all complaints and notifies

the appropriate district office if a field investigation is warranted. TWC staff attempt to contact the citizen caller within two working days to schedule an investigation visit. The caller is later notified of the results of the investigation. If the investigation continues for an extended period, quarterly status reports are filed.

TWC's Hazardous and Solid Waste Division administers the Texas Emergency Response Center, which is focused more toward accidental spills than pre-meditated dumping activities. The center is a central receiving point for reports from across the state of oil or hazardous material spills. The center's hotline takes calls on a 24-hour basis, and the center coordinates clean-up procedures. The center also periodically updates the *State of Texas Oil and Hazardous Substances Spill Contingency Plan*, which includes spill response maps for Texas counties. TWC's Field Operations Division provides field support for emergency response activities. Field investigators from the appropriate division office make an on-the-scene assessment of reported chemical and waste spills. Field personnel also respond to major emergency situations where significant environmental damage may occur. The U.S. Environmental Protection Agency provides technical assistance, funding, and investigative support to state agencies such as the Water Commission that are involved in permitting and enforcement of hazardous and solid waste activities. In Texas, the Water Commission is responsible for regulating hazardous waste and non-hazardous industrial solid waste, while the Texas Department of Health administers municipal solid waste programs.

The Surveillance and Enforcement Division of TDH's Solid Waste Management Branch investigates illegal dumping activities under its jurisdiction. Ground water monitoring data often is collected and analyzed to check for contamination problems at disposal sites. If sufficient evidence can be gathered, TDH may request that the Texas Attorney General's office pursue a civil suit in district court. TDH region staff report that the Texas Litter Abatement Act has been a great help to their agency in combatting illegal dumping.

Many state agency programs today feature a stronger emphasis on pollution prevention, reflecting the influence and guidance of EPA. TDH is promoting waste minimization techniques, particularly recycling and reuse of troublesome waste materials such as used tires. TWC's Hazardous and Solid Waste Enforcement Section helps to organize pesticide and household hazardous waste "amnesty" days throughout the state. The Texas General Land Office also has demonstrated its interest in supporting the lead agencies involved with recycling and hazardous waste management. These types of preventive strategies should help to reduce to some extent the illegal dumping problem.

Management Evaluation Findings

1. *The basic nature of illegal dumping makes it a difficult problem to combat.*

   Agency staff say that most illegal dumping activity is like a "shot in the dark." There often are few leads to follow, so city and county response agencies have little

chance of identifying and locating the responsible parties. This is why citizen reporting and quick response are so important. In the case of certain materials, the evidence may literally wash away if the dump site is not discovered in time. If illegal activity can be documented, then the involved agencies try to prosecute violators to the fullest extent of the law. The Environmental Protection Agency reports that the conviction rate actually is high, but most cases are very difficult to prove, if they get to court at all. The process of gathering evidence, building a case, and then getting on the court docket can be tedious and time-consuming. Apparently pollution cases are not receiving the preferential scheduling that they once did. This only adds to the time that it takes to resolve a case and show results.

Some staff members say that the illegal dumping situation in the Houston area has reached a crisis stage, both in terms of the seriousness of the materials being dumped and the growing geographic extent of the problem. Hazardous waste is no longer an isolated problem found only in industrial areas. This increases the cost and difficulty of agency monitoring efforts. It also has increased constituent pressure on local politicians, who are turning to their pollution control staff for results. Some agency staff suspect that illegal dumping probably has not increased a great deal, but the public is more aware now and quicker to report illegal activity. They also believe that many dumpers do not perceive what they are doing as an immediate threat to the environment. They do not understand the costs to the public of their behavior or the potential widespread, cumulative impact of dumped materials, especially in the coastal zone. Those who are fully aware of the high stakes involved in waste transport and disposal are becoming increasingly belligerent. In some cases illegal dumpers have been found carrying weapons when confronted, which makes the enforcement task that much more dangerous for agency personnel. Their managers emphasize that pollution control personnel are not commissioned peace officers. Without police power authority, they are limited in what they can do on the spot. They cannot arrest individuals or even force them to reveal their name or affiliation. They must have a court order and a police officer at their side to intervene. Agency officials emphasize that their staff would need specialized training to respond to criminal activities directly.

In general, agency officials are concerned that the costs of legal disposal, especially for special wastes and hazardous materials, are becoming prohibitive for more and more waste generators. One agency manager admitted being more afraid of the unintended consequences of tough hazardous waste regulations than of hazardous waste itself.

2. *The "shallow pockets" of fly-by-night dumpers often limits the amount of damages that can be recovered through litigation.*

The desire of the public and enforcement staff for "massive" punishment of illegal dumpers is undercut by the reality of who is dumping. Local governments and taxpayers end up covering the cost of cleaning up illegally dumped materials. In the meantime, the costs of training and equipment -- and of basic program

administration -- continue to grow. One manager said that it seems that the more agencies try to confront the problem, the greater the need becomes. Dumped materials are becoming more "exotic," requiring more time and expense for analysis and removal. In the end, the agencies that respond to the problem must follow the increasingly demanding disposal procedures that the illegal dumper was unwillingly or unable to meet.

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Strategic Plan for the Welder Flats Coastal Preserve, 1990-1995. Texas Parks and Wildlife Department, Austin, TX (December 1989).

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Appendix A
LEGISLATION AND REGULATIONS

FEDERAL LEGISLATION AND REGULATIONS

Endangered Species Act. U.S. Code. vol. 16, sec. 1531 et seq. (1974).

Emergency Wetlands Resources Act. U.S. Code. vol. 16, sec. 3901 (1986).

Federal Water Pollution Control Act. U.S. Code. vol. 33, secs. 106, 205, 319, 402, 405, 1251-1376 (1972).

Fish and Wildlife Coordination Act. U.S. Code. vol. 16, secs. 661-667 (1974).

Food and Security Act. U.S. Code. vol. 7, secs. 1221, 1231, 1251, 1255, 1281, 4202 (1985).

Hazardous and Solid Waste Amendments of 1984. Pub. L. 98-616.

Migratory Bird Hunting and Conservation Stamp Act. Pub. L. 99-645 (1986).

National Environmental Policy Act. U.S. Code. vol. 42, secs. 4321-4361 (1969).

Regulatory Programs of the Corps of Engineers: Final Rule (33 CFR Parts 320-330), Federal Register, November 13, 1986.

Resource Conservation and Recovery Act. U.S. Code. vol. 42, secs. 6901-6987 (1976).

Rivers and Harbors Act. section 10, Pub. L. 87-830 (1899).

Toxic Substances Control Act. U.S. Code. vol. 15, secs. 2601 et seq. (1976).

Water Quality Act. Pub. L. 100-104, sec. 319 (1987).

STATE LEGISLATION AND REGULATIONS

Health and Safety Code. State of Texas.

Natural Resources Code. State of Texas.

Statewide Rules 8 and 77. Railroad Commission of Texas.

Water Code. State of Texas.

Appendix B
LIST OF AGENCIES CONTACTED

Federal	Acronym
U.S. Army Corps of Engineers, Galveston District • Regulatory Branch	CORPS
U.S. Environmental Protection Agency, Region 6 (Dallas) • Environmental Services Division • Hazardous Waste Management Division • Water Management Division	EPA
U.S. Fish & Wildlife Service (Clear Lake) • Ecological Services Division	FWS
State	
Texas Department of Health (Austin and Houston) • Bureau of Solid Waste Management • Division of Shellfish Sanitation Control • Permits and Registration Branch • Surveillance and Enforcement Division	TDH
Texas General Land Office (Austin and La Porte) • Coastal Division • Recreational Cabins Program	GLO
Texas Parks and Wildlife Department (Seabrook) • Resource Protection Division	TPWD
Texas Water Commission (Austin and Houston) • Field Operations Division • Water Quality Division - Wastewater Enforcement Section - Wastewater Permits Section - Water Quality Standards and Evaluation Section	TWC
Local	
Harris County Pollution Control Department (Pasadena)	HCPC

Appendix C
SURVEY FORM EXAMPLE

The information about agency regulatory programs used in the development of this report was gathered primarily through interviews with selected agency staff. An example of the forms used to guide the interviews is shown on the following pages.

The questions shown on this example are, for the most part, generic and were used with all the agencies interviewed. Specific questions on individual program areas were added for each agency and/or area of management concern.

INTERVIEW FORM

Regulatory Effectiveness Studies

Agency _____

Interviewee _____

Title _____

Interviewer _____

Date _____

Legal Authority

1. Confirm: what are the major laws under which [agency]'s [water quality] programs operate -- [Clean Water Act, Texas Water Code]?

2a. Do these laws give [agency] all the legal authority it needs to be an effective regulator?
2b. Are there any additional types of legislation that would help [agency] to be more effective?

3a. Are there areas of environmental regulation that currently are not under [agency] but which it would prefer to have responsibility for?
3b. Why?

Policy/Standards

1. Confirm: The [Commission] is the policy-making body for your agency?

2a. Does the [Commission] actually come up with a written environmental policy to guide the entire agency, or does the staff already have a good idea of what the agency should be doing based on the various laws and past experience?
2b. If a private citizen were to walk into your office today, are there any agency plans, policy statements, or other documents that could be handed to him where he could actually read [agency]'s official policies?
2c. Are these policy documents reviewed and updated periodically?
2d. Is this a formal process, with public hearings, etc.?

3a. Are most of [agency]'s policies already obvious just by looking at what it is mandated to do under various state and federal laws?
3b. Does the [Commission] ever go beyond these laws and come up with policies of its own just for Texas?

4a. Do the lessons that the [agency] staff learn in the field somehow feed back into the policy-setting process in [Austin]?
4b. How?

5. Are there policies that [agency] would like to adopt but doesn't because it would not have the resources to implement them?

Strategy/Programs/Implementation

Permitting

1. What are the objectives of [agency]'s permitting process?

2a. What aspects of the proposed activity are reviewed?
2b. How is the review done?
2c. What is the role of the field staff -- are there set procedures for them to follow and specific information that they are expected to gather for each review?

3. Do the [Commissioners] and [agency] staff have adequate information available to them to do effective reviews?

4a. Does the quantity of permit applications which [agency] must review diminish the quality of those reviews?
4b. In what way?
4c. If you had more time for your reviews, what types of things would you look at that don't receive enough attention now?

5a. Does [agency] evaluate its permitting process from time to time?
5b. Can you give any examples of changes made to the review process to improve it?

6a. Will the designation of an area as a Texas Coastal Preserve be a key factor in future reviews of permits applications within that area?
6b. Has this been discussed within [agency]?

Monitoring and Enforcement

1a. Does [agency] have any difficulty enforcing the conditions of its permits?
1b. In what ways?

2a. What types of enforcement and monitoring methods are currently used by [agency]?
2b. Are these effective?
2c. Are surprise inspections ever used?

3a. Are there any problems or gaps in enforcement that sometimes occur?
3b. Are there adequate resources for effective enforcement?
4. Which agencies have the greatest responsibility for detecting permit violations and other [water quality] violations in the field?

5a. Is it fairly obvious when an individual or a city is violating [water quality] regulations, or do enforcement staff have to make certain judgements?
5b. What happens after a violation is detected?

6a. What are the existing types of penalties for permit and [water quality] violations?
6b. Is there some method for matching the size of a fine or penalty to the magnitude of the violation, such as a schedule of fines?
6c. Is court action common (injunctions, fines) -- usually a last resort?

7a. Are administrative fines effective in bringing compliance?
7b. Is litigation effective in those worst cases?

Coordination

1. Are [agency]'s monitoring and enforcement efforts coordinated with those of other federal, state and local agencies?

2. How effective has such coordination usually been?

3. What factors work against better inter-agency coordination?
   ___lack of communication
   ___distance
   ___insufficient time
   ___never emphasized by superiors
   ___different agency goals/orientations
   ___others:

General

1a. Would local government land-use regulations (such as zoning, subdivision regulations, and erosion control rules) be helpful in [water quality] regulation?
1b. In what ways?

2a. Are there any existing regulations that are ineffective because of a lack of support or understanding of them among industry and the public?
2b. How might that situation be improved?

Evaluation/Measurement of Progress

1. Does [agency] have an established procedure for evaluating the effectiveness of its regulatory programs?

2a. In general, would you say that [agency] has adequate resources to carry out its regulatory duties?
2b. Where are the problem areas, what types of frustrations do the staff experience?

3. What additional resources would help [agency] to be more effective?
   ___more staff
   ___more equipment
   ___larger budget for travel
   ___more resources to devote to recruitment and retention of high-quality staff
   ___others:

4. Which of the following are problem areas for [agency] in terms of the adequacy of its staff?
   ___educational background
   ___practical experience

___ training (on the job?)
___ continuing education
___ salary & benefits (challenge of competing with the private sector?)
___ working conditions
___ turnover/retention (loss of talent and experience to the private sector?)
___ others:

5. Does your agency have incentive programs or merit rewards for staff members who are particularly effective in carrying out the agency's work?

6a. How successful is [agency] in attempting to keep up with new developments, research and innovations in the regulatory field?
6b. If this is a problem, does it reduce the effectiveness of your agency?

7a. What are the most significant environmental problems under [agency]'s jurisdiction which it cannot address adequately at present?
7b. Why?

8a. In your opinion, what regulatory program of [agency] has been particularly effective in achieving its intended purpose?
8b. Is there some way that such progress can be measured? (or do you just have to rely on general observations, such as the return of fish to a stream?)
8c. Are there any [agency] programs that have been particularly ineffective?
8d. Why?
8e. Could any of these be eliminated without causing much harm?

9a. If [agency] were promised a substantial budget increase, how could this new funding be best used to improve the agency's regulatory work?
9b. If your agency were to suffer a substantial budget reduction, what regulatory programs would it be most important to protect from cuts?

General Observations

1. Does the existing set of laws, regulations and agencies which manage the Coastal Preserves need to change much at all, or does it just need to be implemented more effectively?

2. Are there any specific changes you would suggest to make the overall management of the Coastal Preserves more effective?

LAST: Are there any other issues that we are overlooking? Additional comments?

Appendix D
AGENCY DIRECTORY

Federal Agencies

Federal Emergency Management Agency
Insurance and Mitigation Division
Region VI
800 N. Loop 288
Denton, TX 76201
817/898-9134

National Marine Fisheries Service
Habitat Conservation Division
4700 Avenue U
Galveston, TX 77550
409/766-3699

U.S. Army Corps of Engineers
Regulatory Branch
Galveston District
PO Box 1229
Galveston, TX 77553-1229
409/766-3930

Soil Conservation Service
U.S. Department of Agriculture
16151 Cairnway, Suite 209
Houston, TX 77084
713/855-8716

U.S. Environmental Protection Agency
Water Quality Branch
1445 Ross Avenue
Dallas, TX 75202
214/655-7145

U.S. Fish and Wildlife Service
Division of Ecological Service
17629 El Camino Real, Suite 211
Houston, TX 77058
713/750-1700

U.S. Geological Survey
2320 LaBranch, Room 1112
Houston, TX 77004
713/750-1662

State Agencies

Railroad Commission of Texas
Oil and Gas Division
1701 N. Congress
PO Drawer 12967
Austin, TX 78711-2967
512/463-6887

Texas Air Control Board
6330 Highway 290 East
Austin, TX 78723
512/451-5711

Texas Department of Agriculture
Agricultural Resources Protection
Stephen F. Austin Building, 9th Floor
PO Box 12847
Austin, TX 78711-2847
512/463-7476

Texas Department of Health
Shellfish Sanitation Control Division
1100 West 49th Street
Austin, TX 78756
512/458-7510

Texas Department of Health
Solid Waste Management Division
1100 West 49th Street
Austin, TX 78756
512/458-7271

Texas Department of Health
Water Hygiene Division
1100 West 49th Street
Austin, TX 78756
512/458-7533

Texas Department of Highways and Public Transportation
PO Box 1386
Houston, TX 77251
713/869-4571

Texas Department of Public Safety
Division of Emergency Management
PO Box 4087
512/465-2138

Texas General Land Office
Stephen F. Austin Building, 8th Floor
Austin, TX 78711
512/463-5055

Texas Parks & Wildlife Department
Environmental Assessment Branch
Resource Protection Division
4200 Smith School Road
Austin, TX 78744
512/389-4639

Texas State Soil & Water Conservation Board
PO Box 658
Temple, TX 76503-0658
817/773-2250

Texas Water Commission
Water Quality Standards and Evaluation Section
Water Quality Division
PO Box 13087, Capitol Station
Austin, TX 78711-3087
512/463-8412

Texas Water Development Board
PO Box 13231, Capitol Station
Austin, TX 78711-3231
512/463-7981

Local Agencies

Armand Bayou Nature Center
8600 Bay Area Boulevard
PO Box 58828
Houston, TX 77258
713/474-2551

Bayfield Public Utility District
430 El Toro
Webster, TX 77598

City of Deer Park
Department of Public Works
PO Box 700
Deer Park, TX 77536
713/479-2394

City of Houston
Environmental Pollution Control
7411 Park Place Boulevard
Houston, TX 77087
713/640-4266

City of Houston
Public Works Department
PO Box 1562
Houston, TX 77251
713/247-2507

City of Pasadena
Department of Public Works
PO Box 672
Pasadena, TX 77501
713/477-1511

City of Taylor Lake Village
1202 Kirby Road
Seabrook, TX 77586
713/474-2843

Clear Lake Water Authority
900 Bay Area Boulevard
Houston, TX 77058
713/488-1164

Galveston Bay Foundation
3027 Marina Bay Drive #110
League City, TX 77573
713/524-0240

Gulf Coast Waste Disposal Authority
Special Projects and Technical Services
910 Bay Area Boulevard
Houston, TX 77058
713/488-4115

Gulfway Utility District
1301 Leeland Street
Houston, TX 77002

Harris County Flood Control District
9900 Northwest Freeway, Suite 200
Houston, TX 77092
713/684-4000

Harris County Engineer
Harris County Administration Building
1001 Preston Avenue
Houston, TX 77002
713/221-5370

Harris County Health Department
Environmental Health Division
PO Box 25349
Houston, TX 77265
713/620-6860

Harris County Municipal Utility District #67
2703 Tangley
Houston, TX 77005

Harris County Pollution Control
PO Box 6031
Pasadena, TX 77056
713/920-2831

Harris-Galveston Coastal Subsidence District
1660 West Bay Area Boulevard
Friendswood, TX 77546
713/486-1105