

# STATE OF TEXAS

## COASTAL NONPOINT SOURCE POLLUTION CONTROL PROGRAM

Coastal Coordination Council  
December 1998

A publication of the Coastal Coordination Council pursuant to National Oceanic and Atmospheric Administration Award No. NA87OZ0251. This publication is funded by a grant from the National Oceanic and Atmospheric Administration. The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its sub-agencies.

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## Note to Readers

In November 1996, the Coastal Coordination Council formed a work group of state agency staff to develop the State of Texas state coastal nonpoint source pollution control program and draft this document to meet the requirements of §6217 of the Coastal Zone Reauthorization Amendments of 1990. Approved by the Council on December 9, 1998, this document is the product of two years' work by that group, particularly the staff of Texas' lead water quality agency, the Texas Natural Resource Conservation Commission, and its agriculture water quality agency, the Texas State Soil and Water Conservation Board. The work group was aided by the active participation of Mr. John Barrett, Coastal Coordination Council member representing agriculture. Staff who contributed to the drafting and production of the document include the following.

Texas Natural Resource Conservation Commission: Lennie Winkelman, Arthur Talley, Mark Jordan, Bruce Moulton, Stephen Sheperd, Tina Amberboy

Texas State Soil and Water Conservation Board: James Moore, Beade Northcut, Bo Spoons, Richard Egg

Texas General Land Office: Doug Myers, Jimmy Martinez, Scot Friedman, Janet Fatheree, Muriel Wright, Allison Martin, Tom Nuckols

Texas Department of Transportation: Tom Remaley, Carlos Swonke

Texas Parks and Wildlife Department: Cindy Contreras, Dave Buzan

Railroad Commission of Texas: Leslie Savage, Windle Taylor, Larry Hanneschlager

Technical writing and editing for the final document was done by Ms. Amanda Orrick Mintz of Shorr & Orrick Planning Associates, Corpus Christi, Texas.

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# List of Acronyms

ADT	average daily traffic
BDL	below detection limit
BMP	best management practice
CAFO	concentrated animal feeding operations
CBBEP	Coastal Bend Bays and Estuaries Program
CCBNEP	Corpus Christi Bay National Estuary Program
CCMP	comprehensive conservation and management plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1990
CMP	Texas Coastal Management Program
CMS	Conservation Management System
CNRA	coastal natural resource area
COD	chemical oxygen demand
Corps	U.S. Army Corps of Engineers
CRP	Conservation Reserve Program
CWA	Clean Water Act
CZARA	Coastal Zone Act Reauthorization Amendments
CZMA	Coastal Zone Management Act
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ESC	erosion and sediment control
FHWA	Federal Highway Administration
FY	fiscal year
GBEP	Galveston Bay Estuary Program
GBNEP	Galveston Bay National Estuary Program
GCHD	Galveston County Health District
GIS	geographic information system
GIWW	Gulf Intracoastal Waterway
GLO	Texas General Land Office
HEL	highly erodible land
ILM	integrated landscape management
IPM	integrated pest management
LCRA	Lower Colorado River Authority
MARSH	Ducks Unlimited Matching Aid to Restore States Habitat
MAS	Sea Grant Marine Advisory Service
MOA	memorandum of agreement
MOU	memorandum of understanding
MS4	municipal separate storm sewer system
NASA	National Aeronautics and Space Administration
NEP	National Estuary Program
NOAA	National Oceanic and Atmospheric Administration

## List of Acronyms, continued

NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
NPS	nonpoint source
NRCS	Natural Resources Conservation Service
NRDA	natural resource damage assessment
OPPR	Office of Pollution Prevention and Recycling
OSDS	on-site disposal systems
OSPR	Oil Spill Prevention and Response Act
OSSF	on-site sewage facility
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyls
PI	principal investigator
POTW	publicly owned treatment works
PSSMP	pesticide-specific state management plan
QA/QC	quality assurance/quality control
RGD	Regulatory Guidance Document
RRC	Railroad Commission of Texas
SB	Senate Bill
SCPT	Seagrass Conservation Plan for Texas
SCS	Soil Conservation Service
SMA	Streamside Management Areas
SOD	sediment oxygen demand
SRF	State Revolving Fund
SWCDs	Soil and Water Conservation Districts
SWQM	Texas Surface Water Quality Management
SWQS	Texas Surface Water Quality Standards
TAC	Texas Administrative Code
TAES	Texas Agricultural Experiment Station
TAEX	Texas Agricultural Extension Service
TDA	Texas Department of Agriculture
TDH	Texas Department of Health
TFA	Texas Forestry Association
TFS	Texas Forest Service
THSC	Texas Health and Safety Code
TIAER	Texas Institute for Applied Environmental Research
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TNRCC	Texas Natural Resource Conservation Commission
TOC	Total Organic Carbon
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department

## List of Acronyms, continued

TRI	Toxic Release Inventory
TSS	total suspended solids
TSSWCB	Texas State Soil and Water Conservation Board
TWC	Texas Water Code
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation
USDA	United States Department of Agriculture
USGS	United States Geological Survey
VDS	vehicles during a storm
VOC	volatile organic compound
WQMP	Water Quality Management Plan
WRPA	Waste Reduction Policy Act

# Chapter 1. Introduction

## 1.1 Purpose and Development of This Document

Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA) requires each state with an approved coastal zone management program to develop a federally approvable program<sup>1</sup> to control coastal nonpoint source pollution. Texas is required to submit its program within 30 months of approval of the Texas Coastal Management Program (CMP), which was approved on January 10, 1997.

In 1993, the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Environmental Protection Agency (EPA) published *Program Development and Approval Guidance* and *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* to assist states in developing their Coastal Nonpoint Pollution Control Programs. These guidance documents, together with the statutory requirements found in Section 6217 and subsequent program clarification and guidance, including the *Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance* (1998), were used to develop this Coastal Nonpoint Source Pollution Control Program for the State of Texas.

The Texas Coastal Coordination Council appointed a Coastal Nonpoint Source Pollution Control Program workgroup to develop this document. The workgroup consists of representatives from six member state agencies responsible for Coastal Nonpoint Source Pollution Control Program activities. Following is a list of the state agencies with descriptions of their respective program activities.

- **Texas General Land Office (GLO):** Lead state agency for receiving and administering federal Coastal Zone Management Act funds. The GLO manages development in the beach/dune system to protect sand dunes and public beach access. The GLO also administers state-owned submerged lands with specific lease conditions for construction of waterfront facilities, dredging, and filling.
- **Texas State Soil and Water Conservation Board (TSSWCB):** Lead state agency for the management of agricultural and silvicultural nonpoint source pollution, which includes

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<sup>1</sup> This program is jointly administered by the National Oceanic and Atmospheric Administration and the U.S. Environmental Protection Agency. In Texas, two agencies hold primary responsibility for the program's development and implementation: the Texas Natural Resource Conservation Commission and the Texas State Soil and Water Conservation Board. Other agencies supporting this program are the Texas General Land Office, the Texas Parks and Wildlife Department, the Texas Department of Transportation, and the Railroad Commission of Texas.

activities related to implementation of management measures, complaint investigations, education, and technical assistance.

- **Texas Natural Resource Conservation Commission (TNRCC):** Lead state agency for the management of urban and other non-agricultural and non-silvicultural nonpoint source pollution, which includes activities related to implementation of management measures, complaint investigations, education, and technical assistance. The TNRCC is also responsible for administering the on-site sewage (septic) system program, wetland certification under §401 of the federal Clean Water Act (CWA), water quality monitoring and assessment activities, and establishment of water quality standards.
- **Texas Department of Transportation (TxDOT):** Lead state agency for construction and maintenance of state roads, which includes responsibility for the management of road and highway nonpoint sources of pollution.
- **Texas Parks and Wildlife Department (TPWD):** Lead state agency for the protection of fish and wildlife, which includes participation in the review of CWA §404 permits and §401 wetland certifications. The TPWD also works on programs to enhance, create, and conserve wetlands and provides technical and/or financial assistance to private wetland owners. Responsible for enforcing boat sewage rules.
- **Railroad Commission of Texas (RRC):** Lead state agency for Section 401 water quality certifications for oil and gas exploration and development activities.

## ***Organization***

The Texas Coastal Nonpoint Source Pollution Control Program consists of two volumes. Volume I presents the program and response to public comments. Volume II contains a list of the applicable laws, regulations, and programs which will be used to carry out the program.

Volume I consists of nine chapters. The remainder of this chapter discusses the federal requirements under §6217 as well as EPA and NOAA's program development guidance. Chapter 2 provides an overview of nonpoint source pollution, including the impacts of nonpoint source pollution within Texas' coastal regions. The remaining seven chapters describe Texas's approach to program development and implementation. Included in these chapters is a discussion of the coastal nonpoint source management area; an overview of program implementation and coordination; presentation of specific nonpoint source categories, the §6217 management measures, and the state rules and programs that address those sources and meet the federal requirements; information on additional management measures, technical assistance, and public participation; and program monitoring and evaluation.

## 1.2 Federal Requirements for the Coastal Nonpoint Source Pollution Control Program

Section 6217 of CZARA requires all states with approved coastal zone management programs to develop and submit a coastal nonpoint source pollution control program to NOAA and the EPA for approval.

Section 6217 calls for implementation of management measures (“§6217(g) measures”<sup>2</sup> or “(g) measures”) that will control significant nonpoint sources of pollution to coastal waters. The six source categories addressed by these measures are: agriculture, forestry, urban and developing areas, marinas, wetland/riparian areas, and hydromodification. NOAA and EPA agree that states may focus resources on preventing and controlling significant impacts of nonpoint source pollution on living coastal resources and human health. The availability of resources will necessitate the implementation of management measures incrementally. Targeting program implementation will involve balancing the need to implement nonpoint source controls broadly and the need to address specific water quality problems for particular watersheds. States can use voluntary approaches combined with existing state authorities to achieve implementation of management measures. However, if the voluntary mechanisms are not effective, states must have backup enforcement authorities<sup>3</sup> in place to ensure that management measures are implemented.

### 1.2.1 Program Requirements and Guidance

EPA and NOAA’s *Program Development and Approval Guidance* and *Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance* (1998) provide both technical and programmatic guidance on program development and how NOAA and EPA intend to exercise their discretion in implementing the Coastal Nonpoint Pollution Control Program. Key elements from these guidance documents and §6217 are summarized below.

- Coastal nonpoint programs need to be coordinated and integrated with other programs and water quality initiatives; e.g., state §319 CWA nonpoint source programs, the development of Total Maximum Daily Loads (TMDLs) under §303(d) of the CWA, the Environmental Quality Incentives Program (EQIP) under the 1996 Farm Bill, National Estuary Programs, and State Watershed Plans should be considered in establishing priorities and strategies to meet §6217 CZARA program requirements.

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<sup>2</sup>Management measures are defined in Section 6217(g) as “economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives.”

<sup>3</sup>According to §304(6a) of the Coastal Zone Management Act, an “enforceable policy” is a legally binding state policy by which a state “exerts control over private and public land and water uses and natural resources in the coastal zone” (US EPA and USDC, 1993, p. 34).

- Section 6217 time frames should be coordinated with other program implementation schedules and review processes; e.g., §312 Coastal Zone Management Act evaluations, §319 CWA program reviews and updates, and TMDL development deadlines.
- Each coastal nonpoint program should include implementation of management measures to conform with the §6217(g) guidance.
- The implementation of management measures should be focused and targeted on priority coastal waters with significant nonpoint source pollution impacts on living coastal resources and human health.
- After NOAA and EPA have approved or conditionally approved the coastal nonpoint program, states will determine program priorities and communicate those priorities to NOAA and EPA by submitting a 15-year program strategy that briefly describes the state's overall approach and schedule to ensure implementation of the §6217(g) management measures and improve water quality within 15 years of the date of conditional approval. This means that all applicable §6217(g) management measures to protect and restore coastal waters will be implemented, though NOAA and EPA recognize that all water quality problems attributable to nonpoint sources may not be resolved within 15 years.
- In establishing priorities, states will address both pollution prevention and water quality improvement goals, including the protection of pristine areas and coastal waters that are threatened by reasonably foreseeable increases in pollution loadings from new or expanding nonpoint sources. Targeting program implementation will involve a balance between the need to broadly implement nonpoint source controls and the need to address specific water quality problems for particular watersheds.
- Rather than the implementation of §6217(g) management measures, monitoring, and implementation of additional management measures in succession, states may establish an iterative process for implementing §6217(g) management measures, assessing their effectiveness in achieving water quality goals, and determining the need for additional management measures.
- NOAA and EPA will continue to expect that management measures for new sources (e.g., new development) will be implemented as the new sources come online. NOAA and EPA expect that all individually and cumulatively significant nonpoint source categories and all watersheds within the §6217 management area will be addressed within 15 years.
- A critical provision of §6217 is that the Coastal Nonpoint Pollution Control Program must include enforceable policies and mechanisms sufficient to ensure implementation of the management measures. States may use voluntary or incentive-based programs if these programs are backed by existing enforcement authorities and the following are provided:
  1. A legal opinion from the attorney general or an attorney representing the agency with jurisdiction for enforcement that such authorities can be used to prevent nonpoint pollution and require management measure implementation, as necessary.

2. A description of the voluntary or incentive-based programs the state will use to encourage implementation of the management measures, including the methods for tracking and evaluating those programs;<sup>4</sup> and
  3. A description of the mechanism or process that links the implementing agency with the enforcement agency and a commitment to use the existing enforcement authorities where necessary.<sup>5</sup>
- Coastal Nonpoint Pollution Programs should provide technical assistance to local governments and the public for implementing additional management measures.
  - Coastal Nonpoint Pollution Programs should provide opportunities for public participation in all aspects of the program.

### **1.2.2 Coastal Nonpoint Management Area**

Section 6217 of CZARA requires that state coastal zone management agencies and water quality agencies designate a coastal nonpoint management area sufficient to restore coastal waters and to prevent future deterioration of those waters. In no case would Congress allow the coastal nonpoint management area to be less than the existing state coastal zone. Congress further required that NOAA conduct a review of land uses in the state coastal watersheds and recommend to each state an area beyond its existing coastal zone that should be included in its coastal nonpoint management area.

Section 6217 further requires coastal states to demonstrate authority to manage nonpoint pollution within the final approved coastal nonpoint management area in one of two ways. First, states may choose to change their existing coastal zone boundaries to encompass the coastal nonpoint management area recommended by NOAA. Under the second option, states may choose to maintain their existing coastal zone boundaries and demonstrate that the necessary enforceable policies and mechanisms are in place to ensure the implementation of management measures within the existing coastal zone and the recommended coastal nonpoint management area. NOAA and EPA will defer to the state in delineating the coastal nonpoint source boundary unless they determine that the boundary excludes existing land or water uses that can be expected to have significant impacts on coastal waters or excludes reasonably foreseeable threats to coastal waters from nearby activities

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<sup>4</sup>Programs that will be used to implement the management measures are described in Chapters 4 and 5. Enforcement mechanisms are discussed in Chapter 4.

<sup>5</sup>Enforcement mechanisms and administrative coordination and implementation are discussed in Chapter 4.

landward of the boundary.

Texas proposes to use the existing Coastal Management Program (CMP) boundary as its Coastal Nonpoint Source Control Management Boundary (also referred to as the §6217 Management Area). A detailed discussion of the proposed boundary and supporting maps are provided in Chapter 3.

### **1.2.3 Time Frame for Approval and Implementation**

Texas must submit a Coastal Nonpoint Pollution Control Program by July 1999. EPA and NOAA have until January 2000 to review the program. After review, NOAA and EPA will take one of three actions. They will (1) approve the program, (2) grant conditional approval, or (3) disapprove the program. The time frames for program development, approval, and implementation are given below.

1998 (December)	Texas submits Coastal Nonpoint Pollution Control Program to NOAA and EPA.
2000 (January)	NOAA and EPA review and approve the program. Texas must begin implementing management measures upon conditional or final approval. Upon final or conditional approval, Texas must submit a 15-year program strategy for achieving full implementation of the §6217(g) management measures. Nested within the 15-year program strategy will be a more specific 5-year implementation plan.
2003 (January)	NOAA and EPA evaluate the progress of Texas in meeting any conditional approval requirements.
2005 (January)	NOAA and EPA evaluate progress in achieving goals established through the 5-year implementation plan and 15-year program strategy. Texas submits a new 5-year implementation plan for management measures.
2010 (January)	NOAA and EPA evaluate progress in achieving goals established through the 5-year implementation plan and 15-year program strategy. Texas submits a new 5-year implementation plan for management measures.
2015 (January)	Implementation of management measures for all individual and cumulative nonpoint source categories is complete. <sup>6</sup>

States that fail to submit an adequate coastal nonpoint program within 30 months of approval of their coastal management program face penalties including the withholding of funds from NOAA and EPA. These penalties range from 10 percent in the first year of an unapproved program to 30 percent in the fourth year. Texas receives \$2 million per year in coastal management funds from NOAA and

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<sup>6</sup>Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), *Federal Register*, October 21, 1998.

\$4.7 million per year from EPA for nonpoint source programs. Accordingly, state law provides that if NOAA and EPA find that Texas has failed to submit an approvable coastal nonpoint program, federal coastal management funds or EPA nonpoint source funds will be withheld, and the governor will withdraw the CMP from the federal Coastal Zone Management Program.<sup>7</sup>

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<sup>7</sup>House Bill 3226, 74th Texas Legislature, 1995.

# Chapter 2. Nonpoint Source Pollution in the Texas Coastal Region

## 2.1 Nonpoint Source Pollution

Nonpoint source (NPS) pollution has many causes, but it can be described as polluted runoff. Because it does not come from an easily identifiable point, such as a pipe or drain, NPS pollution is sometimes called diffuse pollution. NPS pollution occurs when rainfall, snowmelt, or irrigation water runs over land, picks up pollutants, and deposits them into rivers, lakes, and coastal waters. NPS pollution also results in adverse changes to the vegetation, shape, and flow of streams and other aquatic systems. NPS pollution is widespread because it can occur any time activities disturb the land or water. Atmospheric deposition, concentrations of wildlife, natural backgrounds, agriculture, forestry, grazing, septic systems, recreational boating, urban runoff, construction, physical changes to stream channels, and habitat degradation are potential sources of NPS pollution.<sup>1</sup>

### 2.1.1 Nonpoint Source Pollution Constituents

Some of the constituents normally associated with NPS pollution are favorable to the ecosystem under certain conditions. For example, nutrients such as nitrogen and phosphorus stimulate plant growth. Under normal conditions, nutrients are beneficial and necessary, but in high concentrations, they can become an environmental threat. Another component associated with NPS pollution is sediment. Sediment can be beneficial for marsh and wetland creation; however, decreasing the amount of sediment entering a stream may increase streambank erosion in downstream reaches. As with nutrients, sediment from NPS pollution can produce positive or negative effects in receiving waters.

NPS pollution constituents and their impact on water quality are described below. Other impacts on water quality which are not related to specific pollutants but which can also occur as a result of activities on land, such as changes in water temperature, salinity, hydrology, and habitat, are also described.

#### Nutrients

Nitrogen and phosphorous in their various forms are the major nutrients which can impact water quality. Secondary nutrients, micronutrients, salts, metals, and organic solids can also have adverse effects on the water quality of a receiving water body in certain circumstances.

All plants require nutrients for growth. In aquatic environments, naturally limited nutrient availability usually limits plant growth. Therefore, when nutrients are introduced from runoff into a stream, lake,

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<sup>1</sup>*Nonpoint Source Pollution: The Nation's Largest Water Quality Problem*, EPA Factsheet, Nonpoint Pointers series EPA-841-F-96-004.

or estuary at rates that are higher than normal, aquatic plant productivity may increase dramatically. This process, referred to as cultural eutrophication, may adversely affect the suitability of the water for other uses. Increased aquatic plant productivity adds more organic material to the system. This material eventually dies and decays. The decaying organic matter produces unpleasant odors and depletes the oxygen supply required by aquatic organisms. Excess plant growth may also interfere with recreational activities such as swimming and boating. Depleted oxygen levels, especially in colder bottom waters where dead organic matter tends to accumulate, can reduce the quality of fish habitat and encourage the propagation of fish that are adapted to less oxygen or to warmer surface waters. Highly enriched waters will stimulate the production of microscopic algae, increasing turbidity and a green color. The increased turbidity reduces sunlight penetration and availability to submerged aquatic vegetation. Since submerged aquatic vegetation provides habitat for small or juvenile fish, the loss of submerged aquatic vegetation can have severe consequences for the food chain.

### **Sediment**

Sediment loading is primarily the result of erosion. It is the solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice. Soil erosion can be characterized as the transport of particles that are detached by rainfall, flowing water, or wind. Sediment affects the use of water in many ways. Sediment can help build coastal marshes and prevent an exclusive open water habitat in bays and estuaries. However, suspended solids reduce the amount of sunlight available to aquatic plants, cover fish spawning areas and food supplies, clog the filtering mechanisms of filter feeders, and clog and harm the gills of fish. Turbidity interferes with the feeding habits of fish. These effects combine to reduce fish, shellfish, coral, and plant populations and decrease the overall productivity of lakes, streams, estuaries, and coastal waters. In addition, recreation is limited because of the decreased fish population and the water's unappealing, turbid appearance. Turbidity also reduces visibility, making swimming less safe.

Chemicals such as some pesticides, phosphorus, and ammonium are transported with sediment in an adsorbed state. Changes in the aquatic environment, such as a lower concentration of oxygen in the overlying waters or the development of anaerobic conditions in the bottom sediments, can cause these chemicals to be released from the sediment. Adsorbed phosphorus transported by the sediment may not be immediately available for aquatic plant growth but does serve as a long-term contributor to eutrophication.

### **Oxygen-Demanding Substances**

Sufficient levels of dissolved oxygen in water bodies are essential to maintaining water quality and aquatic life. Decomposition of organic matter by microorganisms is a process that consumes oxygen and may deplete dissolved oxygen levels, impairing the water body's ability to support aquatic life. Chemical decomposition of some compounds consumes oxygen in water. Runoff containing high concentrations of organic matter and other oxygen-demanding compounds can severely depress dissolved oxygen levels in receiving waters after storm events.

## **Pathogens**

Pathogens are bacteria, viruses, algae, and protozoans which cause diseases in humans, plants, and other animals. Pathogens typically enter water through runoff or discharges carrying untreated or partially treated human sewage and may be found in wild and domestic animal waste. The presence of pathogens in runoff may result in water body impairments such as closed beaches, contaminated drinking water sources, and shellfish bed closings.

## **Toxics**

Toxic contaminants refer to either man-made or naturally occurring substances that, when found in certain concentrations, can alter or impair the normal functioning of organisms that are exposed to them. Numerous water quality constituents can become toxic only at high concentrations; however, certain constituents have been found to have toxic effects at relatively low levels or at levels that may result from NPS pollution. Metals, organic compounds, dissolved gases (chlorine and ammonium), anions (cyanides and sulfides), acids, and alkalis can be toxic to aquatic organisms at relatively low levels. These constituents can cause death, illness, cancer, genetic mutation, physiological malfunction, physical deformation, and behavioral abnormalities in aquatic organisms, wildlife, and humans. Toxic compounds may bioaccumulate in fish and shellfish. Toxic compounds can biomagnify in concentration in organisms with increasing trophic levels.

### ***2.1.2 Water Quality Impacts***

#### **Water Temperature**

Temperature changes result from increased flows, reservoir releases, removal of vegetative cover, and increases in impervious surfaces. Impervious surfaces act as heat collectors, heating urban runoff as it passes over them. Thermal loading disrupts aquatic organisms that have finely tuned temperature limits. The ability for oxygen to dissolve in water is also dependent on temperature.

#### **Salinity**

Freshwater inflows are generally beneficial to bays and estuaries because they maintain the necessary salinity regime in brackish estuarine nurseries. However, too much freshwater inflow due to increased runoff can negatively impact estuaries, especially if it occurs in pulses, disrupting the natural salinity of an area. Alteration of the natural topography, increased impervious surface area, and the presence of storm water conveyance systems commonly result in elevated peak flows in streams during and after storm events. These rapid pulses or influxes of fresh water into the watershed may be two to ten times greater than normal and can lead to a decrease in the number of aquatic organisms living in the receiving waters. Conversely, impoundment or diversion of fresh water can cause salinity increases in coastal waters that can be detrimental to oyster reefs and certain species of emergent marsh vegetation.

## Hydrologic Changes

Hydrologic and hydraulic changes occur in response to activities on land such as plowing, site clearing, grading, and the addition of impervious surfaces and maintained landscapes. Most problematic in urban areas are the greatly increased runoff volumes and the ensuing erosion and sediment loadings to surface waters that accompany these changes to the landscape. Impervious surfaces in urban areas, such as rooftops, roads, parking lots, and sidewalks, decrease the infiltrative capacity of the ground and greatly increase the volume of runoff. Elevated flows also necessitate the construction of runoff conveyances or the modification of existing drainage systems to avoid erosion of stream banks and steep slopes. The alteration of natural hydrology such as diversion of runoff, channelization, and destruction of natural drainage systems can result in riparian and tidal wetland degradation or destruction. Deltaic wetlands can also be impacted by changes in historic sediment deposition rates and patterns. Hydromodification projects designed to prevent flooding may reduce sedimentation rates and decrease the marsh aggradation that would normally offset erosion and apparent changes in sea level within deltas.

## Changes in Aquatic Habitats

The functioning condition of riparian-wetland areas is a result of interaction among geology, soil, water, and vegetation. Encroachment of urban development and improper livestock grazing affects all components of the water-riparian system: shore/banks, water column, channel, and aquatic and bordering vegetation. The potential impacts of land-based activities on aquatic habitats are listed below.

**Shore/banks.** Shearing or sloughing of streambank soils; erosion of exposed streambank and channel soils due to loss of vegetative cover; reduction of the quality and quantity of streambank undercuts; increase in streambank angle (laying back of stream banks), which increases water width, decreases stream depth, and alters or eliminates fish habitat.

**Water Column.** Withdrawal of water from streams for water supply; draining or filling of wetlands to facilitate grazing and development; addition of pollutants from runoff which are detrimental to the designated uses of water bodies; changes in magnitude and timing of organic and inorganic energy inputs to the stream; increase in stream temperature.

**Channel.** Changes in channel morphology; altered sediment transport processes; downstream flooding.

**Riparian Vegetation.** Changes in plant species composition; reduction of floodplain and streambank vegetation; changes in timing and amounts of organic energy leaving the riparian zone; elimination of riparian plant communities.

**Wetland Loss.** A decrease in wetland areas, making wetland systems less effective in the filtration of pollutants and control of erosion.

## 2.2 Nonpoint Sources and Activities Addressed by the Coastal Nonpoint Source Program

EPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* under §6217(g) calls for Coastal Nonpoint Pollution Control Programs to address five major categories of nonpoint sources that impair or threaten coastal waters nationally: (1) agricultural runoff; (2) urban runoff (including developing and developed areas); (3) silvicultural (forestry) runoff; (4) marinas and recreational boating; and (5) hydromodification (channelization and channel modification, dams, and streambank and shoreline erosion). The guidance specifies management measures or strategies which reflect the greatest degree of pollutant reduction achievable through the application of pollution control practices, technologies, processes, siting criteria, and operating methods. In addition to the five categories shown above, EPA's guidance also specifies management measures for wetlands, riparian areas, and vegetated treatment systems.

A state may exclude sources or components of sources from its Coastal Nonpoint Program if it can demonstrate that the sources are not causing, individually or cumulatively, adverse effects to coastal resources and human health and are not reasonably expected to cause such impacts in the future. Supporting factors can include pollutant loadings or estimates of loadings from the sources; intensity of land use; and ecological and human risk associated with the source. To determine the significance of adverse effects, both indirect and direct effects should be considered.<sup>2</sup>

States have the burden of demonstrating that sources can be excluded from the coastal program without causing further damage to coastal waters. To substantiate an exclusion, the state must submit a description and documentation of the data and rationale relied upon for excluding the sources.<sup>3</sup> Documentation can include information from existing state water quality assessments; other sources reporting on water quality, including university research, volunteer monitoring, and federal agencies. Ultimately, such data should indicate the insignificance of the loadings or the impacts caused by sources proposed for exclusion.

Chapter 5 presents the Management Measures in conformance with the §6217(g) guidance which will be implemented under the State Coastal Nonpoint Program for each of the required source categories as well as wetlands and riparian areas. As discussed in Chapter 5, Texas proposes to exclude only one source subcategory at this time, namely dryland rowcrop agriculture within the §6217 Management Area beginning at the northern boundary of the Coastal Bend Bays and Estuaries

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<sup>2</sup>US EPA and USDC. 1993. *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*. U.S. Environmental Protection Agency, Office of Water, and U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Washington, D.C. January. Page 12.

<sup>3</sup>US EPA and USDC. 1993. *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*. U.S. Environmental Protection Agency, Office of Water, and U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Washington, D.C. January. Page 13.

Program area and continuing southward to the Northern Boundary of the Arroyo Colorado Watershed.

### **Other Nonpoint Sources**

Neither the 36217(g) guidance nor the (g) management measures directly addresses three additional nonpoint sources of pollution which have significant impacts on Texas coastal waters. These sources are atmospheric deposition, wildlife, and natural backgrounds.

Although these sources are not specifically addressed as categories in the 36217 program, the broad applicability of many of the (g) measures may result in a reduction of impacts from these sources. These three sources and their impacts in Texas are described below.

#### **Atmospheric Deposition**

Wet and dry deposition of nutrients and metals is a significant emerging national issue. Atmospheric deposition affects coastal waters in two ways. First, there is a loading component of nutrients and metals in rainfall and dryfall (direct deposition) that falls directly on water bodies. A second and more significant loading component is the portion of the surface runoff load that nutrients and metals in rainfall contribute to total runoff loads. Studies done by the Corpus Christi Bay National Estuary Program indicate that as much as 80 percent of the nitrogen in runoff water comes from rainfall.

There is a significant lack of understanding as to the sources of nitrogen wetfall. Possible sources include mobile sources (automobiles and barges), stationary sources (industrial air pollutants), and the earth's atmosphere, which is 80 percent nitrogen.

#### **Wildlife**

Warm-blooded animals produce fecal coliform bacteria, which is the indicator currently used to determine use support for water contact recreation. In some areas of significant wildlife populations, the loadings of nutrients and fecal coliform bacteria may be significant.

#### **Natural Backgrounds**

Natural background sources can be significant contributors to water quality problems. Much of the Texas coastal region contains soils with extremely high natural phosphorus concentrations, and when these soils erode during runoff events, they can lead to high concentrations of phosphorus in receiving waters. Similar problems occur with chlorides, sulfates, and some metals.

## **2.3 Impacts to Coastal Water Bodies in Texas**

The types and sources of NPS pollution found in the coastal zone are closely related to the land uses and anthropogenic activities that take place within the region. In addition, the degree to which those nonpoint sources of pollution impact coastal water bodies is closely related to types and intensities of land uses and activities as well as the natural physical characteristics within the region. These

characteristics are discussed below, followed by an overview of growth trends and land uses within the coastal region and a list of impaired water bodies within the coastal region.

### **2.3.1 Physical/Biological Characteristics of the Texas Coast**

The coast of Texas ranges from warm temperate to subtropical in climate with a wide range in rainfall from the Texas-Louisiana border to the U.S.-Mexico border (see Figure 2.1). Consequently, the salinity regime ranges from near freshwater conditions in the Sabine Lake estuary near the Louisiana border to hypersaline conditions in Laguna Madre at the southern end of the Texas coast. High freshwater inflows tend to frequently Aflush≡ the estuaries of the upper coast. Lower coast estuaries have low freshwater inflows and high residence times for natural and man-made pollutant inputs. Thick clay soils, which persist throughout the coast except for areas directly adjacent to large rivers, prevent the exchange of surface water and groundwater, unlike inland areas of the state, which have pervious limestone and sandy soils. Even the barrier islands on the upper Texas coast are composed of thin layers of fine sand over a predominantly Pleistocene clay base.

The upper Texas coast=s heavy rainfall and thick clay soils support rice cultivation. As rainfall declines further south, dryland row crops of cotton and grain sorghum dominate the agricultural scene. Extensive irrigation systems in the Lower Rio Grande Valley support such diverse crops as citrus, vegetables, sugar cane, and aloe vera.

The prevailing wind direction on the Texas coast is southeasterly (landward) for much of the year, and there is little tidal variation. Frequent tropical storms and hurricanes cause prolonged high tides, beach overpasses, and storm surges, resulting in significant episodic erosion of beaches.<sup>4</sup> These physical conditions create specific water chemistry conditions, such as temperature-induced low dissolved oxygen, salinity-induced toxicity to marine life, and accumulation of pollutants, which may cause water quality problems in the absence of a specific pollutant loading problem.

The lack of significant tidal variation restricts intertidal marsh vegetation to narrow bands along tidal creeks and bayshores on the upper coast. The lack of rainfall on the lower coast prevents growth of these marshes completely, and the frequency of winter freezes prevents the establishment of a significant mangrove community. The clay soils prevent the formation of maritime forests. The relative infrequency of filtering fringing marshes and mangroves and the lack of a maritime forest as compared to East and West Coast states and even the other Gulf states puts Texas in a unique category where runoff from upland areas receives little natural filtration before entering coastal water bodies.

### **2.3.2 Growth Trends, Population, and Land Use**

#### **Business and Industry**

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<sup>4</sup>Fisher, W. L., J. H. McGowen, L. F. Brown, Jr., and C. G. Gnoat. 1972. Environmental geologic atlas of the Texas coastal zone - Galveston-Houston area. Bureau of Economic Geology, University of Texas, Austin, Texas.

The Texas coast houses half the nation's petrochemical industry and more than a quarter of its refining capacity. The steady growth of these industries, as well as burgeoning marine commerce, agriculture, commercial and recreational fishing, and a thriving tourist trade, has intensified competition for coastal resources. Continued economic and population growth are projected for the Texas coast, and as population and development increase, so do waste generation, environmental degradation, and the risks of damage to natural systems. The loss of valuable coastal natural resources not only jeopardizes the environmental health of the area, but also threatens the economic health and the very livelihoods of coastal residents.

There are four major urban and industrial centers on the Texas Coast: Beaumont-Port Arthur-Orange; Houston-Galveston; Corpus Christi; and the Lower Rio Grande Valley. In addition to dense urban and suburban development, significant oil refining and associated petrochemical industry infrastructure exist in the first three areas. The Rio Grande Valley is primarily a year-round agricultural center which is experiencing explosive population growth due to its proximity to Mexico and an improved economy in response to the North American Free Trade Agreement. Most of this development has occurred within 50 miles of the Gulf of Mexico shoreline.

### **Population and Growth Trends**

Texas is the second-largest state in the nation, occupying seven percent of the total U.S. water and land area. The Texas population ranks second in the U.S., totaling over 16 million residents in 1990. More than one-third of the state's permanent population and 70 percent of its economic activity are located within 100 miles of the Texas coastline. In recent years, there has been significant population growth along most bay shorelines on the Texas coast, many of which rely on on-site septic systems for sewage treatment.

Eighteen counties are located wholly or partially within the 6217 Management Area. In 1990, the total population of these counties was 4.3 million residents. It is estimated that by 2020, the population in these counties will have increased 66 percent, to 6.6 million residents<sup>5</sup> (see Table 2.1). Of the 71 incorporated cities and towns within the boundary, 40 have populations of less than 10,000 residents.

### **Land Use**

Rural (rangeland) and agricultural lands comprise approximately 46 percent of the total land use/land cover within the 6217 Management Area, although there are major coastal urban centers in Jefferson-Orange, Harris-Galveston, Nueces, and Cameron counties. Rural areas between the larger urban centers support a diverse agricultural industry. Rangeland is scattered throughout the Texas coast as well as the rest of the state. Within the entire coastal watershed, most counties comprise primarily rangeland and agricultural land. A few exceptions are Tyler, Jasper, and Newton counties, where forested land is the predominant land use, and Hidalgo, Fort Bend, Victoria, and Montgomery

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<sup>5</sup>*Water for Texas - Today and Tomorrow: Legislative Summary of the 1996 Consensus-based Update of the State Water Plan*, Texas Water Development Board, 1996.

counties, where there are major urban centers. Land use maps for each of the counties within the 6217 Management Area can be found in Attachment 1; Attachment 2 contains the land use maps for counties within the entire coastal watershed.

### **2.3.3 Impaired Coastal Water Body Segments**

Texas consists of 15 major river basins, eight coastal basins, nine estuarine systems, and the Gulf of Mexico (see Figure 2.2, Major Surface Water Basins of Texas). Eight coastal basins and eight river basins flow into Texas coastal bays and estuaries. The TNRCC carries out a regular program of monitoring and assessment that helps determine which water bodies in the state are meeting the standards set for their uses and which water bodies are impaired. Along with the narrative and numerical criteria established under the Texas Surface Water Quality Standards, data from the TNRCC monitoring program, as well as data from other federal, state, regional, and local agencies, form the basis for this assessment. The results of this monitoring and assessment effort are published in the *State of Texas Water Quality Inventory*, the Clean Water Act (CWA) Section 305(b) report. The 305(b) report and other available data and information on water quality are then used to produce the *State of Texas List of Impaired Water Bodies*, the CWA Section 303(d) list. This list identifies

1. water bodies that do not meet the standards set for their use, or that are not expected to meet standards in the near future;
2. the pollutants responsible for the failure of a water body to meet standards; and
3. the priority ranking of listed water bodies for cleanup activities; i.e., for establishing a total maximum daily load (TMDL) for those water bodies where such a calculation is suitable.

The CWA requires each state to review and if appropriate revise its 303(d) list at least every two years. The most recent 303(d) list, which was published in June of 1998, identifies the state's impaired water bodies. In addition, for coastal waters, the TNRCC water quality staff identified possible sources of pollution and determined the magnitude of the contribution from each source. In their review of the data, staff determined the types of impairments (bacteria, metals, etc.) and the general sources of impairment (point source, nonpoint source, or both). If NPS pollution was identified, then a specific nonpoint source category (urban, agriculture, industrial, unknown) was determined whenever possible.

Seventy-one coastal water body segments are listed on the State of Texas 1998 303(d) list as not supporting or as partially supporting their designated water uses, with NPS pollution contributing to the impairment of 60 of these listed segments. Major NPS pollutants in coastal waters include: bacteria, oxygen-demanding substances, toxic chemicals, and metals.<sup>6</sup>

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<sup>6</sup>State of Texas 1998 Clean Water Act Section 303(d) List and Schedule for Development of Total Maximum Daily

For approximately 80 percent of the impaired coastal water bodies, it is not known which nonpoint sources contribute to the impairment. The State of Texas anticipates that these nonpoint sources will be identified as more monitoring and assessment activities occur in individual water bodies and as selected water bodies are targeted for development of TMDLs. Table 2.2 shows the number of impaired coastal water bodies by causes and sources of impairment. Each of the impaired coastal water bodies is described in Attachment 3 and accompanied by maps depicting the coastal and river basins that flow into Texas coastal bays and estuaries.

**Table 2.1: Coastal County Populations**

<b>Counties Located in the Coastal Management Program Boundary</b>			<b>Counties in Coastal Watersheds Outside of the Coastal Management Program Boundary</b>				
	<b>1990</b>	<b>2020</b>		<b>1990</b>	<b>2020</b>		
Aransas	17,892	32,576	Austin	19,832	28,698	Angelina	N/P
Brazoria	191,707	303,383	Bee	25,135	34,386	Fayette	N/P
Calhoun	19,053	26,027	Brooks	8,204	10,239	Goliad	N/P
Cameron	260,120	473,775	Colorado *	18,383	22,221	Gonzales	N/P
Chambers	20,088	40,005	De Witt *	18,840	22,367	Grimes	N/P
Galveston	217,399	335,000	Duval *	12,918	17,647	Karnes	N/P
Harris	2,818,199	4,315,000	Fort Bend	225,421	545,413	McMullen	N/P
Jackson	13,039	15,040	Hardin *	41,320	58,387	San Jacinto	N/P
Jefferson	239,397	277,369	Hidalgo	383,545	858,591	Starr	N/P
Kenedy	460	504	Jasper *	31,102	36,754	Tyler	N/P
Kleberg	30,274	46,262	Jim Hogg *	5,109	8,717	Washington	N/P
Matagorda	36,928	51,008	Jim Wells	37,679	45,733	Webb	N/P
Nueces	291,145	422,288	Lavaca	18,690	22,193		
Orange	80,509	101,613	Liberty *	45,602	63,735		
Refugio	7,976	9,110	Live Oak *	9,556	10,954		
San Patricio	58,749	89,780	Montgomery *	154,591	357,118		
Victoria	74,361	96,977	Newton *	13,569	15,186		
Willacy	17,705	24,630	Waller	23,390	44,071		
			Wharton	39,955	49,845		
<b>TOTAL</b>	<b>4,304,925</b>	<b>6,540,760</b>	<b>TOTAL</b>	<b>1,132,841</b>	<b>2,252,255</b>		

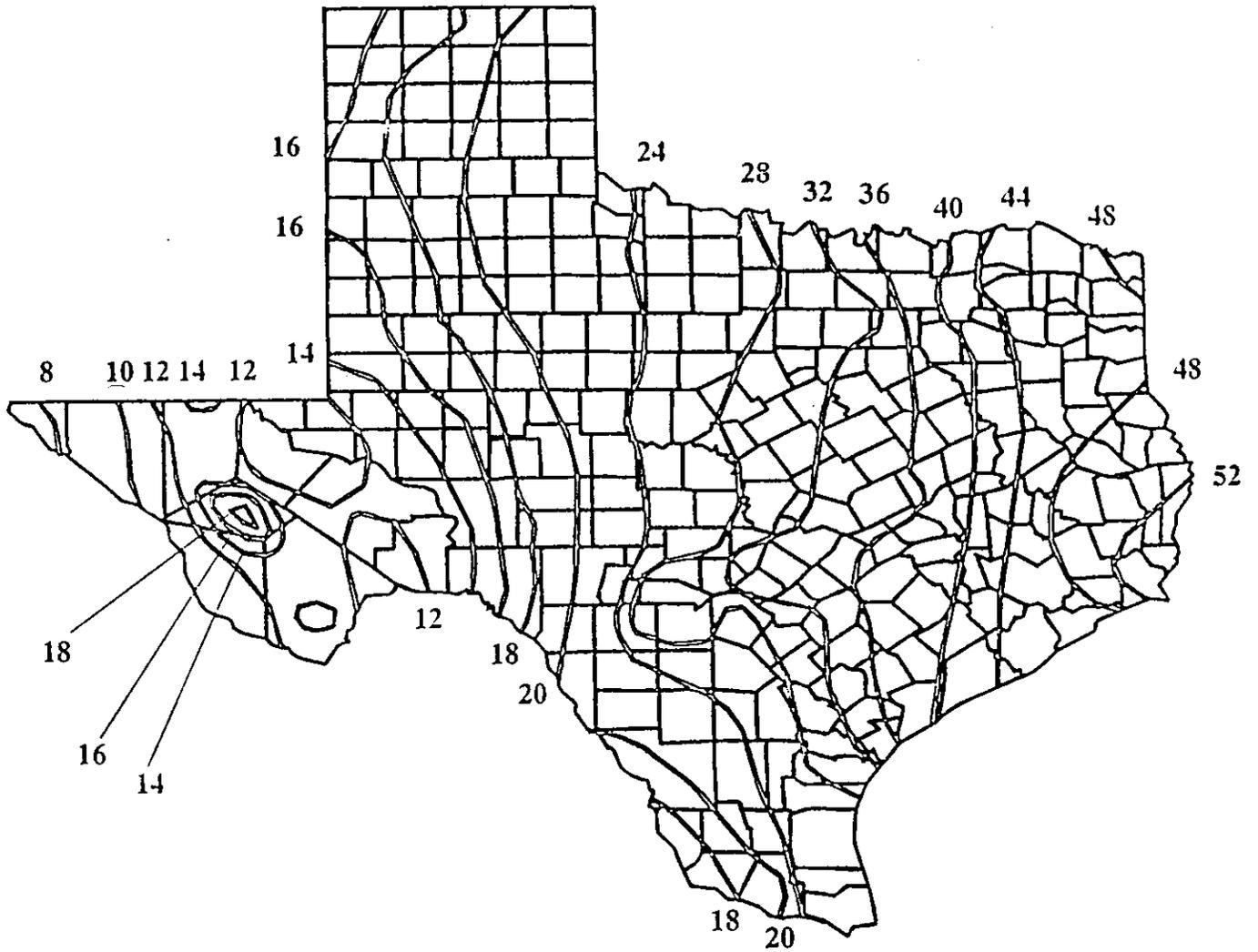
Population Estimates Based on Most Likely Projection Scenario  
 \* = Counties that are partially in Coastal Watersheds Boundary  
 N/P = No Town or City Populations Located in these Counties

*SOURCE: Water for Texas - Today and Tomorrow:  
 Legislative Summary of the 1996 Consensus-based  
 Update of the State Water Plan*

**Table 2.2: Summary of Impaired Water Body Segments in Coastal Waters**

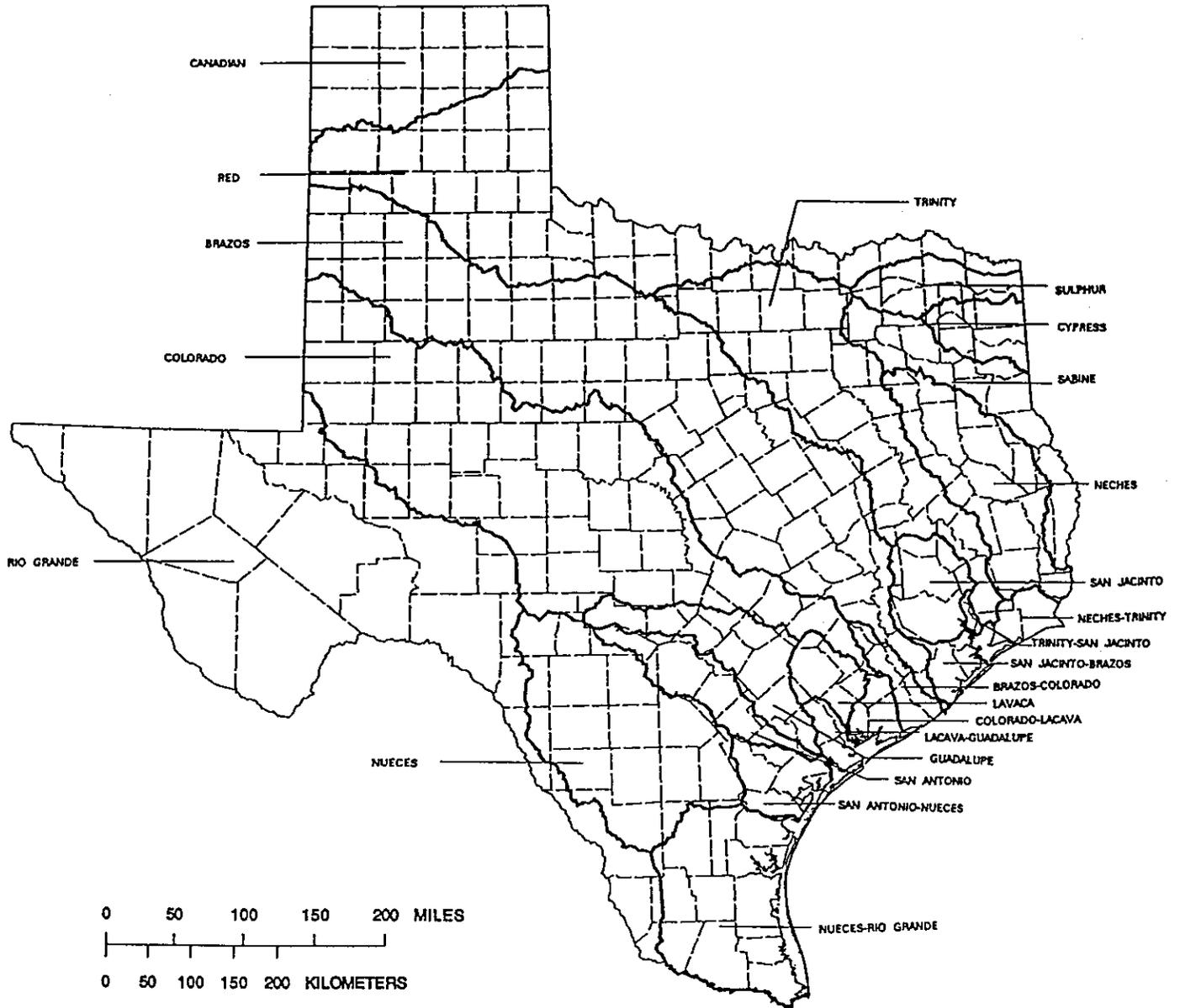
<b>Sources of Impairment</b>	<b>Number of Impaired Segments by Source</b>	<b>Percentage of Impaired Segments</b>
Point Sources	7	10%
Nonpoint Sources (NPS)	30	42%
Both Point & Nonpoint Source *	30	42%
Unknown/Natural Sources	4	6%
<b>Total Impaired Segments</b>	<b>71</b>	<b>100.00%</b>
<b>Causes of Segment Impairments</b>	<b>Number of Impaired Segments by Cause **</b>	<b>Percentage of Segment Impairment</b>
Bacteria	41	58%
Dissolved Oxygen	14	20%
Metals	15	21%
Toxic Chemicals	14	20%
Total Dissolved Solids/Other	1	1%
<b>Categories of Nonpoint Source Impairment</b>	<b>Number of NPS Impaired Segments by Category</b>	<b>Percentage of NPS Impairment</b>
Urban ***	15	25%
Agriculture	2	3%
Unknown ***	48	80%
<b>NOTES:</b>		
* Both point and nonpoint sources contribute to designated use impairment.		
** In several segments there are multiple causes of impairment; these are noted individually.		
*** In several segments both unknown and urban nonpoint sources are causing impairments; these are noted individually.		
Source: State of Texas, 1998 303(d) List		

**Figure 2.1: Mean Annual Total Precipitation (inches) in Texas**



Adapted from Griffiths and Orton (1968)

**Figure 2.2: Major Surface Water Basins of Texas**



**EXPLANATION**

- BASIN BOUNDARY
- - - COUNTY BOUNDARY

## Chapter 3. Coastal Nonpoint Source Boundary Determination

Section 6217 of CZARA requires states to establish coastal nonpoint programs that control sources of nonpoint pollution that impact or threaten to impact coastal waters. As part of its responsibilities under §6217(e) of CZARA, NOAA reviewed existing state coastal zone boundaries to determine “whether the boundary extends inland to the extent necessary to control the land and water uses that have a significant impact on coastal waters.” In consultation with EPA, NOAA recommended that every state, including Texas, establish a §6217 management area that includes all coastal watersheds, as defined by U.S. Geological Survey Cataloging Units, adjacent to the coast and extending inland along estuaries to include Cataloging Units that encompass the head of tide. However, NOAA and EPA recognize the limitations of the data that was used in making boundary determinations. NOAA and EPA consider the “burden of proof” to be with the federal agencies and, therefore, will generally defer to the state on delineation of its §6217 management area.

The §6217 management area recommended by NOAA and EPA encompasses all lands draining into coastal areas including rural upland areas. Based on a review of population densities and land uses, the state’s coastal zone management agency (GLO) and water quality agencies (TNRCC and TSSWCB) do not anticipate or expect the rural upland areas to have a significant impact on coastal waters. Therefore, Texas proposes to use the existing coastal zone boundary as the boundary of its §6217 Management Area. A review of Texas’ environmental programs, land uses, population, and water quality data led to the finding that the existing coastal zone boundary encompasses those activities and land uses that have the greatest potential to significantly impact coastal resources through nonpoint source pollution.

The existing coastal zone boundary and proposed §6217 Management Area are based on the Oil Spill Prevention and Response Act (OSPRA) line. The OSPRA line provides a sound basis for the §6217 Management Area because it was drawn to delineate inland areas that might generate water pollution threats to coastal waters. Specifically, it encompasses inland areas in which pollution to tidal waters might be threatened if an oil spill occurs. However, it is important to note that the coastal zone boundary extends even farther inland than the OSPRA line because it includes several “wetlands buffer zones.” These zones extend farther inland than the OSPRA line in certain wetlands.

State Coastal Nonpoint Program development, implementation, and evaluation efforts will focus on land and water uses in the proposed §6217 Management Area. However, most of the existing state programs that implement the management measures already apply statewide. These programs are presently assessing, on an ongoing basis, the existing and future land and water uses and their impacts on coastal waters. If, during the course of implementing these programs, it is found that activities within coastal watersheds but outside of the proposed §6217 Management Area are significantly impacting coastal waters, these programs will address these activities. The scope of Texas’ existing programs extends to sources inland of the proposed §6217 Management Area. When, on a case-by-case basis, these existing programs identify and address inland sources, Texas’ §6217 Management Area will consequently extend inland to the same extent.

Examples of such programs include

- On-site septic system program
- §401 wetlands certification and educational program
- Technical assistance and pollution prevention activities
- Water quality monitoring, development and implementation of Total Maximum Daily Loads (TMDLs)
- Texas Pollutant Discharge Elimination System (TPDES), including the storm water permitting program
- Texas Water Code §§26.177 and 26.121 which provide authority to address urban nonpoint sources of pollution for cities not covered under the TPDES storm water program
- Senate Bill 503 agricultural/forestry nonpoint source control programs with targeted cost-share funding for agricultural producers in the CMP boundary
- The Galveston and Corpus Christi Estuary Programs

The Coastal Coordination Council and its staff, as administrators of the Coastal Nonpoint Program, will coordinate with these programs to disseminate information on the Coastal Nonpoint Program and work cooperatively with the programs to identify appropriate management measures where inland nonpoint sources of pollution are determined to be significantly impacting coastal waters.

A base map of the Texas coastal region can be found in Figure 3.1. Overlays showing the existing coastal zone boundary, the management areas of existing programs, and the entire coastal watershed (NOAA/EPA recommended boundary) are also provided.

*Figure 3.1: Geographic Scope - §6217 Management Area*



## Chapter 4. Implementation and Coordination

### 4.1 General Approach: Coordinating Existing State Programs to Implement the Coastal Nonpoint Pollution Control Program

Section 6217(a)(2) of CZARA requires state coastal nonpoint programs to be “closely coordinated” with other federal and state nonpoint source programs. EPA and NOAA’s *Program Development and Approval Guidance* for Coastal Nonpoint Pollution Control Programs emphasizes that, “[s]tates should develop their coastal nonpoint source programs to complement and strengthen existing coastal management and nonpoint source authorities, while minimizing unnecessary duplication or conflicts at the Federal, state, or local levels.” Following this Guidance, Texas proposes to implement its Coastal Nonpoint Pollution Control Program through several broader programs which address nonpoint source pollution and water quality throughout the state, including

- Texas’ Watershed Management Approach (including the TMDL process and development of Watershed Action Plans),
- Section 319 Nonpoint Source Program,
- SB 503 Water Quality Management Plan Program (Texas Agricultural Code §201.026),
- TPDES/NPDES Program,
- Section 401 Water Quality Certification, and
- Water Pollution Control and Abatement Program under Texas Water Code §26.177

These programs encompass all categories of nonpoint source pollution listed in the federal guidance for the development of coastal nonpoint pollution control programs. Many of the programs listed above rely on voluntary measures for implementation of best management practices and reduction of nonpoint source pollution. However, if initial voluntary measures do not work, then backup enforcement authorities are employed. Together, these programs have pollution control measures that are equal to *or more stringent than* the §6217(g) measures. In addition to working within the programs listed above, the Texas Coastal Nonpoint Pollution Control Program will coordinate with numerous other programs, such as the Galveston Bay Estuary Program and the Coastal Bend Bays and Estuaries Program, to ensure wide participation and input into the Coastal Nonpoint Program. Agency and program roles and interagency coordination are discussed further in Section 4.7.

Each of the primary programs that will be used to implement the Texas Coastal Nonpoint Pollution Control Program is listed in Table 4.1 and described below.

### ***4.1.1 Texas' Watershed Management Approach***

The TNRCC has established a framework for coordinating and implementing existing water quality programs through a watershed-based approach. Watershed management is not a new regulatory program, but rather a way to coordinate the operations of existing water resource programs to better achieve water resource management goals.

Watershed management is a resource-centered approach involving several steps to achieve the overall goal of maintaining, protecting, and, where necessary, restoring the quality of water resources in the state. It is an organizing principle based on the premise that water resource management can best be addressed through integrated efforts within a hydrologically defined area. Water resource management decisions depend upon an understanding of the functional relationships existing within the hydrologic system. Watershed management facilitates the coordination of water resource management programs of federal, state, and local entities in working toward common goals and objectives. The holistic nature of the watershed management approach helps identify the most cost-effective solutions to water resource management issues and fosters a greater degree of accountability for addressing water resource impairments.

The initial focus of the TNRCC Watershed Management Approach is on coordinating and integrating watershed assessment, monitoring, modeling, toxicity evaluation, nonpoint source pollution, ecosystem research, water quality standards, and wastewater permitting. Within Texas' §6217 Management Area, this process will be the vehicle for implementing (g) measures or determining and implementing equally effective alternative management measures in conformity with the §6217 requirements.

Understanding the relationships between land and water within a watershed often requires the collection of representative data from the watershed through targeted monitoring programs. Accurate watershed assessments are needed to characterize physical, chemical, hydrological, and biological conditions of water bodies, to identify sources and causes of water resource degradation, and, ultimately, to evaluate the effectiveness of various water resource management actions. The culmination of watershed-based monitoring and assessment programs is the development and implementation of water resource management actions that address local water resource priorities. Watershed management actions consist of coordinating existing regulatory and nonregulatory programs of the TNRCC and other management organizations in a more interdependent manner. The success of the watershed management approach is measured in terms of improving and maintaining environmental quality and protecting public health. Implementation of the watershed management approach fosters the protection and restoration of specific water uses such as drinking water supply, aquatic life habitat and propagation, recreation, and irrigation.

One of the TNRCC's guiding principles is ensuring meaningful public participation in the agency's decision-making process. The watershed management approach enables citizens and businesses to collaborate and participate with government by coordinating programs and services that lead to the desired environmental results. The watershed management approach also establishes a more consistent process for coordination between the TNRCC and stakeholders. A primary tenet of the

watershed management process is to rely on existing mechanisms and forums to achieve the public participation necessary to establish support for the implementation of pollution management strategies at the local level. Public participation efforts under the Watershed Management Approach and the overall Coastal Nonpoint Pollution Control Program are discussed further in Chapter 8, Public Participation.

### **Geographic Units for the Watershed Management Approach**

The watershed management approach provides a framework and method for coordinating, developing, and implementing water quality management programs throughout the state. In order to implement the watershed management approach in an orderly manner, the state's 15 river basins and eight coastal basins, along with its estuaries and extraterritorial waters of the Gulf of Mexico, have been assembled into five geographic basin groups (see Figure 4.1, TNRCC Permit-by-Basin Approach to Wastewater Permitting). As shown in Figure 4.1, all of the coastal watersheds within the NOAA/EPA recommended §6217 Management Area are included within one of TNRCC's five geographic basin groups. Key water quality activities such as monitoring, assessment, data management, permitting, and reporting will be coordinated on a basinwide scale. These basins will be subdivided into smaller geographic units, or watersheds, to be used for more focused data collection, analysis, management strategy development, and implementation activities. This water basin and watershed approach encompasses the entire land area (or watershed) that drains into a water body and is not merely limited to a stream, its bed, and its banks. Assessment activities are conducted on both classified and unclassified waters of the state. When water quality problems or impairments are identified, those waters are placed on the state's §303(d) list.

### **Basin Management Cycle**

Just as the state's river basins and watersheds provide geographic focus for coordination, the basin management cycle provides the focus for scheduling activities and coordinating resources within each watershed. Each basin group has been placed in a statewide basin management schedule that establishes a calendar and sequence for conducting key watershed management activities. These watershed management activities include coordinating public outreach, surface water quality monitoring, modeling, assessment, standard setting, nonpoint source management projects, and permit activities. In addition, the basin management schedule sets specific time frames for developing Total Maximum Daily Loads (TMDLs) and implementing watershed action plans. The basin cycle of the watershed management approach is the mechanism whereby the TNRCC will continuously identify water quality problems within the various river basins in the state, establish statewide and local water quality priorities, develop community-based solutions to be implemented at both the statewide and local levels, and collaborate with local interest groups.

The basin management cycle has five sequenced activity phases that are repeated for each basin at fixed five-year intervals to ensure that management goals, priorities, and implementation strategies are routinely updated and progressively implemented. Therefore, planning and implementation are not one-time activities. The repeating management cycle reflects the TNRCC's understanding that the nature of watershed management is dynamic, and a framework must be flexible enough to address this dynamic nature in an orderly manner over time.

Each basin group will begin a cluster of actions at five-year intervals; statewide, a different basin will be initiating TMDLs in each year of the five-year cycle. Management strategies initially will be developed during the fourth year of the first cycle and implemented beginning in the fifth year of the first cycle. It is anticipated that the development of the 5-year implementation plan for this Coastal Nonpoint Program will be closely coordinated with the five-year basin management cycle.

Each of the major activities which will take place within each basin during the five-year intervals is described below.

**Phase One: Scoping and Reevaluation.** This phase involves three basic activities: conducting public outreach, identifying priority watershed<sup>1</sup> issues, and planning for coordinated data collection. The TNRCC will work with the State Soil and Water Conservation Board and local partners to ensure that the broadest audience is reached through scheduled outreach efforts. To achieve this goal, the TNRCC will solicit input and participation, provide educational materials, and make presentations in the appropriate basins. Special emphasis will be placed on outreach aimed at priority watersheds containing segments listed on the §303(d) list. The TNRCC will also review existing data and identify the need for additional data to support planning for targeted monitoring. The TNRCC will work with local stakeholders to prioritize problems on the §303(d) list based on available scientific data, local concerns and support, and basinwide goals and objectives. In subsequent iterations of the cycle, planning may involve reevaluating previously identified issues and goals to determine their relevance in light of new information.

**Phase Two: Data Collection.** Watershed-based data are collected by responsible parties (such as private, local, regional, state, and federal organizations) during this phase. Efforts are guided by quality assurance project plans. Monitoring plans incorporate three major components:

1. Baseline monitoring. Baseline monitoring is conducted on every important water body in each basin. This is the traditional monitoring performed continually at key sites on high-profile water bodies regardless of the basin cycle. Data are collected using a monitoring network to adequately characterize water quality trends and monitor progress in protecting or restoring water quality.
2. Status monitoring. Status monitoring is conducted on every important water body in each basin. An intense two-year period of status monitoring commences in phase one of the five-year basin management cycle and ends at the beginning of Year 3. This is the effort necessary to collect data on undesignated water bodies as well as more extensive status and trend analyses of those classified segments not on the §303(d) list. These data are critical for determining compliance with water quality standards and will be used primarily to revise interim updates of the CWA §305(b) Water Quality Inventory Report.

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<sup>1</sup>All water bodies which have been designated as impaired water bodies and placed on the state §303(d) list are considered “priority” water bodies. Priority water bodies are further categorized as “high priority,” “medium priority,” “low priority,” or “threatened.” Water quality impairments in priority water bodies are addressed on a sub-watershed basis.

3. **Targeted monitoring.** Targeted monitoring focuses on those water bodies identified on the CWA §303(d) list. This monitoring will establish the geographic extent and degree of water quality impairment necessary to apply models for establishing TMDLs, determine sources of contamination to revise water quality standards, and support specific wastewater permit limits.

**Phase Three: Assessment and Targeting.** During this phase, quantitative and qualitative analyses are performed on baseline, status, and targeted watershed data by developing and applying tools such as GIS, statistical analysis methods, contaminant fate and transport models, and forecasting models. Information gathered during phases one and two for priority watersheds is analyzed to determine appropriateness of water quality standards and to establish load allocations for point and nonpoint sources of pollution. Additional issues identified during assessment are the basis for subsequent assessment reports and revisions to the CWA §303(d) list.

**Phase Four: Strategy Development.** In this phase, the TNRCC, the State Soil and Water Conservation Board, and technical experts from partner agencies will work with basin stakeholders to identify, evaluate, and select management strategies that will be effective in achieving pollutant reduction goals for priority watersheds. Focusing on the priority watersheds identified in Phase One, the state will work with stakeholders to develop strategies that target management activities and financial resources when and where they will have the greatest environmental benefit. Sound science and stakeholder consensus will be emphasized to establish cost-effective solutions that have strong support. Action plans will be communicated to a broad public audience and fine-tuned as necessary to strengthen public support.

**Phase Five: Implementation.** During this phase, the TNRCC, the State Soil and Water Conservation Board, and other stakeholders will carry out action plan activities. For example, TNRCC actions include reclassifying uses for misclassified streams, classifying unclassified streams, revising stream standards, implementing wastewater pretreatment programs, issuing wastewater permits, or implementing water quality control measures in accordance with a watershed action plan. Within the §6217 Management Area, water quality control measures will be based on (g) measures or alternatives that are equally effective in protecting water quality. Public outreach will be conducted to inform stakeholders of the progress of activities and the achievement of goals. Upon completion of the implementation phase in any given basin, the cycle will begin again with Phase One to maintain the continuous planning process.

#### ***4.1.2 TMDLs and Watershed Action Plans***

A core component of the watershed management approach is the development of Total Maximum Daily Loads (TMDLs). Under the federal Clean Water Act §303(d), the TNRCC is required to estimate load allocations for point and nonpoint source pollutants in water bodies that do not meet their designated use. TMDLs are detailed technical water quality assessments which determine the maximum amount of pollutants a water body can assimilate and still meet its water quality standards for its designated uses (e.g., aquatic life, recreation, water supply) as established by the state. The

TMDL establishes the allowable constituent loadings to a water body from both point and nonpoint sources of pollution and provides the basis for establishing water-quality-based control programs.

A TMDL addresses a defined problem or concern within a particular geographic area and must consider all known sources of pollutant loadings within the affected watershed or drainage area, including permitted point source discharges and regulated and unregulated nonpoint sources of pollution. Allowances are made for background constituent levels and loadings from natural sources. A margin of safety must also be included to account for uncertainty. Acceptable constituent loadings for the watershed are determined through technical analysis. The allowable load is allocated among the various sources in the watershed (point, nonpoint, and background sources) while maintaining an appropriate margin of safety. A document detailing data collection and analytical methods, technical analysis, load allocation, and implementation strategies for a particular water body must be submitted by the TNRCC to EPA for review and approval.

A TMDL, however, is not merely a load allocation number obtained through a water quality modeling exercise. Instead, a TMDL is the process that will culminate in a written, quantitative assessment of water quality problems and contributing sources, and an implementation plan (watershed action plan) identifying responsible parties and specifying actions needed to restore and protect water quality.

Watershed action plans specify the actions to be taken to address the individual pollutants and use impairments identified for each water body on the §303(d) list. Within the §6217 Management Area, Coastal Management Program (CMP) staff will review watershed action plans to ensure that the management actions include the (g) measures and/or alternative management measures that are equally effective in protecting water quality. Each watershed action plan also will include a schedule for the implementation of management measures, provisions for monitoring to determine the effectiveness of the management measures, and provisions for corrective actions if it is determined that the management measures are not successful in achieving and maintaining applicable water quality standards. For agricultural and silvicultural sources, the TSSWCB will ensure that watershed action plans include the (g) measures or alternatives that are as effective in protecting water quality.

This will be achieved through the development, certification, and implementation of Water Quality Management Plans (WQMPs) as part of the TMDL process. WQMPs follow U.S. Department of Agriculture Natural Resources Conservation Service Field Office Technical Guide criteria for BMPs which are in conformity with the (g) measures guidance. WQMPs are used for site-specific reduction of nonpoint source pollution and other water quality problems.

EPA guidance specifies that a watershed action plan should include seven key components. These seven components and their relationship to the Coastal Nonpoint Pollution Control Program are described below.

1. **A description of control actions anticipated to achieve the TMDL.** The description contained in each TMDL varies depending upon the complexity of the problem and control actions. For point sources, the plan should include a list of the NPDES permits whose discharge impacts water quality in the water body of interest and a description of how wasteload limitations can be achieved in existing permits. For nonpoint sources, the plan

should describe what actions are to be implemented, who is responsible, when actions will be taken, and where actions will be implemented. For watersheds within the §6217 Management Area, this section of the watershed action plan will include (g) measures listed in the Texas Coastal Nonpoint Pollution Control Program or alternatives that are equally effective in protecting water quality.

2. **A schedule for implementing specific actions deemed necessary to achieve the TMDL.**  
This schedule addresses source activities as well as activities, such as certain follow-up monitoring or evaluation activities, expected from EPA, the state, regional, and local agencies, and interest groups. The schedule will include a time line for revising necessary NPDES permits, a schedule for implementing nonpoint source management measures, an indication of when the milestones for control actions should be met, and the time line for control action implementation. For watersheds within the §6217 Management Area, the schedule for implementing nonpoint source management measures will be coordinated with the statewide schedule for developing TMDLs, the 15-year Coastal Nonpoint Pollution Control Program Strategy, and any intermediate 5-year Coastal Nonpoint Implementation Plans.
3. **The legal authorities under which the control actions will be carried out and whether those actions are enforceable.** All §6217(g) measures found in the Coastal Nonpoint Pollution Control Program are backed by existing state enforcement authorities. These enforcement authorities would come into play for any watershed action plans incorporating §6217(g) measures.
4. **Reasonable assurances that nonenforceable actions for certain nonpoint source activities will result in the load allocations for nonpoint sources required by the TMDL.** Reasonable assurances can include the availability of funds to implement controls for point and nonpoint sources, assurance that backup enforcement authorities exist if initial voluntary measures are insufficient to implement BMPs, an analysis of the anticipated effectiveness of controls, and an evaluation of the experience/record of the success of existing programs calling for similar controls in the watershed or a similar watershed. All §6217(g) measures found in the Coastal Nonpoint Pollution Control Program are backed by existing state enforcement authorities.
5. **A monitoring plan designed to determine the effectiveness of the implementing actions.** This should include a plan for assessing the improvement in ambient water quality conditions, a plan for assessing whether control actions are being implemented as planned, and a plan for assessing the effectiveness of control actions. The monitoring plan should indicate who is responsible for the monitoring activities and the funding available. In the §6217 Management Area, monitoring plans for watershed action plans will be used to monitor the effectiveness of the management measures and determine where additional management measures may be needed.

6. **Measurable milestones for determining whether the implementation plan is being properly executed and for determining whether applicable water quality standards are being achieved.** These would include appropriate incremental, numeric ambient water quality targets to ensure that progress is being made and milestones for implementing control actions. Milestones should be adequate to demonstrate adherence to the implementation plan and improvements in water quality. For watersheds within the §6217 Management Area, the milestones for implementing nonpoint source management measures will be coordinated with the 15-year Coastal Nonpoint Pollution Control Program Strategy and any intermediate 5-year Coastal Nonpoint Implementation Plans.
7. **The ramifications of failing to meet these milestones.** The ramifications depend on why the milestones are not being achieved and the degree to which the milestones were not met. The ramifications will explain the TMDL corrective mechanism, including how and when it is appropriate to take corrective actions that can be taken without "reopening" the TMDL, and, as a last resort, when the TMDL (and/or implementation plan component) will need to be modified.

To prevent duplication of effort between the Watershed Management Approach and the Coastal Nonpoint Pollution Control Program within the §6217 Management Area, watershed action plans will be utilized to meet the requirements found in the statute and federal guidance for implementation of applicable (g) measures for the watershed. Coastal Management Program staff will review watershed action plans within the §6217 Management Area to ensure conformity with the §6217 (g) measures. It is anticipated that primarily Urban and Agricultural nonpoint source (g) measures will be implemented through the TMDL process.

### **TMDL Priorities and Scheduling**

The TNRCC developed criteria for establishing priorities for TMDL development (see Attachment 4, Guidance for Assigning Priority for TMDL Development). While designated uses and severity of pollution were the basis for structuring the criteria, it should be noted that the prioritization methodology was not an attempt to determine the economic or aesthetic value of a water body or the value of its designated use. The priority ranking criteria are meant to include elements of risk assessment (that is, place higher priority on more severe water quality problems) and allow for programmatic needs (that is, distinguish between situations that are known to require immediate TMDL development and those where more information is required to verify that impairments exist).

The TNRCC intends to further delineate watersheds and subwatersheds statewide as needed to define and determine water quality issues. The delineation of watersheds will also provide a geographic reference for water bodies on the list that are more detailed than the current designated segment numbers. Where possible, impairments will be addressed at the subwatershed level unless evidence shows that constituents from other subwatersheds contribute to the impairment of the targeted water body. In general, TMDL analyses and activities will be designed to include all subwatersheds necessary to adequately define or address the issues at hand, but will be limited to those subwatersheds where a TMDL is truly needed and appropriate. That scope may sometimes require

that predefined subwatersheds be even further subdivided to address very localized issues. As the subwatershed delineation proceeds, a scheme for numbering or identifying the subwatersheds will be developed and implemented. The delineation of watersheds and subwatersheds throughout the state is evolving through the Watershed Planner, a tool that will greatly enhance Texas' ability to target water quality impairments at the scale necessary to address nonpoint source pollution.

As a general rule, when completing TMDLs, the TNRCC will address impaired water bodies with the highest priority assignments first, within the constraints of the basin management cycle. If there are no water bodies listed with a high priority within a basin, then TMDL activities will focus on those listed as medium, then on those listed as low, and finally on those listed as threatened. This prioritization is not absolute and can be changed with significant stakeholder information to support the need to target a threatened segment first. The process for prioritizing and targeting water bodies is discussed further in Attachment 4. Attachment 5 provides a schematic showing where and when each water body on the 1998 CWA §303(d) list will be targeted for action over the next 11 years.

As shown in Attachment 5, the TMDL process has begun in Basin Group C (including the Neches-Trinity Coastal Basin, Trinity-San Jacinto Coastal Basin, San Jacinto River Basin, and San Jacinto-Brazos Coastal Basin) and Basin Group D (including the Brazos River Basin, Brazos-Colorado Coastal Basin, Colorado River Basin, and Lavaca River Basin). Current TMDL activities are described below.

### **TMDLs and Water Quality Management Initiatives Currently Underway**

TMDLs and other water quality management initiatives that address pollutants of concern are currently underway in many of the water bodies on the 1998 §303(d) list.

To date, the TNRCC has submitted a total of eight TMDLs to the EPA for technical review in the form of five separate reports within about the last five years. None of these eight has received final EPA approval. The TMDLs which have been submitted for review include Cypress Creek, Segment 1009, and multiple segments of the Houston Ship Channel System (for nickel and six other dissolved metals). These TMDLs are described below with the other TMDLs and water quality management initiatives currently underway.

#### TMDLs Within the §6217 Management Area

**Houston Ship Channel System, multiple segments.** Two drafts of a TMDL for dissolved nickel have been submitted. The EPA approved the first draft, but it was unacceptable to area stakeholders. The EPA did not approve the second draft, but the objections are minor and resolvable. A third draft is being prepared and should be submitted for EPA review after receipt of stakeholder comment and TNRCC management review. After EPA approval, a public hearing will be conducted in conjunction with the hearing on the Cypress Creek TMDL.

**Houston Ship Channel System, multiple segments (same as those for nickel).** TMDLs for six other dissolved metals (zinc, copper, lead, arsenic, mercury, and silver) were submitted in three separate reports for EPA review and were approved. However, the TMDLs were opposed by stakeholders and have been delayed. The process currently underway to resolve issues related to the

nickel TMDLs will be used to reach agreement on the TMDLs for these other metals. However, recent sampling and assessment for the 1998 §303(d) list suggest that problems from these metals may not actually exist, and significant revision or elimination of some of these TMDLs may be needed.

**Armand Bayou, Segment 1113.** Development of a TMDL for dissolved oxygen is in the initial stages. TNRCC staff have developed a water quality model of the bayou system and are developing a geographic information system model of the watershed using techniques similar to those used in the nearby Dickinson Bayou watershed. Additional field studies have been performed to gather hydraulic characterization data for Armand Bayou and its tributaries. Stakeholder meetings have been held in the watershed to introduce project plans and begin involving local interests in planning further developments. A watershed study may be financed by the General Land Office to better assess water and biological community quality in the watershed, and to determine the appropriate standards for undesignated tributaries or tidal fringes.

**Arroyo Colorado Tidal, Segment 2201.** Dissolved oxygen concentrations are sometimes lower than the standard established to assure optimum habitat conditions for aquatic life. Comments received from the Texas Parks and Wildlife Department suggest that depressed dissolved oxygen impairs aquatic life in the upper 16 miles of the segment and point out that the segment provides important habitat for many economically, ecologically, and recreationally valuable species. A TMDL project to address these issues was begun by the TNRCC and TSSWCB in FY 1997.

Chemical, hydrologic, and spatial data are being acquired and compiled for the water quality modeling effort associated with this project. Analysis of existing data is currently underway. Coordination of stakeholder and public participation for the project is also progressing. The first meetings of the Stakeholder Committee and the Science and Technical Advisory Committee took place in June of 1998.

**Arroyo Colorado, Segment 2202.** The Texas Department of Health issued a restricted consumption advisory for the general population in September 1980 due to elevated levels of chlordane, toxaphene, and DDE in fish tissue. The advisory, which applies to the entire segment, recommends that consumption be limited to one meal per month for any type of fish. A TMDL project to address these issues was begun by the TNRCC and TSSWCB in FY 1997.

**Dickinson Bayou, Segments 1103 and 1104.** The TNRCC is developing a method that employs geographic information system software in conjunction with water quality models to perform TMDLs, using the Dickinson Bayou watershed as the test case. After the method is developed adequately, and usable, recent data on watershed land use are available, a TMDL for dissolved oxygen will be developed for Dickinson Bayou. This TMDL is being conducted in the §6217 Management Area and coastal watersheds.

#### TMDLs Within Coastal Watersheds

**Greens Bayou Above Tidal, Segment 1016.** A TMDL for dissolved oxygen is being developed. A model to analyze point source impacts has been calibrated, and preliminary estimates of nonpoint source loads have been developed with a simple spreadsheet model. Representatives of the City of Houston have proposed performing a study in the watershed to characterize nonpoint source loading and effects, and the TNRCC is awaiting specifics on the proposed study.

**Cypress Creek, Segment 1009.** A draft of this TMDL for dissolved oxygen was sent to EPA for technical review and was approved. The TNRCC is planning to conduct a public hearing for this TMDL within the next six months in conjunction with a public hearing for another TMDL in the Houston Ship Channel (described previously). The TNRCC is using the Cypress Creek TMDL model in the review of new wastewater permits.

#### Additional TMDLs Underway Throughout the State

**Lake O' the Pines, Segment 403.** Concentrations of dissolved zinc in water occasionally exceed the criterion established to protect aquatic life in approximately one-half of the reservoir extending upstream from the dam. A TMDL project to address this issue began in FY 1998 under contract with the Northeast Texas Municipal Water District.

**Big Cypress Creek, Segment 404.** A consumption advisory was issued by the Texas Department of Health in May 1992 for Welsh Reservoir in Titus County due to elevated levels of selenium in fish tissue. All fish species tested have shown elevated selenium levels. Historical data suggest that depressed dissolved oxygen levels may be an intermittent but chronic problem in local waters and are of concern to regional interests. A TMDL project to address these issues began in FY 1998 under contract with the Northeast Texas Municipal Water District.

**Trinity River, Segment 804.** Mean dissolved cadmium and lead concentrations in water exceed the criteria established to protect aquatic life from chronic exposure, through a 25-mile portion centering on State Highway 7. A TMDL project to address this issue is scheduled to begin in FY 1999 under contract with the Trinity River Authority.

**Elm Fork Trinity River, Segment 822.** Through the upper 15 miles, dissolved oxygen concentrations are occasionally lower than the standard established to assure optimum habitat conditions for aquatic life. The average lead concentration in water exceeds the human health criterion for freshwater fish. The mean dissolved lead concentration in water exceeds the criterion established to protect aquatic life from chronic exposure. A TMDL project to address these issues is scheduled to begin in FY 1999 under contract with the Trinity River Authority.

**North Bosque River, Segment 1226.** Nitrite plus nitrate nitrogen, and ortho- and total phosphorus greater than the screening levels occur in the upper portion of the segment in the area of Highway 6 and the City of Iredale. Excessive nutrient levels are occurring in the lower portion near the city of Clifton. The excessive nutrient levels are entering the river from tributary watersheds and are contributing to excessive plankton growth. The Texas Institute for Applied Environmental Research (TIAER) has monitored agricultural nonpoint source runoff since 1991. TIAER, the Brazos River

Authority, and the TNRCC are participating in intensive monitoring surveys to determine nonpoint source loading. A TMDL is in preparation for this water body. Local studies will support control programs in the near future.

**Upper North Bosque River, Segment 1255.** Dissolved oxygen concentrations are occasionally below the standard established to assure optimum habitat conditions for aquatic life. Average chloride, sulfate, and total dissolved solids levels exceed segment criteria to protect aquatic life, water supply, and other water quality uses. Nitrogen and phosphorus levels are elevated and contribute to excessive phytoplankton and attached algal growths. A TMDL is in preparation for this water body. A wasteload evaluation conducted on the segment requires advanced waste treatment for the attainment of stream standards. Local studies will support control programs in the near future. TIAER has monitored agricultural nonpoint source runoff in the segment since 1991. TIAER, the Brazos River Authority, and the TNRCC are conducting intensive monitoring surveys in the Lake Waco watershed to determine nonpoint source loading.

**Marlin City Lake System, Segment 1242-A.** All water quality measurements currently support use as a public water supply; however, atrazine concentrations in finished drinking water indicate contamination of source water and represent a threat to future use. The lake system includes Old Marlin City Lake and New Marlin Reservoir. A TMDL to address this issue was initiated in FY 1999 under the guidance of the Agricultural Subcommittee of Texas' Surface Water Protection Committee. The Texas Agricultural Experiment Station (TAES) Blackland Research Center is being contracted to provide watershed monitoring and modeling of the watershed.

**Aquilla Lake, Segment 1254.** Atrazine concentrations in finished drinking water violate the Maximum Contaminant Level for primary drinking water standards. Origin of the contamination is source water and represents a failure of the water body to support the public water supply use. Alachlor concentrations in finished drinking water indicate contamination of source water and represent a threat to future use. A TMDL to address this issue was initiated in FY 1999 under the guidance of the Agriculture Subcommittee of Texas' Surface Water Protection Committee. The TAES Blackland Research Center is being contracted to provide watershed monitoring and modeling of the watershed.

**E. V. Spence Reservoir, Segment 1411.** Average levels of sulfate and total dissolved solids exceed segment criteria to protect aquatic life, water supply, and other water quality uses. Excessive dissolved solids, especially chloride, are attributed to brine seepage from abandoned and improperly capped or cased oil wells located along the Colorado River (Segment 1412) and tributaries immediately downstream from Lake J. B. Thomas. There is a concern for the public water supply use for this segment because the mean sulfate, chloride, and total dissolved solids concentrations exceed the secondary drinking water standard in finished water. Public water supply systems have experienced increased costs for demineralization due to high dissolved solids. A TMDL to address these issues was begun in FY 1998 under contract with the Colorado River Municipal Water District.

### **Coordination with the WQMP Program**

The TNRCC, as the state's lead water quality agency, has overall responsibility for maintaining the state's Clean Water Act §303(d) list (the list of impaired water bodies), targeting water bodies for TMDL development, and carrying out the overall TMDL development process. The TSSWCB has overall responsibility for developing and implementing provisions of TMDLs relating to agricultural and silvicultural nonpoint sources. The function of the TSSWCB and Soil and Water Conservation Districts (SWCDs) in the TMDL process is participation and concurrence in the determination of load allocations attributed to nonpoint source pollutants from agricultural and silvicultural activities and implementation of management measures necessary to achieve those load allocations. Development, certification and implementation of WQMPs will address site-specific issues which are affecting water quality in given stream segments. Implementation of these plans is crucial in achieving and documenting the attainment of water quality goals relating to agriculture and silviculture nonpoint source management. To help ensure successful implementation, landowner participation in the TMDL development process will be sought through formation of advisory committees. Assistance from the Cooperative Extension Service as well as numerous producer groups will be utilized to assist with informing landowners and securing participation. The complaint resolution process in SB 503 will be used as a last resort to assure necessary compliance.

## **4.2 Section 319 Nonpoint Source Program**

In 1987, Congress passed the Water Quality Act of 1987, enacting §319 of the Clean Water Act, which established a national program to control nonpoint sources of water pollution. To remain eligible for federal funding under §319, states must develop an assessment report detailing the extent of nonpoint pollution within the state as well as a management program which specifies nonpoint source controls or management practices. Under §319, grants are available to states to assist in the implementation of their nonpoint source programs.

### ***4.2.1 Nonpoint Source Management Program Report***

The TNRCC's Nonpoint Source Program Team is responsible for the Nonpoint Source Management Program for the State of Texas. This document, last updated in 1990, describes the programs and management practices that the state will use to manage nonpoint source pollution in Texas. The program envisions a partnership among many organizations, both public and private, necessary to achieve program goals. The TNRCC will work as the lead agency to establish and foster these partnerships. The program outlines an ambitious public education project to inform water quality professionals and the general public about the nature of nonpoint source pollution and the issues involved in managing it. It identifies programs and best management practices for managing nonpoint source pollution from land development; urban surface runoff; highways, roads, and bridges; on-site sewage facilities; and spills. Methods of management described include technical assistance, education programs, and state and local regulations.

The Nonpoint Source Assessment Report for the state of Texas was last revised in 1991. The report compiles information from the TNRCC and other state, regional, and local organizations regarding nonpoint source impacts to Texas waters. The report contains information on more than 230 water bodies. At the time this report was published, less than 0.8 percent of stream miles had known

impacts, and less than 0.8 percent of lake acres had known impacts. The major cause of impairment for designated uses in streams was fecal coliform (70%). The major sources of stream nonpoint source pollutants were municipal sources (32%), agriculture (16%), and unknown sources (31%).

In November of 1998, the State of Texas completed a draft Nonpoint Source Pollution Assessment Report and Management Program and submitted it to EPA for review and comment. The 1998 Update describes the TNRCC's watershed-based approach to managing water quality in the state and discusses the role of the TNRCC programs, the TSSWCB's statewide agricultural and silvicultural program, and other state, regional, and local governments in managing nonpoint source pollution within Texas watersheds. The update also outlines the management practices that will be used to prevent or abate nonpoint source pollution, the goals of the state's programs, and the schedule for implementing nonpoint source management activities and projects.

It is anticipated that the draft program document will be published for public comment in December 1998. After public comments are incorporated into the document, the final document will be submitted by the Governor to EPA for final approval in early 1999.

#### ***4.2.2 Grant Program for Nonpoint Source Pollution Prevention and Abatement***

The §319(h) grant program provides for federal assistance to support the implementation of management measures to address nonpoint source pollution. The TNRCC Watershed Management Team administers the §319 program in Texas for nonagricultural management projects. The TSSWCB administers the program for agricultural and silvicultural projects.

The strategy for using §319(h) grant funds has changed significantly over the last two years. Traditionally, these funds were used to support local demonstration and best management practice evaluation projects. While these projects have been fruitful in identifying effective practices for controlling specific types of pollutants, it was determined that these funds must be used for more strategic goals. The TNRCC, TSSWCB, and EPA are now directing §319(h) funds toward implementation and demonstration projects within the boundaries of §303(d) list impaired watersheds.

#### ***4.2.3 Texas' Section 319 Agricultural and Silvicultural Nonpoint Source Program***

The *State of Texas Agricultural/Silvicultural Nonpoint Source Management Program* was published in March of 1995 by the TSSWCB. This program has since been incorporated into the State Nonpoint Source Program discussed above.

The Texas Agricultural/Silvicultural Nonpoint Source Management Program will be used to implement those portions of the Coastal Nonpoint Pollution Control Program that relate to agricultural and silvicultural sources. Program activities to control agricultural nonpoint sources of pollution in Texas take place at two levels ? with statewide activities at one level and regional and watershed activities at another. The agricultural and silvicultural component of the state's nonpoint source management program is designed to achieve implementation of best management practices

from both a statewide pollution prevention standpoint and from a regional or watershed standpoint where specific water quality problems or concerns are addressed.

### **Statewide Program**

Statewide activities are necessary for overall program guidance, problem identification, program criteria development, priority determination, and program coordination. The major elements of the comprehensive statewide program are:

- Monitoring
- Continuing assessment
- Prioritization
- Federal program consistency review
- Program coordination
- Management Program implementation
- Education
- Technical assistance
- Financial assistance
- Program evaluation

### **Regional and Watershed Programs**

Regional and watershed programs are essential for delivering program services to site-specific situations and addressing individual water quality concerns in the most expedient and effective manner. While the statewide program focuses primarily on overall priority determination, continuing assessment, and program development and implementation functions, the regional and watershed programs are concerned with abating watershed-specific problems caused by agricultural and silvicultural activities. Regional programs are therefore a direct result of the state program. The program implementation process for regional and watershed programs involves problem identification, specification of load allocations, identification of BMPs, establishment of program and practice criteria, and BMP implementation. The State Management Program, based on best available assessment data, identifies implementation priority areas within the state. Implementation procedures are described for different production operation types (animal holding facilities and feedlots, irrigated and non-irrigated cropland, grazing land, and silviculture), outlining the BMPs which are appropriate for each and the programs to be utilized and what their roles in the process will be. One key regional program is the development and implementation of individual WQMPs for landowners.

The *State of Texas Agricultural/Silvicultural Nonpoint Source Management Program* serves as a basis for grant funds, which are provided to the state to assist in implementing the Management Program. Grant funds are utilized within designated priority watersheds to support the implementation of best management practices and, in certain cases, transfer that technology to areas with similar nonpoint source circumstances. These funds in the past were used mostly for demonstration and education projects; however, the majority of these funds are now being used in specific impaired or threatened watersheds to provide technical and financial assistance to landowners for implementing on-the-ground practices on their operations as part of WQMPs. (See Section 4.3 for discussion of WQMPs.)

### **4.3 SB 503 Water Quality Management Plan Program**

In 1993, the 73rd Legislature passed Senate Bill 503, which specifically:

- designates the TSSWCB as the lead agency to abate agricultural and silvicultural nonpoint source pollution in Texas;
- authorizes the establishment of a water quality management plan (WQMP) program through soil and water conservation districts in priority watersheds designated by the State Board;
- sets up a complaint resolution process for agricultural and silvicultural nonpoint sources of pollution;
- provides for cost-share assistance in designated areas to install approved water quality BMPs; and
- amends the Water Code to grant certified WQMPs the same legal status as TNRCC point source pollution permits.

With the establishment of the WQMP program, Senate Bill 503 created a system that provides agricultural and silvicultural producers an opportunity to comply with state water quality laws through traditional, voluntary, incentive-based programs. The general purpose of the program is to provide the needed incentive to landowners or operators for the installation of soil and water conservation land improvement measures for the purpose of controlling erosion, conserving water, and/or protecting water quality.

The program is centered upon the voluntary development and implementation of individual WQMPs for landowners. Each plan is a site-specific plan reflecting the production operating parameters of the individual farm or ranch. It may include appropriate land treatment practices, production practices, technologies and combinations thereof, and an implementation schedule. Local SWCDs provide the technical assistance to develop the plan through agreements with USDA Natural Resources Conservation Service or the TSSWCB. After being approved by the district, the developed plan requires TSSWCB certification. Approval and certification by the TSSWCB along with the implementation of the plan into the farm or ranch operation provides the producer with the equivalent of a permit for a point source discharge. Annual status reviews are conducted of WQMPs to verify compliance.

## ***Utilizing the WQMP Program to Address Nonpoint Source Pollution in the §6217 Management Area***

The enabling legislation behind the agricultural/silvicultural nonpoint source program requires that the TSSWCB implement this program in the coastal zone, as designated by the Coastal Coordination Council. In response, the TSSWCB maintains two regional offices in the coastal area to assist in implementation of the program. The offices are located in Wharton and Harlingen. Figure 4.2 depicts the office locations and the extent of program coverage.

WQMP criteria for production practices, land treatment practices, and technologies are consistent with the management measure guidance published by EPA for the coastal nonpoint source program. The agricultural (g) measures were developed by EPA based on existing systems and practices commonly used by states and recommended by the U.S. Department of Agriculture (USDA), such as components of Resource Management Systems and Water Quality Management Plans. Likewise, the forestry (g) measures were developed based in part on the systems and practices commonly used by states and recommended by the U.S. Forest Service in guidance or rules for forestry-related nonpoint source pollution. Therefore, EPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* recognizes that, in many states, existing programs will be sufficient to implement agricultural and silvicultural management measures, and there will be "no need to spend additional resources for a practice that is already in existence and operational. Existing practices, plans, and systems should be viewed as building blocks for these management measures and may need no additional improvement."<sup>2</sup>

In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit, and practices are planned for implementation in such a way as to meet Resource Management System criteria, as defined for various land uses in the Field Office Technical Guide.

The USDA Natural Resources Conservation Service (NRCS) Field Office Technical Guide contains the criteria established for water quality management plans. The Field Office Technical Guide contains technical information, important conservation considerations for natural resources, quality criteria and treatment levels, conservation management system guide sheets by land use, information on the effects of applied conservation treatments, and practice standards and specifications. The guide is specifically tailored for the geographic area of each district. It is consistent with requirements of federal programs for agricultural and silvicultural nonpoint source management including the §6217(g) measures. Each SWCD annually reviews and adopts the technical guide as the criteria for use within the district. The TSSWCB and SWCDs are involved in development and maintenance of the technical guide.

Forestry-specific BMPs are contained in *Texas Forestry Best Management Practices* (September 1997) published by the Texas Forestry Association. *Texas Forestry Best Management Practices*

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<sup>2</sup>*Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*, EPA, 1993, p. 3-2.

contains the BMPs for the forestry management measures in §6217(g) as well as recommended technical specifications and construction details. The Texas Forestry Service and TSSWCB work cooperatively to develop and maintain these BMPs so they meet the criteria of the State of Texas Agricultural/Silvicultural Nonpoint Source Management Program.

### ***Technical Assistance and Funding***

Technical assistance for the development of WQMPs is offered to producers (through local districts) by local USDA-NRCS, TSSWCB, or other personnel of other entities, as deemed necessary.

The TSSWCB offers cost-share assistance as an incentive for implementing WQMPs and to aid cooperators in the implementation of practices required by WQMPs. As a condition of the receipt of state cost-share funds, persons receiving funds agree to implement and maintain all measures in their WQMPs consistent with the implementation schedule. The agreement remains in effect for a minimum period of two years after the WQMP is completely implemented for all practices except those cost-shared. The maintenance agreement remains in effect on cost-share practice(s) for the expected life of the cost-shared practice(s) as established by the TSSWCB or a period of two years after the WQMP is completely implemented, whichever period of time is longer.

### ***Enforcement***

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint, based on water quality impairment, is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action. This mechanism is delineated in a Memorandum of Agreement between the TSSWCB and TNRCC. The mechanism has been tested and proven, with several cases of noncooperation or noncompliance having been referred to TNRCC for enforcement action.

## **4.4 NPDES Program**

### ***4.4.1 Background***

In 1987 Congress amended the Clean Water Act to require the EPA to establish phased National Pollutant Discharge Elimination System (NPDES) requirements for point source discharges of storm water. To implement these requirements, the EPA published the initial permit application requirements for discharges from municipal separate storm sewer systems (MS4) located in municipalities with a population of 100,000 or more (Phase I sources) on November 16, 1990. Storm

water discharges from construction operations disturbing five or more acres and certain other transportation facilities were also included. Discharges of storm water to a sanitary sewer system or to Publicly Owned Treatment Works (POTW) are excluded from the NPDES requirements.

In August, 1995, EPA issued its initial storm water Phase II rule. The 1995 rule allows the NPDES permitting authority to require permits for discharges contributing to water quality impairment on a case-by-case basis and requires all other unregulated storm water dischargers to apply for NPDES permits by August 7, 2001. If this rule is not superseded, millions of industrial and commercial facilities and storm water discharges from all construction activities, no matter what size, as well as over 19,000 municipalities in the U.S., will have to submit permit applications in August 2001.

On January 9, 1998, EPA proposed Phase II NPDES storm water regulations which will supersede the storm water regulation issued in August 1995. The proposed Phase II rules are scheduled for finalization and adoption in March 1999, and general permits will be issued in March 2002. The newly proposed rules designate two classes of facilities for automatic coverage on a nationwide basis.

These classes are small MS4s located in “urbanized areas” and construction activities that disturb at least one but less than five acres of land.

An urbanized area consists of one or more central places and the adjacent densely settled surrounding area, the urban fringe consisting of incorporated places, census designated places, and county nonplace territory that together have a minimum population of 50,000. Urbanized areas can also include portions of counties. The NPDES permitting authority will be required to evaluate whether coverage is needed for other facilities and construction activities, such as small MS4 cities outside urbanized areas with a population of 10,000 or more and a population density of at least 1,000 persons per square mile. Also, MS4s contributing substantially to the storm water pollutant loadings of a regulated, physically interconnected MS4 could be designated by the permitting authority. MS4s located outside of an urbanized area with a population of less than 10,000 or a density of less than 1,000 persons per square mile may be designated by the permitting authority on an optional basis.

Table 4.2 provides a summary of the types of small MS4 cities that would be required to have NPDES permits.

As proposed, the 1998 Phase II rule would require all regulated small MS4 cities to develop and implement a storm water management program. Program components would include at a minimum:

- measures to address requirements concerning public education and outreach,
- public involvement,
- illicit discharge detection and elimination,
- construction site runoff control,
- post-construction storm water management in new development and redevelopment, and
- pollution prevention and good housekeeping of municipal operations.

These program components would be implemented through individual or general NPDES permits. As part of the NPDES permit application, a covered facility would submit the BMPs proposed to be implemented and the measurable goals for each of the minimum control measures listed above.

A small MS4 city with a population of less than 1,000, whose discharges are not contributing substantially to storm water pollutant loadings to a physically interconnected MS4, may be granted a waiver if the owner or operator of the small MS4 certifies that storm water controls are not needed based on wasteload allocations that are part of a TMDL that addresses the pollutants of concern; or that there is a comprehensive watershed plan, implemented for the water body, that includes the equivalents of TMDLs, and addresses the pollutants of concern.

#### ***4.4.2 NPDES Delegation to Texas***

On September 14, 1998, EPA delegated the NPDES program to Texas, and the TNRCC began administering the program at the state level. The EPA will retain administration of all EPA-issued storm water general permits until the existing permits expire. Administration by EPA includes processing notices of intent (NOIs), permit appeals, modification requests, and variance requests; conducting inspections; and receiving and reviewing self-monitoring reports. Prior to expiration of each general permit, the TNRCC may initiate procedures to adopt a corresponding state-issued general permit. At the time of issuance of a TPDES (Texas Pollution Discharge Elimination System) general permit, the TNRCC will assume jurisdiction of the discharges covered by it, including processing of notices of intent (NOIs), permit appeals, modification requests, or variance requests; the conduct of inspections; and the receipt and review of any self-monitoring reports. The TNRCC may exclude certain categories authorized to discharge under an EPA-issued general permit from coverage under a TPDES-issued general permit (making the general permit less broad in coverage) or may elect to adopt a general permit for some discharges. The TNRCC will authorize discharges of storm water by individual permit where a TPDES general permit is not available or it is otherwise necessary to protect water quality.

The TNRCC will have primary responsibility for implementing the NPDES program for facilities within the state. The TNRCC has authority under Texas Water Code §26.121 to regulate discharges from industrial facilities and discharges of storm water from separate municipal storm sewer systems.

#### ***4.4.3 Linking NPDES and §6217 Management Requirements***

In order to avoid overlaps and ambiguities between the NPDES program, which is designed to control urban storm water point sources, and the §6217 program, which is designed to control urban runoff nonpoint sources, EPA's *Program and Development Approval Guidance* excludes all storm water discharges that are covered by Phase I of the NPDES storm water permit program from the §6217 program. As stated in the guidance, EPA "is excluding any discharge from a municipal separate storm sewer system serving a population of 100,000 or more; any point source discharge associated with a permitted industrial activity; any discharge which has already been permitted; and any discharge for which EPA or the state makes a determination that the storm water discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to

waters of the United States.” EPA intends that coastal nonpoint pollution control programs apply only to sources that are not currently required to apply for and receive an NPDES permit. Activities that are exempt from the NPDES permit requirements, such as onsite disposal systems, which are generally not covered by the storm water permit program, would fall under the coastal nonpoint program.

Cities with Phase I NPDES MS4 permits are exempt from meeting those §6217(g) management measures of the Coastal Nonpoint Management Program which are addressed through their NPDES permits. There are five Phase I NPDES permittees in the coastal zone: the City of Houston, unincorporated Harris County, the City of Pasadena, the City of Beaumont, and the City of Corpus Christi.

When the EPA’s *Program and Development Approval Guidance* was written in 1993, the EPA had not yet promulgated its regulations specifying storm water discharges to be regulated under Phase II of the NPDES program. However, the guidance specifies that “any storm water discharge that ultimately is issued an NPDES permit will become exempt from this guidance and from the coastal nonpoint pollution control program at the time that the permit is issued.” As discussed previously, the EPA issued new proposed Phase II regulations in January of 1998. The EPA anticipates that these regulations will be finalized in March 1999, and Phase II permit applications will be due in May 2002.

Texas proposes that Phase II NPDES permittees whose applications for general or individual permits are approved will be exempt from implementing §6217(g) management measures for activities and sources that are addressed by their Phase II permits. The general permits for these cities will address the management measures for urban runoff, construction activities, existing development, and pollution prevention (see Section 4.4.1 for a list of six minimum best management practices). If Phase II permits have not been issued by the time this Coastal Nonpoint Pollution Control Program is implemented, the §6217(g) measures or alternatives that are equally effective in protecting water quality will be implemented within the proposed Phase II areas in the same manner they are to be implemented in non-NPDES covered areas. That is, for cities not covered under NPDES, Texas will use the programs discussed elsewhere in this chapter as well as §26.177 of the Texas Water Code and §26.121 of the Texas Water Code to implement the §6217 management measures.

Section 26.177 of the Texas Water Code and the implementing regulations in 30 TAC Chapter 216 will provide that cities with populations of 10,000 or more persons implement management measures in those circumstances where it is necessary to correct water pollution that is attributable to nonpermitted sources identified in water quality assessments and studies prepared, approved, or accepted by the Executive Director of the TNRCC.

For those cities with populations of less than 10,000 persons, the TNRCC may use its general authority under TWC §26.121 to require a city, regardless of population, a person, or an entity, to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for nonpoint source pollution impairments. This approach will allow the state and local governments to make better use of limited resources and address (target) specific water quality problems in specific watersheds.

#### ***4.4.4 Geographic Scope of the NPDES Program Within the §6217 Management Area***

There are five Phase I NPDES permittees in the coastal zone: the City of Houston, unincorporated Harris County, the City of Pasadena, the City of Beaumont, and the City of Corpus Christi.

Under the proposed Phase II rules, of the 18 counties wholly or partly within the §6217 Management Area, portions of eight counties (Brazoria, Cameron, Galveston, Harris, Jefferson, Nueces, San Patricio, and Victoria) will be automatically designated as NPDES counties. Ninety percent of the residents within the §6217 Management Area live in these eight counties (see Chapter 2, Table 2.1).

There are 67 cities within the §6217 Management Area, 38 of which are designated as Phase II NPDES cities (see Table 4.3).

There are also 31 counties wholly or partly within the coastal watersheds. Portions of nine of these counties are automatically designated as NPDES counties under the proposed Phase II NPDES rules. There are also 99 cities within the coastal watersheds, and 40 are designated as Phase II NPDES cities (see Table 4.4). All Phase I and Phase II NPDES cities and counties in the Texas Coastal Region are shown in Figure 4.3.

### **4.5 Section 401 Certification**

Section 401 of the Clean Water Act provides for the protection of the state's water resources by ensuring that federal discharge permits are consistent with the Texas Surface Water Quality Standards (SWQS). Under §401, states are given the authority to review federally permitted or licensed activities that may result in a discharge of pollutants to waters of the United States, such as the discharge of dredge or fill material. Section 401 is a very important tool because it is a cooperative federal/state program. It gives states authority to review federal activities in or affecting state waters and reflects the state's role at the forefront in administering water quality programs.

Before issuing a federal permit in Texas, the permitting agency must receive a TNRCC certification, conditional certification, or waiver stating that the discharge will not violate the Texas Surface Water Quality Standards. If the state denies certification, the federal permit is also denied. The TNRCC is responsible for certifying most federal permits, except for federal permits related to oil and gas production, which are certified by the Railroad Commission of Texas.

The TNRCC rules governing Water Quality Certifications are found at 30 TAC Chapter 279. Responsibility for performing all certification functions is delegated to the Executive Director of the TNRCC. Substantive revisions to Chapter 279 in July 1995 included the following: incorporation of the TNRCC's policy of no overall net loss of wetland resources; inclusion of Rivers and Harbors Act §10 permits as Department of Army permits requiring certification; the option for the Executive Director to delay certification until after a review of the draft permit or the statement of findings; clarification of nonadjudicative public hearing requirements; changes in certification of NPDES permits to be consistent with federal rules; incorporation of the mitigation sequencing requirements

of the federal §404(b)(1) guidelines as certification criteria for §404 permits; changing nationwide and general permit certification requirements to be applicable for any nationwide or general federal license or permit; certification procedures for federal permits or licenses for agencies other than EPA or the Corps of Engineers; and clarifying the ability of the TNRCC to pursue enforcement of certification conditions.

#### ***4.5.1 Applicability***

Only those activities that require a federal permit are subject to state review for §401 certification. Federal permits which require state certification generally fall under the federal programs listed below; however, any federally authorized activity which may result in a discharge may be subject to §401 certification.

- **Section 404 of the federal Clean Water Act** (regarding discharges of dredge and fill material into waters of the U.S., including wetlands). State authority under §401 serves as the basis for state decisions concerning activities that affect wetlands. An important type of permit subject to §401 Certification is the U.S. Army Corps of Engineers §404 permit, which is the federal permit required for discharges into wetlands or other navigable waters. Approximately 200 individual §404 permits are evaluated by the TNRCC annually.
- **Section 402 of the Federal Clean Water Act** (regarding discharges into or adjacent to waters of the U.S. under federal National Pollutant Discharge Elimination System permits).
- **Section 9 of the Rivers and Harbors Act** (regarding construction of dams or dikes across navigable waters).
- **Section 10 of the Rivers and Harbors Act** (regarding work placement of any structures in navigable waters that have the potential for discharge of pollutants).
- **Licenses required for hydroelectric projects issued under the Federal Power Act.**

#### ***4.5.2 Section 401 Certifications and the Coastal Nonpoint Program***

NOAA and EPA will approve those program elements for which states have proposed the use of §401 Clean Water Act (CWA) certifications and Coastal Zone Management Act (CZMA) consistency certifications to meet program requirements where states can demonstrate the following:<sup>3</sup>

*The certifications, either alone or in concert with other programs, are sufficient to address the full range of applicable activities and sources of nonpoint pollution (e.g.,*

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<sup>3</sup>Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), *Federal Register*, October 21, 1998.

*marinas, hydromodification, and wetlands) and geographic areas for which they are proposed.*

*There is a back-up authority (e.g., water quality authority) that can be used, as described above, by the state to enforce conditions or revoke certification; and*

*The state has a monitoring system or other tracking methods by which to assess whether permit conditions have been met.*

Individual management measure discussions in Chapter 5 provide additional information supporting the use of certification either alone or in conjunction with other programs to address the full range of applicable activities and sources of nonpoint pollution for a given (g) measure.

Backup authority for certifications comes from the U.S. Army Corps of Engineers (Corps) and the TNRCC. When the TNRCC places conditions on a water quality certification, the conditions become part of the permit. Enforcement of §404 permits is primarily the responsibility of the Corps. In addition, the TNRCC has the authority under chapters 7 and 26 of the Texas Water Code to set and enforce water quality standards in Texas. Specifically, §26.019, §26.121(c), and §§7.051-7.053 of the Texas Water Code and Chapter 337 of the TNRCC rules detail the Commission's authority to issue orders, assess administrative penalties, and take other necessary action if a person violates the state water quality standards or other applicable state water quality requirements. The TNRCC may also seek injunctive relief and civil penalties in state district court for violations of its rules, permits, or orders under Texas Water Code §7.032. For both agencies, the decision whether to pursue enforcement in specific cases is discretionary.

In those cases where the Corps finds that certification conditions can not reasonably be implemented or enforced, the Corps will notify TNRCC prior to finalizing the permit. If TNRCC determines such conditions must be retained to protect water quality, the Corps, in accordance with 33 CFR 325.4(c), will deny the permit.

Monitoring and tracking to assess whether permit conditions are being met is the responsibility of the TNRCC field offices. Field offices are responsible for responding to and making investigations of §401 certification noncompliance.

## **4.6 Enforcement Mechanisms for the Coastal Nonpoint Program**

### ***4.6.1 Texas Water Code §26.177***

Section 26.177 of the Texas Water Code is a regulatory program with a built-in enforcement mechanism. It can be used as a stand-alone program to address water pollution problems in urban areas, or it can be used as backup enforcement authority for other programs in the state, including the TMDL process and the Coastal Nonpoint Source Program.

Section 26.177 establishes statutory responsibilities for cities in the abatement and control of water pollution within their jurisdictions. The statute requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to non-permitted sources of pollution, (2) the city has had reasonable time to correct the problem, and (3) a public hearing has been held on the matter.

Section 26.177 of the Texas Water Code was amended by the 75th Texas Legislature in 1997. The development and adoption of the rule implementing the provisions of §26.177 was included in the TNRCC's Legislative Implementation Work plan for fiscal year 1998. Draft rules implementing the provisions of §26.177 were proposed in the October 30, 1998 edition of the Texas Register. A 30-day public comment period extending from October 30, 1998, to November 30, 1998, and including a public hearing on November 10, 1998, was established to receive public comments on the proposed rule. Adoption of the final rule is expected to occur in January of 1999. The rule is proposed for incorporation into Chapter 216 of the Texas Administrative Code, Subchapter B, entitled "Municipal Water Pollution Control and Abatement."

The draft rule defines a permitted source of water pollution as a source that discharges pollution with a valid permit or authorization granted pursuant to the Texas Water Code, the federal Clean Water Act, or other applicable state or federal law. The definition of pollution specified in the draft rule includes, but is not limited to, nonpoint sources of pollution as those sources are defined and identified pursuant to applicable state and federal statutes, regulations, policies, and guidance. Discharges authorized by NPDES permits, including storm water discharge permits, meet the definition of permitted sources as proposed in the draft rule and therefore do not fall under the jurisdiction of the proposed regulations. Water quality assessments and studies which may be used by the TNRCC to identify nonpermitted sources of water pollution in a city are identified in the draft rule as follows:

- State Water Quality Inventory - The state program which assesses the quality of surface and ground waters resulting in a report describing the status of water quality in the state in accordance with §305(b) of the federal Clean Water Act.
- Clean Rivers Program - Watershed water quality assessments conducted in accordance with §26.0135 of the Texas Water Code.
- State Nonpoint Source Assessment - The state program implemented in compliance with §319(a) of the federal Clean Water Act which identifies surface and ground waters in the state which cannot reasonably be expected to attain or maintain applicable water quality standards or the goals and requirements of the federal Clean Water Act without additional controls for nonpoint sources of pollution.
- Total Maximum Daily Load Analyses - Water quality analyses required by §303(d) of the federal Clean Water Act for water bodies in the state not supporting or not expected to support the beneficial uses designated for the water body.

- Other - Special studies, pilot projects, reports, or other quality assured assessments of water quality in the state prepared, approved, or accepted by the Executive Director of the TNRCC which identify non-permitted sources of water pollution within cities including information used by the Executive Director for the purpose of updating the state's list of impaired waters prepared in accordance with §303(d) of the federal Clean Water Act.

The draft rule provides for the TNRCC to give notice to cities which may be subject to the requirements of Chapter 216. The notice is to specify the basis for determining that a city may be subject to the requirements of Chapter 216, that additional water quality assessments and studies may be performed in the area of interest, that the city may undertake additional water quality assessments and studies of non-permitted sources of water pollution within its jurisdiction, and the time period (not to exceed five years) within which the city may try to correct the problem. A public meeting must be conducted if the Executive Director determines a city still meets the applicable criteria specified in the proposed regulation. The draft rule requires a notice of the public meeting, and the public must be provided with an opportunity to submit comments to the TNRCC on whether a city should be required to develop and implement a water pollution control and abatement program. At the public meeting, the TNRCC may take one of the following actions: refer the matter to a contested case hearing, determine that a city does not have to submit a water pollution control and abatement program, require the city to develop and implement a water pollution control and abatement program, or issue any other order the TNRCC deems to be appropriate.

The draft rule specifies the requirements of a water pollution control and abatement program including its jurisdictional extent, municipal personnel, services, and functions. The services and functions specified in the draft rule include: develop and maintain an inventory of significant waste discharges; inspect and monitor these discharges including collecting and analyzing samples; determine if these discharges are in compliance with any applicable regulations; obtain compliance by these dischargers with applicable regulations, including where necessary the use of enforcement proceedings; and, develop and execute reasonable plans for controlling pollution resulting from generalized discharges of waste.

The draft rule provides for cities to submit water pollution control and abatement programs to the Executive Director of the TNRCC. The water pollution control and abatement programs must be signed and sealed by a licensed professional engineer in Texas certifying that the program is designed to abate and prevent nonpermitted sources of water pollution in a city. Cities may amend their water pollution control and abatement program by submitting a new program signed and sealed by a licensed professional engineer to the Executive Director of the TNRCC. The Executive Director may require a city to amend a water pollution control and abatement program for a city when new or additional information or circumstances warrant. Persons affected by water pollution control and abatement programs outside of the corporate limits of a city may appeal these programs to the TNRCC or district court in accordance with the provisions in the statute.

### **Linking §26.177 with the Coastal Nonpoint Pollution Control Program**

The development and implementation of water pollution control and abatement plans, where appropriate, will provide significant protection for coastal natural resources and will be an integral part of the state's coastal nonpoint source pollution control program. The proposed rules state that cities should develop "reasonable and realistic plans" for the control of nonpermitted sources. Since this is a statewide program, no specific provisions are included for plans within the §6217 Management Area. However, cities within these areas will implement (g) measures or equally effective alternative management measures in conformity with the Coastal Nonpoint Pollution Control Program. The TNRCC may develop additional guidance for cities related to the development and implementation of water pollution control and abatement plans. Such a guidance document could be linked with the requirements of §6217.

The timing of development and implementation of water pollution control and abatement plans will depend in part on the water quality assessments and studies which trigger §26.177. For example, under the TMDL process, cities and other stakeholders located in watersheds of water bodies that do not meet applicable water quality standards would be encouraged and given an opportunity to work with the TNRCC in the development of TMDLs for the segment. If, during the development of a TMDL, sources, other than permitted, in a city are determined to be contributing to the violation of water quality standards, the city will be notified by the Executive Director of the TNRCC and given a reasonable amount of time to correct the problem. Actions undertaken by the city to correct the problem would need to be coordinated with the TMDL Implementation Plan adopted for the water body.

#### ***4.6.2 Texas Water Code §26.121***

Section 6217 specifies that Coastal Nonpoint Pollution Control Programs include enforceable policies and mechanisms sufficient to ensure implementation of the management measures. States may use voluntary or incentive-based programs if these programs are backed by existing enforcement authorities and the following is provided:

1. *a legal opinion from the attorney general or an attorney representing the agency with jurisdiction for enforcement that such authorities can be used to prevent nonpoint pollution and require management measure implementation, as necessary;*
2. *a description of the voluntary or incentive-based programs the state will use to encourage implementation of the management measures, including the methods for tracking and evaluating those programs; and*
3. *a description of the mechanism or process that links the implementing agency with the enforcement agency and a commitment to use the existing enforcement authorities where necessary.*

The primary programs discussed previously in this chapter, including the TMDL process, the state's nonpoint pollution program, the agricultural/silvicultural nonpoint pollution control program, the SB 503 WQMP program, NPDES program, certification under §401 of the Clean Water Act, and TWC

§26.177 will all be utilized to implement the Coastal Nonpoint Source Program. Additional programs and initiatives that will be used to implement specific (g) measures are discussed in Chapter 5. Since many of these primary and secondary programs rely on voluntary compliance, a back-up authority is required under the program guidance.

Texas proposes to use §26.121 of the Texas Water Code as the overall backup authority to ensure implementation of the (g) measures. Section 26.121 will come into play as an enforcement authority for any voluntary programs that lack their own specific enforcement authority or backup mechanism. The need for backup enforcement will be determined through regular program monitoring and evaluation, as discussed in Chapter 9.

Section 26.121 of the Texas Water Code is the general TNRCC authority which prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

## **4.7 Administrative Coordination**

NOAA's *Guidance on Incorporating Coastal Nonpoint Pollution Control Programs into State and Territory Coastal Management Programs* (May, 1988) states that upon program approval, a Coastal Nonpoint Program will be incorporated automatically into the state's coastal management and nonpoint programs. Individual program elements that are fully approvable (those elements that do not have conditions) can be incorporated into the Coastal Management Program (CMP) even if the entire Coastal Nonpoint Program has not yet been fully approved. Since the Coastal Nonpoint Program will be a part of the CMP, general administration of the Coastal Nonpoint Program will be the responsibility of the GLO, as administrative staff of the Coastal Coordination Council and as the lead agency for the CMP. However, successful implementation of the Coastal Nonpoint Program will depend on a coordinated effort by multiple state agencies and programs, as described below.

### **4.7.1 Agency Roles**

As stated in Chapter 1, Texas' Coastal Nonpoint Program was developed by a workgroup made up of six state agencies responsible for coastal nonpoint source pollution control. A description of each of these agencies is provided again here, with additional information on specific roles relating to the implementation of the Coastal Nonpoint Program.

#### **Texas General Land Office (GLO)**

The GLO is responsible for managing nearly four million acres of state-owned property in bays, estuaries, tidally influenced rivers, and the Gulf of Mexico. The GLO is the lead agency for the Texas

Coastal Management Program (CMP) and the lead state agency for receiving and administering federal Coastal Zone Management Act funds. The GLO has responsibility for managing development in the beach/dune system to protect sand dunes and public beach access. The GLO also administers state-owned submerged lands with specific lease conditions for construction of waterfront facilities, dredging, and filling. These lease conditions will be instrumental in meeting many of the (g) measures for marinas and recreational boating.

Within the §6217 Management Area, CMP staff will review watershed action plans developed through the TMDL process to ensure that the plans include the appropriate (g) measures and/or alternative management measures that are as effective in protecting water quality.

### **Texas State Soil and Water Conservation Board (TSSWCB)**

The TSSWCB is the lead state agency for the management of agricultural and silvicultural nonpoint source pollution, which includes activities related to implementation of management measures, complaint investigations, education, and technical assistance.

The TSSWCB has overall responsibility for developing and implementing provisions of TMDLs relating to agricultural and silvicultural nonpoint sources. The function of the TSSWCB and SWCDs in the TMDL process will be participation and concurrence in the determination of load allocations attributed to nonpoint source pollutants from agricultural and silvicultural activities and implementation of management measures necessary to achieve those load allocations.

The TSSWCB is also responsible for the development, certification, and implementation of WQMPs, both as part of the TMDL process and as a stand-alone initiative. Implementation of these plans is crucial in achieving and documenting the attainment of water quality goals relating to agriculture and silviculture nonpoint source management.

### **Texas Natural Resource Conservation Commission (TNRCC)**

The TNRCC is the lead state agency for the management of urban and other non-agricultural and non-silvicultural nonpoint source pollution, which includes activities related to implementation of management measures, complaint investigations, education, and technical assistance. The TNRCC, as the state's lead water quality agency, has overall responsibility for maintaining the state's §303(d) list (the list of impaired water bodies), for targeting water bodies for TMDL development, and for carrying out the overall TMDL development process. The TNRCC is also responsible for administering the on-site sewerage (septic) system program, wetland certification under §401 of the federal Clean Water Act (CWA), water quality monitoring and assessment activities, and establishment of water quality standards.

### **Texas Department of Transportation (TxDOT)**

TxDOT is the lead state agency for the construction and maintenance of state roads which includes responsibility for the management of road and highway nonpoint sources of pollution.

**Texas Parks and Wildlife Department (TPWD)**

TPWD is the lead state agency for the protection of fish and wildlife, which includes participation in the review of CWA §404 permits and §401 wetland certifications. The TPWD also works on programs to enhance, create, and conserve wetlands and provides technical and/or financial assistance to private wetland owners. Responsible for enforcing boat sewage rules.

**Railroad Commission of Texas (RRC)**

The RRC is the lead state agency for §401 water quality certifications for oil and gas exploration and development activities.

**4.7.2 Interagency Agreements**

A variety of mechanisms will be used to ensure coordination among the agencies involved in the coastal nonpoint program, including the development of memorandum of agreement/understanding describing specific agency roles and mechanisms for coordination. A list of existing MOAs and MOUs which relate to the implementation of the Coastal Nonpoint Program is provided below.

**Memorandum of Understanding Between TxDOT and the Texas Department of Parks and Wildlife (TPWD)<sup>4</sup> concerning:**

- (1) the review of department projects which have the potential to affect natural resources within the jurisdiction of TPWD, in order to assist TxDOT in making environmentally sound decisions; and
- (2) the development of a system by which information developed by TxDOT and TPWD may be exchanged to their mutual benefit.

**Memorandum of Understanding between TxDOT and the Texas Water Commission (now the TNRCC)<sup>4</sup> concerning:**

- (1) the review of department projects which have the potential to affect natural resources within the jurisdiction of the Commission in order to assist TxDOT in making environmentally sound decisions; and
- (2) the development of a system by which information developed by TxDOT and the Commission may be exchanged to their mutual benefit.

**Memorandum of Understanding between TxDOT and the TNRCC<sup>4</sup> concerning:**

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<sup>4</sup>Texas Administrative Code Title 43, Transportation, Chapter 2, Environmental Policy, Subchapter B.

- (1) the review of department projects which may affect air quality, in order to assist TxDOT in making environmentally sound decisions; and
- (2) the development of a system by which information developed by TxDOT and TNRCC may be exchanged to their mutual benefits.

**Memoranda of Understanding between TSSWCB and the TNRCC:**

This MOU dated November 27, 1997, sets forth the coordination of jurisdictional authority, program responsibility, and procedural mechanisms for point and nonpoint source pollution programs.

**Memoranda of Understanding between GLO and the TNRCC:**

This MOU sets forth the coordination of program responsibility and procedural mechanisms for the Galveston Bay Estuary Program.

**Memoranda of Understanding between TSSWCB and the Texas A&M University System:**

The TSSWCB and the Texas A&M University System, including TAES and TAEX, have a longstanding memorandum of understanding by which TAEX will conduct soil and water conservation and nonpoint source management demonstrations and related educational activities, and TAES will cooperate with TSSWCB and SWCDs to identify research needs relative to soil and water conservation and nonpoint source management.

In addition to the existing MOAs and MOUs above, TNRCC and TSSWCB currently have a draft MOU that sets forth the cooperation, responsibility, and authority regarding the development of TMDLs. The TNRCC is currently working with a number of other state resource agencies to develop MOUs related to interagency coordination in the development of TMDLs across the state.

***4.7.3 Other Programs***

Texas' Coastal Nonpoint Source Pollution Control Program will be coordinated with numerous ongoing state programs and activities, including the programs previously described in this chapter and programs such as those listed below.

- TxDOT's "Don't Mess with Texas" anti-litter campaign
- GLO's Adopt-A-Beach Program
- GLO's Beach Watch Program
- TNRCC's Rural Outreach Program for the proper disposal of agricultural chemicals

- TNRCC's Clean Texas 2000 program, which provides financial assistance to communities for household hazardous waste and waste oil collections and public education campaigns to encourage prevention of nonpoint source pollution.
- TNRCC's Texas Watch Program - citizen water quality monitoring
- Galveston Bay Estuary Program and Corpus Christi Bay National Estuary Program - water quality assessments and recommended plans of action.

Because these programs are already implementing nonpoint source pollution prevention measures generally throughout the state as well as within the coastal zone through their roles in data gathering, implementing demonstration projects, and securing funding for local initiatives aimed at reducing coastal nonpoint source pollution, they provide an important resource for the Coastal Nonpoint Program. The two national estuary programs in particular will help to coordinate the individual efforts of multiple state agencies within the coastal zone, will serve as a forum for reaching local stakeholders, and, through their research studies and demonstration projects, will be a valuable resource for evaluating the progress of coastal nonpoint protection activities as a whole.

### **National Estuary Programs**

The National Estuary Program (NEP) was established under §320 of the Clean Water Act to “identify nationally significant estuaries that are threatened by pollution, development, or overuse; promote comprehensive planning for, and conservation and management plans for estuaries of national significance; and enhance the coordination of estuarine research.” There are two active estuary programs in Texas. The first was established for the Galveston Bay system and the second was established for the bays and estuaries along the Coastal Bend of South Texas. Each of these estuary programs has culminated in the development of a Comprehensive Conservation and Management Plan (CCMP) that recommends priority actions and implementation schedules to address impacts observed in the estuary. CCMP development is a consensus-based process involving a partnership across federal, state, and local levels. With the completion of the CCMPs, each NEP formed a nonprofit, nonregulatory management structure to implement its plan.

**Galveston Bay Estuary Program.** The Galveston Bay Estuary Program (GBEP) is a continuation of the National Estuary Program (NEP) established for Galveston Bay in 1989. The Galveston Bay Estuary Program is a partnership of bay stakeholders currently working to implement the *Galveston Bay Plan*. The plan contains action plans dealing with habitat and species protection, freshwater inflows, spills and dumping, exotic species, point sources of pollution, and nonpoint sources of pollution to protect and restore the health of the estuary while supporting economic and recreational activities. Eighty-two initiatives are outlined under these nine action plans. The GBEP takes a leading role in facilitating and coordinating the implementation of these initiatives.

Nonpoint source pollution is the number one identified water quality problem in Galveston Bay. Implementation of the *Galveston Bay Plan* includes the following actions to address this problem:

- Developing and implementing a Galveston Bay public education program aimed at reducing pollution from residential areas.
- Compiling a Galveston Bay BMP Performance Document to inventory nonpoint source control techniques which have been evaluated.
- Identifying and correcting priority watershed pollutant problems by maintaining and publishing an inventory of nonpoint source concerns in the bay watershed.
- Adopting regional construction standards for nonpoint source reduction and implementing toxics and nutrient control practices.
- Encouraging sewage pumpout, storage, and provisions for treatment.
- Implementing storm water programs for local municipalities.

To date, the GBEP has addressed nonpoint source pollution by convening a forum for information sharing among Galveston Bay stakeholders involved in nonpoint source pollution prevention/control activities, providing technical assistance to local and county governments, and educating and reaching out to children and adults. During 1998, the GBEP is partnering with the Houston-Galveston Area Council, the Galveston County Health District, the Galveston Bay Foundation, and the Texas A&M Sea Grant Program to

- provide technical assistance on storm water management to local governments;
- provide technical assistance to small businesses on implementation of waste minimization strategies and general best management practices;
- develop, maintain, and publish an inventory of nonpoint source concerns in the bay watershed;
- implement a baywide public education program aimed at reduction of pollution from residential areas through illustration, presentations, and workshops; and
- conduct voluntary inspections and provide information assistance to reduce bacterial pollution caused by malfunctioning septic systems.

**Coastal Bend Bays and Estuaries Program.** The Coastal Bend Bays and Estuaries Program (CBBEP), formerly known as the Corpus Christi Bay National Estuary Program (CCBNEP), was established in October 1992. Like the Galveston Bay NEP, the CBBEP has completed a Comprehensive Conservation and Management Plan, called the *Coastal Bend Bays Plan*, to improve water quality and enhance living resources in the Coastal Bend Bay system. The final *Bays Plan* was submitted to EPA for review and approval in the fall of 1998.

The *Bays Plan* identifies a need for action in six major areas in the Coastal Bend Bay System:

1. Human Uses, including Bay Tourism and Recreation, Bay Debris, Public Health, and Shoreline Management
2. Maritime Commerce and Dredging
3. Habitat and Living Resources
4. Water and Sediment Quality, including Nonpoint Source Runoff
5. Freshwater Resources
6. Public Education and Outreach

The Bays Plan contains nine actions which specifically address water and sediment quality. Four of these actions address nonpoint source pollution:

- Develop a regional handbook of urban nonpoint source pollution Best Management Practices for voluntary use by local governments seeking to implement nonpoint source pollution prevention programs.
- Provide compliance assistance to small businesses and industries in the region that are subject to the NPDES permit program or have nonpoint source control needs.
- Assist local governments to implement On-Site Sewage Facility (OSSF) programs.
- Coordinate and implement agricultural water quality management programs necessary to meet water quality standards.

The CBBEP sponsors numerous Action Plan Demonstration Projects to demonstrate the effectiveness of selected cleanup strategies that can be achieved on a small scale. These projects help define the time and resources required for basinwide implementation of the actions found in the *Bays Plan* and other programs. Some of the Action Plan Demonstration Projects addressing nonpoint source pollution include the construction of a biofilter to treat storm water runoff in Ingleside prior to discharge into the bay; the construction and enhancement of wetlands in Refugio to catch and filter storm water from a nearby highway, residential areas, and agricultural areas; and an edge of field water quality sampling program for the Odem Ranch Watershed. These projects provide site-specific and regional data that will be used by the Coastal Nonpoint Pollution Control Program in the development of watershed action plans and in assessing the effectiveness of management measure implementation.

## **4.8 Implementation/Evaluation of the Coastal Nonpoint Program**

Texas proposes to take a two-pronged approach to implementing the Coastal Nonpoint Pollution Program: a targeted, water-quality-based approach, and a nontargeted, technology-based approach. The targeted, water-quality-based approach falls in line with Texas' overall Watershed Management

Approach. This targeted approach will be complemented by a technology-based approach for the general implementation of nonpoint source control measures throughout the §6217 Management Area.

Due to limited agency and program resources, implementation under these two approaches will follow an iterative process. In the *Final Administrative Changes*, NOAA and EPA recognize that limited resources will necessitate implementation of the management measures incrementally. EPA and NOAA support the establishment of an iterative process for implementing (g) management measures, assessing their effectiveness in achieving water quality goals, and determining the need for additional management measures. Texas will implement the (g) measures under such an iterative process, utilizing evaluation mechanisms built into the state's water quality assessment process to evaluate effectiveness and the need for additional measures.

#### ***4.8.1 Targeted Approach***

Under the Watershed Management Approach, Texas will use a coordinated strategy of targeting existing coastal nonpoint source pollution problems through the implementation of management measures and statewide nonpoint source pollution program activities. This approach is applicable primarily to urban and agricultural sources of nonpoint source pollution in targeted water bodies. This iterative and targeted strategy will be used to set a 15-year schedule for implementation of nonpoint source pollution management measures.

The watershed management program in Texas will lead to the implementation of water quality-based management measures for nonpoint sources of pollution in priority watersheds within the coastal zone. These management measures, which will be the result of the implementation of TMDLs, will meet the objectives of CZARA §6217(g), which are designed to achieve and maintain applicable water quality standards. Water bodies on the state's §303(d) list will be evaluated through the state's TMDL program in accordance with the statewide schedule for TMDL development. The TMDL evaluations will result in the development and implementation of a watershed action plan tailored to address the water quality impairments in each water body on the §303(d) list. The watershed action plan will specify the actions to be taken to address the individual pollutants and use impairments identified for each water body on the §303(d) list. Actions will include implementation of (g) measures or alternative management measures that are equally effective in protecting water quality. The watershed action plans also will include a schedule for the implementation of management measures, provisions for monitoring to determine the effectiveness of the management measures, and provisions for corrective actions if it is determined that the management measures are not successful in achieving and maintaining applicable water quality standards. Coastal Management Program staff will review watershed action plans to ensure that they incorporate (g) measures and/or alternative management measures that are as effective in protecting water quality.

Where agricultural activities are a source of nonpoint impairments in any targeted water body, the TSSWCB and local soil and water conservation districts will work with local agricultural producers to alleviate these sources through the development, certification, and implementation of WQMPs. The function of the TSSWCB and SWCDs in the TMDL process will be participation and concurrence

in the determination of load allocations attributed to nonpoint source pollutants from agricultural and silvicultural activities and implementation of management measures necessary to achieve those load allocations. Implementation of WQMPs under the TMDL process will be crucial in achieving and documenting the attainment of water quality goals relating to agriculture and silviculture nonpoint source management.

#### ***4.8.2 Technology Approach***

Nonpoint source categories that are not addressed through the targeted approach described above, including on-site septic systems, roads and bridges, marinas, wetlands, and hydromodification, will be addressed by a variety of state nonpoint source programs which are administered both statewide and solely within coastal areas. These programs promote the use of best management practices and measures throughout the state to address nonpoint source pollution generally, rather than targeting specific impaired water bodies. Urban and agricultural sources also are addressed by many of these programs and activities.

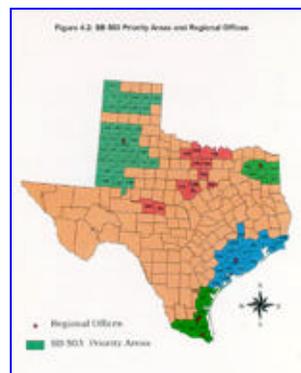
Many of the programs and activities that address nonpoint source pollution generally within the coastal zone and throughout the state are mentioned in this document, such as the State Nonpoint Source Program and demonstration projects funded through §319(h), efforts to develop WQMPs independent of the TMDL process, action plan implementation by the National Estuary Programs, public education and outreach programs undertaken by state agencies responsible for the control of nonpoint source pollution, projects funded by the CMP which address nonpoint source pollution, and various wetlands conservation and restoration projects. In addition to these state-level programs, funding and technical assistance for implementation of a variety of nonpoint source management measures are available at the federal level.

The state believes that by using this balanced program of targeted implementation and statewide nonpoint source program activities, Texas will meet the §6217(g) management measure requirements of the Coastal Zone Amendments and Reauthorization Act effectively and expeditiously.

*Figure 4.1: TNRCC Permit-by-Basin Approach to Wastewater Permitting*



*Figure 4.2: SB 503 Priority Areas and Regional Offices*



*Figure 4.3: NPDES Cities and Counties Located in the Coastal Watersheds*



**Table 4.1 Primary Programs and Activities for Implementing the Texas Coastal Nonpoint Source Pollution Control Program**

Program/Activity	Lead Agencies	Program Description	Inter-related Programs	Applicable Source Categories	Statute
<p><b>Watershed Management Approach:</b> TMDL Process and Watershed Action Plans</p>	<p>TNRCC TSSWCB</p>	<p>TMDLs are detailed technical water quality assessments which determine the maximum amount of pollutants a water body can assimilate and still meet its water quality standards for its designated uses (e.g., aquatic life, recreation, water supply) as established by the state. The TMDL establishes the allowable constituent loadings to a water body from both point and nonpoint sources of pollution and provides the basis for establishing water quality-based control programs. The TMDL process culminates in a written, quantitative assessment of water quality problems and contributing sources and an implementation plan identifying responsible parties and specifying actions needed to restore and protect water quality standards.</p>	<p>Clean Rivers Program; Source Water Protection Program; Nonpoint Source Management Program activities; CAFO and point source discharge permitting</p>	<p>Urban Agriculture Silviculture</p>	<p>CWA §303; TWC §26.121; TWC §26.177; TWC §26.261; TWC §26.341; THSC Ch. 366</p>
<p><b>Nonpoint Source Program</b> (CWA Section 319)</p>	<p>TNRCC TSSWCB</p>	<p>The Nonpoint Source Program is a statewide program which identifies programs and best management practices for managing nonpoint source pollution from land development; urban surface runoff; highways, roads, and bridges; on-site sewage facilities; and spills. Methods of management include technical assistance, education programs, and state and local regulations. The Agricultural/Silvicultural Nonpoint Source Program is a component of the statewide program.</p>	<p>Agricultural/Silvicultural Nonpoint Source Program; Section 319(h) grant program and related demonstration projects; TMDL process</p>	<p>Urban Agriculture Silviculture Marinas Wetlands Hydro-modification</p>	<p>CWA §319</p>

**Table 4.1, continued**

Program/Activity	Lead Agencies	Program Description	Inter-related Programs	Applicable Source Categories	Statute
<b>Water Quality Management Plan Program (SB 503)</b>	TSSWCB SWCDs TNRCC	A landowner can voluntarily develop and implement Water Quality Management Plans (WQMPs) to address agricultural nonpoint source pollution. If a landowner does not comply with the WQMP and a valid water quality complaint is received, the TSSWCB will refer the landowner to the TNRCC for enforcement action under TWC§26.121. TSSWCB provides TNRCC with a database of all landowners with WQMPs. Landowners without WQMPs are subject to §26.121, but the TSSWCB does not refer them.	TMDL process; Section 319(h) grant program and related demonstration projects; NRCS-EQIP and CRP funds and technical assistance; TSSWCB pollution prevention and nonpoint source education program; TAEX educational programs	Agriculture Silviculture	SB 503 TAC§201.026 TWC§26.121
<b>NPDES/TPDES Program</b>	TNRCC EPA	A permitting program implemented by EPA and the State of Texas to regulate point source discharges of storm water from municipal sewer systems, certain construction activities, and certain marina activities.	TxDOT Highway BMP program; TNRCC nonpoint source management program urban education and technical assistance; TNRCC pollution prevention program	Urban Marinas	CWA §402(p); TWC §26.121
<b>Section 401 Water Quality Certification</b>	TNRCC TPWD RRC	Section 401 Water Quality Certifications are completed to ensure that certain marina, wetland, and hydromodification activities are not impacting waters of the state or violating State Water Quality Standards.	Coastal Wetlands Conservation Plan; Sea Grant Marine Advisory Service technical assistance and education	Marinas Hydro-modification Wetlands	CWA §404; CWA §402; §§9 and 10 Rivers and Harbors Act; TWC §26.121

**Table 4.2 Summary of Coverage of Small Municipal Separate Storm Sewer Systems\* Under the NPDES Storm Water Program (\*see definition at §122.26(b)(16))**

<b>WHO IS DESIGNATED/COVERED UNDER THIS PART?</b>	
<b>AUTOMATIC DESIGNATION: Required Nationwide Coverage</b>	All owners or operators of small municipal separate storm sewer systems (MS4s) located <u>within</u> an “urbanized area.” (see § 122.32(a)(1))
<b>POTENTIAL DESIGNATION: Required Evaluation by the Permitting Authority for Coverage</b>	All owners or operators of small MS4s located <u>outside</u> of an “urbanized area” with a population of at least 10,000 <u>and</u> a population density of at least 1,000. (see §§ 122.32(a)(2) and 123.35(b)(2))  All owners or operators of small MS4s that contribute substantially to the storm water pollutant loadings of a physically interconnected MS4 that is regulated by the NPDES storm water program. (see §§ 122.32(a)(2) and 123.35(b)(4))
<b>POTENTIAL DESIGNATION: Optional Evaluation by the Permitting Authority for Coverage</b>	Owners and operators of small MS4s located <u>outside</u> of an “urbanized area” with a population of less than 10,000 <u>or</u> a density of less than 1,000. (see §§ 122.32(a)(2) and 123.35(b)(3))
<b>WHO IS ELIGIBLE FOR A WAIVER or AN EXEMPTION FROM THE SMALL MS4 PERMIT REQUIREMENTS?</b>	
<b>POTENTIAL WAIVER: Locally-Based Waiver from Requirements as Determined by the Permitting Authority</b>	Owners or operators of small MS4s, located <u>within</u> an “urbanized area,” with a jurisdiction of less than 1,000 persons and a system that is not contributing substantially to the pollutant loadings of a physically interconnected MS4 may certify that storm water controls are not needed based on: (1) waste load allocations that are part of “total maximum daily loads” (TMDLs) that address the pollutants of concern; or (2) a comprehensive watershed plan, implemented for the waterbody, that includes the equivalents of TMDLs, and addresses the pollutants of concern.
<b>EXEMPTION: Not Defined as a Regulated Small MS4.</b>	Federal Indian reservations where the population within the “urbanized area” portion of the reservation is less than 1,000 persons.

**Table 4.3: National Pollutant Discharge Elimination System (NPDES)  
Cities Located in the §6217 Management Area**

<b>Aransas</b>		<b>Galveston- Phase II County</b>		<b>Kenedy</b>	
ARANSAS PASS		LA MARQUE	Phase II - AD	SARITA	
ROCKPORT		LEAGUE CITY	Phase II - AD	<b>Kleberg</b>	
<b>Brazoria- Phase II County</b>		TEXAS CITY	Phase II - AD	KINGSVILLE	Phase II - PD
BRAZORIA		SANTA FE	Phase II - AD	<b>Matagorda</b>	
CLUTE		BAYOU VISTA	Phase II - AD	PALACIOS	
FREEPORT		CLEAR LAKE	Phase II - AD	<b>Nueces- Phase II County</b>	
JONES CREEK		<b>Harris- Phase I County</b>	Phase II - AD	CORPUS CHRISTI	Phase I - NPDES
LAKE JACKSON	Phase II - PD	BAYTOWN	Phase II - AD	PORT ARANSAS	
OYSTER CREEK		DEER PARK	Phase II - AD	ROBSTOWN	Phase II - PD
RICHWOOD		EL LAGO	Phase II - AD	<b>Orange</b>	
<b>Calhoun</b>		FRIENDSWOOD	Phase II - AD	BRIDGE CITY	
POINT COMFORT		GALENA PARK	Phase II - AD	ORANGE	
PORT LAVACA	Phase II - PD	HOUSTON	Phase I - NPDES	PINEHURST	
SEADRIFT		JACINTO CITY	Phase II - AD	VIDOR	Phase II - PD
<b>Cameron- Phase II County</b>		LA PORTE	Phase II - AD	WEST ORANGE	
BROWNSVILLE	Phase II - AD	LEAGUE CITY	Phase II - AD	<b>Refugio</b>	
LAGUNA VISTA		NASSAU BAY	Phase II - AD	REFUGIO	
LOS FRESNOS		PASADENA	Phase I - NPDES	WOODSBORO	
PORT ISABEL		SEABROOK	Phase II - AD	<b>San Patricio- Phase II County</b>	
RIO HONDO		SHOREACRES	Phase II - AD	ARANSAS PASS	
SOUTH PADRE		SOUTH HOUSTON	Phase II - AD	GREGORY	
<b>Chambers</b>		TAYLOR LAKE	Phase II - AD	INGLESIDE	
ANAHUAC		WEBSTER	Phase II - AD	ODEM	
BAYTOWN	Phase II - AD	<b>Jefferson - Phase II County</b>		PORTLAND	Phase II - AD
OLD RIVER-WINFREE		BEAUMONT	Phase I - NPDES	SINTON	
<b>Galveston- Phase II County</b>		GROVES	Phase II - AD	TAFT	
DICKINSON	Phase II - AD	NEDERLAND	Phase II - AD		
FRIENDSWOOD	Phase II - AD	PORT ARTHUR	Phase II - AD		
GALVESTON	Phase II - AD	PORT NECHES	Phase II - AD		
HITCHCOCK	Phase II - AD				
KEMAH	Phase II - AD				

Phase I - NPDES (Cities/Counties with NPDES Permits)  
Phase II - AD (Automatically Designated NPDES Cities/Counties)  
Phase II - PD (Potentially Designated NPDES Cities)

**Table 4.4: National Pollutant Discharge Elimination System (NPDES)  
Cities in the Coastal Watersheds**

<b>Brazoria- Phase II County</b>		<b>Nueces- Phase II County</b>		<b>Hidalgo- Phase II County</b>	
ALVIN	Phase II - PD	BISHOP		LA VILLA	
ANGLETON	Phase II - PD	<b>San Patricio- Phase II County</b>		MCALLEN	Phase II - AD
BROOKSIDE		MATHIS		MERCEDES	Phase II - PD
DANBURY		<b>Victoria- Phase II County</b>		MISSION	Phase II - AD
HOLIDAY LAKES		VICTORIA	Phase II - AD	PALMVIEW	Phase II - AD
MANVEL		<b>Willacy</b>		PHARR	Phase II - AD
PEARLAND	Phase II - AD	LYFORD		SAN JUAN	Phase II - AD
SWEENY		RAYMONDVILLE		WESLACO	Phase II - AD
WEST COLUMBIA		<b>Austin</b>		<b>Jasper</b>	
<b>Cameron- Phase II County</b>		BELLVILLE		JASPER	
COMBES	Phase II - AD	SEALLY		KIRBYVILLE	
HARLINGEN	Phase II - AD	WALLIS		<b>Jim Hogg</b>	
LA FERIA		<b>Bee</b>		HEBBRONVILLE	
PALM VALLEY	Phase II - AD	BEEVILLE		<b>Jim Wells</b>	
PRIMERA	Phase II - AD	<b>Brooks</b>		ALICE	Phase II - PD
SAN BENITO	Phase II - AD	FALFURRIAS		ORANGE GROVE	
SANTA ROSA		<b>Colorado</b>		PREMONT	
<b>Chambers</b>		EAGLE LAKE		<b>Lavaca</b>	
MONT BELVIEU		<b>De Witt</b>		HALLETTSVILLE	
<b>Harris- Phase I County</b>		CUERO		MOULTON	
BELLAIRE	Phase II - AD	YOAKUM		SHINER	
BUNKER HILL	Phase II - AD	<b>Duval</b>		YOAKUM	
HEDWIG VILLAGE	Phase II - AD	BENAVIDES		<b>Liberty</b>	
HUMBLE	Phase II - AD	SAN DIEGO		AMES	
HUNTERS CREEK	Phase II - AD	<b>Fort Bend- Phase II County</b>		DAISETTA	
JERSEY VILLAGE	Phase II - AD	HOUSTON	Phase I - NPDES	DAYTON	
KATY	Phase II - AD	KATY	Phase II - AD	LIBERTY	
MCNAIR		MEADOWS	Phase II - AD	<b>Live Oak</b>	
MISSOURI CITY	Phase II - AD	MISSOURI CITY	Phase II - AD	GEORGE WEST	
PEARLAND	Phase II - AD	NEEDVILLE		THREE RIVERS	
PINEY POINT VILLAGE	Phase II - AD	RICHMOND		<b>Montgomery- Phase II County</b>	
SOUTHSIDE PLACE	Phase II - AD	ROSENBERG		HOUSTON	Phase I - NPDES
SPRING VALLEY	Phase II - AD	STAFFORD	Phase II - AD	OAK RIDGE NORTH	
STAFFORD	Phase II - AD	SUGAR LAND	Phase II - AD	SHENANDOAH	
TOMBALL	Phase II - AD	<b>Hardin</b>		<b>Newton</b>	
WALLER		SILSBEE		NEWTON	
WEST UNIVERSITY	Phase II - AD	<b>Hidalgo- Phase II County</b>		<b>Waller</b>	
<b>Jackson</b>		ALAMO	Phase II - AD	BROOKSHIRE	
EDNA		ALTON		HEMPSTEAD	
GANADO		DONNA	Phase II - AD	KATY	Phase II - AD
<b>Jefferson</b>		EDCOUCH		PRAIRIE VIEW	
BEVIL OAKS		EDINBURG	Phase II - AD	WALLER	
CHINA		ELSA		<b>Wharton</b>	
<b>Matagorda</b>		HIDALGO		EL CAMPO	Phase II - PD
BAY CITY	Phase II - PD	LA JOYA		WHARTON	

Phase I - NPDES (Cities/Countries with NPDES Permits)  
Phase II - AD (Automatically Designated NPDES Cities/Countries)  
Phase II - PD (Potentially Designated NPDES Cities)

## Chapter 5: Management Measures

This chapter presents the §6217 (g) measures contained in EPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*. These measures cover each of the five major categories of nonpoint sources that impair or threaten coastal waters nationally: (1) agricultural runoff; (2) urban runoff (including developing and developed areas); (3) silvicultural (forestry) runoff; (4) marinas and recreational boating; and (5) channelization and channel modification, dams, and streambank and shoreline erosion. Management measures for wetlands, riparian areas, and vegetated treatment systems that apply generally to various categories of sources of nonpoint pollution also are included.

Management measures are defined in §6217(g)(5) of CZARA as:

*economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives.*

State Nonpoint Pollution Control Programs must provide for the implementation of management measures that are in conformity with EPA's management measure guidance. This chapter presents a description of each source category, programs which will be used to implement the (g) measures, each management measure, its purpose and applicability, and information on implementation. The management measures listed in this chapter are taken directly from EPA's management measures guidance. Similarly, much of the general information on the purpose and applicability of each measure is drawn from EPA's guidance. Additional information on the primary programs which will be used to implement Texas' Coastal Nonpoint Program is contained in Chapter 4.

### 5.1 Agriculture and Silviculture

#### **5.1.1 Sources and Activities Resulting in Agricultural and Silvicultural Nonpoint Source Pollution**

Approximately 46 percent of the land in the coastal zone is in agricultural land uses, and less than 2 percent is in forestry land uses. Because the entire Texas coast is topographically extremely flat, the potential for sheet and rill erosion is quite low compared to other parts of the state and nation. In addition, from the mid-coast south, semiarid conditions exist. Each of these conditions tends to limit the impacts of certain agricultural activities because soil erosion is the key vehicle for transporting agricultural nutrients and pesticides to receiving waters. The intent of the coastal nonpoint source program for agriculture and forestry is to have state-level enforceable policies to ensure that adequate management measures are applied to these lands.

Agricultural and silvicultural activities having the potential to cause nonpoint source pollution are discussed below.

#### **5.1.1.1 Agricultural Activities**

**Animal Feeding Operations.** Waste products generated by smaller animal feeding operations (below the thresholds which require a National Pollutant Discharge Elimination System (NPDES) permit) have the potential to cause nonpoint source pollution. These materials contain nutrients, pathogens, and oxygen-demanding substances.

**Row Crop Production.** Plowing the land for the cultivation of crops exposes the soil to the erosive forces of wind and rain and can be the source of eroded sediment. Nutrients in fertilizers applied to croplands can be transported to surface waters through rainfall runoff and to ground water through infiltration. Toxic compounds in insecticides and herbicides applied to crops can impact water quality in receiving waters. Crop production activities which encroach upon riparian areas can degrade aquatic habitats.

**Rangeland.** In some instances, rangeland areas which encroach upon riparian areas can degrade aquatic habitats. Wastes from rangeland livestock can contribute nutrients, pathogens, and oxygen-demanding substances to water bodies and thus degrade the water quality.

**Irrigation/Animal Watering.** Water removed from streams and aquifers for irrigation and for livestock can alter the hydrologic regime of an area. Runoff and irrigation return flow can carry nutrients and sediment to surface waters. Also, irrigation can cause leaching of salts and nutrients into groundwater.

#### **5.1.1.2 Silvicultural Activities**

Forestry operations can degrade several water quality characteristics in water bodies receiving drainage from forestlands. Sediment concentrations can increase due to accelerated erosion; water temperatures can increase due to removal of overstory riparian shade; slash and other organic debris can accumulate in water bodies, depleting dissolved oxygen; and organic and inorganic chemical concentrations can increase due to harvesting and to fertilizer and pesticide applications. These potential increases in water quality contaminants are usually proportional to the severity of site disturbance. Silvicultural nonpoint source pollution impacts depend on site characteristics, climatic conditions, and the forestry practices employed. The types of forestry activities that affect nonpoint source pollution include road construction and use, timber harvesting, mechanical equipment operation, burning, and application of fertilizers and pesticides.

**Road Construction and Use.** Roads can be a major source of erosion from forested lands. Erosion potential from roads can be accelerated by increasing slope gradients on cut-and-fill slopes, intercepting subsurface water flow, and concentrating overland flow on the road surface and in channels. Roads with steep gradients, deep cut-and-fill sections, poor drainage, erodible soils, and road-stream crossings can contribute a significant amount to the sediment load. Road-stream crossings are frequent sources of erosion and sediment. Soil loss can be larger during and immediately

after road construction because of the unstable roadbase and disturbance by passage of heavy trucks and equipment.

**Timber Harvesting.** Detrimental effects on water quality can occur during harvesting due to the access and movement of vehicles and machinery, and the skidding and loading of trees or logs. These effects include soil disturbance, soil compaction, and direct disturbance of stream channels. Logging operation planning, soil and cover type, and slope are important factors influencing harvesting impacts on water quality. The construction and use of haul roads, skid trails, and landings for access to and movement of logs are the harvesting activities that can have a large erosion potential.

Another adverse impact of harvesting can be an increase in stream water temperatures resulting from removal of streamside vegetation, with the greatest potential impacts occurring in small streams.

**Regeneration Methods.** Regeneration methods can be divided into two general types: (1) regeneration from seedlings, either planted seedlings or existing seedlings released by harvesting, and (2) regeneration from seed, which can be seed from existing trees on or near the site or the broadcast application of seeds of the desired species. In some areas, regeneration with seedlings by mechanical tree planting is conducted because it is fast and produces consistent results. Planting approaches relying on seeding generally require a certain amount of mineral soil to be exposed for seed establishment. For this reason, site preparation is usually needed for regeneration by seeding.

**Site Preparation.** Mechanical site preparation by large tractors that shear, disk, drum-chop, or root-rake a site may result in considerable soil disturbance over large areas and has a high potential to deteriorate water quality. Site preparation techniques that result in the removal of vegetation and litter cover, soil compaction, exposure or disturbance of the mineral soil, and increased stormflows due to decreased infiltration and percolation all can contribute to increases in stream sediment loads.

**Prescribed Burning.** Prescribed burning of slash can increase erosion by eliminating protective cover and altering soil properties. The degree of erosion following a prescribed burn depends on soil erodibility; slope; precipitation timing, volume, and intensity; fire severity; cover remaining on the soil; and speed of revegetation. Burning may also increase stormflow in areas where all vegetation is killed. Such increases are partially attributable to decreased evapotranspiration rates and reduced canopy interception of precipitation.

**Application of Forest Chemicals.** Adverse effects on water quality due to forest chemical application typically result from improper application, such as failure to establish buffers around watercourses. Aerial application of forest chemicals has a greater potential to adversely affect water quality, especially if chemicals are applied under improper conditions, such as high winds, or are applied directly to watercourses.

### ***5.1.2 Texas Programs Implementing Agricultural and Silvicultural Management Measures***

In Texas, the control of nonpoint source pollution from agricultural and silvicultural sources in coastal areas is being addressed through a combination of regulatory and voluntary incentive-based

state and federal programs. As discussed in Chapter 4, the State of Texas Agricultural/Silvicultural Nonpoint Source Management Program together with the TMDL process will be the primary programs used to implement those portions of the Coastal Nonpoint Pollution Control Program that relate to agricultural and silvicultural sources.

Agricultural and silvicultural contributions to nonpoint source pollution will be examined through the TMDL process. The activities described under the Texas Agricultural/Silvicultural Nonpoint Source Program will be used to resolve agricultural and silvicultural nonpoint source issues and to develop and implement watershed action plans for these nonpoint sources. The function of the TSSWCB and Soil and Water Conservation Districts (SWCDs) in the TMDL process will be participation and concurrence in the determination of load allocations attributed to nonpoint source pollutants from agricultural and silvicultural activities and implementation of management measures necessary to achieve those load allocations. Development, certification, and implementation of Water Quality Management Plans (WQMPs) will address site-specific issues which are affecting water quality in given stream segments. Implementation of these plans is crucial to achieving and documenting the attainment of water quality goals relating to agriculture and silviculture nonpoint source management.

The TSSWCB funds educational activities through the Texas Forest Service which can result in implementation of forestry BMPs. The Texas Forest Service's nonregulatory nonpoint source pollution prevention program promotes and monitors the use of voluntary best management practices in forestry operations throughout East Texas. The effectiveness of these programs in reducing silvicultural nonpoint source pollution is demonstrated by the fact that not a single water body segment on the state's §303(d) list has an impairment due to forestry activities.

Since Texas is currently relying on primarily voluntary incentive-based programs to address agricultural and silvicultural nonpoint source pollution, backup enforcement mechanisms are needed to meet the requirements of §6217. As mentioned in Chapter 4, SB 503 does contain provisions that can be used to address "bad actors" through the complaint resolution process, should the voluntary program be found to be insufficient. This, coupled with the §303(d) and TMDL activities under the Clean Water Act, will result in broad-scale implementation of nonpoint source management measures. Activities will be focused on water bodies where water quality impairments exist. Resources will be targeted to these water bodies. Programs that encourage and promote the application of management measures for pollution prevention will be in place throughout the coastal zone. This array of programs and activities will meet the requirements of §6217 of CZARA.

Additional state and federal programs related to the implementation of the Coastal Nonpoint program are discussed below. These programs, together with the programs discussed above, are designed to cover all of the (g) measures outlined in the EPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*.

### **Supporting State and Federal Programs**

#### **Conservation Planning and Other USDA-NRCS Programs**

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has historically aided soil and water conservation districts in on-the-ground implementation of

conservation practices by local farmers and ranchers. This relationship is nearing its sixtieth year. A multitude of conservation measures which are directly linked to nonpoint source pollution abatement and prevention measures have been developed and implemented over the years and continue to be implemented. New responsibilities with regard to environmental quality maintenance and enhancement have been delegated to the NRCS.

The mission of the NRCS is to provide technical assistance to all landowners and operators on soil and water conservation matters. Under some conditions, the TSSWCB, Texas Forest Service, or other agencies provide technical assistance. Work is directed through local SWCDs in Texas, according to the terms of memoranda of understanding with each district. After an agricultural nonpoint source pollution problem is identified and best management practices are selected for the affected area, the NRCS and others will work with individual landholders to develop and implement plans to abate the problems. Adequate technical assistance is essential in any voluntary effort designed to achieve implementation of best management practices and nonpoint source management programs.

The NRCS and conservation districts also are heavily involved in implementing conservation compliance programs such as the Wetlands Reserve Program. This program places emphasis on retaining wetlands functions and values by limiting uses on privately owned wetlands in return for financial benefits. Three financial incentive packages are available: (1) permanent easements, (2) 30-year easements, and (3) restoration cost-share agreements of minimum 10-year duration. Compatible uses are allowed if they are fully consistent with the protection and enhancement of the wetland. This program fits well with most agricultural operations and can improve or protect water quality and control erosion. The TSSWCB works with conservation districts and the NRCS to designate areas for various special projects and activities.

### **Texas Prairie Wetland Project**

This program, created by Ducks Unlimited, the Texas Parks and Wildlife Department, the NRCS, and the U.S. Fish and Wildlife Service, is designed to restore, conserve, enhance, and maintain the historic Gulf Coast Prairie of Texas. Native coastal prairies are disappearing, making them the most impacted habitat along the Texas Gulf Coast. Such prairies serve to filter runoff and thus protect water quality.

Cooperators interested in the program set up a management agreement with their local soil and water conservation district to carry out range management practices such as brush management and re-establishment of native grasses. Technical assistance and financial incentives are available to landowners interested in improving the status of waterfowl and wetlands on their property. Like the Wetlands Reserve Program, involvement in this program fits well with most agricultural operations and can improve or protect water quality and control erosion.

### **Texas Department of Agriculture**

The Texas Department of Agriculture (TDA) is the state's lead agency responsible for agricultural pesticide regulation. The Texas pesticide and herbicide laws grant TDA the authority to enforce the provisions of the law pertaining to the registration, distribution, and use of all agricultural pesticides. Through its Pesticide Division, TDA is responsible for licensing all agricultural pesticide applicators and the labeling, storage, sales, usage and disposal of all pesticides. TDA also cooperates with other

state agencies that have statutory pesticide responsibilities, such as the TNRCC, the Structural Pest Control Board, and the Texas Department of Health. TDA is responsible for the enforcement of federal pesticide laws under a cooperative agreement with the EPA.

The TDA cooperates with all agricultural producers and other users of pesticides to make certain that the products are used safely and according to instructions. The Texas Pesticide Control Act requires storage in a manner that will reasonably ensure that human food, domestic and public water, pet foods, drugs, animal feeds, commercial fertilizers, seeds or clothing will not be contaminated. The law directs that pesticide containers are to be disposed of as directed on the label or by any other methods approved by the TDA. Any use of pesticides inconsistent with label directions is a violation of the law and may subject the user to penalties under federal and state law.

The TDA also has responsibility for developing and implementing the State of Texas Plan for Certification of Pesticide Applicators. All application equipment used by commercial applicators must be registered and is subject to inspection at any reasonable time. All licensed applicators must maintain a two-year record. The TSSWCB works with the TDA to provide appropriate nonpoint source educational materials to the state's certified pesticide applicators. The TSSWCB will coordinate with the TDA if it is determined that misapplication, mishandling, or misuse of agricultural chemicals is contributing to a nonpoint source pollution problem.

### **Texas Forest Service**

The Texas Forest Service (TFS) is a member of the Texas A&M University System, with administrative offices in College Station and field offices in over 40 locations throughout the state. The mission of the TFS is to provide statewide leadership and professional assistance to ensure that the state's forest, tree, and related natural resources are wisely used, nurtured, protected and perpetuated for the benefit of all Texans.

The TFS resource development program provides professional assistance to nonindustrial private landowners, including services such as development of forest management plans, assistance in implementation of reforestation and timber stand improvement practices, prescribed burning, fireline plowing, and other services. It administers several state and federal cost-share programs which promote reforestation and stewardship. Emphasis is placed on developing the state's timber resources in an environmentally sound manner to meet present and future needs for timber and other benefits.

The TFS has an active, effective, nonregulatory nonpoint source pollution prevention program, funded in part through a TSSWCB-administered Clean Water Act §319 grant. This program promotes and monitors the use of voluntary best management practices in forestry operations throughout East Texas. Compliance with these nonregulatory BMPs is currently over 87 percent.

On forestland owned by the forest industry, compliance is 98 percent. Approximately 80 percent of the timber harvested in East Texas comes from logging contractors trained in BMPs. This program has won the Governor's Clean Texas 2000 Environmental Excellence Award, a state water quality award, for its effective implementation of BMPs and highly successful cooperation among various groups and agencies.

In addition to the programs above, the TFS operates wildfire and pest control programs to reduce resource losses to insects, disease, and fire. Other agency programs include tree genetics, wood utilization, windbreaks, and urban and community forestry.

The TSSWCB coordinates silvicultural nonpoint source management activities with the Texas Forest Service to ensure that their programs, expertise, and responsibilities are a part of the state's nonpoint source management program.

### **5.1.3 Funding Implementation of Agricultural and Silvicultural Management Measures**

The *State of Texas Agricultural/Silvicultural Nonpoint Source Management Program* serves as a basis for grant funds under §319 of the Clean Water Act. Grant funds are utilized within designated priority watersheds to support the implementation of best management practices and, in certain cases, to transfer that technology to areas with similar nonpoint source circumstances. These funds in the past were used mostly for demonstration and education projects; however, the majority of these funds will now be used in specific impaired or threatened watersheds to provide technical and financial assistance to landowners for implementing on-the-ground practices on their operations as part of WQMPs.

SB 503 cost-share funds are available to help agriculture and forestry landowners implement WQMPs in the coastal zone.

The USDA-NRCS is a source of funding for conservation practices through the Environmental Quality Incentives Program (EQIP). The NRCS is also a source of funding for some larger projects such as watershed protection and flood prevention projects and resource conservation and development projects which can be directed toward nonpoint source management efforts.

The Texas Forest Service administers several state and federal cost-share programs which promote reforestation and stewardship.

In March 1998, the Coastal Coordination Council approved CMP grants guidance to provide additional funding for implementation of nonpoint source measures in the coastal zone. Projects funded in this category are: (1) development of programs to control urban sources of nonpoint pollution in furtherance of §26.177 of the Texas Water Code; (2) development and implementation of water quality management plans in compliance with S.B. 503 (§201.026 of the Agriculture Code); and (3) projects that demonstrate BMPs for nonpoint source pollution control.

### **5.1.4 Agricultural and Silvicultural Implementation Goals and Strategies**

1. Potential loadings from agricultural and silvicultural nonpoint sources will be reduced by implementing pollution prevention programs in each of the areas with identified problems and concerns.

2. Conservation districts will be assisted in developing and certifying water quality management plans for agricultural and silvicultural operations within identified problem areas having the potential to cause nonpoint pollution in areas with approved TMDLs.
3. The TSSWCB will continue to work with the NRCS to designate areas for various special projects and activities.
4. The TSSWCB will coordinate with the TDA if it is determined that misapplication, mishandling, or misuse of agricultural chemicals is contributing to a nonpoint source pollution problem.
5. The TSSWCB will work with TAEX to include nonpoint source water quality management in TAEX education programs, including the state pesticide applicator certification program training.
6. The TSSWCB will coordinate research needs relative to nonpoint source management programs and will utilize pertinent information developed through soil and water conservation and water quality research programs of the TAES. During each fiscal year any needed program coordination mechanisms will be developed and implemented.
7. The TSSWCB will coordinate silvicultural nonpoint source management activities with the Texas Forest Service to ensure that TFS programs, expertise and responsibilities are a part of the coastal management program.

### **5.1.5 Agricultural and Silvicultural Management Measures**

EPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* contains seven management measures addressing agricultural sources of nonpoint source pollution and ten management measures addressing silvicultural sources of nonpoint source pollution. The source categories addressed by these measures are listed below and summarized in Tables 5.1 and 5.2.

#### **Agricultural categories addressed by the (g) measures:**

- Erosion from cropland
- Confined animal facilities
- Application of nutrients to cropland
- Application of pesticides to cropland
- Grazing management
- Irrigation of cropland

The agricultural (g) measures apply to agricultural lands, including cropland, irrigated cropland, range and pasture, orchards, permanent hayland, specialty crop production, and nursery crop production.

According to NOAA and EPA's *Program Development and Approval Guidance* for Coastal Nonpoint Pollution Control Programs, NOAA and EPA may allow a state to exclude some categories, subcategories, or sources from the requirements of its Coastal Nonpoint Program if the state can demonstrate that a category, subcategory, or particular source of nonpoint pollution does not and is not reasonably expected to, individually or cumulatively, present significant adverse effects to living coastal resources or human health.

Texas proposes to exclude the subcategory of dryland rowcrop agriculture from the program in the section of the §6217 Management Area beginning at the northern boundary of the Coastal Bend Bays and Estuaries Program Area (northern Refugio and Bee Counties) and continuing southward to the northern boundary of the Arroyo Colorado Watershed. Data supporting this exclusion can be found in Section 5.1.6 of this Chapter.

When data can be made available to support a similar exclusion for rangeland throughout the §6217 Management Area, the state will seek such an exclusion. Initial investigations indicate that nutrient and sediment losses from rangeland are not a significant source of water quality impacts within the coastal zone, and priorities for implementing management measures will be placed elsewhere. Additional research and data gathering will be conducted as resources can be made available to determine if nonpoint source pollution from rangeland has a significant effect on coastal resources.

#### **Silvicultural categories addressed by the (g) measures:**

- Preharvest planning
- Streamside management areas
- Road construction/reconstruction
- Road management
- Timber harvesting
- Irrigation water management
- Site preparation and forest regeneration
- Fire management
- Revegetation of disturbed areas
- Forest chemical management
- Wetland forest management

Only three coastal counties have significant forestry activities, which account for only 1.8 percent of the total land use in the coastal zone. Examination of impaired water body segments on the §303(d) list within these three counties shows no impairments resulting from forestry activities. Additional

research and data gathering will be conducted as resources can be made available to determine if nonpoint source pollution from forestland and forestry practices has a significant adverse effect on living coastal resources, human health, or water quality within the coastal zone.

A description of each of the agricultural and silvicultural management measures and the programs that will be used to implement the measure follows.

#### **5.1.5.1 Agriculture Management Measure: Erosion and Sediment Control**

*Apply the erosion component of a Conservation Management System (CMS) as defined in the Field Office Technical Guide of the U.S. Department of Agriculture - Soil Conservation Service to minimize the delivery of sediment from agricultural lands to surface waters, or*

*Design and install a combination of management and physical practices to settle the settleable solids and associated pollutants in runoff delivered from the contributing area for storms of up to and including a 10-year, 24-hour frequency.*

#### **Purpose and Applicability**

This management measure is intended to be applied by states to activities that cause erosion on agricultural land and on land that is converted from other land uses to agricultural land. The problems associated with soil erosion are the movement of sediment and associated pollutants by runoff into a water body. Application of this management measure will reduce the mass load of sediment reaching a water body and improve water quality and the use of the water resource.

#### **Implementation**

**WQMPs.** Numerous producers voluntarily participate in the WQMP program throughout the state. WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide.

These same criteria were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

**TMDL Process.** Through the TMDL process, nonpoint source load allocations will be determined for agricultural and silvicultural sources and activities, and management measures will be developed and implemented to ensure that the load allocations are achieved. The TSSWCB and SWCDs will work with landowners to develop WQMPs to address site-specific issues affecting water quality which are identified through the TMDL process.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. The TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121 of the Texas Water Code.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes agricultural and silvicultural nonpoint sources of pollution not in compliance with a certified WQMP approved by the TSSWCB as provided by §201.026 of the Agriculture Code. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**EQIP and CRP.** At the federal level, the USDA-NRCS Environmental Quality Incentives Program (EQIP) and the Conservation Reserve Program (CRP) can be used to address this management measure. Both are voluntary and incentive-based programs as noted earlier. The EQIP assists farmers and ranchers in complying with federal, state, and tribal environmental laws and encourages environmental enhancement in targeted project areas. The CRP offers agricultural producers the opportunity to retire highly erodible land (HEL) currently under cultivation through a 10-year contract whereby the producer receives annual rental payments. HEL under contract is planted in permanent vegetation. Soil erosion on acreage enrolled in either program is, for the most part, adequately controlled.

**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with erosion and sediment control that can be used to implement this (g) measure include conservation cover, conservation cropping sequence, conservation tillage, contour farming, contour orchard, cover and green manure crops, critical area planting, crop residue use, delayed seedbed preparation, diversion, field border, filter strip, grade stabilization structure, grassed waterway, grasses and legumes in rotation, land smoothing, mulching, contour strip cropping, sediment basin, terrace, water and sediment control basin, wetland and riparian zone protection, and close spaced crops.

#### **5.1.5.2 Agriculture Management Measure: Confined Animal Facilities (Large and Small)**

##### Large Units Management Measure

*Limit the discharge from the confined animal facility to surface waters by:*

- (1) *Storing both the facility wastewater and the runoff from confined animal facilities that is caused by storms up to and including a 25-year, 24-hour frequency storm. Storage structures should:*
  - (a) *Have an earthen lining or plastic membrane lining, or*
  - (b) *Be constructed with concrete, or*
  - (c) *Be a storage tank;*

*and*

- (2) *Managing stored runoff and accumulated solids from the facility through an appropriate waste utilization system.*

### **Purpose and Applicability**

Large Units: The problems associated with animal facilities result from runoff, facility wastewater, and manure. Application of this management measure will greatly reduce the volume of runoff, manure, and facility wastewater reaching a water body, thereby improving water quality and the use of the water resource.

#### **Small Units Management Measure**

*Design and implement systems that collect solids, reduce contaminant concentrations, and reduce runoff to minimize the discharge of contaminants in both facility wastewater and in runoff that is caused by storms up to and including a 25-year, 24-hour frequency storm. Implement these systems to substantially reduce significant increases in pollutant loadings to ground water.*

*Manage stored runoff and accumulated solids from the facility through an appropriate waste utilization system.*

### **Purpose and Applicability**

Small Units: The goal of this management measure is to minimize the discharge of contaminants both in facility wastewater and in runoff from storms by using practices such as solids separation basins in combination with vegetative practices and other practices that reduce runoff and are also protective of groundwater.

Existing facilities that meet the requirements of the management measure for large units are in compliance with the requirements for small units. Existing and new facilities that already minimize the discharge of contaminants to surface waters, protect against contamination of ground water, and

have an appropriate waste utilization system may already meet the requirements of this management measure. Such facilities may not need additional controls.

### **Implementation**

**NPDES Program.** The Texas Water Code and the Texas Clean Air Act authorize the TNRCC to regulate, as point sources, the management of livestock and poultry waste from large concentrated animal feeding operations (CAFOs). Large CAFOs include dairies that milk more than 250 cows and feedlots that confine more than 1,000 cattle, 1,500 hogs or 30,000 chickens. These CAFOs are required to obtain a NPDES permit from TNRCC and EPA and are exempted from the §6217 requirements.

**WQMPs.** Confined animal facilities not required to obtain a discharge permit have the option of registering with the TNRCC and submitting an approved animal waste management system or obtaining a certified WQMP from the TSSWCB. Criteria for certification of water quality management plans for confined animal facilities equal or exceed the CZMA guidance. The program for small and large CAFOs equals the (g) measure requirements for the large CAFOs. WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide. These same criteria were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. The TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint, based on water quality impairment, is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes agricultural and silvicultural nonpoint sources of pollution not in compliance with a certified WQMP approved by the TSSWCB as provided by §201.026 of the Agriculture Code. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with animal water management/animal feeding facilities include proper location of livestock concentration, dikes, diversion, grassed waterway, heavy use protection, lined waterway, roof runoff management, terrace, waste storage pond, waste storage structure, and constructed wetland.

### 5.1.5.3 Agriculture Management Measure: Nutrient Management

*Develop, implement, and periodically update a nutrient management plan to: (1) apply nutrients at rates necessary to achieve realistic crop yields, (2) improve the timing of nutrient application, and (3) use agronomic crop production technology to increase nutrient use efficiency. When the source of the nutrients is other than commercial fertilizer, determine the nutrient value and the rate of availability of the nutrients. Determine and credit the nitrogen contribution of any legume crop. Soil and plant tissue testing should be used routinely. Nutrient management plans contain the following core components:*

- (1) *Farm and field maps showing acreage, crops, soils, and water bodies.*
- (2) *Realistic yield expectations for the crop(s) to be grown, based primarily on the producer's actual yield history, State Land Grant University yield expectations for the soil series, or SCS Soils-5 information for the soil series.*
- (3) *A summary of the nutrient resources available to the producer, which at a minimum include:*
  - *Soil test results for pH, phosphorus, nitrogen, and potassium;*
  - *Nutrient analysis of manure, sludge, mortality compost (birds, pigs, etc.), or effluent (if applicable);*
  - *Nitrogen contribution to the soil from legumes grown in the rotation (if applicable); and*
  - *Other significant nutrient sources (e.g., irrigation water).*
- (4) *An evaluation of field limitations based on environmental hazards or concerns, such as:*
  - *Sinkholes, shallow soils over fractured bedrock, and soils with high leaching potential,*
  - *Lands near surface water,*
  - *Highly erodible soils, and*
  - *Shallow aquifers.*
- (5) *Use of the limiting nutrient concept to establish the mix of nutrient sources and requirements for the crop based on a realistic yield expectation.*

- (6) *Identification of timing and application methods for nutrients to: provide nutrients at rates necessary to achieve realistic crop yields; reduce losses to the environment; and avoid applications as much as possible to frozen soil and during periods of leaching or runoff.*
- (7) *Provisions for the proper calibration and operation of nutrient application equipment.*

### **Purpose and Applicability**

This management measure is intended to be applied by states to activities associated with the application of nutrients to agricultural lands. The goal of this management measure is to minimize edge-of-field delivery of nutrients and minimize leaching of nutrients from the root zone. Nutrient management is pollution prevention achieved by developing a nutrient budget for the crop, applying nutrients at the proper time, applying only the types and amounts of nutrients necessary to produce a crop, and considering the environmental hazards of the site. In cases where manure is used as a nutrient source, manure holding areas may be needed to provide capability to avoid application to frozen soil.

### **Implementation**

**WQMPs.** The nutrient management component of a certified WQMP addresses the seven core components of a nutrient management plan as referenced in the (g) measure. The nutrient management component of a WQMP requires (1) a nutrient budget or (2) a soils analysis one of every three years. WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide. These same criteria were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

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will cause pollution of any of the water in the state. This includes agricultural and silvicultural nonpoint sources of pollution not in compliance with a certified WQMP approved by the TSSWCB as provided by §201.026 of the Agriculture Code. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with nutrient management include matching fertilizer with soil and crop requirements, applying fertilizer in the most efficient manner, applying fertilizer when actually needed by crop, and utilizing practices which minimize soil erosion.

#### **5.1.5.4 Agriculture Management Measure: Pesticide Management**

*To reduce contamination of surface water and ground water from pesticides:*

- (1) Evaluate the pest problems, previous pest control measures, and cropping history;*
- (2) Evaluate the soil and physical characteristics of the site including mixing, loading, and storage areas for potential leaching or runoff of pesticides. If leaching or runoff is found to occur, steps should be taken to prevent further contamination;*
- (3) Use integrated pest management (IPM) strategies that:*
  - (a) Apply pesticides only when an economic benefit to the producer will be achieved (i.e., applications based on economic thresholds); and*
  - (b) Apply pesticides efficiently and at times when runoff losses are unlikely;*
- (4) When pesticide applications are necessary and a choice of registered materials exists, consider the persistence, toxicity, runoff potential, and leaching potential of products in making a selection;*
- (5) Periodically calibrate pesticide spray equipment; and*
- (6) Use anti-backflow devices on hoses used for filling tank mixtures.*

#### **Purpose and Applicability**

This management measure is intended to be applied by states to activities associated with the application of pesticides to agricultural lands. The goal of this management measure is to reduce

contamination of surface water and ground water from pesticides. The basic concept of the pesticide management measure is to foster effective and safe use of pesticides without causing degradation to the environment. The most effective approach to reducing pesticide pollution of waters is, first, to release fewer pesticides and/or less toxic pesticides into the environment and, second, to use practices that minimize the movement of pesticides to surface water and ground water.

### **Implementation**

**WQMPs.** A certified WQMP requires that pest management standards from the USDA Field Office Technical Guide be applied when pesticides are used. The TDA regulates the use of pesticides through product labeling and applicator licensing. WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide. These same criteria were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes agricultural and silvicultural nonpoint sources of pollution not in compliance with a certified WQMP approved by the TSSWCB as provided by §201.026 of the Agriculture Code. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**Pesticide-Specific State Management Plans (PSSMP)** are implemented to protect groundwater from contamination by pesticides. Once an active ingredient (chemical) is listed by EPA requiring a PSSMP, registration is canceled nationally. Products containing the specified active ingredient can only be used in states with an approved PSSMP. The implementation of a PSSMP requires numerous activities including: groundwater monitoring of vulnerable areas and the use of voluntary and/or regulatory BMPs to protect groundwater.

**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with pesticide management include inventory of pest problems, site characteristics, use of pesticides with lower risk factors, records maintenance, lower use rates, recalibration of equipment, appropriate application, storage, and disposal, and use of integrated pest management.

#### **5.1.5.5 Agriculture Management Measure: Livestock Grazing**

*Protect range, pasture and other grazing lands:*

(1) *By implementing one or more of the following to protect sensitive areas (such as streambanks, wetlands, estuaries, ponds, lake shores, and riparian zones):*

- (a) Exclude livestock,*
- (b) Provide stream crossings or hardened watering access for drinking,*
- (c) Provide alternative drinking water locations,*
- (d) Locate salt and additional shade, if needed, away from sensitive areas, or*
- (e) Use improved grazing management (e.g., herding)*

*to reduce the physical disturbance and reduce direct loading of animal waste and sediment caused by livestock; and*

(2) *By achieving either of the following on all range, pasture, and other grazing lands not addressed under (1):*

- (a) Implement the range and pasture components of a Conservation Management System (CMS) as defined in the Field Office Technical Guide of the USDA-SCS by applying the progressive planning approach of the USDA-Soil Conservation Service (SCS) to reduce erosion, or*
- (b) Maintain range, pasture, and other grazing lands in accordance with activity plans established by either the Bureau of Land Management of the U.S. Department of the Interior or the Forest Service of USDA.*

#### **Purpose and Applicability**

This management measure is intended to be applied by states to activities on range, irrigated and nonirrigated pasture, and other grazing lands used by domestic livestock. Range is those lands on which the native vegetation (climax or natural potential plant community) is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing use. Range includes natural grassland, savannas, many wetlands, some deserts, tundra, and certain forb and shrub communities. Pastures are those lands that are primarily used for the production of adapted, domesticated forage plants for livestock. Other grazing lands include woodlands, native pastures, and croplands producing forages.

The focus of the grazing management measure is on the riparian zone, yet the control of erosion from range, pasture, and other grazing lands above the riparian zone is also encouraged. Application of this management measure will reduce the physical disturbance to sensitive areas and reduce the discharge of sediment, animal waste, nutrients, and chemicals to surface waters.

### **Implementation**

**WQMPs.** A certified WQMP requires that the prescribed grazing standard from the USDA Field Office Technical Guide be applied to grazing land. WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide. These same criteria were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. The TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

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**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with grazing management include deferred grazing, planned grazing system, proper grazing use, pasture and hayland management, proper water distribution, pipeline, pond, trough, well spring development, fencing, livestock exclusion, stream crossing, pasture and hayland planting, range seeding, critical area planting, brush and weed management, and prescribed burning.

#### **5.1.5.6 Agriculture Management Measure: Irrigation Water Management**

*To reduce nonpoint source pollution of surface waters caused by irrigation:*

- (1) Operate the irrigation system so that the timing and amount of irrigation water applied match crop water needs. This will require, as a minimum: (a) the accurate measurement of soil-water depletion volume and the volume of irrigation water applied, and (b) uniform application of water.*
- (2) When chemigation is used, include backflow preventers for wells, minimize the harmful amounts of chemigated waters that discharge from the edge of the field, and control deep percolation. In cases where chemigation is performed with furrow irrigation systems, a tailwater management system may be needed.*

*The following limitations and special conditions apply:*

- (1) In some locations, irrigation return flows are subject to other water rights or are required to maintain stream flow. In these special cases, on-site reuse could be precluded and would not be considered part of the management measure for such locations.*
- (2) By increasing the water use efficiency, the discharge volume from the system will usually be reduced. While the total pollutant load may be reduced somewhat, there is the potential for an increase in the concentration of pollutants in the discharge. In these special cases, where living resources or human health may be adversely affected and where other management measures (nutrients and pesticides) do not reduce concentrations in the discharge, increasing water use efficiency would not be considered part of the management measure.*
- (3) In some irrigation districts, the time interval between the order for and the delivery of irrigation water to the farm may limit the irrigator's ability to achieve the maximum on-farm application efficiencies that are otherwise possible.*
- (4) In some locations, leaching is necessary to control salt in the soil profile. Leaching for salt control should be limited to the leaching requirement for the root zone.*
- (5) Where leakage from delivery systems or return flows supports wetlands or wildlife refuges, it may be preferable to modify the system to achieve a high level of efficiency and then divert the "saved water" to the wetland or wildlife refuge. This will improve the quality of water delivered to wetlands or wildlife refuges by preventing the introduction of pollutants from irrigated lands to such diverted water.*
- (6) In some locations, sprinkler irrigation is used for frost or freeze protection, or for crop cooling. In these special cases, applications should be limited to the amount necessary for crop protection, and applied water should remain on-site.*

### **Purpose and Applicability**

This management measure is intended to be applied by states to activities on irrigated lands, including agricultural crop and pasture land (except for isolated fields of less than ten acres in size that are not

contiguous to other irrigated lands); orchard land; specialty cropland; and nursery cropland. The goal of this management measure is to reduce nonpoint source pollution of surface waters caused by irrigation. Those landowners already practicing effective irrigation management in conformity with the irrigation water management measure may not need to purchase additional devices to measure soil-water depletion or the volume of irrigation water applied, and may not need to expend additional labor resources to manage the irrigation system. For the purposes of this management measure, "harmful amounts" are those amounts that pose a significant risk to aquatic plant or animal life, ecosystem health, human health, or agricultural or industrial uses of the water.

### **Implementation**

Currently, many farmers practice irrigation water management on a voluntary basis with technical assistance provided by the USDA-NRCS, soil and water conservation districts, the TSSWCB, and other agencies. Irrigation districts also may be able to provide assistance to landowners in addressing this management measure.

**WQMPs.** A certified WQMP requires that the irrigation water management standard from the USDA Field Office Technical Guide be applied to irrigated land. WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide. These same criteria were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. The TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes agricultural and silvicultural nonpoint sources of pollution not in compliance with a certified WQMP approved by the TSSWCB as provided by §201.026 of the Agriculture Code. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with

irrigation water management include scheduling, proper slopes, proper stream size, proper furrow length, cultural practices, salinity control, efficient water application systems, field ditches, land leveling, efficient water transport, tailwater recovery, filter strips, surface drainage, subsurface drains, water table control, controlled drainage, and backflow prevention.

#### **5.1.5.7 Forestry Management Measure: Preharvest Planning**

*Perform advance planning for forest harvesting that includes the following elements where appropriate:*

- (1) Identify the area to be harvested including location of water bodies and sensitive areas such as wetlands, threatened or endangered aquatic species habitat areas, or high-erosion-hazard areas (landslide-prone areas) within the harvest unit.*
- (2) Time the activity for the season or moisture conditions when the least impact occurs.*
- (3) Consider potential water quality impacts and erosion and sedimentation control in the selection of silvicultural and regeneration systems, especially for harvesting and site preparation.*
- (4) Reduce the risk of occurrence of landslides and severe erosion by identifying high-erosion-hazard areas and avoiding harvesting in such areas to the extent practicable.*
- (5) Consider additional contributions from harvesting or roads to any known existing water quality impairments or problems in watersheds of concern.*

*Perform advance planning for forest road systems that includes the following elements where appropriate:*

- (1) Locate and design road systems to minimize, to the extent practicable, potential sediment generation and delivery to surface waters. Key components are:*
  - locate roads, landings, and skid trails to avoid to the extent practicable steep grades and steep hillslope areas, and to decrease the number of stream crossings;*
  - avoid to the extent practicable locating new roads and landings in Streamside Management Areas (SMAs); and*
  - determine road usage and select the appropriate road standard.*
- (2) Locate and design temporary and permanent stream crossings to prevent failure and control impacts from the road system. Key components are:*
  - size and site crossing structures to prevent failure;*
  - for fish-bearing streams, design crossings to facilitate fish passage.*
- (3) Ensure that the design of road prism and the road surface drainage are appropriate to the terrain and that road surface design is consistent with the road drainage structures.*

- (4) *Use suitable materials to surface roads planned for all-weather use to support truck traffic.*
- (5) *Design road systems to avoid high erosion or landslide hazard areas. Identify these areas and consult a qualified specialist for design of any roads that must be constructed through these areas.*

*Each state should develop a process (or utilize an existing process) that ensures that the management measures in this chapter are implemented. Such a process should include appropriate notification, compliance audits, or other mechanisms for forestry activities with the potential for significant adverse nonpoint source effects based on the type and size of operation and the presence of stream crossings or SMAs.*

### **Purpose and Applicability**

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. The planning process components of this management measure are intended to apply to commercial harvesting on areas greater than five acres and any associated road system construction or reconstruction conducted as part of normal silvicultural activities. The component for ensuring implementation of this management measure applies to harvesting and road construction activities that are determined by the state agency to be of a sufficient size to potentially impact the receiving water or that involve SMAs or stream crossings. On federal lands, where notification of forestry activities is provided to the federal land management agency, the provisions of the final paragraph of this measure may be implemented through a formal agreement between the state agency and the federal land management agency. This measure does not apply to harvesting conducted for precommercial thinning or noncommercial firewood cutting.

The objective of this management measure is to ensure that silvicultural activities, including timber harvesting, site preparation, and associated road construction, are conducted in a way that takes into account potential nonpoint source pollutant delivery to surface waters. Preharvest planning has been demonstrated to play an important role in the control of nonpoint source pollution and efficient forest management operations. Components of this measure address key aspects of forestry operations relevant to water quality protection, including the timing, location, and design of harvesting and road construction, the identification of sensitive areas or high-erosion-hazard areas; and the potential for additional cumulative contributions to existing water quality impairments.

### **Implementation**

**The Texas Forest Service** has an active, effective, nonregulatory nonpoint source pollution prevention program which promotes and monitors the use of voluntary best management practices by loggers and landowners. These best management practices also are incorporated into certified WQMPs. Best Management Practices 2.0 and 3.0 address the management measure above.

**WQMPs.** WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System established by the USDA-NRCS Field Office Technical Guide as well as Texas Forest Service best management practices. Resource Management System

criteria and U.S. Forest Service guidance were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint, based on water quality impairment, is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes agricultural and silvicultural nonpoint sources of pollution not in compliance with a certified WQMP approved by the TSSWCB as provided by §201.026 of the Agriculture Code. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with pre-harvest planting include appropriate planning of harvesting practices and road systems.

#### **5.1.5.8 Forestry Management Measure: Streamside Management Areas (SMAs)**

*Establish and maintain a streamside management area along surface waters, which is sufficiently wide and which includes a sufficient number of canopy species to buffer against detrimental changes in the temperature regime of the water body, to provide bank stability, and to withstand wind damage. Manage the SMA in such a way as to protect against soil disturbance in the SMA and delivery to the stream of sediments and nutrients generated by forestry activities, including harvesting. Manage the SMA canopy species to provide a sustainable source of large woody debris needed for instream channel structure and aquatic species habitat.*

#### **Purpose and Applicability**

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to surface waters bordering or within the area of operations. SMAs should be established for perennial water bodies as well as for intermittent streams that are flowing during the time of operation. For winter logging, SMAs are also needed for intermittent streams since spring breakup is both the time of maximum transport of sediments from the harvest unit and the time when highest flows are present in intermittent streams.

This management measure establishes areas along surface waters that are managed to protect the water quality of the adjacent water body. SMAs protect against soil disturbance and reduce the delivery to water bodies of sediment and nutrients from upslope activities. Canopy species in SMAs shade water bodies, moderating water temperature, and provide the detritus that often serves as an energy source for stream ecosystems. Trees in the SMA also provide a source of large, woody debris to water bodies.

### **Implementation**

**The Texas Forest Service** has an active, effective, nonregulatory nonpoint source pollution prevention program which promotes and monitors the use of voluntary best management practices by loggers and landowners. These best management practices also are incorporated into certified WQMPs. Best Management Practice 9.0 addresses the management measure above.

**WQMPs.** WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide as well as Texas Forest Service best management practices. Resource Management System criteria and U.S. Forest Service guidance were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

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**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with streamside management areas include minimizing disturbances, limiting pesticide and fertilizer use, and applying harvesting restrictions.

### 5.1.5.9 Forestry Management Measure: Road Construction/Reconstruction

- (1) *Follow preharvest planning (as described under Management Measure A) when constructing or reconstructing the roadway.*
- (2) *Follow designs planned under Management Measure A for road surfacing and shaping.*
- (3) *Install road drainage structures according to designs planned under Management Measure A and regional storm return period and installation specifications. Match these drainage structures with terrain features and with road surface and prism designs.*
- (4) *Guard against the production of sediment when installing stream crossings.*
- (5) *Protect surface waters from slash and debris material from roadway clearing.*
- (6) *Use straw bales, silt fences, mulching, or other favorable practices on disturbed soils on unstable cuts, fills, etc.*
- (7) *Avoid constructing new roads in SMAs to the extent practicable.*

#### **Purpose and Applicability**

Road construction is often the largest source of silviculture-produced sediment. This management measure is intended to apply to road construction/reconstruction operations for silvicultural purposes, including the following:

- The clearing phase: clearing to remove trees and woody vegetation from the road right-of-way.
- The pioneering phase: excavating and filling the slope to establish the road centerline and approximate grade.
- The construction phase: final grade and road prism construction and bridge, culvert, and road drainage installation.
- The surfacing phase: placement and compaction of the roadbed, road fill compaction, and surface placement and compaction (if applicable).

The purpose of this management measure is to reduce the generation and delivery of sediment from road construction or reconstruction. This is to be accomplished by following the preharvest plan layouts and designs for the road system, incorporating adequate drainage structures, and properly installing stream crossings. Other components of this measure include avoiding constructing roads in SMAs, removing debris from streams, and stabilizing areas of disturbed soil such as road fills.

#### **Implementation**

**The Texas Forest Service** has an active, effective, nonregulatory nonpoint source pollution prevention program which promotes and monitors the use of voluntary best management practices by loggers and landowners. These best management practices also are incorporated into certified WQMPs. Best Management Practice 3.0 addresses the management measure above.

**WQMPs.** WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System established by the USDA-NRCS Field Office Technical Guide as well as Texas Forest Service best management practices. Resource Management System criteria and U.S. Forest Service guidance were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. The TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes agricultural and silvicultural nonpoint sources of pollution not in compliance with a certified WQMP approved by the TSSWCB as provided by §201.026 of the Agriculture Code. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with road construction include turnouts, broad-based dip construction, pole culverts, outsloping, ditch construction, brush barriers, silt fences, riprap, filter strips, revegetation of cutbanks, and proper debris disposal.

#### **5.1.5.10 Forestry Management Measure: Road Management**

- (1) Avoid using roads where possible for timber hauling or heavy traffic during wet or thaw periods on roads not designed and constructed for these conditions.*
- (2) Evaluate the future need for a road and close roads that will not be needed. Leave closed roads and drainage channels in a stable condition to withstand storms.*
- (3) Remove drainage crossings and culverts if there is a reasonable risk of plugging or failure from lack of maintenance.*

- (4) *Following completion of harvesting, close and stabilize temporary spur roads and seasonal roads to control and direct water away from the roadway. Remove all temporary stream crossings.*
- (5) *Inspect roads to determine the need for structural maintenance. Conduct maintenance practices, when conditions warrant, including cleaning and replacement of deteriorated structures and erosion controls, grading or seeding of road surfaces, and, in extreme cases, slope stabilization or removal of road fills where necessary to maintain structural integrity.*
- (6) *Conduct maintenance activities, such as dust abatement, so that chemical contaminants or pollutants are not introduced into surface waters to the extent practicable.*
- (7) *Properly maintain permanent stream crossings and associated fills and approaches to reduce the likelihood (a) that stream overflow will divert onto roads, and (b) that fill erosion will occur if the drainage structures become obstructed.*

### **Purpose and Applicability**

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to active and inactive roads constructed or used for silvicultural activities.

The objective of this management measure is to manage existing roads to prevent sedimentation and pollution from runoff-transported materials. This management measure describes how to manage existing roads to minimize erosion, maintain stability, and reduce the risk of failure or decreased effectiveness of drainage structures and stream crossings. Components of this measure include the use of inspections and maintenance actions to prevent erosion of road surfaces and ensure the continued effectiveness of stream crossing structures. The measure also addresses appropriate actions for closing roads that are no longer in use.

### **Implementation**

**The Texas Forest Service** has an active, effective, nonregulatory nonpoint source pollution prevention program which promotes and monitors the use of voluntary best management practices by loggers and landowners. These best management practices also are incorporated into certified WQMPs. Best Management Practice 6.0 addresses the management measure above.

**WQMPs.** WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide as well as Texas Forest Service best management practices. Resource Management System criteria and U.S. Forest Service guidance were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

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**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with road management include blading and reshaping, keeping ditches clean, maintaining road surfaces, and revegetating roadsides.

#### **5.1.5.11 Forestry Management Measure: Timber Harvesting**

*The timber harvesting management measure consists of implementing the following:*

- (1) Timber harvesting operations with skid trails or cable yarding follow layouts determined under Management Measure A [the Preharvest Planning Management Measure].*
- (2) Install landing drainage structures to avoid sedimentation to the extent practicable. Disperse landing drainage over sideslopes.*
- (3) Construct landings away from steep slopes and reduce the likelihood of fill slope failures. Protect landing surfaces used during wet periods. Locate landings outside of SMAs.*
- (4) Protect stream channels and significant ephemeral drainages from logging debris and slash material.*
- (5) Use appropriate areas for petroleum storage, draining, dispensing. Establish procedures to contain and treat spills. Recycle or properly dispose of all waste materials.*

*For cable yarding:*

- (1) *Limit yarding corridor gouge or soil plowing by properly locating cable yarding landings.*
- (2) *Locate corridors for SMAs following Management Measure B [the SMA Management Measure].*

*For groundskidding:*

- (1) *Within SMAs, operate groundskidding equipment only at stream crossings to the extent practicable. In SMAs, fell and endline trees to avoid sedimentation.*
- (2) *Use improved stream crossings for skid trails which cross flowing drainages. Construct skid trails to disperse runoff and with adequate drainage structures.*
- (3) *On steep slopes, use cable systems rather than groundskidding where groundskidding may cause excessive sedimentation.*

### **Purpose and Applicability**

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to all harvesting, yarding, and hauling conducted as part of normal silvicultural activities on harvest units larger than five acres. This measure does not apply to harvesting conducted for precommercial thinnings or noncommercial firewood cutting.

The goal of this management measure is to minimize sedimentation resulting from the siting and operation of timber harvesting, and to manage petroleum products properly.

### **Implementation**

**The Texas Forest Service** has an active, effective, nonregulatory nonpoint source pollution prevention program which promotes and monitors the use of voluntary best management practices by loggers and landowners. These best management practices also are incorporated into certified WQMPs. Best Management Practices 3.0, 4.0, and 5.0 address the management measure above.

**WQMPs.** WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide as well as Texas Forest Service best management practices. Resource Management System criteria and U.S. Forest Service guidance were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. The TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices

prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes agricultural and silvicultural nonpoint sources of pollution not in compliance with a certified WQMP approved by the TSSWCB as provided by §201.026 of the Agriculture Code. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with timber harvesting include harvesting practices, landing practices, groundskidding practices, cable yarding practices, and petroleum management practices.

#### **5.1.5.12 Forestry Management Measure: Site Preparation and Forest Regeneration**

*Confine on-site potential nonpoint source pollution and erosion resulting from site preparation and the regeneration of forest stands. The components of the management measure for site preparation and regeneration are:*

- (1) Select a method of site preparation and regeneration suitable for the site conditions.*
- (2) Conduct mechanical tree planting and ground-disturbing site preparation activities on the contour of sloping terrain.*
- (3) Do not conduct mechanical site preparation and mechanical tree planting in streamside management areas.*
- (4) Protect surface waters from logging debris and slash material.*
- (5) Suspend operations during wet periods if equipment used begins to cause excessive soil disturbance that will increase erosion.*
- (6) Locate windrows at a safe distance from drainages and SMAs to control movement of the material during high runoff conditions.*
- (7) Conduct bedding operations in high-water-table areas during dry periods of the year. Conduct bedding in sloping areas on the contour.*
- (8) Protect small ephemeral drainages when conducting mechanical tree planting.*

#### **Purpose and Applicability**

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to all site preparation and regeneration activities conducted as part of normal silvicultural activities on harvested units larger than five acres.

### **Implementation**

**The Texas Forest Service** has an active, effective, nonregulatory nonpoint source pollution prevention program which promotes and monitors the use of voluntary best management practices by loggers and landowners. These best management practices also are incorporated into certified WQMPs. Best Management Practice 6.0 addresses the management measure above.

**WQMPs.** WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide as well as Texas Forest Service best management practices. Resource Management System criteria and U.S. Forest Service guidance were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. The TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

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**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with site preparation include proper use of equipment, haystack piling of slash, minimizing soil disturbance, and placement of slash away from drainages. Practices for regeneration include planting erodible sites and planting with suitable soil conditions.

#### **5.1.5.13 Forestry Management Measure: Fire Management**

*Prescribe fire for site preparation and control or suppress wildfire in a manner which reduces potential nonpoint source pollution of surface waters:*

- (1) Intense prescribed fire should not cause excessive sedimentation due to the combined effect of removal of canopy species and the loss of soil-binding ability of subcanopy and herbaceous vegetation roots, especially in SMAs, in streamside vegetation for small ephemeral drainages, or on very steep slopes.*
- (2) Prescriptions for prescribed fire should protect against excessive erosion or sedimentation to the extent practicable.*
- (3) All bladed firelines, for prescribed fire and wildfire, should be plowed on contour or stabilized with water bars and/or other appropriate techniques if needed to control excessive sedimentation or erosion of the fireline.*
- (4) Wildfire suppression and rehabilitation should consider possible NPS pollution of watercourses, while recognizing the safety and operational priorities of fighting wildfires.*

### **Purpose and Applicability**

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to all prescribed burning conducted as part of normal silvicultural activities on harvested units larger than five acres and for wildfire suppression and rehabilitation on forest lands.

Prescribed burning is aimed at reducing slash and competition for nutrients among seedlings and protecting against wildfire. Prescribed fires that burn intensely on steep slopes in close proximity to streams and that remove most of the forest floor and litter down to the mineral soil are most likely to adversely affect water quality. The purpose of this management measure is to reduce the potential nonpoint source pollution and erosion resulting from prescribed fire for site preparation and from methods for suppression of wildfire. Prescribed fires should be conducted under conditions to avoid the loss of litter and incorporated soil organic matter. Bladed firelines should be stabilized to prevent erosion, or practices such as handlines, firebreaks, or hose lays should be used where possible.

### **Implementation**

**The Texas Forest Service** has an active, effective, nonregulatory nonpoint source pollution prevention program which promotes and monitors the use of voluntary best management practices by loggers and landowners. These best management practices also are incorporated into certified WQMPs. Best Management Practice 5.0 addresses the management measure above.

**WQMPs.** WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide as well as Texas Forest Service best management practices. Resource Management System criteria and U.S. Forest Service guidance were used by the EPA in establishing the (g)

measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

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**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes agricultural and silvicultural nonpoint sources of pollution not in compliance with a certified WQMP approved by the TSSWCB as provided by §201.026 of the Agriculture Code. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with fire management include appropriate planning, minimizing fireline construction erosion potential, and constructing diversion ditches and cross ditches on firelines.

#### **5.1.5.14 Forestry Management Measure: Revegetation of Disturbed Areas**

*Reduce erosion and sedimentation by rapid revegetation of areas disturbed by harvesting operations or road construction:*

- (1) Revegetate disturbed areas (using seeding or planting) promptly after completion of the earth-disturbing activity. Local growing conditions will dictate the timing for establishment of vegetative cover.*
- (2) Use mixes of species and treatments developed and tailored for successful vegetation establishment for the region or area.*
- (3) Concentrate revegetation efforts initially on priority areas such as disturbed areas in SMAs or the steepest areas of disturbance near drainages.*

#### **Purpose and Applicability**

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to all disturbed areas resulting from harvesting, road building, and site preparation conducted as part of normal silvicultural activities. Disturbed areas are those

localized areas within harvest units or road systems where mineral soil is exposed or agitated (e.g., road cuts, fill slopes, landing surfaces, cable corridors, or skid trail ruts).

Revegetation of areas of disturbed soil can successfully prevent sediment and pollutants associated with the sediment (such as nutrients) from entering nearby streams. The objective of this management measure is to reduce erosion and sedimentation by the rapid revegetation of areas of soil disturbance from harvesting and road construction. The disturbed areas to be revegetated are those localized areas within harvest units or road systems where mineral soil is exposed or agitated such as road cuts, fill slopes, landing surfaces, cable corridors, or skid trails.

### **Implementation**

**The Texas Forest Service** has an active, effective, nonregulatory nonpoint source pollution prevention program which promotes and monitors the use of voluntary best management practices by loggers and landowners. These best management practices also are incorporated into certified WQMPs. Best Management Practice 6.0 addresses the management measure above.

**WQMPs.** WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide as well as Texas Forest Service best management practices. Resource Management System criteria and U.S. Forest Service guidance were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. The TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes agricultural and silvicultural nonpoint sources of pollution not in compliance with a certified WQMP approved by the TSSWCB as provided by §201.026 of the Agriculture Code. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with the revegetation of disturbed areas include using seed mixtures adapted to the site; avoiding the use of exotic species; using annuals to allow natural revegetation of native understory plants; selecting appropriate grasses and legumes; and ensuring that proper seeding rates are used.

#### **5.1.5.15 Forestry Management Measure: Forest Chemical Management**

*Use chemicals when necessary for forest management in accordance with the following to reduce nonpoint source pollution impacts due to the movement of forest chemicals off-site during and after application:*

- (1) Conduct applications by skilled and, where required, licensed applicators according to the registered use, with special consideration given to impacts to nearby surface waters.*
- (2) Carefully prescribe the type and amount of pesticides appropriate for the insect, fungus, or herbaceous species.*
- (3) Prior to applications of pesticides and fertilizers, inspect the mixing and loading process and the calibration of equipment, and identify the appropriate weather conditions, the spray area, and buffer areas for surface waters.*
- (4) Establish and identify buffer areas for surface waters. (This is especially important for aerial applications.)*
- (5) Immediately report accidental spills of pesticides or fertilizers into surface waters to the appropriate state agency. Develop an effective spill contingency plan to contain spills.*

#### **Purpose and Applicability**

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to all fertilizer and pesticide applications (including biological agents) conducted as part of normal silvicultural activities.

Chemicals used in forest management are generally pesticides (insecticides, herbicides, and fungicides) and fertilizers. Since pesticides may be toxic, they must be properly mixed, transported, loaded, and applied and their containers must be properly disposed of to prevent potential nonpoint source pollution. Fertilizers must also be properly handled and applied since they also may be toxic or may shift surface water energy dynamics, depending on the exposure and concentration. The objective of this management measure is to ensure that the application of pesticides and fertilizers does not lead to contamination of surface waters. Components of this measure include applications by skilled workers according to label instructions, careful prescription of the type and amount of chemical to be applied, and the use of buffer areas for surface waters to prevent direct application or deposition.

## **Implementation**

**The Texas Forest Service** has an active, effective, nonregulatory nonpoint source pollution prevention program which promotes and monitors the use of voluntary best management practices by loggers and landowners. These best management practices also are incorporated into certified WQMPs. Best Management Practice 8.0 addresses the management measure above.

**WQMPs.** WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide as well as Texas Forest Service best management practices. Resource Management System criteria and U.S. Forest Service guidance were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. The TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes agricultural and silvicultural nonpoint sources of pollution not in compliance with a certified WQMP approved by the TSSWCB as provided by §201.026 of the Agriculture Code. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**The TDA** regulates the use of pesticides through product labeling and applicator licensing.

**Pesticide-Specific State Management Plans (PSSMPs)** are implemented to protect groundwater from contamination by pesticides. Once an active ingredient (chemical) is listed by EPA as requiring a PSSMP, registration is canceled nationally. Products containing the specified active ingredient can only be used in states with an approved PSSMP. The implementation of a PSSMP requires numerous activities including groundwater monitoring of vulnerable areas and the use of voluntary and/or regulatory BMPs to protect groundwater.

**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with

forest chemical management include maintaining and marking a buffer area of at least 50 feet around all watercourses and water bodies for aerial spray applications.

#### **5.1.5.16 Forestry Management Measure: Wetlands Forest**

*Plan, operate, and manage normal, ongoing forestry activities (including harvesting, road design and construction, site preparation and regeneration, and chemical management) to adequately protect the aquatic functions of forested wetlands.*

##### **Purpose and Applicability**

This management measure is intended for forested wetlands where silvicultural or forestry operations are planned or conducted. It is intended to apply specifically to forest management activities in forested wetlands and to supplement the previous management measures by addressing the operational circumstances and management practices appropriate for forested wetlands.

Forested wetlands provide many beneficial water quality functions and provide habitat for aquatic life. The primary adverse impacts associated with road construction in forested wetlands are alteration of drainage and flow patterns, increased erosion and sedimentation, habitat degradation, and damage to existing timber stands. In an effort to prevent these adverse effects, §404 of the Federal Water Pollution Control Act requires usage of appropriate BMPs for road construction and maintenance in wetlands so that flow and circulation patterns and chemical and biological characteristics are not impaired.

##### **Implementation**

**The Texas Forest Service** has an active, effective, nonregulatory nonpoint source pollution prevention program which promotes and monitors the use of voluntary best management practices by loggers and landowners. These best management practices also are incorporated into certified WQMPs. Best Management Practices (Part IV) address the management measure above.

**WQMPs.** WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide as well as Texas Forest Service best management practices. Resource Management System criteria and U.S. Forest Service guidance were used by the EPA in establishing the (g) measures guidance. Certified WQMPs meet the requirements of this (g) measure, satisfy the state's requirements for water quality, and comply with §26.121 of the Texas Water Code. The WQMP program is discussed further in Chapter 4.

The WQMP program is a voluntary compliance program. Enforceable mechanisms for this program are used if necessary when initial voluntary actions are not taken or are insufficient. The TSSWCB investigates complaints about water quality when agricultural or silvicultural activities are a suspected cause. A producer whose operations have resulted in a valid complaint based on water quality impairment is given the opportunity to resolve the problem through implementation of practices

prescribed in a corrective action plan. Those who refuse or fail to implement a corrective action plan, or those who are found to be out of compliance with a corrective action, are referred to the state's regulatory authority on water quality matters, the TNRCC, for enforcement action under §26.121.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes agricultural and silvicultural nonpoint sources of pollution not in compliance with a certified WQMP approved by the TSSWCB as provided by §201.026 of the Agriculture Code. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**BMPs.** The Agricultural/Silvicultural Nonpoint Program contains a list and description of BMPs used in Texas to address agricultural and silvicultural nonpoint pollution. Practices associated with wetland forests include road design and construction practices, harvesting practices, site preparation and regeneration practices, and chemical management practices.

### **5.1.6 Dryland Rowcrop Agriculture Exclusion**

*Note: All figures and tables referenced in this section are located in Attachment 6.*

According to NOAA and EPA's *Program Development and Approval Guidance* for Coastal Nonpoint Pollution Control Programs, NOAA and EPA may allow a state to exclude some categories, subcategories, or sources from the requirements of its Coastal Nonpoint Program if the state can demonstrate that a category, subcategory, or particular source of nonpoint pollution does not and is not reasonably expected to, individually or cumulatively, present significant adverse effects to living coastal resources or human health. Accordingly, Texas proposes to exclude the subcategory of dryland rowcrop agriculture from the Coastal Nonpoint Program in the section of the §6217 Management Area beginning at the northern boundary of the Coastal Bend Bays and Estuaries Program Area (northern Bee and Refugio Counties) and continuing southward to the northern boundary of the Arroyo Colorado Watershed.

Texas believes that excluding dryland rowcrop agriculture as practiced in the proposed area will have no significant adverse effects on living coastal resources, human health, or water quality. This belief is supported by (1) the climate, soils, and topography within the exclusion area; (2) two applied research projects monitoring edge-of-field runoff which found negligible amounts of nutrients and pesticides leaving the fields; and (3) water quality characterization reports, §305(b) assessments, and the 1998 §303(d) list, which indicate no water quality impairments attributable to dryland rowcrop agriculture.

### 5.1.6.1 Natural Characteristics

The §6217 (g) measures address the following impacts which can potentially result from dryland rowcrop agriculture:

- erosion,
- edge-of-field delivery of nutrients, and
- contamination of surface and groundwater from pesticides.

Within the proposed exclusion area for dryland rowcrop agriculture, none of these impacts currently causes significant adverse effects to coastal resources or human health, and these impacts are not reasonably expected to cause significant adverse effects in the future.

Climate, especially precipitation and the resulting runoff, is the dominant factor affecting quantities and timing of agricultural runoff from dryland rowcrop agriculture within the proposed exclusion area. Topography and soil characteristics also affect runoff and nonpoint source loadings. The low average rainfall, flat slopes, and predominantly clay soils found in the exclusion area result in a low potential for erosion and resulting nonpoint source pollution. So, while dryland rowcrop agriculture is practiced on approximately 30 percent of the land within the proposed exclusion area, the potential for agricultural nonpoint source pollution is lower within this area than in most other areas in the §6217 Management Area.

Average annual rainfall along the Texas coast decreases on a north-to-south gradient. The area from Corpus Christi south is typically semiarid. Rainfall within the exclusion area is variable from year to year, with average rainfall of approximately 30 inches in the northern portion of the exclusion area, decreasing to approximately 25 inches in the southern portion of the exclusion area.<sup>1</sup> (Mean annual total precipitation in Texas is shown in Figure 2.1 in Chapter 2 of this document.) Because of the limited rainfall, dryland rowcrop producers within the region use a variety of BMPs to enhance soil moisture storage and limit runoff. Limited rainfall, combined with the widespread use of BMPs, results in very low volumes of rainfall runoff from dryland rowcrops, contributing to low freshwater inflows to coastal bays and estuaries. Although low freshwater inflows (Figure 1) to the enclosed coastal estuaries suggest a high potential enrichment (NOAA, 1989), trends in water quality data (Ward and Armstrong, 1997) indicate that bays in this area may, in fact, be nutrient-deficient.

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<sup>1</sup>Characterization of Nonpoint Sources and Loadings to the Corpus Christi Bay National Estuary Program Study Area, CCBNEP-05, January, 1996.

Soil properties can have a significant impact on storm water runoff depending on their permeability, erodability, and the hydrologic cover condition associated with their land use.<sup>2</sup> The clay soil which is predominant within the exclusion area has relatively flat slopes (typically less than 1% slope), especially in the agricultural cropland areas (Baird and Jennings, 1996). Victoria clays are found throughout the eastern portion of coastal counties within the exclusion area. These soils take in water rapidly when dry, swell when wet, and exhibit slow to very slow surface runoff.

### **5.1.6.2 Characterization Reports and Water Quality Assessments**

The EPA, Texas, and the Coastal Bend Bays and Estuaries Program (CBBEP) have devoted significant efforts to characterizing estuarine water quality on the middle Texas coast. Texas' argument to exclude this dryland rowcrop agriculture from the coastal nonpoint program is partially based on these characterization reports as well as the state's most recent §305(b) assessment and the 1998 §303(d) list. This empirical water quality evidence is supported by the results of two unique applied research demonstration projects, discussed in Section 5.1.6.3.

#### ***CBBEP Characterization Studies***

##### **Nutrients**

In 1995, the CBBEP commissioned Drs. George Ward and Neil Armstrong of the University of Texas Center for Research in Water Resources to characterize the status and historical trends of water, sediment, and tissue quality in the CBBEP area. This report compiled the results of thirty different data collection programs. The results relative to nutrients are tabulated in Attachment 6, Table 1, of this document. The Ward and Armstrong report contains these conclusions:

*From a systemic point of view, the most significant potential problems affecting the bay as a whole are related to the parameters for which there is no regulatory standard or criterion of optimality, namely, suspended particulates, nutrients and salinity. The statistical analyses of TSS in Corpus Christi Bay disclosed a decline widespread throughout the system, increasing in significance from north to south. The rate of decline is sufficient to have reduced the average concentration by about 25% in the upper bays and by about 50% in the lower bays over the last two decades. Suspended sediment is an intrinsic and important aspect of the Corpus Christi Bay environment; its decline is not necessarily beneficial.*

Where inorganic nitrogen is higher in the system, declining trends were found to be typical, especially in the upper bays.

A widespread declining trend was determined in water-phase TOC at a rate sufficient to reduce the concentrations in the Corpus Christi Bay study area by about one-fourth over two decades. It is not clear from the data whether this indicates a decline in organic loading or a decline in productivity.

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<sup>2</sup>*Ibid.*

More important, whether a decline in any of these nutrients is a problem or an improvement depends upon determination of the optimum levels for Corpus Christi Bay.

These authors are speculating, as have others recently, that the CBBEP area may have bays which are nutrient-deficient. It is interesting to compare the concentrations from Ward and Armstrong in Table 1 to the concentrations of TKN and phosphorous predicted by the NOAA Strategic Assessment of Near Coastal Waters (NOAA 1989) for Aransas and Corpus Christi Bay and the Laguna Madre (Figures 2, 3, and 4).

### **Pesticides**

The initial CBBEP Nonpoint Source characterization report (Baird and Jennings, 1996) (Table 12) reports pesticide data from two agricultural watersheds that have been gauged and monitored by the USGS since 1970. The majority of the samples in this table are reported as below detection limit (BDL), and the maximum reported concentration is 0.2 micrograms/liter. Ward and Armstrong report a sparse database with criteria violations limited to a few exceedences for DDT and chlordane (legacy urban/agricultural pollutants).

#### ***§305(b) Water Quality Summaries***

Water Quality summary sheets from the 1996 §305(b) assessment for the principal bays in the area proposed for exclusion are provided in tables 2 through 11. Examination of the various nutrient indicators in these data indicate values consistent with Ward and Armstrong and also at least an order of magnitude less than the NOAA model prediction.

The assessment for the subject waters reports pesticide water column below detection limit (BDL) values for all segments except the previously mentioned Arroyo Colorado tidal, where DDT and DDE remain an issue.

#### ***§303(d) List***

The 1998 §303(d) list identifies the state's impaired water bodies. A summary of impaired water body segments within the §6217 Management Area is provided in Chapter 1. Maps of the impaired coastal segments and descriptions of the sources leading to impairment can be found in Attachment 3. The descriptions of impaired water bodies do not include any stream segments impaired by agricultural nonpoint sources in the area proposed for exclusion.

#### **5.1.6.3 Agricultural Runoff Loading Studies**

In 1995, the Texas Agricultural Experiment Station (TAES), in collaboration with the U.S. Geological Survey (USGS) and the U.S. Department of Agriculture Natural Resources Conservation Service (USDA-NRCS), initiated an action plan demonstration project for the CBBEP (under an EPA/TNRCC QA/QC plan). This ongoing project is designed to determine the water-quality components of runoff from a watershed representative of a major portion of the cropland soils in the CBBEP project area by assessing the actual farmer-applied nutrient and pesticide inputs on row crop watersheds. The quantity of nutrients in the rainwater which falls on these watersheds is being measured as is the total nutrient and pesticide load in the runoff water. Since these are edge-of-field projects, the results are conservative in terms of receiving water body impacts. The data base, which

begins in the summer of 1995, indicates negligible loadings of nutrients and pesticides. In a typical runoff event, there is five to seven times more nitrogen in the rainwater falling on the watersheds than in the runoff load (Eddleman et al., in preparation, 1998).

The primary objectives of the agricultural runoff demonstration project are listed below.

- Locate a dryland rowcrop agricultural watershed in which agriculture is the only source present, and which is representative of the large majority of the soils in the area.
- Secure cooperation from all farm operators in the watershed including self reports of amounts and timing of fertilizer and pesticide applications and crop yields.
- Measure and quantify the nutrient load to the watershed from wet air deposition.
- Measure, with appropriate flow gauging equipment, the actual quantity of runoff water leaving the watershed.
- Using automated sampling equipment, collect flow-weighted samples of the runoff from each rainfall event producing runoff and analyze the samples for a specified suite of water quality parameters and pesticides.
- Using the flow data and the reported chemical concentrations, develop a set of Event Mean Concentrations (EMCs) specific to the area for use in future modeling efforts.
- Assess and demonstrate the effectiveness of the BMPs currently employed by the agricultural community.

A suitable watershed (the Odem Ranch northwest of Corpus Christi) within the Nueces Coastal Basin was selected for the project. The CBBEP selected Dr. Bobby Eddleman of the Texas Agricultural Experiment Station (TAES) at Corpus Christi as principal investigator (PI). Co-PIs include the U.S. Geological Survey (USGS) and the Natural Resources Conservation Service (NRCS). Additional funding was provided by the Texas State Soil and Water Conservation Board with local support from the San Patricio Soil and Water Conservation District. Equipment was installed and monitoring began during the summer of 1995.

During the spring of 1995, King Ranch, Inc., expressed a desire to privately fund a similar project on a larger watershed in the Rio Grande Coastal Basin. This project was approved by the CBBEP and was begun in the late summer of 1995 by the same team involved with the earlier Odem Ranch watershed study.

Reports of these two studies are in the preparation stages and will be submitted to NOAA/EPA as supplemental documentation when they are approved for publication by the CBBEP.

### ***Project Results***

The King Ranch and Odem Ranch watershed studies have shown that the total load of nutrients and pesticides in runoff water from rowcrops is extremely low. In most runoff events, the total nitrogen component of runoff is dominated by the atmospheric load. Additionally, the observed values of nutrients and pesticides are minute in relationship to the total farmer-applied load.

Just as important, both the King Ranch and Odem Ranch projects help to explain the lack of freshwater inflows on the lower coast (see Figure 1 from Ward and Armstrong, 1997). During the period these projects have been active (1995 to present) there have been 168 days with measurable rainfall at the Odem Ranch Site and 115 days with measurable rainfall at the King Ranch. According to the USGS (Table 13) these events produced measurable runoff only four times at the Odem Ranch (see Figures 5, 6, 7, 8, and 9) and eight times at the King Ranch site (see Figures 10, 11, 12, and 13). With the exception of episodic flood in October 1997, the average annual runoff coefficient at the King Ranch since the beginning of the project is less than one percent. The average annual runoff coefficient at the Odem Ranch is approximately two percent. These data clearly document that natural topography and soil characteristics combined with the BMPs adopted by the farmers to limit runoff and enhance soil moisture storage are effective in significantly reducing nonpoint source pollution associated with rowcrop agriculture.

### **Groundwater Issues**

The rowcropped portions of the area proposed for exclusion are primarily composed of Victoria Clay soil from the surface to a depth of about 72 inches. In the zone of constant moisture, this soil is almost impermeable, and in the past it has been used as a landfill liner. The technical committees which designed the King Ranch and Odem Ranch runoff projects elected not to include a groundwater monitoring component in either study because it was thought that there was no potential for groundwater communication from cropped soil layers due to the presence of this clay barrier. If there is sufficient interest and funding, the state will conduct a radium isotope reconnaissance study to determine if groundwater is communicating with tidal waters.

#### **5.1.6.4 Conclusion**

For nutrients, the state and other interested water quality and resource agencies have an extensive database which identifies no problems attributable to dryland rowcrop agricultural nonpoint sources. There is some concern that the area in question may not receive enough nutrients to sustain optimum levels of productivity.

Pesticide impacts are more problematic since there are fewer data points. However, there are no data which indicate a concern or problem for other than banned, or legacy, pollutants. Pesticides associated with modern farming practices are rarely detected.

In the case of both nutrients and pesticides, the state feels that an examination of loading potential from the land use in question is in order. Texas does not argue that actual water quality is the end product in this discussion. We agree that source loading potential is an important part of the equation and must be considered in our effort to properly focus the coastal nonpoint source pollution control program and state resources. Loading sources and their impacts will continue to be studied through the TNRCC's TMDL process, discussed in Chapter 4.

In view of the full body of evidence, including water quality data, loading studies, and runoff data, the TSSWCB concludes that dryland row crop agriculture within the area proposed for exclusion does not, and is not reasonably expected to, individually or cumulatively present significant adverse effects to living coastal resources or human health.

Accordingly, Texas intends, with the concurrence of NOAA and EPA, to exclude the proposed area from the §6217(g) program and to focus the state's program and resources on areas where problems or potential problems exist or have a potential to exist.

## **5.2 Urban and Developing Areas**

### ***5.2.1 Sources and Activities Resulting in Urban Nonpoint Source Pollution***

During urbanization, pervious surfaces, including vegetated and open forested areas, are converted to land uses that usually have increased areas of impervious surface, resulting in increased runoff volumes and pollutant loadings. Urbanization typically results in changes to the physical, chemical, and biological characteristics of the watershed. Vegetative cover is stripped from the land, and cut-and-fill activities that enhance the development potential of the land occur. As population density increases, there is a corresponding increase in pollutant loadings generated from human activities. These pollutants typically enter surface waters via runoff without undergoing treatment.

The Galveston Bay Estuary Program has identified urban land areas as generating the highest loadings of nonpoint source pollution to Galveston Bay. Urban areas in this local watershed contributed over 43 percent of the total nonpoint source sediment loadings, 55 to 65 percent of the nonpoint source nutrient loadings, and over 85 percent of all the fecal coliform, pesticides, and oil and grease coming from local nonpoint sources of pollution. Urban sources are also responsible for impairing 15 stream segments in the §6217 Management Area. Various subcategories of urban sources of nonpoint source pollution and their potential adverse impacts on water quality are discussed below.

#### **5.2.1.1 Urban Runoff**

Urbanization can alter the hydrologic regime of an area, encroach upon riparian areas, and result in the loss of aquatic habitat. Urban runoff has been monitored and found to contribute significant loadings of nutrients, oxygen-demanding substances, pathogens, and toxic materials.

#### **5.2.1.2 Construction**

Construction activities associated with new urban development can be the source of significant amounts of sediment. Other contaminants such as nutrients and toxic compounds can adsorb onto the sediments originating at construction sites.

#### **5.2.1.3 On-site Disposal Systems**

Malfunctioning on-site disposal systems can be the source of significant amounts of nutrients, oxygen-demanding substances, and pathogens.

Currently, approximately one-third of the state's population relies upon on-site sewage facilities (OSSF). The number of OSSF systems continues to increase dramatically, with the number of permits doubling over the last five years. Before the late 1960s, OSSFs were regulated only by municipal governments through local building inspection and plumbing inspection programs. There was no statewide standard for installation, and significant nonpoint-source pollution problems from failing septic systems were observed.

#### 5.2.1.4 Roads and Bridges

Runoff from roads and bridges can be the source of water pollutants such as toxic compounds and sediment. Obstruction of natural sheetflow from roads and bridges can alter the hydrologic regime of an area and can be responsible for the loss of aquatic habitat.

Highway operations are a potential source of a wide variety of possible pollutants to surface and groundwater resources. Major sources of pollutants on highways are vehicles and airborne particles. Other possible, but less frequent, sources include accidental spills of oil and gas, and losses from accidents. Roadway maintenance practices such as sanding and deicing or the use of herbicides on highway rights-of-way may also be sources of pollutants.

The reported data for urban storm water and highway runoff quality presents similar pollutant constituents and concentrations. Exceptions to this are the elevated levels of heavy metals in highway runoff due to vehicle use, wear, and emissions. Heavy metals (particularly copper, lead, and zinc) are by far the most prevalent priority pollutants in highway runoff.<sup>1</sup> A significant amount of nutrients and organic priority pollutants are also present in the highway environment. Particulates and solid materials in highway runoff are considered important pollutants due, in part, to their ability to sequester and transport other pollutant constituents. Phosphorous and many metal species are known to readily adsorb to solids, particularly fine particles. Exposure to the water often releases these pollutants into the aquatic system where they compromise receiving water quality and aquatic habitat.

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<sup>1</sup>Transportation Research Board, 1993. *Stormwater Management for Transportation Facilities*, NCHRP Synthesis 174, Washington, D.C.

Several studies have attempted to measure and correlate traffic volume with pollutant accumulation on highways. Two measures of traffic volume are most often considered: average daily traffic (ADT) and vehicles during a storm (VDS). There have been mixed results in correlating ADT with pollutant concentrations.<sup>2</sup> However, based on the monitoring results from one study with over 900 storm events in 31 states, it has been suggested that ADT influences concentrations of nutrients, metals, particulates, and chemical oxygen demand (COD)<sup>3</sup>. This study concluded that paved roadways with ADT >30,000 produced runoff with two to five times the pollutant levels present in runoff from rural highways. The study also noted that individual highway sites within each category (urban or rural) were shown to have different pollutant concentrations and correlated poorly with traffic density.<sup>28</sup>

Other studies suggest that ADT may be less influential from site to site, and that vehicles during a storm (VDS) may be a stronger predictor for constituent concentrations.

Despite individual variation, ADT continues to be the focus for predicting pollutant concentrations and is used in many modeling techniques to distinguish between urban and rural settings and to estimate pollutant loadings. Results from various studies have led the highway community to formulate pollutant load estimates based on the differing ADT values for urban and rural areas.

Highway runoff pollution may affect the quality of receiving waters through acute loadings and through chronic effects from long-term accumulation. The significance of these impacts is very site-specific and is influenced mainly by the highway drainage conditions and receiving water characteristics. Research indicates few significant impacts for highways with less than 30,000 ADT. From these studies and other literature reviewed, the following conclusions can be reached regarding highway runoff pollution potential:

- Highway runoff does have the potential to adversely affect water quality and aquatic biota of receiving waters.
- The significance of these adverse effects is variable by highway, receiving water, and runoff event.
- Runoff from urban highways with high ADT volumes may have a relatively high potential to cause adverse effects.
- Runoff from rural highways with low ADT volumes has a relatively low potential to cause adverse effects.

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<sup>2</sup>Barrett, M. E., R. D. Zuber, E. R. Collins, J. F. Molina, R. J. Charbeneau, and G. H. Ward, 1993. *A Review and Evaluation of Literature Pertaining to Quality and Control of Pollution from Highway Runoff and Construction*, Center for Research in Water Resources, Bureau of Engineering Research, University of Texas at Austin, Austin, Texas.

<sup>3</sup>Driscoll, E., P. E. Shelley, and E. W. Strecker, 1990. *Pollutant Loadings and Impacts from Highway Stormwater Runoff, Volumes I-IV*, FHWA/RD-88-006-9, Federal Highway Administration, Woodward-Clyde Consultants, Oakland, California.

## **5.2.2 Texas Programs Implementing Urban and Developing Areas Management Measures**

Texas achieves the requirements of the federal management measures for urban and developing areas through a mixture of regulatory authorities and voluntary programs. Regulations addressing urban and developing areas are shown in Figure 5.1. Many of these programs are discussed in detail in Chapter 4, including the TMDL process and resulting Watershed Action Plans and pollution control and abatement programs developed under Texas Water Code §26.177. As discussed in Chapter 4, cities with Phase I or Phase II NPDES permits will be exempt from addressing activities specified under their permits.

In addition to the previously discussed programs and regulations, model local nonpoint source program manuals and ordinances will be used to provide technical assistance to local governments in the development of urban runoff management programs. For roads, highways, and bridges under TxDOT jurisdiction, TxDOT guidance documents call for a multitude of practices addressing the reduction of nonpoint source pollution from road runoff and road and bridge construction and maintenance activities. These model ordinances and guidance documents are discussed below.

### **5.2.2.1 Model Local Nonpoint Source Pollution Programs and Ordinances**

Programs and guidance documents which provide technical assistance to local municipalities are a crucial element of any nonpoint source pollution control program. Currently, only a few cities within the §6217 Management Area which do not fall under the Phase I NPDES requirements are known to have ordinances addressing nonpoint source pollution or urban runoff management programs. Many of these cities will be required to develop urban runoff management programs through Phase II NPDES permitting, the TMDL Watershed Action Plan process, or §26.177. These model ordinances and appropriate manuals will be distributed to urban areas throughout the coastal management area, and local governments will be encouraged to apply for CMP grants to develop specific programs to address urban sources of nonpoint pollution. A new nonpoint sourcebook and existing urban nonpoint source ordinances are described below.

#### ***Texas Nonpoint Sourcebook: A Guide to Developing Urban Runoff Management Programs***

The Statewide Storm Water Quality Task Force, which is sponsored by the Texas Chapter of the American Public Works Association, is sponsoring the development of a *Texas Nonpoint Sourcebook* through a Clean Water Act §319(h) nonpoint source grant. The Internet-based document is intended to provide public works officials with the informational tools they need for storm water management. The web site is currently under development and available for review at <http://www.txnpsbook.org>.

The *Sourcebook* is a valuable tool for municipalities interested in developing new urban runoff management programs or implementing additional management measures or best management practices under existing urban runoff programs. The web site provides detailed information on best management practices, implementation strategies, funding mechanisms, and strategies for measuring program effectiveness. Many of the best management practices draw upon the federal guidance for storm water pollution prevention plans.

A Project Management Committee of the Statewide Storm Water Quality Task Force was responsible for overseeing the development of the *Sourcebook*. The *Sourcebook* was developed using five basic tenets to guide and emphasize source controls for storm water:

**Tenet No. 1:** The nonpoint source management program elements addressed in the *Texas Nonpoint Sourcebook* must be structured in such a way that public and private resources spent in this program result in noticeable improvement in or protection of the overall quality of the receiving water.

**Tenet No. 2:** Regulation of pollutant loads from storm water runoff from urban areas should not be developed independent of other pollutant load sources (point and other nonpoint sources) that are specific to a particular water resource or watershed.

**Tenet No. 3:** Sooner or later, most municipalities in Texas will be asked to characterize and perhaps address the nonpoint source discharges from their communities.

**Tenet No. 4:** For the vast majority of municipalities, the ecosystems of urban waterways are governed far more by hydrology than by water quality.

**Tenet No. 5:** For developing urban areas, relatively minor modifications in the way drainage infrastructure is designed and operated for flood protection will address hydrologic impacts to urban waterways and reduce urban runoff pollution as a by-product. For developed areas, source controls (pollution prevention techniques) should be applied and treatment controls applied only when it is clearly documented that water quality impacts occur.

### ***Model Nonpoint Source Pollution Prevention Ordinances***

#### **Galveston County Model NPS Ordinance**

The Galveston County Health District is developing a model Nonpoint Source Pollution Prevention Ordinance through a Clean Water Act §319(h) nonpoint source grant. The goal of this project is to provide a copy of the model ordinance to ten cities in Galveston County and assist these cities in the implementation of the ordinance. The model ordinance has two key chapters:

- **Construction Activities** - Provisions in this chapter include: definitions of development activities; permit application requirements and procedures for erosion and sediment control; suspension and revocation of permits; site inspections; and permit fees.
- **Storm Drain Systems** - Provisions in this chapter include: that storm drain systems are for conveyance of storm water only; that motor oil, gasoline, paint, solvents, etc. should be kept out of storm drains; and that violation will be a Class C Misdemeanor.

#### **Inventory of Local NPS Ordinances**

In October 1997, the TNRCC mailed a survey to local cities within the CMP boundary to inventory the number and types of local ordinances that address nonpoint source pollution. The TNRCC received responses from approximately half the cities. Only a few had local ordinances that addressed some of the urban management measures. Some of the more notable ordinances are described below.

- **City of Brownsville** - This city has a Stormwater Detention Plan that requires that discharge from a developed commercial site be no greater than the discharge from the site in its undeveloped state. This policy applies to sites of 0.5 acres or larger. Smaller areas have no detention requirements but must discharge flow through grass areas to filter out sediment.
- **City of Port Aransas** - This city has a Stormwater Master Plan which allows 20 percent of the drainage area for a given site to be covered with impervious materials. The plan encourages developers that build new subdivisions to design their drainage plans with retention ponds.
- **Jacinto City** - This city has ordinances that protect existing storm drains from construction project sediment runoff. Site drainage is required for new projects.
- **City of Kingsville** - This city has ordinances relating to storm water runoff capacity. The city is in the process of creating a new ordinance relating to erosion and sediment control from construction projects.
- **City of Pearland** - This city has a general subdivision ordinance that addresses construction and sediment control, and chemicals and pesticides.

### 5.2.2.2 TxDOT Guidance Documents

Nonpoint sources and activities in urban and developing areas that are covered by NPDES/TPDES Phase I and Phase II permits will be exempt from meeting the §6217 requirements. As discussed in Chapter 4, NPDES permitting under Phase I applies to construction activities greater than five acres in size. This includes road, bridge, and highway construction activities. Under the proposed Phase II rules, construction activities between one and five acres will be required to obtain NPDES permits. These Phase I and Phase II permitting activities will address the majority of road, bridge, and highway-related sources of nonpoint pollution.

Management measures related to TxDOT roads, highways, and bridges will be implemented through the voluntary application of TxDOT BMPs. These BMPs are found in TxDOT guidance documents related to the construction and maintenance of TxDOT roads, highways, and bridges. These guidance documents are available to local governments for use as model programs. However, TxDOT's implementation of these BMPs extends only to those roads, bridges, and highways that are under TxDOT jurisdiction. It is not TxDOT's intention that any other entity be required to implement these measures.

### ***Federal Highway Administration (FHWA) Highway Runoff Water Quality Training Course***

Where the use of specific BMPs is not regulated, TxDOT designers and environmental staff follow guidance from the FHWA Highway Runoff Water Quality Training Course to determine the need for water quality mitigation and the choice of BMPs. This guidance includes information on permanent storm water management measures and permanent and temporary erosion control, as discussed below.

#### **Permanent Storm Water Management Measures**

If water resources may be affected, an assessment should be done to determine the need for BMPs. The assessment of water quality impacts from a specific highway project requires the evaluation of several site-specific issues. The *Federal Highway Administration (FHWA) Highway Runoff Water Quality Training Course*<sup>4</sup> identifies a number of factors that should be included in assessing the potential for a highway project to impact receiving waters. These include:

- The type of receiving water affected, including any designation of sensitive or unique habitats, the presence of endangered species, or the use as a public water supply.
- Rainfall characteristics, including amount, frequency, duration, and intensity.
- Highway design features, such as curb and gutter versus open ditch drainage, and scupper drains versus indirect discharges from bridge decks. Drainage areas, channel types, flow paths, and flow rates should also be considered.
- Traffic characteristics, such as volume, speed, and type (including the potential for hazardous spills).

This information combined with relevant field data and coordination with regulatory agencies should be taken into account and addressed in the environmental assessment as appropriate. Project-specific BMP design features will vary widely, but all BMP planning should begin with an assessment of this basic information.

#### **Permanent Erosion Control**

Erosion control is not only an important management practice for highway construction, it is an important aspect of storm water management during the ongoing operation and maintenance of the highway system. Erosion control can be accomplished in two ways: by stabilizing the soil with vegetation or other materials to hold it in place, and by minimizing the erosive velocities of storm water runoff.

Stabilizing the soil as soon as possible after construction is one of the most important and cost-effective measures to control erosion and prevent storm water pollution. In addition, stabilized slopes

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<sup>4</sup>Federal Highway Administration, 1986. Highway Water Quality Training Course, Student Workbook, Office of Implementation, Turner-Fairbank Highway Research Center, McLean, Virginia.

and drainage ways will assure that other storm water management measures will perform as designed. Minimizing velocities and mitigating erosion at outfalls prevents downstream sedimentation and helps preserve the integrity of the drainage system. The most common erosion control practices are permanent seeding and sodding, temporary seeding, vegetated buffers, mulching, soil retention blankets, flexible channel liners, rock riprap, velocity dissipaters, and bioengineering.

**Permanent and Temporary Vegetation.** The establishment of vegetation includes the seeding and sodding of temporary and permanent grasses, sod mulching, transplanting, and planting of trees, shrubs, and other landscaping. Vegetation reduces sediments and runoff to downstream areas by slowing the velocity of runoff and permitting greater infiltration. In addition, it prevents sedimentation by holding the soil particles in place. Vegetation also helps the soil absorb water, improves wildlife habitats, and enhances the aesthetics of a site.

**Vegetated Buffer Zones.** Vegetated filter strips, or buffer zones, can be utilized for temporary or permanent storm water management. The buffer zone may be preserved or planted vegetation and is usually located at the bottom of a slope, outlining a property boundary, along a drainage path, or adjacent to receiving waters such as a stream or wetland. Buffer zones can decrease the velocity of storm water runoff, which in turn helps to prevent soil erosion. If large enough (20-100 feet wide), buffer zones can promote sediment removal through filtration, infiltration, and sedimentation. The buffer zone technique can be used at any site that can support vegetation. Buffer zones are particularly effective on floodplains, next to wetlands, along stream banks, and on steep, unstable slopes.

The buffer zone can be an area of vegetation that is left undisturbed during construction, or it can be newly planted. If buffer zones are preserved, existing vegetation, good planning, and site management are needed to prevent disturbances such as grade changes, excavation, damage from equipment, and other activities. The creation of new buffer strips requires the establishment of a good dense turf, trees, and shrubs. Careful maintenance is important to ensure healthy vegetation.

This practice has great potential as an economical solution to installing structural controls throughout the project, especially when the right-of-way is not constrained and the buffers can be delineated by existing vegetation. If buffer zones are intended to be used on the project, they should be designated as such on the plans for the benefit of the contractor, inspectors, and environmental regulatory agencies.

**Mulches.** Mulches are considered a temporary control measure, but mention of them should be made here because they are an integral part of the establishment of vegetation and the prevention of erosion. The purpose of mulch is to provide a protective cover that reduces erosion by protecting the soil surface from the erosive forces of raindrops; improves the infiltration properties of the soil, which reduces amount of runoff; and promotes the growth of vegetation by conserving soil moisture and insulating against extreme heat and cold.

The use of mulch is probably one of the single most important elements in a successful revegetation project. Areas which have been temporarily or permanently seeded should be mulched immediately after seeding to facilitate vegetative growth

The most common mulches are hay, straw, and cellulose fiber. They are usually applied with a mechanical blower but can be applied by hand in small areas. For straw and hay, a tackifier should be used to bind and hold down the material.

**Soil Retention Blankets.** Like mulches, soil retention blankets are considered a temporary control measure, but they, too, are an integral part of the establishment of vegetation and the prevention of erosion. Soil retention blankets are organic or synthetic matting/blankets placed on disturbed areas, slopes, or in channels to be stabilized with vegetation. They help in controlling surface erosion and promote establishment of a permanent vegetative cover.

The use of soil retention blankets is recommended on slopes of 3:1 or steeper, where the erosion potential is high and revegetation may be slow. They can also be used in channels, where the flow velocities are higher and concentrated. The selection and use of soil retention blankets should consider the amount of runoff, steepness of slope, type of material, and intended results.

**Flexible Channel Liners.** Channel liners are similar to erosion control blankets in design and utilization. Like erosion control blankets, channel liners provide protection and stabilization which, in turn, assists in the establishment of vegetation and the prevention of erosion. Channel liners consist of organic or synthetic matting placed in drainage ways or channels to be stabilized with vegetation. They help in controlling surface erosion and promote establishment of permanent vegetative cover. Since they provide stabilization and protect against scour, channel liners should be considered as a cost-efficient alternative to concrete riprap.

**Velocity Dissipaters.** A common problem at storm water outfalls is the erosion and scour due to the velocity of the runoff leaving the drainage system and entering the natural waterway. This erosion can degrade the quality of the receiving water, cause downstream sedimentation, and result in damage to the outfall structure itself. One solution to this problem is the use of a velocity dissipation device at the outfall.

In addition to outfalls where the potential for scour exists, locations suitable for velocity dissipation devices include areas where there are highly erodible soils, and where an outfall enters a retention/detention pond. Velocity dissipation devices include rock riprap, gabions, and stone or concrete flow spreaders which dissipate the energy of storm water as it exits the outfall, thereby reducing erosion caused by the discharge.

- Gabions are rectangular, heavy wire mesh mattresses or baskets filled with rock and are used to protect erodible soils, channel bottoms, and stream banks. They are typically placed at culvert outlets and are sometimes used as earth-retaining structures.
- Rock riprap is a relatively inexpensive method to stabilize the outlet of a culvert and is sometimes used to line the sides and bottom of an excavated channel. The rock should be well graded and sized so as not to be displaced by the maximum expected flow.
- Columns, deflectors, or other similar structures can be formed or placed into the skirt of the outfall to dissipate the energy of the runoff as it leaves the culvert. These structures may vary in

size and shape but should be placed carefully so as not to obstruct the flow of the storm water to the point of back flooding.

### ***Storm Water Management Guidelines for Construction Activities***

TxDOT's *Storm Water Management Guidelines for Construction Activities* outline the requirements for Storm Water Pollution Prevention Plans for NPDES-permitted activities and provide information on best management practices including stabilization practices, structural control practices, and temporary control measures.

A storm water pollution prevention plan is developed for every construction site covered by a NPDES permit for construction activities. Sources and activities covered by NPDES permits are exempt from meeting §6217 requirements. Development of a storm water management plan spans the entire planning, design, and construction stages of a highway project development.

The *Storm Water Management Guidelines* outline the following steps which should be followed when planning and siting a roadway:

- Identification and consideration of water pollution sensitive areas when selecting route locations and establishing control measures.
- Identification of areas sensitive to storm water pollution during the planning and location stages of project development; these would include areas such as water supply sources, recreational waters, wetlands, and streams with particularly sensitive ecological systems. This provides information as to whether the project can be located in a particular area without potential damaging results, and provides the criteria on which to base cost-effective storm water control measures.
- Contact and coordination with the private and public sectors which may either have an interest in, or control of, the effects of the proposed development. This process provides a means for obtaining input identifying water-quality-sensitive areas as well as regulatory controls. Coordination and/or review by other agencies may also be appropriate.
- Planning the highway project to fit the particular topography, soils, drainage patterns, and natural vegetation as much as practicable. In general, areas with steep slopes, erodible soils, and soils with severe limitations are avoided when possible.

These practices will be used to implement §6217(g) measures such as the Site Development Management Measure and the Management Measure for Planning, Siting and Developing Roads and Highways.

The *Storm Water Management Guidelines for Construction Activities* also include best management practices for the minimization of erosion and sedimentation processes during highway construction. These practices can be used to implement many of the (g) measures.

The design of erosion and sediment control systems involves planning, scheduling, and control actions that will minimize the adverse impacts of soil erosion and sedimentation. The following basic guidelines are followed on TxDOT projects:

- Plan the highway project to fit the particular topography, soils, drainage patterns, and natural vegetation as much as practicable. In general, areas with steep slopes, erodible soils, and soils with severe limitations should be avoided when possible.
- Develop a sequence of construction that minimizes the potential erosion and sedimentation impacts. The sequence should consider specific measures dealing with allowable disturbed areas, construction vehicle maintenance procedures, and material stockpiling methods. The sequence of work must be anticipated and stipulated and should reflect measures to be used throughout the project. Layouts for erosion control features should be included in the construction plans.
- Minimize the extent and the duration of exposure. Plan the phases or stages of construction to minimize exposure. Permanent vegetation should be established as soon as practicable as the work progresses.
- Employ erosion control practices to prevent discharge of sediments offsite. This principle relates to using practices that control erosion on a site to prevent excessive sediment from being produced. Efforts should be made to keep soil covered as much as possible with temporary or permanent vegetation, erosion control blankets, or various mulch materials. Other practices include diversion structures to channel surface runoff from exposed soils and using slope drains where grades may be prone to erosion.
- Employ perimeter control practices to protect the disturbed area from off-site runoff and to prevent sedimentation damage to areas downgradient of the construction site. This principle relates to using practices that effectively isolate the construction site from surrounding properties, and especially to controlling sediment once it is produced and preventing its transport from the site. Diversion structures, swales, dikes, sediment traps, and vegetative and structural sediment control measures can be classified as either temporary or permanent, depending on whether they will remain in use after construction is complete.
- Keep runoff velocities low and retain runoff on the site. The removal of existing vegetative cover and the resulting increase in impermeable surface area during construction will increase both the volume and velocity of runoff. These increases must be taken into account when providing for erosion control. Keeping slope lengths short and gradients low, and preserving natural vegetative cover can keep storm water velocities low and limit erosion hazards.
- Stabilize disturbed areas immediately after final grade has been attained. Permanent structures, temporary or permanent vegetation, mulch, stabilizing emulsions, or a combination of these measures should be employed as quickly as possible after the land is disturbed. Temporary seeding, mulches, and other control materials can be most effective where or when it is not practical to establish permanent vegetation or until the vegetation is established.
- Implement a thorough inspection, maintenance, and follow-up program. This last principle is vital to the success of the management of runoff from construction activities. A site cannot

be effectively controlled without thorough, periodic checks of the erosion and sediment control practices.

### ***Infrastructure Maintenance Manual***

TxDOT's *Infrastructure Maintenance Manual* outlines guidelines and standards for operation and maintenance of TxDOT roads, highways, and bridges. Many of these guidelines and standards can be used to implement (g) measures related to TxDOT operation and maintenance. The document addresses six categories of maintenance and operations:

1. Vegetation Management
2. Material Storage
3. Disposal Practices
4. Spill Response
5. Paint Removal
6. Deicing Activities

**Vegetation Management.** Vegetation management includes activities such as mowing, herbicide operations, use of native grasses, wildflowers, and legumes, pruning and brush management, and vegetation management and wildlife habitat. Efforts to control storm water runoff and their success in water quality conservation depend heavily on roadside vegetation management. Vegetation management along the roadside consists of propagation and control of vegetation. Control of vegetation growth is accomplished by physical and chemical means. Physical methods of weed and brush control may include hand-pulling, hoeing, plowing, cultivating, trimming and mowing. The most economical means of control is the use of herbicides. Herbicides have been developed to control vegetation with a minimum of harm to the environment. All herbicide use should follow proper instructions for handling and storage.

**Disposal Practices - Wash Water from Striping Trucks.** For roadway striping, lead-free water-based paint should be used rather than oil-based paint. Therefore the cleanup of solvent-based painting operations and disposal of waste solvent is minimal to nonexistent. Waste water from flushing water-based paint from lines and spray nozzles is usually diluted and then released into the sanitary sewer system. Maintenance facilities which are not on a sanitary sewer system may subcontract for services to treat and dispose of the wash water.

**Disposal Practices - Wash Water from Asphalt Paving Equipment.** The procedures to clean asphalt paving equipment should involve the following:

- The cleaning area must have access to a high pressure or steam source and must be designed so that all asphalt/solvent mixture and wash water remains within the cleaning area (no runoff). A minimum of 12 inches of loose base course is to be layered over compacted subgrade. Clay or other low-permeability soil mixtures are preferred for the subgrade.

- Equipment requiring asphalt removal is brought to the cleaning area and sprayed with just enough diesel or high flash d-limonene emulsion solvent to soften the asphalt with no free product dripping from the equipment.
- Asphalt is then removed with high- pressure water or steam using a minimal amount of water. If additional cleaning is required, the equipment is moved to a regular washrack.
- Front-end loaders are used to mix the asphalt/solvent mixture into the loose base course. When the mixture meets the requirements for asphalt-stabilized asphalt base, this material is transferred to a suitable storage area.

**Spill Response.** A state-accepted response plan calls for TxDOT's relationship with the TNRCC regarding cleanup of oil and hazardous material spills to be in a "coordination and support" role. TxDOT has an interagency agreement with the TNRCC that provides for TxDOT's limited participation in cleanup of spills throughout the state. The contract is implemented through the Division of Maintenance and Operations and the TNRCC Spill Response Unit.

**Bridge, Heavy Equipment, and Building Paint Removal.** Sandblasting has typically been used in the cleaning and removal of paint from equipment and structures, particularly in maintenance of existing bridges. New air control regulations limiting airborne particles and the work locations near water impoundments have increased awareness of the potential for environmental impacts to receiving waters. Old paints often contain a substantial amount of heavy metals (lead, chromium), and some of the newer paints contain volatile organic compounds (VOCs). Strict TxDOT requirements involving containment on-site and disposal limitations are currently being developed.

**Deicing Activities.** Removal of snow and ice from the roadway is classified as an emergency operation that takes precedence over all other work. The work is executed as expeditiously as practicable so that roads are maintained in as good a working condition as possible. During and after icy conditions, inspection should be made of the conduct of the work and to insure proper cleanup operations. The preferred method of maintaining a safe roadway during icy conditions is through the use of sand without salt. Only during the most severe conditions should salt be mixed with the sand.

### ***5.2.3 Funding for Implementation of Urban and Developing Areas Management Measures***

- Texas has a State Revolving Fund (SRF) loan program that is administered by the Texas Water Development Board (TWDB). These loan funds could be used by cities to install best management practice structures to control and treat storm water runoff. In fiscal year 1999 it is estimated that \$300 million in SRF monies will be available to cities and other political entities to borrow for various local water and wastewater projects.<sup>5</sup> The TWDB has set aside a minimum of five percent of the SRF monies to be used for nonpoint source pollution projects. Currently, there is only one SRF project in the state that was funded to address nonpoint source pollution.

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<sup>5</sup>Personal communication George Green, SRF Project Manager, Texas Water Development Board, May 7, 1998.

The Texas Water Development Board has five eligibility requirements for SRF loan applicants.

1. The applicant must be a political entity (city, county, water district, etc.).
2. The political entity must be located in an impaired water body listed on the CWA §303(d) list.
3. A list of BMPs (storm water detention/retention ponds, etc.) that will be implemented must be identified. The State of Texas Nonpoint Source Management Program has a list of applicable BMPs.
4. The political entity must be able demonstrate that the loan can be repaid.
5. The political entity must develop a water conservation plan if the loan is greater than \$500,000.

As discussed in Chapter 4, the EPA recently published draft Phase II NPDES storm water regulations which will require many cities in Texas to address storm water runoff. With over \$15 million available in nonpoint source SRF loan monies, these cities could make great strides in implementing BMPs to control urban storm water runoff and meet the Phase II rules.

Many cities are in the process of revising, or have revised, their local storm water management plans and could use these funds to upgrade their facilities to control the quantity and quality of storm water runoff. Also, several cities in Texas have dedicated storm water fees to pay for storm water management activities. Cities without dedicated funds could establish a storm water fees program to repay the SRF loan funds and accomplish local storm water management activities.

- In March 1998, the Coastal Coordination Council approved CMP grants guidance to provide additional funding for implementation of nonpoint source measures in the coastal zone. Projects funded in this category are: (1) development of programs to control urban sources of nonpoint pollution in furtherance of Section 26.177 of the Texas Water Code; (2) development and implementation of water quality management plans in compliance with S.B. 503 (Section 201.026 of the Agriculture Code); and (3) projects that demonstrate BMPs for nonpoint source pollution control.
- Under the Statewide Transportation Enhancement Program, projects throughout Texas that go beyond standard transportation activities will be built using \$40 million in federal transportation funds. The program funds a broad range of transportation-related activities, including landscaping and scenic beautification, bicycle and pedestrian facilities, historical preservation and water-pollution control. The program is authorized under the federal Intermodal Surface Transportation Efficiency Act of 1991. Federal funds may be used for

80 percent of the project cost. Local project sponsors are responsible for the remaining 20 percent.

#### **5.2.4 Urban Management Measure Implementation Goals and Strategies**

- The TNRCC will work with the Texas Chapter of the American Public Works Association and other interested parties (Texas Municipal League, etc.) to distribute copies of the *Texas Sourcebook* urban BMP manual to coastal cities and encourage its use and implementation.
- The TNRCC will work with a consultant and/or other interested parties to distribute examples of the Galveston County Health District model Nonpoint Source Pollution Prevention Ordinance to coastal cities and encourage its use and adoption.
- The TNRCC will continue ongoing prevention education and technical assistance activities for Texas coastal cities. The TNRCC will also target additional pollution prevention activities as needed for impaired water bodies along the coast.
- The TNRCC and the TWDB will work to educate and inform local political entities about the availability of State Revolving Fund loan monies for nonpoint source projects and encourage these entities to participate in this program.
- The TNRCC will work to obtain additional grant funds as they become available for local governments to implement or improve local NPS programs. Such programs could include on-site septic systems, pollution prevention activities, and storm water monitoring.

#### **5.2.5 Urban and Developing Areas §6217(g) Management Measures**

Sections 5.2.5.1 through 5.2.5.6 describe each of the (g) measures for urban and developing areas found in EPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* and the programs which will be used to implement those measures. Table 5.3 provides a summary of the authorities for implementing the measures. The management measures are organized under the following six categories: Urban Runoff, Construction Activities, Existing Development, Onsite Development Systems, Roads, Highways, and Bridges, and Pollution Prevention.

##### **5.2.5.1 Urban Runoff: New Development Management Measure**

(1) *By design or performance:*

(a) *After construction has been completed and the site is permanently stabilized, reduce the average annual total suspended solid (TSS) loadings by 80 percent. For the purposes of this measure, an 80 percent TSS reduction is to be determined on an average annual basis (based on the average annual TSS loadings from all storms less than or equal to the 2-year/24-hour storm. TSS loadings from storms greater than 2-year/24 hour storm are not expected to be included in the calculation of the average TSS loadings), or*

- (b) *Reduce the postdevelopment loadings of TSS so that the average annual TSS loadings are no greater than predevelopment loadings, and*
- (2) *To the extent practicable, maintain postdevelopment peak runoff rate and average volume at levels that are similar to predevelopment levels.*

### **Purpose and Applicability**

This management measure is intended to be applied by states to control urban runoff and treat associated pollutants generated from new development, redevelopment, and new and relocated roads, highways, and bridges.

This management measure is intended to: (1) decrease the erosive potential of increased runoff volumes and velocities associated with development-induced changes in hydrology; (2) remove suspended solids and associated pollutants entrained in runoff that result from activities occurring during and after development; (3) retain hydrological conditions to closely resemble those of the predisturbance condition; and (4) preserve natural systems including in-stream habitat.

### **Implementation**

**Watershed Action Plans** developed for impaired water bodies through the TMDL process will include management measures as needed to address specific source impacts such as new development. Within the §6217 Management Area, these management measures will be the (g) measures or alternatives that are as effective in controlling nonpoint source pollution. Watershed Action Plans are discussed in detail in Chapter 4.

**TxDOT Guidance Documents.** For the construction of new and relocated roads, highways, and bridges which fall under TxDOT jurisdiction, the (g) measures listed above are currently implemented through voluntary compliance with TxDOT guidance documents such as *Storm Water Management Guidelines for Construction Activities* and the *Infrastructure Maintenance Manual*. TxDOT guidance is discussed further in Section 5.2.2.2 of this chapter.

**Model Local NPS Programs and Ordinances.** TNRCC will work with cities, non-governmental organizations, and other interested parties to distribute copies of the *Texas Nonpoint Sourcebook* (American Public Works Association, under development) and the *Nonpoint Source Pollution Prevention Model Ordinance* (Galveston County Health District, under development) to coastal cities throughout the §6217 Management Area. Galveston's model ordinance addresses construction and development activities. Local NPS programs and ordinances are discussed further in Section 5.2.2.1 of this chapter.

**Section 26.177** of the Texas Water Code requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to non-permitted sources of pollution,

(2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 Management Area, municipalities will implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

Under §26.121, the TNRCC may use its general authority to require a city (regardless of population), a person, or an entity to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for NPS pollution.

**NPDES Program.** Within the §6217 Management Area, the majority of new development and redevelopment occurs and is expected to continue to occur within metropolitan areas. Cities with Phase I and Phase II TPDES/NPDES permits covering the sources and impacts addressed by this (g) measure will be exempt from meeting the §6217 requirements, as will construction projects, including road construction, which are permitted through the NPDES program.

### **5.2.5.2 Urban Runoff: Watershed Protection from Urban Runoff**

*Develop a watershed protection program to:*

- (1) Avoid conversion, to the extent practicable, of areas that are particularly susceptible to erosion and sediment loss;*
- (2) Preserve areas that provide important water quality benefits and/or are necessary to maintain riparian and aquatic biota; and*
- (3) Site development, including roads, highways, and bridges, to protect to the extent practicable the natural integrity of water bodies and natural drainage systems.*

#### **Purpose and Applicability**

The purpose of this management measure is to reduce the generation of nonpoint source pollutants and to mitigate the impacts of urban runoff and associated pollutants that result from new development or redevelopment, including the construction of new and relocated roads, highways, and bridges through the development of a watershed protection program.

### **Implementation**

**Watershed Action Plans** will be developed for all §303(d) listed priority watersheds in the state.

These Action Plans will provide a written, quantitative assessment of water quality problems and contributing sources as well as an implementation plan identifying responsible parties at the state, regional, and local level, and specifying actions needed to restore and protect water quality standards.

Watersheds within the §6217 Management Area will utilize the §6217(g) measures or alternatives that are as effective in controlling nonpoint source pollution. Watershed Action Plans are discussed at length in Chapter 4.

**TxDOT Guidance Documents.** For the construction of new and relocated roads, highways, and bridges which fall under TxDOT jurisdiction, the (g) measures listed above are currently implemented through voluntary compliance with TxDOT guidance documents such as *Storm Water Management Guidelines for Construction Activities* and the *Infrastructure Maintenance Manual*. TxDOT guidance calls for the identification and consideration of water pollution sensitive areas when selecting route locations and establishing control measures. TxDOT guidance is discussed further in Section 5.2.2.2 of this chapter.

**Memorandum of Agreement.** The Texas Parks and Wildlife Department (TPWD) has a memorandum of agreement with TxDOT which allows the department to have active input into TxDOT activities which threaten habitat or fish and wildlife.

**Model Local NPS Programs and Ordinances.** The TNRCC will work with cities, nongovernmental organizations, and other interested parties to distribute copies of the *Texas Nonpoint Sourcebook* (American Public Works Association, under development) and the *Nonpoint Source Pollution Prevention Model Ordinance* (Galveston County Health District, under development) to coastal cities throughout the §6217 Management Area. Galveston's model ordinance addresses construction and development activities. Local NPS programs and ordinances are discussed further in Section 5.2.2.1 of this chapter.

**Watershed Action Plans** developed for impaired water bodies through the TMDL process will include management measures as needed to address specific source impacts such as new development. Within the §6217 Management Area, these management measures will be the (g) measures or alternatives that are as effective in controlling nonpoint source pollution. Watershed Action Plans are discussed in detail in Chapter 4.

**Section 26.177** of the Texas Water Code requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to non-permitted sources of pollution, (2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has

been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 Management Area, municipalities will implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

Under §26.121, the TNRCC may use its general authority to require a city (regardless of population), a person, or an entity, to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for NPS pollution.

**NPDES Program.** Within the §6217 Management Area, the majority of new development and redevelopment occurs and is expected to continue to occur within metropolitan areas. Cities with Phase I and Phase II TPDES/NPDES permits covering the sources and impacts addressed by this (g) measure will be exempt from meeting the §6217 requirements, as will construction projects, including road construction, which are permitted through the NPDES program.

### **5.2.5.3 Urban Runoff: Site Development Management Measure**

*Plan, design, and develop sites to:*

- (1) *Protect areas that provide important water quality benefits and/or are particularly susceptible to erosion and sediment loss;*
- (2) *Limit increases of impervious areas, except where necessary;*
- (3) *Limit land disturbance activities such as clearing and grading, and cut and fill to reduce erosion and sediment loss; and*
- (4) *Limit disturbance of natural drainage features and vegetation.*

#### **Purpose and Applicability**

This management measure is intended to be applied by states to all site development activities including those associated with roads, highways, and bridges. The goal of this management measure is to reduce the generation of nonpoint source pollution and to mitigate the impacts of urban runoff and associated pollutants from all site development, including activities associated with roads,

highways, and bridges. This management measure is intended to provide controls and policies that are to be applied to individual sites during the site planning and review process.

### **Implementation**

**Watershed Action Plans** developed for impaired water bodies through the TMDL process will include management measures as needed to address specific source impacts such as site development.

Within the §6217 Management Area, these management measures will be the (g) measures or alternatives that are as effective in controlling nonpoint source pollution. Watershed Action Plans are discussed in detail in Chapter 4.

**TxDOT Guidance Documents.** For the construction of new and relocated roads, highways, and bridges which fall under TxDOT jurisdiction, the (g) measures listed above are currently implemented through voluntary compliance with TxDOT guidance documents such as *Storm Water Management Guidelines for Construction Activities* and the *Infrastructure Maintenance Manual*. TxDOT guidance is discussed further in Section 5.2.2.2 of this chapter.

**Memorandum of Agreement.** The Texas Parks and Wildlife Department (TPWD) has a memorandum of agreement with TxDOT which allows the department to have active input into TxDOT activities which threaten habitat or fish and wildlife.

**Model Local NPS Programs and Ordinances.** TNRCC will work with cities, non-governmental organizations, and other interested parties to distribute copies of the *Texas Nonpoint Sourcebook* (American Public Works Association, under development) and the *Nonpoint Source Pollution Prevention Model Ordinance* (Galveston County Health District, under development) to coastal cities throughout the §6217 Management Area. Galveston's model ordinance addresses construction and development activities. Local NPS programs and ordinances are discussed further in Section 5.2.2.1 of this chapter.

**Section 26.177** of the Texas Water Code requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to non-permitted sources of pollution, (2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 Management Area, municipalities will implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

Under §26.121, the TNRCC may use its general authority to require a city (regardless of population), a person, or an entity to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for NPS pollution.

**NPDES Program.** Within the §6217 Management Area, the majority of new development and redevelopment occurs and is expected to continue to occur within metropolitan areas. Cities with Phase I and Phase II TPDES/NPDES permits covering the sources and impacts addressed by this (g) measure will be exempt from meeting the §6217 requirements, as will construction projects, including road construction, which are permitted through the NPDES program.

#### **5.2.5.4 Construction Activities: Construction Site Erosion and Sediment Control Management Measure**

- (1) Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction, and
- (2) Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

#### **Purpose and Applicability**

The federal management measure for construction site erosion and sediment control applies to all construction activities on sites of less than five acres which do not have an NPDES permit. The management measure does not apply to: (1) construction of a detached single family home on a site of half an acre or more, or (2) construction that disturbs less than 5,000 square feet of land.

The goal of this management measure is to reduce the sediment loadings from construction sites in coastal areas that enter surface water bodies. This measure requires that coastal states establish new or enhance existing state erosion and sediment control (ESC) programs and/or require ESC programs at the local level. It is intended to be part of a comprehensive land use or watershed management program, as previously detailed in the Watershed and Site Development Management Measures. It is expected that state and local programs will establish criteria determined by local conditions (e.g., soil types, climate, meteorology) that reduce erosion and sediment transport from construction sites.

#### **Implementation**

**Watershed Action Plans** developed for impaired water bodies through the TMDL process will include management measures as needed to address specific source impacts such as construction activities. Within the §6217 Management Area, these management measures will be the (g) measures or alternatives that are as effective in controlling nonpoint source pollution. Watershed Action Plans are discussed in detail in Chapter 4.

**TxDOT Guidance Documents.** For the construction of new and relocated roads, highways, and bridges which fall under TxDOT jurisdiction, the (g) measures listed above are currently implemented through voluntary compliance with TxDOT guidance documents such as *Storm Water Management Guidelines for Construction Activities* and the *Infrastructure Maintenance Manual*. These documents include a wide variety of practices which are used to minimize the adverse impacts of soil erosion and sedimentation. TxDOT guidance is discussed further in Section 5.2.2.2 of this chapter.

**Memorandum of Agreement.** The Texas Parks and Wildlife Department (TPWD) has a memorandum of agreement with TxDOT which allows the department to have active input into TxDOT activities which threaten habitat or fish and wildlife.

**Model Local NPS Programs and Ordinances.** TNRCC will work with cities, non-governmental organizations, and other interested parties to distribute copies of the *Texas Nonpoint Sourcebook* (American Public Works Association, under development) and the *Nonpoint Source Pollution Prevention Model Ordinance* (Galveston County Health District, under development) to coastal cities throughout the §6217 Management Area. Galveston's model ordinance addresses construction and development activities. Local NPS programs and ordinances are discussed further in Section 5.2.2.1 of this chapter.

**Section 26.177** of the Texas Water Code requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to nonpermitted sources of pollution, (2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 Management Area, municipalities will implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

Under §26.121, the TNRCC may use its general authority to require a city (regardless of population), a person, or an entity to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for NPS pollution.

**NPDES Program.** Within the §6217 Management Area, the majority of new development and redevelopment occurs and is expected to continue to occur within metropolitan areas. Cities with Phase I and Phase II TPDES/NPDES permits covering the sources and impacts addressed by this (g) measure will be exempt from meeting the §6217 requirements, as will construction projects, including road construction, which are permitted through the NPDES program.

#### **5.2.5.5 Construction Activities: Construction Site Chemical Control Management Measure**

- (1) Limit application, generation, and migration of toxic substances;
- (2) Ensure the proper storage and disposal of toxic materials; and
- (3) Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface waters.

#### **Purpose and Applicability**

This management measure is intended to be applied by states to all construction sites of less than five acres in area and to new, resurfaced, restored, and reconstructed road, highway, and bridge construction projects. This management measure does not apply to: (1) construction of a detached single family home on a site of one-half acre or more or (2) construction that does not disturb over 5,000 square feet of land on a site. (NOTE: All construction activities, including clearing, grading, and excavation, that result in the disturbance of areas greater than or equal to five acres or are a part of a larger development plan are covered by the NPDES Phase I regulations and are thus excluded from these requirements.) The purpose of this management measure is to prevent the generation of nonpoint source pollution from construction sites due to improper handling and usage of nutrients and toxic substances, and to prevent the movement of toxic substances from the construction site.

#### **Implementation**

**Watershed Action Plans** developed for impaired water bodies through the TMDL process will include management measures as needed to address specific source impacts such as construction activities. Within the §6217 Management Area, these management measures will be the (g) measures or alternatives that are as effective in controlling nonpoint source pollution. Watershed Action Plans are discussed in detail in Chapter 4.

**TxDOT Guidance Documents.** For the construction of new and relocated roads, highways, and bridges which fall under TxDOT jurisdiction, the (g) measures listed above are currently implemented through voluntary compliance with TxDOT guidance documents such as *Storm Water Management*

*Guidelines for Construction Activities and the Infrastructure Maintenance Manual.* TxDOT guidance is discussed further in Section 5.2.2.2 of this chapter.

**Memorandum of Agreement.** The Texas Parks and Wildlife Department (TPWD) has a memorandum of agreement with TxDOT which allows the department to have active input into TxDOT activities which threaten habitat or fish and wildlife.

**Model Local NPS Programs and Ordinances.** TNRCC will work with cities, non-governmental organizations, and other interested parties to distribute copies of the *Texas Nonpoint Sourcebook* (American Public Works Association, under development) and the *Nonpoint Source Pollution Prevention Model Ordinance* (Galveston County Health District, under development) to coastal cities throughout the §6217 Management Area. Galveston's model ordinance addresses construction and development activities. Local NPS programs and ordinances are discussed further in Section 5.2.2.1 of this chapter.

**Section 26.177** of the Texas Water Code requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to non-permitted sources of pollution, (2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 Management Area, municipalities will implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

Under §26.121, the TNRCC may use its general authority to require a city (regardless of population), a person, or an entity to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for NPS pollution.

**NPDES Program.** Within the §6217 Management Area, the majority of new development and redevelopment occurs and is expected to continue to occur within metropolitan areas. Cities with Phase I and Phase II TPDES/NPDES permits covering the sources and impacts addressed by this (g) measure will be exempt from meeting the §6217 requirements, as will construction projects, including road construction, which are permitted through the NPDES program.

### 5.2.5.6 Existing Development: Existing Development Management Measure

*Develop and implement watershed management programs to reduce runoff pollutant concentrations and volumes from existing development:*

- (1) Identify priority local and/or regional watershed pollutant reduction opportunities, e.g., improvements to existing urban runoff control structures;*
- (2) Contain a schedule for implementing appropriate controls;*
- (3) Limit destruction of natural conveyance systems; and*
- (4) Where appropriate, preserve, enhance, or establish buffers along surface water bodies and their tributaries.*

#### **Purpose and Applicability**

This management measure is intended to be applied by states to all urban areas and existing development in order to reduce surface water runoff pollutant loadings from such areas. The purpose of this management measure is to protect or improve surface water quality by the development and implementation of watershed management programs that pursue the following objectives:

- Reduce surface water runoff pollution loadings from areas where development has already occurred.
- Limit surface water runoff volumes in order to minimize sediment loadings resulting from the erosion of streambanks and other natural conveyance systems.
- Preserve, enhance, or establish buffers that provide water quality benefits along water bodies and their tributaries.

#### **Implementation**

**Watershed Action Plans** will be developed for all §303(d) listed priority watersheds in the state.

These Action Plans will provide a written, quantitative assessment of water quality problems and contributing sources as well as an implementation plan identifying responsible parties at the state, regional, and local level, and specifying actions needed to restore and protect water quality standards.

Watersheds within the §6217 Management Area will utilize the §6217(g) measures or alternatives that are as effective in controlling nonpoint source pollution. Watershed Action Plans are discussed at length in Chapter 4.

**Model Local NPS Programs and Ordinances.** TNRCC will work with cities, non-governmental organizations, and other interested parties to distribute copies of the *Texas Nonpoint Sourcebook* (American Public Works Association, under development) and the *Nonpoint Source Pollution Prevention Model Ordinance* (Galveston County Health District, under development) to coastal cities throughout the §6217 Management Area. Galveston's model ordinance addresses construction and development activities. Local NPS programs and ordinances are discussed further in Section 5.2.2.1 of this chapter.

**Section 26.177** of the Texas Water Code requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to non-permitted sources of pollution, (2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 Management Area, municipalities will implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

Under §26.121, the TNRCC may use its general authority to require a city (regardless of population), a person, or an entity to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for NPS pollution.

**NPDES Program.** Within the §6217 Management Area, the majority of new development and redevelopment occurs and is expected to continue to occur within metropolitan areas. Cities with Phase I and Phase II TPDES/NPDES permits covering the sources and impacts addressed by this (g) measure will be exempt from meeting the §6217 requirements, as will construction projects, including road construction, which are permitted through the NPDES program.

#### **5.2.5.7 On-Site Disposal Systems: New On-Site Disposal Systems Management Measure**

- (1) *Ensure that new Onsite Disposal Systems (OSDS) are located, designed, installed, operated, inspected, and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce*

*the discharge of pollutants into ground waters that are closely hydrologically connected to surface waters. Where necessary to meet these objectives: (a) discourage the installation of garbage disposals to reduce hydraulic and nutrient loadings; and (b) where low-volume plumbing fixtures have not been installed in new developments or redevelopments, reduce total hydraulic loadings to the OSDS by 25 percent. Implement OSDS inspection schedules for preconstruction, construction, and postconstruction.*

- (2) *Direct placement of OSDS away from unsuitable areas. Where OSDS placement in unsuitable areas is not practicable, ensure that the OSDS is designed or sited at a density so as not to adversely affect surface waters or ground water that is closely hydrologically connected to surface water. Unsuitable areas include, but are not limited to, areas with poorly or excessively drained soils; areas with shallow water tables or areas with high seasonal water tables; areas overlaying fractured bedrock that drain directly to ground water; areas within floodplains; or areas where nutrient and/or pathogen concentrations in the effluent cannot be sufficiently treated or reduced before the effluent reaches sensitive waterbodies;*
- (3) *Establish protective setbacks from surface waters, wetlands, and floodplains for conventional as well as alternative OSDS. The lateral setbacks should be based on soil type, slope, hydrologic factors, and type of OSDS. Where uniform protective setbacks cannot be achieved, site development with OSDS so as not to adversely affect waterbodies and/or contribute to a public health nuisance;*
- (4) *Establish protective separation distances between OSDS system components and groundwater which is closely hydrologically connected to surface waters. The separation distances should be based on soil type, distance to ground water, hydrologic factors, and type of OSDS;*
- (5) *Where conditions indicate that nitrogen-limited surface waters may be adversely affected by excess nitrogen loadings from ground water, require the installation of OSDS that reduce total nitrogen loadings by 50 percent to ground water that is closely hydrologically connected to surface water.*

### **Purpose and Applicability**

This management measure is intended to be applied by states to all new OSDS including package plants and small-scale or regional treatment facilities not covered by NPDES regulations in order to manage the siting, design, installation, and operation and maintenance of all such OSDS. The purpose of this management measure is to protect the §6217 Management Area from pollutants discharged by OSDS. The measure requires that OSDS be sited, designed, and installed so that impacts to water bodies will be reduced, to the extent practicable. Factors such as soil type, soil

depth, depth to water table, rate of sea level rise, and topography must be considered in siting and installing conventional OSDS.

The objective of the management measure is to prevent the installation of conventional OSDS in areas where soil absorption systems will not provide adequate treatment of effluents containing solids, phosphorus, pathogens, nitrogen, and nonconventional pollutants prior to entry into surface waters and ground water (e.g., highly permeable soils, areas with shallow water tables or confining layers, or poorly drained soils).

### **Implementation**

**GLO Beachfront Construction Regulations.** GLO rules at 31 TAC §15.4(c)(10) require on-site sewage disposal systems to be set back from Gulf beaches by prohibiting any part of the system from being located seaward of the structures they service.

**TNRCC On-Site Wastewater Program.** The OSSF program in Texas is designed to be administered locally. This allows a faster response time to all OSSF activities. It also allows the local entity to adopt more stringent standards based on local conditions, providing greater public health protection. Many local governments have pursued that option. In the coastal area, the program has been delegated to 21 counties and to five cities. In 1996, these entities permitted almost 9,400 systems (see Table 5.4). TNRCC has a model local ordinance for cities and a model county order for counties that must be adopted or approved in a public meeting by these local entities before they can receive delegation of the OSSF program.

The TNRCC On-Site Wastewater Program establishes standards for installation of OSSFs and outlines licensing and educational requirements for installers. On February 4, 1997, the TNRCC adopted rules (30 TAC Chapter 285) to provide minimum levels of acceptable criteria to assure that the proper on-site sewage facilities will be installed in the state in order to eliminate and prevent health hazards for the public and the waters in the state. One of the main changes in these rules was to base the design of an OSSF on a proper soil and site evaluation. This allows the use of economically feasible alternative techniques and technologies for OSSF treatment and disposal that can be used in soils not suitable for conventional OSSFs. These proposed rule changes seek to accomplish the following:

- Make technical improvements by updating the minimum OSSF construction standards; providing better testing criteria for aerobic units; providing a protocol for testing and approval of innovative systems; and requiring maintenance for all systems.
- Require stricter education and certification by expanding the levels of installer certification and training; expanding inspector training; and requiring inspector certification.
- Require better site evaluations by improving the site evaluation process and the subdivision reviews.
- Increase the permit, installer registration, and inspector fees to provide better funding sources, and add civil and administrative penalties.

- Establish enforcement procedures.

To better facilitate the training requirements for the installers and inspectors, On-Site Wastewater Treatment Training Centers in College Station, Weslaco, and El Paso will be used to provide hands-on training for installers and inspectors of on-site wastewater treatment and disposal systems and soils evaluations.

The TNRCC is currently undertaking an effort to develop a state management plan for the on-site wastewater program. The plan will address issues concerning on-site wastewater treatment and disposal, solutions for those issues, and priorities for accomplishing the work. Areas that will be evaluated will include training and education, local on-site wastewater programs, alternative systems, and demonstration projects. The plan will also identify problem areas of the state that need attention. This process will take approximately one year.

The TNRCC is working with members of the regulated community to develop a process for correlating data from experimental and demonstration constructed wetlands projects that will enable the TNRCC to establish standards for the design and installation of constructed wetlands for on-site sewage disposal. Several projects currently being funded under §319(h) of the Clean Water Act will be included in this process. They are scheduled for completion in two years.

*The following sections of 30 TAC Chapter 285 specifically address element (1) of the (g) measure:*

- TNRCC rules (30 TAC Chapter 285) provide minimum levels of acceptable criteria to assure that the proper on-site sewage facilities will be installed in the state in order to eliminate and prevent health hazards for the public and the waters in the state.
- 30 TAC §285.39 requires installers to provide homeowners a list of water conservation practices and maintenance and management practices to keep the OSSF working properly.
- 30 TAC §285.91 (Table III) provides reduction in the sizing of the OSSF system for utilizing low-flow fixtures.
- To ensure that the OSSF has been properly installed, a construction inspection is required before the system is covered up and permitted for use.

*The following section of 30 TAC Chapter 285 specifically addresses element (2) of the (g) measure:*

- 30 TAC §285.91 (Tables V and X) has setback requirements that address suitable/unsuitable areas and parameters or setback requirements that each OSSF component must meet. The overall assumption is that there will be adequate soil beneath the excavation bottom of a particular type OSSF to properly treat the effluent. In the event that adequate soils do not exist, emphasis must be placed on pre-treatment or total containment of the effluent.

*The following section of 30 TAC Chapter 285 specifically addresses element (3) of the (g) measure:*

- This management measure specification is addressed in 30 TAC Chapter 285, which provides minimum levels of acceptable criteria to assure that the proper on-site sewage facilities will

be installed, and in 30 TAC §285.91 (Tables V and X) which has setback requirements that address suitable/unsuitable areas and parameters or set back requirements that each OSSF component must meet.

*The following section of 30 TAC Chapter 285 specifically addresses element (4) of the (g) measure:*

- This management measure specification is addressed in 30 TAC Chapter 285 and in 30 TAC §285.91 (Tables V and X).

*The following specifically addresses element (5) of the (g) measure:*

- Although there is some nitrogen reduction in the treatment and disposal processes of effluent with OSSF, there are no specific requirements in 30 TAC Chapter 285 for nitrogen reduction measures. The TMDL process will be used to address sources of surface water impairment in the §6217 Management Area. If a stream segment is shown to be impacted by failing OSSFs, then activities will be implemented to encourage homeowners to install or retrofit existing systems with more efficient or alternative OSSFs.

#### **5.2.5.8 On-Site Disposal Systems: Operating On-Site Disposal Systems Management Measure**

- (1) *Establish and implement policies and systems to ensure that existing OSDS are operated and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground waters that are closely hydrologically connected to surface waters. Where necessary to meet these objectives, encourage the reduced use of garbage disposals, encourage the use of low-volume plumbing fixtures, and reduce total phosphorus loadings to the OSDS by 15 percent (if the use of low-level phosphate detergents has not been required or widely adopted by OSDS users). Establish and implement policies that require an OSDS to be repaired, replaced, or modified where the OSDS fails, or threatens or impairs surface waters;*
- (2) *Inspect OSDS at a frequency adequate to ascertain whether OSDS are failing;*
- (3) *Consider replacing or upgrading OSDS to treat effluent so that total nitrogen loadings in the effluent are reduced by 50 percent. This provision applies only:*
  - (a) *where conditions indicate that nitrogen-limited surface waters may be adversely affected by significant ground water nitrogen loadings from OSDS, and*
  - (b) *where nitrogen loadings from OSDS are delivered to ground water that is closely hydrologically connected to surface water.*

### **Purpose and Applicability**

The purpose of this management measure is to minimize pollutant loadings from operating OSDS. This management measure does not apply to existing conventional OSDS that meet all of the following criteria: (1) treat wastewater from a single family home; (2) are sited where OSDS density is less than or equal to one OSDS per 20 acres; and (3) the OSDS is sited at least 1,250 feet away from surface waters. This management measure requires that OSDS be modified, operated, repaired, and maintained to reduce nutrient and pathogen loadings in order to protect and enhance surface waters. In the past, it has been a common practice to site conventional OSDS in coastal areas that have inadequate separation distances to ground water, fractured bedrock, sandy soils, or other conditions that prevent or do not allow adequate treatment of OSDS-generated pollutants. Eutrophication in surface waters has also been attributed to the low nitrogen reductions provided by conventional OSDS designs.

### **Implementation**

**TNRCC On-Site Wastewater Program.** The OSSF program in Texas is designed to be administered locally. This allows a faster response time to all OSSF activities. It also allows the local entity to adopt more stringent standards based on local conditions, providing greater public health protection. Many local governments have pursued that option. In the coastal area, the program has been delegated to 21 counties and to five cities. In 1996, these entities permitted almost 9,400 systems (see Table 5.4). The TNRCC has a model local ordinance for cities and a model county order for counties that must be adopted or approved in a public meeting by these local entities before they can receive delegation of the OSSF program.

On February 4, 1997, the TNRCC adopted rules (30 TAC Chapter 285) to provide minimum levels of acceptable criteria to ensure that the proper on-site sewage facilities will be installed in the state in order to eliminate and prevent health hazards for the public and the waters in the state. Under the rules, the OSSF owner is required to perform system maintenance on a regular basis. There are no requirements in the OSSF rules for periodic inspections by the permitting authority to determine if failing systems exist. Those units that require secondary treatment of the effluent (i.e., aerobic systems with spray irrigation) are required to have a maintenance check and to be tested three times per year by a qualified maintenance company. In the event an OSSF fails, the owner of the system is required to repair or alter it to meet the standards in 30 TAC Chapter 285. If the owner refuses, enforcement action can be taken to ensure compliance under this chapter.

30 TAC §285.39 includes a list of maintenance and management practices, including the reduced use of garbage disposals and the use of low-flow fixtures.

While there are no phosphorus reduction or nitrogen reduction standards in the current OSSF rules, public education and outreach efforts conducted in many coastal areas address these issues. For

example the Coastal Bend Bays and Estuaries Program (CBBEP) has produced a Study of On-Site Sewage Facilities which provides information for local governments on managing OSSFs and obtaining funding for OSSF improvement projects. Through this study, the CBBEP also produced a *Guide for Management of Septic Tank Systems for Homeowners* and a *Guide for Management of Septic Tank Systems for Local Governments*. The *Septic Tank News*, published by the American Society of Civil Engineers, is another source of information for homeowners and local government on OSSF management.

The TMDL process will be used to address sources of surface water impairment in the §6217 Management Area. If a stream segment is shown to be impacted by failing OSSFs, then activities will be implemented to encourage homeowners to install or retrofit existing systems with more efficient or alternative OSSFs.

#### **5.2.5.9 Roads, Highways, and Bridges: Management Measure for Planning, Siting, and Developing Roads and Highways**

*Plan, site, and develop roads and highways to:*

- (1) *Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss;*
- (1) Limit land disturbance such as clearing and grading and cut and fill to reduce erosion and sediment loss; and
- (3) Limit disturbance of natural drainage features and vegetation.

#### **Purpose and Applicability**

This measure is intended to be applied by states to site development and land-disturbing activities for new, relocated, and reconstructed (widened) roads (including residential streets) and highways in order to reduce the generation of nonpoint source pollutants and to mitigate the impacts of urban runoff and associated pollutants from such activities. The best time to address control of NPS pollution from roads and highways is during the initial planning and design phase. New roads and highways should be located with consideration of natural drainage patterns and planned to avoid encroachment on surface waters and wet areas. Where this is not possible, appropriate controls will be needed to minimize the impacts of NPS runoff on surface waters.

#### **Implementation**

**TxDOT Guidance Documents.** For the construction of new and relocated roads, highways, and bridges which fall under TxDOT jurisdiction, the (g) measures listed above are currently implemented through voluntary compliance with TxDOT guidance documents such as *Storm Water Management Guidelines for Construction Activities* and the *Infrastructure Maintenance Manual*. TxDOT guidance is discussed further in Section 5.2.2.2 of this chapter.

**Memorandum of Agreement.** The Texas Parks and Wildlife Department (TPWD) has a memorandum of agreement with TxDOT which allows the department to have active input into TxDOT activities which threaten habitat or fish and wildlife.

**Model Local NPS Programs and Ordinances.** TNRCC will work with cities, nongovernmental organizations, and other interested parties to distribute copies of the *Texas Nonpoint Sourcebook* (American Public Works Association, under development) and the *Nonpoint Source Pollution Prevention Model Ordinance* (Galveston County Health District, under development) to coastal cities throughout the §6217 Management Area. Galveston's model ordinance addresses construction and development activities. Local NPS programs and ordinances are discussed further in Section 5.2.2.1 of this chapter.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

Under §26.121, the TNRCC may use its general authority to require a city (regardless of population), a person, or an entity to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for NPS pollution.

**NPDES Program.** Within the §6217 Management Area, the majority of new development and redevelopment occurs and is expected to continue to occur within metropolitan areas. Cities with Phase I and Phase II TPDES/NPDES permits covering the sources and impacts addressed by this (g) measure will be exempt from meeting the §6217 requirements, as will construction projects, including road construction, which are permitted through the NPDES program.

#### **5.2.5.10 Roads, Highways, and Bridges: Management Measure for Bridges**

*Site, design, and maintain bridge structures so that sensitive and valuable aquatic ecosystems and areas providing important water quality benefits are protected from adverse effects.*

##### **Purpose and Applicability**

This management measure is intended to be applied by states to new, relocated, and rehabilitated bridge structures in order to control erosion, streambed scouring, and surface runoff from such activities.

This measure requires that NPS runoff impacts on surface waters from bridge decks be assessed and that appropriate management and treatment be employed to protect critical habitats, wetlands, fisheries, shellfish beds, and domestic water supplies. The siting of bridges should be a coordinated

effort among the states, the FHWA, the U.S. Coast Guard, and the Army Corps of Engineers. Locating bridges in coastal areas can cause significant erosion and sedimentation, resulting in the loss of wetlands and riparian areas. Additionally, since bridge pavements are extensions of the connecting highway, runoff waters from bridge decks also deliver loadings of heavy metals, hydrocarbons, toxic substances, and deicing chemicals to surface waters as a result of discharge through scupper drains with no overland buffering. Bridge maintenance can also contribute heavy loads of lead, rust particles, paint, abrasives, solvents, and cleaners into surface waters. Protection against possible pollutant overloads can be afforded by minimizing the use of scuppers on bridges traversing very sensitive waters and conveying deck drainage to land for treatment. Whenever practical, bridge structures should be located to avoid crossing over sensitive fisheries and shellfish-harvesting areas to prevent polluted runoff from washing through scuppers into the waters below. Also, bridge design should take into account potential scour and erosion, which may affect shellfish beds and bottom sediments.

### **Implementation**

**TxDOT Guidance Documents.** For the construction of new and relocated roads, highways, and bridges which fall under TxDOT jurisdiction, the (g) measures listed above are currently implemented through voluntary compliance with TxDOT guidance documents such as *Storm Water Management Guidelines for Construction Activities* and the *Infrastructure Maintenance Manual*. TxDOT guidance is discussed further in Section 5.2.2.2 of this chapter.

**Memorandum of Agreement.** The Texas Parks and Wildlife Department (TPWD) has a memorandum of agreement with TxDOT which allows the department to have active input into TxDOT activities which threaten habitat or fish and wildlife.

**Model Local NPS Programs and Ordinances.** TNRCC will work with cities, nongovernmental organizations, and other interested parties to distribute copies of the *Texas Nonpoint Sourcebook* (American Public Works Association, under development) and the *Nonpoint Source Pollution Prevention Model Ordinance* (Galveston County Health District, under development) to coastal cities throughout the §6217 Management Area. Galveston's model ordinance addresses construction and development activities. Local NPS programs and ordinances are discussed further in Section 5.2.2.1 of this chapter.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

Under §26.121, the TNRCC may use its general authority to require a city (regardless of population), a person, or an entity to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for NPS pollution.

**NPDES Program.** Within the §6217 Management Area, the majority of new development and redevelopment occurs and is expected to continue to occur within metropolitan areas. Cities with Phase I and Phase II TPDES/NPDES permits covering the sources and impacts addressed by this (g) measure will be exempt from meeting the §6217 requirements, as will construction projects, including road construction, which are permitted through the NPDES program.

#### **5.2.5.11 Roads, Highways, and Bridges: Management Measure for Construction Projects**

- (1) *Reduce erosion, and, to the extent practicable, retain sediment on-site during and after construction, and*
- (2) *Prior to land disturbance, prepare and implement an approved erosion control plan or similar administrative document that contains erosion and sediment control provisions.*

#### **Purpose and Applicability**

This management measure is intended to be applied by states to new, replaced, restored, and rehabilitated road, highway, and bridge construction projects in order to control erosion and offsite movement of sediment from such project sites. The major water quality issues associated with highway construction activities are the processes of erosion and sedimentation. Accelerated erosion and sedimentation can occur at times in conjunction with the construction of highway and transportation facilities. The accelerated process can result in significant impacts such as safety hazards, expensive maintenance problems, unsightly conditions, instability of slopes, and the disruption and/or destruction of ecosystems. Erosion and sedimentation from construction of roads, highways, and bridges, and from unstabilized cut-and-fill areas, can significantly impact surface waters and wetlands with silt and other pollutants including heavy metals, hydrocarbons, and toxic substances. Erosion and sediment control plans are effective in describing procedures for mitigating erosion problems at construction sites before any land-disturbing activity begins.

#### **Implementation**

**TxDOT Guidance Documents.** For the construction of new and relocated roads, highways, and bridges which fall under TxDOT jurisdiction, the (g) measures listed above are currently implemented through voluntary compliance with TxDOT guidance documents such as *Storm Water Management Guidelines for Construction Activities* and the *Infrastructure Maintenance Manual*. TxDOT guidance is discussed further in Section 5.2.2.2 of this chapter.

**Memorandum of Agreement.** The Texas Parks and Wildlife Department (TPWD) has a memorandum of agreement with TxDOT which allows the department to have active input into TxDOT activities which threaten habitat or fish and wildlife.

**Model Local NPS Programs and Ordinances.** TNRCC will work with cities, non-governmental organizations, and other interested parties to distribute copies of the *Texas Nonpoint Sourcebook* (American Public Works Association, under development) and the *Nonpoint Source Pollution Prevention Model Ordinance* (Galveston County Health District, under development) to coastal cities

throughout the §6217 Management Area. Galveston's model ordinance addresses construction and development activities. Local NPS programs and ordinances are discussed further in Section 5.2.2.1 of this chapter.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

Under §26.121, the TNRCC may use its general authority to require a city (regardless of population), a person, or an entity to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for NPS pollution.

**NPDES Program.** Within the §6217 Management Area, the majority of new development and redevelopment occurs and is expected to continue to occur within metropolitan areas. Cities with Phase I and Phase II TPDES/NPDES permits covering the sources and impacts addressed by this (g) measure will be exempt from meeting the §6217 requirements, as will construction projects, including road construction, which are permitted through the NPDES program.

#### **5.2.5.11 Roads, Highways, and Bridges: Management Measure for Construction Site Chemical Control**

- (1) *Limit the application, generation, and migration of toxic substances;*
- (2) *Ensure the proper storage and disposal of toxic materials; and*
- (3) *Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface water.*

#### **Purpose and Applicability**

This management measure is intended to be applied by states to new, resurfaced, restored, and rehabilitated road, highway, and bridge construction projects in order to reduce toxic and nutrient loadings from such project sites. The objective of this measure is to guard against toxic spills and hazardous loadings at construction sites from equipment and fuel storage sites. Toxic substances tend to bind to fine soil particles; however, by controlling sediment mobilization, it is possible to limit the loadings of these pollutants. Also, some substances such as fuels and solvents are hazardous and excess applications or spills during construction can pose significant environmental impacts. Proper management and control of toxic substances and hazardous materials should be the adopted procedure for all construction projects and should be established by erosion and sediment control plans.

#### **Implementation**

**TxDOT Guidance Documents.** For the construction of new and relocated roads, highways, and bridges which fall under TxDOT jurisdiction, the (g) measures listed above are currently implemented through voluntary compliance with TxDOT guidance documents such as *Storm Water Management Guidelines for Construction Activities* and the *Infrastructure Maintenance Manual*. TxDOT guidance is discussed further in Section 5.2.2.2 of this chapter.

**Memorandum of Agreement.** The Texas Parks and Wildlife Department (TPWD) has a memorandum of agreement with TxDOT which allows the department to have active input into TxDOT activities which threaten habitat or fish and wildlife.

**Model Local NPS Programs and Ordinances.** TNRCC will work with cities, non-governmental organizations, and other interested parties to distribute copies of the *Texas Nonpoint Sourcebook* (American Public Works Association, under development) and the *Nonpoint Source Pollution Prevention Model Ordinance* (Galveston County Health District, under development) to coastal cities throughout the §6217 Management Area. Galveston's model ordinance addresses construction and development activities. Local NPS programs and ordinances are discussed further in Section 5.2.2.1 of this chapter.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

Under §26.121, the TNRCC may use its general authority to require a city (regardless of population), a person, or an entity to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for NPS pollution.

**NPDES Program.** Within the §6217 Management Area, the majority of new development and redevelopment occurs and is expected to continue to occur within metropolitan areas. Cities with Phase I and Phase II TPDES/NPDES permits covering the sources and impacts addressed by this (g) measure will be exempt from meeting the §6217 requirements, as will construction projects, including road construction, which are permitted through the NPDES program.

#### **5.2.5.12 Roads, Highways, and Bridges: Management Measure for Operation and Maintenance of Roads, Highways, and Bridges**

*Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters.*

#### **Purpose and Applicability**

This management measure is intended to be applied by states to existing, restored, and rehabilitated roads, highways, and bridges. Substantial amounts of eroded material and other pollutants can be generated by operation and maintenance procedures for roads, highways, and bridges and from sparsely vegetated areas, cracked pavements, potholes, and poorly operating urban runoff control structures. This measure is intended to ensure that pollutant loadings from roads, highways, and bridges are minimized by the development and implementation of a program and associated practices to ensure that sediment and toxic substance loadings from operation and maintenance activities do not impair coastal surface waters. The program to be developed, using the practices described in this management measure, should consist of and identify standard operating procedures for nutrient and pesticide management, road salt use minimization, and maintenance guidelines (e.g., capture and contain paint chips and other particulates from bridge maintenance operations, resurfacing, and pothole repairs).

### **Implementation**

**TxDOT Guidance Documents.** For the construction of new and relocated roads, highways, and bridges which fall under TxDOT jurisdiction, the (g) measures listed above are currently implemented through voluntary compliance with TxDOT guidance documents such as *Storm Water Management Guidelines for Construction Activities* and the *Infrastructure Maintenance Manual*. TxDOT guidance is discussed further in Section 5.2.2.2 of this chapter.

**Memorandum of Agreement.** The Texas Parks and Wildlife Department (TPWD) has a memorandum of agreement with TxDOT which allows the department to have active input into TxDOT activities which threaten habitat or fish and wildlife.

**Model Local NPS Programs and Ordinances.** The TNRCC will work with cities, nongovernmental organizations, and other interested parties to distribute copies of the *Texas Nonpoint Sourcebook* (American Public Works Association, under development) and the *Nonpoint Source Pollution Prevention Model Ordinance* (Galveston County Health District, under development) to coastal cities throughout the §6217 Management Area. Galveston's model ordinance addresses construction and development activities. Local NPS programs and ordinances are discussed further in Section 5.2.2.1 of this chapter.

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Under §26.121, the TNRCC may use its general authority to require a city (regardless of population), a person, or an entity to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for NPS pollution.

**NPDES Program.** Within the §6217 Management Area, the majority of new development and redevelopment occurs and is expected to continue to occur within metropolitan areas. Cities with Phase I and Phase II TPDES/NPDES permits covering the sources and impacts addressed by this (g) measure will be exempt from meeting the §6217 requirements, as will construction projects, including road construction, which are permitted through the NPDES program.

#### **5.2.5.13 Roads, Highways, and Bridges: Management Measure for Road, Highway, and Bridge Runoff Systems**

*Develop and implement runoff management systems for existing roads, highways, and bridges to reduce runoff pollutant concentrations and volumes entering surface waters.*

*(1) Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures; and*

*(2) Establish schedules for implementing appropriate controls.*

#### **Purpose and Applicability**

This management measure is intended to be applied by states to existing, resurfaced, restored, and rehabilitated roads, highways, and bridges that contribute to adverse effects in surface waters. This measure requires that operation and maintenance systems include the development of retrofit projects, where needed, to collect nonpoint source pollutant loadings from existing, reconstructed, and rehabilitated roads, highways, and bridges. Poorly designed or maintained roads and bridges can generate significant erosion and pollution loads containing heavy metals, hydrocarbons, sediment, and debris that run off into and threaten the quality of surface waters and their tributaries. In areas where such adverse impacts to surface waters can be attributed to adjacent roads or bridges, retrofit management projects to protect these waters may be needed (e.g., installation of structural or nonstructural pollution controls). Retrofit projects can be located in existing rights-of-way, within interchange loops, or on adjacent land areas. Areas with severe erosion and pollution runoff problems may require relocation or reconstruction to mitigate these impacts.

Runoff management systems are a combination of nonstructural and structural practices selected to reduce nonpoint source loadings from roads, highways, and bridges. These systems are expected to include structural improvements to existing runoff control structures for water quality purposes; construction of new runoff control devices, where necessary to protect water quality; and scheduled operation and maintenance activities for these runoff control practices. Typical runoff controls for roads, highways, and bridges include vegetated filter strips, grassed swales, detention basins, constructed wetlands, and infiltration trenches.

#### **Implementation**

Under the **Statewide Transportation Enhancement Program**, projects throughout Texas that go beyond standard transportation activities will be built using \$40 million in federal transportation funds. The program funds a broad range of transportation-related activities, including landscaping

and scenic beautification, bicycle and pedestrian facilities, historical preservation and water-pollution control. The program is authorized under the federal Intermodal Surface Transportation Efficiency Act of 1991. Federal funds may be used for 80 percent of the project cost. Local projects sponsors are responsible for the remaining 20 percent.

**Watershed Action Plans** will be developed for all §303(d) listed priority watersheds in the state. These Action Plans will provide a written, quantitative assessment of water quality problems and contributing sources as well as an implementation plan identifying responsible parties at the state, regional, and local level, and specifying actions needed to restore and protect water quality standards. Watersheds within the §6217 Management Area will utilize the §6217(g) measures or alternatives that are as effective in controlling nonpoint source pollution. Watershed Action Plans are discussed at length in Chapter 4.

**Section 26.177** of the Texas Water Code requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to nonpermitted sources of pollution, (2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 Management Area, municipalities will implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

**TxDOT Guidance Documents.** For the construction of new and relocated roads, highways, and bridges which fall under TxDOT jurisdiction, the (g) measures listed above are currently implemented through voluntary compliance with TxDOT guidance documents such as *Storm Water Management Guidelines for Construction Activities* and the *Infrastructure Maintenance Manual*. TxDOT guidance is discussed further in Section 5.2.2.2 of this chapter.

**Memorandum of Agreement.** The Texas Parks and Wildlife Department (TPWD) has a memorandum of agreement with TxDOT which allows the department to have active input into TxDOT activities which threaten habitat or fish and wildlife.

**Model Local NPS Programs and Ordinances.** TNRCC will work with cities, non-governmental organizations, and other interested parties to distribute copies of the *Texas Nonpoint Sourcebook* (American Public Works Association, under development) and the *Nonpoint Source Pollution Prevention Model Ordinance* (Galveston County Health District, under development) to coastal cities throughout the §6217 Management Area. Galveston's model ordinance addresses construction and development activities. Local NPS programs and ordinances are discussed further in Section 5.2.2.1 of this chapter.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

Under §26.121, the TNRCC may use its general authority to require a city (regardless of population), a person, or an entity to obtain a permit and/or be subject to an enforcement order if the city, person, or entity is responsible for NPS pollution.

**NPDES Program.** Within the §6217 Management Area, the majority of new development and redevelopment occurs and is expected to continue to occur within metropolitan areas. Cities with Phase I and Phase II TPDES/NPDES permits covering the sources and impacts addressed by this (g) measure will be exempt from meeting the §6217 requirements, as will construction projects, including road construction, which are permitted through the NPDES program.

#### **5.2.5.14 Pollution Prevention: Pollution Prevention Management Measure**

*Implement pollution prevention and education programs to reduce nonpoint source pollutants generated from the following activities, where applicable:*

- *The improper storage, use, and disposal of household hazardous chemicals, including automobile fluids, pesticides, paints, solvents, etc.;*
- *Lawn and garden activities, including the application and disposal of lawn and garden care products, and the improper disposal of leaves and yard trimmings;*
- *Turf management on golf courses, parks, and recreational areas;*
- *Improper operation and maintenance of onsite disposal systems;*
- *Discharge of pollutants into storm drains including floatables, waste oil, and litter;*
- *Commercial activities including parking lots, gas stations, and other entities not under NPDES purview; and*
- *Improper disposal of pet excrement.*

#### **Purpose and Applicability**

This management measure is intended to prevent and reduce NPS pollutant loadings generated from a variety of activities within urban areas not addressed by other management measures.

### **Implementation**

Numerous federal and state agencies, local governments, and nongovernmental organizations have ongoing pollution prevention and education programs aimed at the reduction of nonpoint source pollutants from the sources listed in the (g) measure above. A few of these programs are described below.

TNRCC's **Office of Pollution Prevention and Recycling (OPPR)** offers a series of pollution prevention workshops that discuss compliance with the **Waste Reduction Policy Act (WRPA) of 1991**,<sup>6</sup> as well as environmental cost accounting and technical resources available for pollution prevention projects. A more intensive training program, the Permanent Pollution Prevention Program, is also available to train facility managers in methods for developing cross-functional teams of employees who can identify pollution prevention opportunities within a facility.

OPPR also offers free, voluntary, nonregulatory on-site pollution prevention technical assistance to facility managers who are looking for waste-cutting opportunities.

The **Clean Industries 2000** program asks Texas facility managers to make voluntary commitments to reduce their hazardous waste generation and/or Toxic Release Inventory (TRI) releases by 50 percent by the year 2000; to sponsor community environmental projects and forums; and to develop an internal environmental management program. Now in its sixth year, the program has 180 facility members that have created 557 community environmental programs and 184 citizen communication programs. Between 1994 and 1996, member facilities accounted for 8.7 million tons of hazardous waste reductions in Texas. Member facilities have also cut their TRI releases by 60 million pounds between 1987 and 1994, representing approximately 80 percent of the reductions in releases to air in Texas during that period. Approximately two-thirds of the membership of the Clean Industries 2000 program is within 50 miles of the Texas Gulf Coast.

The **Lake and River Cleanup Program** helps local governments and community groups to organize solid waste cleanups of the state's waterways. The Lake and River Cleanup Program has finalized a contract with Keep Texas Beautiful to conduct cleanups for the TNRCC. Spring cleanups will be conducted jointly. Keep Texas Beautiful will then take control of the program and will build upon it with their network of 250 affiliates. In 1996, 23,077 volunteers collected 513 tons of trash from 53 lakes and rivers.

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<sup>6</sup>WRPA requires facilities that are either registered hazardous waste generators or reporters to the federal Toxics Release Inventory to develop a facility waste minimization or source reduction plan. A summary of the plan and yearly progress report must be sent to the TNRCC.

**Texas Recycles Day** is an annual event sponsored by the OPPR with the active participation of hundreds of local partners across the state. Some 400 events promoting recycling and “buying recycled” were held across the state. Sixty Texas Home Depot stores highlighted recycled-content building materials. More than 7,000 students participated in the Amoco school recycling challenge. 100,000 Texans pledged to “keep recycling working” by recycling and purchasing recycled-content products.

**Clean Texas Star** is a voluntary nonhazardous waste reduction program of the OPPR with 3,204 participating sites statewide and more than 73 local partner organizations. Members have committed to voluntarily decrease the amount of solid waste sent to Texas landfills while also committing to increase their purchase of recycled-content materials and sponsor local environmental projects. Three levels of voluntary recycling commitments are offered through the program in order to provide broad eligibility for participation to many different sizes and types of businesses and institutions in Texas. Reductions are calculated by a 1990 benchmark year through the year 2000. A total of 49 percent of the membership has committed to a 25 percent reduction level; 35 percent of the membership have committed to 50 percent reductions; and 16 percent have committed to 75 percent reductions. Members have committed to purchase either 25 percent recycled content products or three major items for their inventory, depending on their ability to participate. Members currently sponsor or participate in 310 community environmental projects. This program also has substantial membership in the Texas Gulf Coast region, with more than 900 participating sites in the Houston area alone.

**OPPR'S Clean Cities 2000** program encourages local governments to make voluntary commitments to reduce solid waste disposal by 50 percent by the year 2000. The program also provides recognition for cities with populations greater than 50,000 for implementing programs to prevent water pollution and to offer environmental public education. A total of 76 Texas municipalities ranging in population from 51 to one million participate in the program. In 1996, participating Clean Cities 2000 members diverted 441,321 tons of solid waste from landfills through recycling, saving an estimated \$13 million in disposal costs.

**Household Hazardous Waste Collection.** OPPR assists local communities in organizing collection events for household hazardous waste. In 1996, sixty collection events were held across the state, with 30,854 participants collecting 755,163 pounds of hazardous waste.

**NPS Videos for the Clean Texas Reporter.** The *Clean Texas Reporter* is a series of 90-second environmental segments which will be marketed to news programs across Texas. Research tells us 93 percent of Texans have strong concerns about environmental pollution and 89 percent turn to mass media--especially television--to get environmental information. The *Clean Texas Reporter* will provide Texans with environmental tips in weekly segments covering a variety of topics, including nonpoint source pollution. Some NPS-related videos that have already been made include: *Let it Rot!* (how to start a compost bin), *Don't Bag It! Leave it a Lawn* (promoting yard trimmings management), and *Look Under Your Sink* (how to reduce household hazardous waste).

**Governor's Award for Environmental Excellence.** The OPPR initiated this award program in 1993 to honor the state's most outstanding waste reduction and pollution prevention projects. In August of 1997 these awards became the Texas Environmental Excellence Awards, presented

annually in a variety of categories to honor individuals, organizations, schools, and businesses that have created successful programs to preserve and protect the Texas environment.

**OPPR Resource Documents.** OPPR provides resource material on numerous topics. These include:

- “Don’t Bag It” programs for backyard composting, xeriscaping, and other options for encouraging alternatives to landfilling of yard waste;
- methods for safely composting pet waste;
- composting programs for urban parks and recreational areas;
- mylar stencils for developing community storm drain stencil programs; and
- safe handling and disposal of used oil, solvents, and other automotive-related items, including filtering and recycling of solvents.

**National Estuary Programs.** Both the Galveston Bay Estuary Program and the Coastal Bend Bays and Estuaries Program include public education and outreach programs in their comprehensive conservation and management plans. The Estuary Programs conduct outreach at schools, through their newsletters, and through demonstration projects. Both programs have conducted research and disseminated information on nonpoint source pollution.

**Pollution Prevention and TMDLs.** OPPR has worked with the TNRCC TMDL team to integrate pollution prevention strategies into the TMDL process. In particular instances, pollution prevention strategies could be used as a best management practice and would be considered for incorporation into the final TMDL/Watershed Action Plan. Section 6217(g) measures or alternatives that are as effective in controlling nonpoint source pollution will also be incorporated into final TMDLs/Watershed Action Plans.

**Pollution Prevention Education and TMDLs.** OPPR developed a nonpoint source urban runoff pollution education project in TMDL-targeted communities. Some of the key activities in this project are:

- meeting with TMDL-targeted communities to determine needs and partnership opportunities;
- using §319 grant funds to develop a nonpoint source education plan; and
- developing outreach materials appropriate for targeted communities.

## 5.3 Marinas and Recreational Boating

### 5.3.1 Sources and Activities Resulting in Nonpoint Source Pollution

Marinas and recreational boating are an important part of the recreational fabric along the Texas coast. There are approximately 97 marinas and 12,800 boat wet slips along the coast.<sup>1</sup> Of the 600,000 boats registered in Texas, one-tenth are docked in Clear Lake alone. The four-county Houston metropolitan area (Brazoria, Fort Bend, Galveston, and Harris counties) has more than 105,000 vessels registered with the state.<sup>2</sup> Because of the large concentration of marinas and boats along the coast, there is a potential for pollutants to be released to streams and bays.

A marina can have significant impacts on the concentrations of pollutants in the water, sediment, and tissue of organisms within the marina itself. Although sources of pollutants outside the marina are part of the problem, marina design, operation, and location appear to play crucial roles in determining whether local water quality is impacted. Because marinas are located right at the water's edge, there is often no buffering of the release of pollutants to waterways. Adverse environmental impacts may result from the following sources of pollution associated with marinas and recreational boating: poorly flushed waterways where dissolved oxygen deficiencies exist; pollutants discharged from boats; pollutants transported in storm water runoff from parking lots, roofs, and other impervious surfaces; the physical alteration or destruction of wetlands and of shellfish and other bottom communities during the construction of marinas, ramps, and related facilities; pollutants generated from boat maintenance activities on land and in the water; and leaching of toxic substances from bottom paints or treated lumber used in pier and dock construction.

Marina construction may alter the type of habitat found at the site. Alterations can have both negative and positive effects. For example, a soft-bottom habitat (i.e., habitat characterized by burrowing organisms and deposit feeders) could be replaced with a habitat characterized by fouling organisms attached to the marina pilings and bulkhead. These fouling organisms, however, may attract other organisms, including invertebrates and juvenile fish.

The presence of a marina is not necessarily an indicator of poor water quality. In fact, many marinas have good water quality. Despite this, they may still have degraded biological resources and contaminated sediments resulting from bioaccumulation in organisms and adhesion of pollutants to sediments. Impacts that can be associated with marina and boating activities are summarized below.

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<sup>1</sup>Texas Marina Facilities and Services Directory, Texas A&M Sea Grant College Program, 1997.

<sup>2</sup>*Houston Chronicle*, Consumer Section, January 26, 1997.

**Boat Sewage.** The organics in sewage discharged from recreational boats can contribute significant amounts of oxygen-demanding substances to a water body. Accumulation of organic material in sediment will result in a sediment oxygen demand (SOD) that can negatively impact the dissolved oxygen (DO) in the water. The effect of boat sewage on DO can be intensified in temperate regions because the peak boating season coincides with the highest water temperatures and thus the lowest solubilities of oxygen in the water and the highest metabolism rates of aquatic organisms. Boat sewage can be a significant source of fecal coliform bacteria in areas with high boat densities and low hydrologic flushing.

**Boat Maintenance and Repair.** Metals and metal-containing compounds have many functions in boat operation, maintenance, and repair. Lead is used as a fuel additive and ballast and may be released through incomplete fuel combustion and boat bilge discharges. Arsenic is used in paint pigments, pesticides, and wood preservatives. Zinc anodes are used to deter corrosion of metal hulls and engine parts. Copper and tin are used as biocides in antifoulant paints. Other metals (iron, chrome, etc.) are used in the construction of marinas and boats. Many of these metals/compounds are found in marina waters at levels that are toxic to aquatic organisms. Elevated concentrations of hydrocarbons have been found in marina waters due to refueling activities and bilge or fuel discharge from nearby boats. Aquatic organisms can concentrate pollutants in the water column through biological activity. Increased levels of metals and organic compounds have been detected in the tissues of aquatic organisms in marina waters.

Many of the contaminants found in the storm water runoff from marinas do not dissolve well in water and accumulate to higher concentrations in sediments than in the overlying water. Contaminated sediments may, in turn, act as a source from which these contaminants can be released into the overlying waters. Metals such as copper have a higher affinity for sediments than for water and therefore tend to concentrate in the sediments. Petroleum hydrocarbons, particularly polynuclear aromatic hydrocarbons (PAHs), tend to adsorb to particulate matter and become incorporated into sediments. They may persist for years, resulting in exposure to benthic organisms.

**Marina and Boat Operations.** Boat operation and dredging can destroy habitat; resuspend bottom sediment (resulting in the reintroduction of toxic substances into the water column); and increase turbidity, which affects the photosynthetic activity of algae and estuarine vegetation. Biological communities can be impacted by boat traffic, which can create changes in waves, velocity, and pressure and can increase shoreline erosion. Shoaling and shoreline erosion can result from the physical transport of sediment due to waves and/or currents caused by boat traffic or channelization for marina operations. Dredging may alter the marina and the adjacent water by increasing turbidity, reducing the oxygen content of the water, burying benthic organisms, causing disruption and removal of bottom habitat, creating stagnant areas, and altering water circulation. Some of these impacts (e.g., turbidity and reduced DO) are temporary and without long-term adverse effects.

### ***5.3.2 Texas Programs Implementing Marinas and Recreational Boating Management Measures***

To comprehensively address marinas and recreational boating as nonpoint sources of pollution to coastal natural resource areas, Texas will make use of a combination of existing federal, state, and

local enforceable policies and nonregulatory initiatives. The latter all have backup enforcement authority if necessary. Regulations that will address marinas and recreational boating nonpoint sources of pollution include:

- Texas Water Code (TWC) §26.121 - Unauthorized Discharges Prohibited
- Title 30 Texas Administrative Code (TAC) Chapter 70 - Administrative Enforcement Actions
- TWC Chapter 7 - Enforcement Provisions
- Title 30 TAC Chapter 220 - Water Quality Assessments
- Title 30 TAC Chapter 321 Subchapter A - Boat Sewage Disposal
- Title 30 TAC Chapter 334 - Underground and Aboveground Storage Tanks
- Texas Natural Resources Code Chapter 40 - Oil Spill Prevention and Response Act
- Texas Natural Resources Code Chapter 33 - Management of Coastal Public Land
- Clean Water Act Section 401 - Water Quality Certification
- Clean Water Act Section 404 - Discharge of Dredge and Fill Material

Texas achieves the requirements of the federal management measures for marinas and recreational boating through a mixture of regulatory authorities and voluntary programs. Some of these programs, including §401 Water Quality Certification, the TMDL process, and §26.121 and §26.177 of the Texas Water Code are discussed in Chapter 4. The following sections describe two additional legal authorities and programs for control of nonpoint source pollution from marinas and recreational boating, the Sea Grant Program's Marine Advisory Service and special lease conditions for state-owned submerged lands.

#### **5.3.2.1 Sea Grant Program - Marine Advisory Service**

Along the Texas coast, there is a Marine Advisory Service (MAS) which is an extension of the Texas A&M Sea Grant College Program. The MAS is actively involved in working with marinas and boat owners to control pollutant sources from marina and boating activities. Some of the key activities the MAS has been involved in include:

- Developing a "Potty-Training" manual and educational program for marinas and boat owners to prevent discharges of sewage from marine sanitation devices.
- Establishing pumpout stations for marine sanitation devices at ten marinas in the Clear Lake region. (There are another 13 pumpout stations at other locations along the Texas coast.)

- Publishing and distributing a recycling guide for ports, marine terminals, and marinas.
- Publishing and distributing a Best Management Practices Manual for Texas marina operators through the Marina Association of Texas.
- Providing educational and technical assistance to marinas and boat owners along the coast.

### **5.3.2.2 Texas General Land Office - Lease Conditions**

The Texas General Land Office (GLO) manages all state-owned submerged lands and has special lease conditions for construction of marinas, piers, docks, and other waterfront appurtenances (TEX. NAT. RES. CODE ANN. §§33.2053(a)(3), (5), (7), (8), and (9)). Certain provisions of the Oil Spill Prevention and Response Act also apply (TEX. NAT. RES. CODE ANN. Ch. 40). These lease conditions are designed to protect sensitive shorelines, shallow water habitat, emergent marshes, oyster reefs, seagrasses, and water quality. The conditions are enforced through the cancellation of leases and civil and administrative penalties under chapters 33 and 51 of the Texas Natural Resources Code.

The GLO has the authority to implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution through the GLO lease conditions.

### ***5.3.3 Funding Implementation of Marinas and Recreational Boating Management Measures***

Marina programs for TNRCC and the MAS are funded through state general revenues. Additional grant funds also are used by the MAS to support staff involved in technical assistance and education activities.

In March 1998, the Coastal Coordination Council approved CMP grants guidance to provide additional funding for implementation of nonpoint source measures in the coastal zone. Projects funded in this category are: (1) development of programs to control urban sources of nonpoint pollution in furtherance of §26.177 of the Texas Water Code; (2) development and implementation of water quality management plans in compliance with S.B. 503 (§201.026 of the Agriculture Code); and (3) projects that demonstrate BMPs for nonpoint source pollution control.

### ***5.3.4 Marinas and Recreational Boating Management Measure Implementation Goals and Strategies***

- Expand Marine Advisory Service (MAS) BMP education programs (Yards and Neighborhoods, Adopt-a-Ditch) to more areas of the Texas coast.<sup>3</sup>
- Continue and expand MAS marina BMP education and outreach to marinas and boat owners.
- Continue MAS education and technical assistance for marinas with marine sanitation device pumpout stations.
- Expand MAS education and technical assistance to areas of the Texas coast without marine sanitation device pumpout stations that are experiencing an increase in shrimping, fishing, and boating activities. These areas include Bay City, Palacios, Rockport, Corpus Christi, and Port Isabel. Also, assist these areas in locating necessary funds to install the pumpout stations.
- Expand technical assistance on marina aeration demonstrations to other areas along the Texas coast.
- Expand or create new partnerships with homeowners on canals along the Texas coast.
- Expand BMP education and implementation for homeowners on canals in lower Galveston Island, North Padre Island, and South Padre Island.

### ***5.3.5 Marinas and Recreational Boating §6217(g) Management Measures***

EPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* contains 15 management measures addressing sources of nonpoint source pollution from marinas and recreational boating that affect coastal waters. These management measures fall into two categories: (1) siting and design, and (2) operation and maintenance. The management measures and their implementation strategies are summarized in Table 5.5.

Under EPA's management measure guidance, management measures for marinas are applicable to the following operations/facilities:

- Any facility that contains ten or more slips, piers where ten or more boats may tie up, or any facility where a boat for hire is docked;
- Boat maintenance or repair yards that are adjacent to the water;
- Any federal, state, or local facility that involves recreational boat maintenance or repair that is on or adjacent to the water;

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<sup>3</sup>Personal communication with Mike Hightower, Deputy Director, Texas Sea Grant Program, May 6, 1998.

- Public or commercial boat ramps;
- Any residential or planned community marina with ten or more slips; and
- Any mooring field where ten or more boats are moored.

In Chapter 4, exemptions from the §6217 requirements were discussed for sources covered by other federal programs, such as NPDES Phase I and Phase II permits and §401 Certification. Marinas that have point source discharges of storm water and conduct equipment cleaning or vehicle maintenance activities are required to obtain NPDES stormwater permits under the Phase I rules.

Section 401 of the Clean Water Act provides for the protection of the state's water resources by ensuring that federal discharge permits are consistent with the Texas Surface Water Quality Standards (SWQS). Under §401, states are given the authority to review federally permitted or licensed activities that may result in a discharge of pollutants to waters of the United States, such as the discharge of dredge or fill material. Section 401 is a very important tool because it is a cooperative federal/state program. It gives states authority to review federal activities in or affecting state waters and reflects the state role at the forefront in administering water quality programs.

A description of each of the marinas and recreational boating management measures and the programs that will be used to implement each measure follows.

### **5.3.5.1 Marina Flushing Management Measure**

*Site and design marinas such that tides and/or currents will aid in flushing of the site or renew its water regularly.*

#### **Purpose and Applicability**

Currents and tides determine the level of flushing within a marina basin. Without proper flushing, pollutant concentrations can reach unacceptable levels and impact biological resources. The degree of flushing necessary to maintain water quality in a marina needs to be balanced with safety, vessel protection, and sedimentation.

#### **Implementation**

**§401 Certification.** Prevailing winds, depth of adjacent waters, and circulation patterns are each given consideration during the §401 certification review process. The primary focus of this evaluation is to ensure that there will not be violation of the dissolved oxygen criteria. The TNRCC has authority to require conditions in the §401 certification of federal permits; these conditions become part of the permit.

**GLO Lease Conditions.** The following GLO lease conditions apply to the construction of marinas, piers, docks, and other waterfront appurtenances on state-owned submerged lands. In addition to the standard lease conditions outlined below which are in conformance with this (g) measure, the

GLO has the authority to design site-specific lease special conditions which further protect coastal areas.

- Canal depths for recreational craft shall not exceed 6 feet below mean low water and shall be no deeper than is necessary for navigation.
- Breakwaters shall be designed to allow for the ingress and egress of fish and for water circulation.
- Depth of dredged areas shall not exceed that which is authorized. Overdredging for advance maintenance is specifically prohibited.

### **5.3.5.2 Water Quality Assessment Management Measure**

*Assess water quality as part of marina siting and design.*

#### **Purpose and Applicability**

The goal of this management measure is to use assessments of water quality to determine whether a proposed marina design will result in poor water quality. This may entail predevelopment and/or postdevelopment monitoring of the marina or ambient waters, numerical or physical modeling of flushing and water quality characteristics, or both.

#### **Implementation**

As part of the TNRCC §401 Certification process, water and sediment quality are assessed from the Texas Surface Water Quality Management (SWQM) database for marina siting and other construction projects in waters of the state. If there is reason to believe there are site-specific parameters that are different from the data in the SWQM database, the TNRCC may require site-specific testing of the applicant. Possible sources of information to require site-specific testing are public notices and other program areas of the agency such as Superfund site locations.

### **5.3.5.3 Habitat Assessment Management Measure**

*Site and design marinas to protect against adverse effects on shellfish resources, wetlands, submerged aquatic vegetation, or other important riparian and aquatic habitat areas as designated by local, State, or Federal governments.*

#### **Purpose and Applicability**

Proper siting and design of marinas can reduce short-term impacts (habitat destruction during construction) and long-term impacts (water quality, sedimentation, circulation, wake energy) on important aquatic habitat.

#### **Implementation**

**§401 Certification.** The mitigation sequence of avoidance, minimization, and, if impacts are unavoidable, compensatory mitigation must be completed before a project which would impact aquatic resources (waters in the state, including wetlands) can be certified. The TNRCC has authority to require conditions in the §401 certification of federal permits; these conditions become part of the permit.

**GLO Lease Conditions.** The following GLO lease conditions apply to the construction of marinas, piers, docks, and other waterfront appurtenances on state-owned submerged lands. In addition to the standard lease conditions outlined below which are in conformance with this (g) measure, the GLO has the authority to design site-specific lease special conditions which further protect coastal areas.

- All dredged material authorized by this instrument shall be placed and contained on private property above the limits of mean high water.
- Silt curtains are to be installed prior to beginning any dredging action, and shall be maintained around the perimeter throughout the duration of all dredging activity to minimize turbidity levels within adjacent waters.
- Unauthorized fill material that has been placed bayward of the approximate boundary between state and private lands is to be removed by Grantee and the area restored to pre-fill elevations and contours.
- All tires, debris, and derelict or unauthorized structures located bayward of the approximate boundary between state and private land are to be removed by Grantee.
- All oysters, seagrass, emergent aquatic vegetation, or other resources located within the area designated for dredging are to be manually relocated to an adjacent, undisturbed site of similar water depth.
- Proposed walkways shall not be placed less than 1.5 feet above the top of the existing emergent vegetation.
- Impacts to seagrasses, emergent marsh, or oyster reefs are to be strictly avoided.
- Unavoidable impacts to smooth cordgrass marshes shall be compensated for. Existing stands of smooth cordgrass located on state-owned land may be used as source material, provided no more than one 6-inch diameter plug per one square yard is taken. Incidental damage to borrow areas, and/or existing adjacent seagrass beds shall be strictly avoided. If the GLO determines that excessive impacts occurred to any of these areas, Grantee shall be responsible for restoration of the areas and compensation for said impacts.
- Notice of intent to harvest and confirming completion of transplant process are required. Completion notice shall include photographic documentation of pre- and post-transplant conditions at both sites.

**Chapter 40 of the Texas Natural Resources Code** requires that facilities which store or transfer oil have certified oil spill prevention and response plans approved by the GLO which specify response actions, containment and recovery strategies, and cleanup contractor identification.

#### **5.3.5.4 Shoreline Stabilization Management Measure**

*Where shoreline erosion is a nonpoint source pollution problem, shorelines should be stabilized. Vegetative methods are strongly preferred unless structural methods are more cost effective, considering the severity of wave and wind erosion, offshore bathymetry, and the potential adverse impact on other shorelines and offshore areas.*

#### **Purpose and Applicability**

The goal of this management measure is to reduce nonpoint source pollution from shoreline erosion at new and expanding marinas. Vegetation has shown the greatest success in low wave energy areas with appropriate underlying soils. A variety of structural techniques, such as bulkheads, jetties, gabions, and riprap can also be used to stabilize shorelines.

#### **Implementation**

**§401 Certification.** When projects to stabilize shorelines are submitted for §401 certification, the TNRCC prefers “soft” methods such as vegetation. The TNRCC requires that areas disturbed during development of a permitted activity be stabilized after construction. Again, the preference is for vegetation or a similar best management practice (BMP). The TNRCC has authority to require conditions in the §401 certification of federal permits; these conditions become part of the permit.

**GLO Technical Assistance.** The GLO consults with private waterfront landowners to design appropriate shoreline stabilization techniques. Field office personnel encourage the use of vegetative or other “soft” methods wherever shoreline wave energy regimes allow. Fill of shallow water habitat along shorelines is prohibited.

**GLO Lease Conditions.** The following GLO lease conditions apply to the construction of marinas, piers, docks, and other waterfront appurtenances on state-owned submerged lands. In addition to the standard lease conditions outlined below which are in conformance with this (g) measure, the GLO has the authority to design site-specific lease special conditions which further protect coastal areas.

- **Shoreline Protection:** Riprap materials shall consist of approved material such as concrete block, interlocking brick, sakrete, rock large enough not to be displaced by storms, or concrete rubble which is free of protruding rebar. The use of tires, automobile bodies or parts, appliances, trash, debris, asphalt, tree limbs, and other unconsolidated material is not acceptable and shall not be used.

- Impacts to seagrasses, emergent marsh, or oyster reefs are to be strictly avoided.
- Unavoidable impacts to smooth cordgrass marshes shall be compensated for. Existing stands of smooth cordgrass located on state-owned land may be used as source material, provided no more than one 6-inch diameter plug per one square yard is taken. Incidental damage to borrow areas and/or existing adjacent seagrass beds shall be strictly avoided. If the GLO determines that excessive impacts occurred to any of these areas, Grantee shall be responsible for restoration of the areas and compensation for said impacts.
- Notice of intent to harvest and confirming completion of transplant process are required. Completion notice shall include photographic documentation of pre- and post-transplant conditions at both sites.

#### **5.3.5.5 Storm Water Runoff Management Measure**

*Implement effective runoff control strategies which include the use of pollution prevention activities and the proper design of hull maintenance areas.*

*Reduce the average annual loadings of total suspended solids (TSS) in runoff from hull maintenance areas by 80 percent. For the purposes of this measure, an 80 percent reduction of TSS is to be determined on an average annual basis.*

#### **Purpose and Applicability**

The principal pollutants in runoff from marina parking areas and hull maintenance areas are suspended solids and organics (such as oil and grease). Toxic metals from boat maintenance activities are part of, or tend to become associated with, suspended solids. Numerous practices, such as filtration, retention, and physical separation of pollutants can be used to reduce loadings of suspended solids.

This management measure is intended to be applied by states to new and expanding marinas and to existing marinas for at least the hull maintenance areas.

#### **Implementation**

**Sea Grant Technical Assistance and BMPs.** The Sea Grant Marine Advisory Service has provided training and copies of a Best Management Practices manual to many marina operators along the coast. Typical strategies for hull maintenance areas are: (1) perform outdoor maintenance over tarps or hard surfaces to ease cleanup and prevent materials from entering surface waters; (2) clean (paint chips, sandings, etc.) immediately after maintenance activity; (3) use vacuum sanders to remove paint and collect paint dust.

**GLO Lease Conditions.** The following GLO lease conditions apply to the construction of marinas, piers, docks, and other waterfront appurtenances on state-owned submerged lands. In addition to the standard lease conditions outlined below which are in conformance with this (g) measure, the

GLO has the authority to design site-specific lease special conditions which further protect coastal areas.

- Surface drainage should be directed away from boat canals.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

#### **5.3.5.6 Fuel Station Design Management Measure**

*Design fueling stations to allow for ease in cleanup of spills.*

##### **Purpose and Applicability**

The goal of this management measure is to incorporate pollution prevention into the design of marinas by planning fueling areas to easily accommodate spill containment equipment and minimize the spread of pollutants through and out of the marina.

##### **Implementation**

**Chapter 334 of the Texas Administrative Code** regulates underground and aboveground storage tanks storing hazardous and petroleum substances.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**Chapter 40 of the Texas Natural Resources Code** requires that facilities which store or transfer oil have certified oil spill prevention and response plans approved by the GLO which specify response actions, containment and recovery strategies, and cleanup contractor identification.

#### **5.3.5.7 Sewage Facility Management Measure**

*Install pumpout, dump station, and restroom facilities where needed at new and expanding marinas to reduce the release of sewage to surface waters. Design these*

*facilities to allow ease of access and post signage to promote use by the boating public.*

### **Purpose and Applicability**

This management measure is intended to be applied to new and expanding marinas in areas where adequate sewage collection facilities do not exist. EPA research has shown that marine sanitary discharges can be effectively reduced by providing adequate and reasonably available pumpout facilities in conjunction with conducting comprehensive boater education.

### **Implementation**

**Sea Grant Technical Assistance and BMPs.** The Sea Grant Marine Advisory Service has provided copies of a “Potty-Training” manual and educational programs to marinas and boat owners to prevent discharges of sewage from marine sanitation devices. Also, the MAS has been involved in establishing pumpout stations for marine sanitation devices at 23 locations along the Texas coast.

**Chapter 321, Subchapter A, of the Texas Administrative Code** prohibits the disposal of boat sewage into the Clear Lake water body. Enforcement is conducted by the TNRCC and assisted by TPWD law enforcement officers (PARKS & WILDLIFE CODE §31.129).

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

### **5.3.5.8 Solid Waste Management Measure**

*Properly dispose of solid wastes produced by the operation, cleaning, maintenance, and repair of boats to limit entry of solid wastes to surface waters.*

### **Purpose and Applicability**

This management measure is intended to be applied to new and expanding marinas. Marinas generate a variety of solid waste through the activities that occur on marina property and their piers. If adequate disposal facilities are not available, there is a potential for disposal of solid waste in surface waters or on shore areas where the material can wash into surface waters.

## **Implementation**

**Chapter 365 of the Texas Health and Safety Code** prohibits illegal dumping of litter and solid waste.

**Chapter 341, Subchapter A, of the Texas Health and Safety Code** regulates nuisances created by waste products, polluting materials, garbage, refuse, etc.

**Sea Grant Technical Assistance and BMPs.** The Sea Grant Marine Advisory Service has provided copies of a recycling guide for ports, marine terminals, and marinas and a Best Management Practices manual to marinas and boat owners.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

### **5.3.5.9 Fish Waste Management Measure**

*Promote sound fish waste management through a combination of fish-cleaning restrictions, public education, and proper disposal of fish waste.*

## **Purpose and Applicability**

This management measure should be applied to marinas where fish waste is a source of water pollution. Marinas with large numbers of fish landings or marinas with low fish landings and poor flushing can experience water quality problems related to the disposal of fish waste. Improper disposal of fish waste can lead to reductions in dissolved oxygen in the water as well as odor problems.

## **Implementation**

**Chapter 365 of the Texas Health and Safety Code** prohibits illegal dumping of litter and solid waste.

**Chapter 341, Subchapter A, of the Texas Health and Safety Code** regulates nuisances created by waste products, polluting materials, garbage, refuse, etc.

**Sea Grant Technical Assistance and BMPs.** The Sea Grant Marine Advisory Service has provided copies of a Best Management Practices manual to marinas and boat owners which addresses improper disposal of wastes.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

#### **5.3.5.10 Liquid Material Management Measure**

*Provide and maintain appropriate storage, transfer, containment, and disposal facilities for liquid material, such as oil, harmful solvents, antifreeze, and paints, and encourage recycling of these materials.*

#### **Purpose and Applicability**

This management measure is intended to be applied to marinas where liquid materials used in the maintenance, repair, or operation of boats are stored. The goal of the management measure is to minimize the entry of potentially harmful liquid materials into marina and surface waters through proper storage and disposal.

#### **Implementation**

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

**Chapter 324 of the Texas Administrative Code** regulates the collection, transportation, storage, recycling, use, discharge, or disposal of used oil.

**Chapter 334 of the Texas Administrative Code** regulates underground and aboveground storage tanks storing hazardous and petroleum substances.

**Chapter 40 of the Texas Natural Resources Code** requires that facilities which store or transfer oil have certified oil spill prevention and response plans approved by the GLO which specify response actions, containment and recovery strategies, and cleanup contractor identification.

**Sea Grant Technical Assistance and BMPs.** The Sea Grant Marine Advisory Service has provided training and copies of a Best Management Practices manual to many marina operators along the coast to address this management measure.

### 5.3.5.11 Petroleum Control Management Measure

*Reduce the amount of fuel and oil from boat bilges and fuel tank air vents entering marina and surface waters.*

#### **Purpose and Applicability**

This management measure is intended to be applied to boats that have inboard fuel tanks. Fuel and oil are commonly released into surface waters during fueling operations through the fuel tank air vent, during bilge pumping, and from spills directly into surface waters and into boats during fueling. Oil and grease from the operation and maintenance of inboard engines are a source of petroleum in bilges.

#### **Implementation**

**Chapter 341, Subchapter A, of the Texas Health and Safety Code** regulates nuisances created by waste products, polluting materials, garbage, refuse, etc.

**Sea Grant Technical Assistance and BMPs.** The Sea Grant Marine Association Service has provided training and copies of a Best Management Practices manual to many marina operators along the coast to address this management measure.

**GLO Demonstration Project.** The GLO is funding an oily bilge reclamation center as a demonstration project in Port Lavaca. Ten new sites are planned for other areas along the Texas coast in the next few years.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

### 5.3.5.12 Boat Cleaning Management Measure

*For boats that are in the water, perform cleaning operations to minimize, to the extent practicable, the release to surface waters of (a) harmful cleaners and solvents and (b) paint from in-water hull cleaning.*

#### **Purpose and Applicability**

This management measure is intended to be applied to marinas where boat topsides are cleaned and marinas where hull scrubbing in the water has been shown to result in water or sediment quality

problems. This measure minimizes the use and release of potentially harmful cleaners and bottom paints to marina and surface waters.

### **Implementation**

**Sea Grant Technical Assistance and BMPs.** The Sea Grant Marine Advisory Service has provided training and copies of a Best Management Practices manual to many marina operators along the coast to address this management measure.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

#### **5.3.5.13 Public Education Management Measure**

*Public education/outreach/training programs should be instituted for boaters, as well as marina owners and operators, to prevent improper disposal of polluting material.*

### **Purpose and Applicability**

This management measure is intended to be applied to all environmental control authorities in areas where marinas are located. Public education programs should involve user groups and the community in all phases of development.

### **Implementation**

**Sea Grant Technical Assistance and BMPs.** The Sea Grant Marine Advisory Service (MAS) is actively involved in working with and educating marinas and boat owners to control pollutant sources from marina and boating activities. The MAS has developed a “Potty-Training” manual and educational program for marine sanitation devices; distributed a recycling guide for ports, marine terminals and marinas; distributed a Best Management Practices manual for Texas marina operators; and provided general educational and technical assistance to marinas and boat owners along the coast.

**National Estuary Programs.** Both the Galveston Bay Estuary Program and the Coastal Bend Bays and Estuaries Program include public education and outreach programs in their comprehensive conservation and management plans. The Estuary Programs conduct outreach at schools, through their newsletters, and through demonstration projects. Both programs have conducted research and disseminated information on nonpoint source pollution related to marinas and recreational boating.

#### **5.3.5.14 Maintenance of Sewage Facilities Management Measure**

*Ensure that sewage pumpout facilities are maintained in operational condition and encourage their use.*

##### **Purpose and Applicability**

The purpose of this measure is to reduce the release of untreated sewage into marina and surface waters by preventing failure of pumpouts and encouraging proper disposal of sanitary waste. The management measure applies only to marinas where marine sewage disposal facilities exist.

##### **Implementation**

**Sea Grant Technical Assistance and BMPs.** The Sea Grant Marine Advisory Service (MAS) has provided copies of a “Potty Training” manual and educational programs to marinas and boat owners to prevent discharges of sewage from marine sanitation devices. The MAS has also been involved in training marinas in the operation and maintenance of sewage pumpout facilities.

#### **5.3.5.15 Boat Operation Management Measure**

*Restrict boating activities where necessary to decrease turbidity and physical destruction of shallow-water habitat. (Applies to boating only.)*

##### **Purpose and Applicability**

This management measure is intended to be applied in non-marina surface waters where evidence indicates that boating activities are impacting shallow water habitats. Some areas are not suitable for boat traffic due to their shallow water depth and the ecological importance and sensitivity to disruption of the types of habitats in the area.

##### **Implementation**

**Local Government Ordinances.** Many local governments, harbor masters, and waterfront facility owners have posted enforceable “No Wake Zones” throughout coastal waters.

**Chapter 51 of the Texas Natural Resource Code** gives the GLO the authority to fine and require restoration of critical habitat destroyed by boating operations on state-owned land. Revenue from fines maintains the Surface Damage Account, which can be used to fund other restoration projects on state-owned lands.

**National Estuary Programs.** The Coastal Bend Bays and Estuaries Program includes public education and outreach programs in its comprehensive conservation and management plan. The Estuary Program conducts outreach at schools, through its newsletters, and through demonstration

projects. The Coastal Bend Bays and Estuaries Program has conducted research and disseminated information on the value of submerged aquatic vegetation. The Estuaries Program also produced a Bay User's Guide for the Corpus Christi Estuary, the Aransas Estuary, and the Upper Laguna Madre. The Guide includes maps depicting seagrass coverage in the bays as well as information on the ecological importance seagrasses and recommended boating practices for protecting seagrass beds.

**State-owned Coastal Wetlands Conservation Plan.** Texas Parks and Wildlife Code §§14.001-14.003 directs the Texas Parks and Wildlife Department and the GLO to develop and adopt a State-owned Coastal Wetlands Conservation Plan. This plan includes provisions for scientific studies examining the effects of boat traffic in sensitive areas and education of the public with regard to boating techniques. The State-owned Coastal Wetlands Conservation Plan is discussed further in Section 5.4, Wetlands and Riparian Areas.

## 5.4 Wetlands and Riparian Areas

### 5.4.1 Sources and Activities Resulting in Nonpoint Source Pollution

Coastal wetlands, which are an integral part of estuarine ecosystems, have tremendous biologic and economic values. Texas coastal wetlands serve as nursery grounds for over 80 percent of the recreational and commercial fish species found in the Gulf of Mexico. Coastal wetlands also perform many chemical and physical functions. Wetlands temporarily retain pollutants such as suspended materials, excess nutrients, toxic chemicals, and disease-causing microorganisms. Also, because of their topography or position in the landscape, wetlands can reduce, capture, and retain surface water, thus providing storage capacity and overall protection during periods of flooding.

Coastal wetland acreage in Texas includes 611,760 acres of fresh, brackish, and salt marshes.<sup>1</sup> Addition of forested wetlands brings the estimate to approximately one million acres of wetlands in the §6217 Management Area counties in 1979.<sup>2</sup> Wetlands are disappearing at an alarming rate. The Texas Parks and Wildlife Department estimates that 35 percent of the state's coastal marshes were lost between 1950 and 1979.<sup>3</sup> From the 1950s to 1989, there was a net loss of 33,400 acres in the Galveston Bay System, or 19 percent of the wetlands that existed in the 1950s.<sup>4</sup> Wetland losses can result from natural processes such as subsidence, erosion, and storms, as well as human activities such as dredging and filling and construction of dikes, levees, and seawalls.

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<sup>1</sup>Texas Parks and Wildlife Department, 1997. Texas Wetlands Conservation Plan. Austin, Texas.

<sup>2</sup>Field, D. W., et al., 1991. Coastal Wetlands of the United States: An Accounting of a Valuable National Resource. Strategic Assessment Branch, National Oceanic and Atmospheric Administration.

<sup>3</sup>Texas Parks and Wildlife Department, 1997. Texas Wetlands Conservation Plan. Austin, Texas.

<sup>4</sup>White, A. W., et al., 1993. Trends and Status of Wetlands and Aquatic Habitats in the Galveston Bay System, Texas. The Galveston Bay Estuary Program, Publication GBNEP-31.

Submerged seagrass meadows constitute a dominant, but unique, wetland habitat within middle and lower coastal Texas bays and estuaries, with distribution in Texas limited to 235,000 acres total.<sup>5</sup> Seagrass systems play critical roles in the coastal environment. These roles include

- nursery habitat for estuarine fisheries,
- a major source of organic biomass for coastal food webs,
- effective natural agents for stabilizing coastal erosion and sedimentation, and
- major biological agents in nutrient cycling and water quality processes.

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<sup>5</sup> Seagrass Conservation Plan for Texas. 1998. Resource Protection Division, Texas Parks and Wildlife Department, Austin, Texas.

Recent national and regional studies show that seagrasses are very sensitive to nutrient enrichment and water quality degradation impacts, as well as physical stress from human disturbances.<sup>6</sup> Concerned about seagrass ecosystem health, especially their susceptibility to various anthropogenic impacts, Texas scientists, resource managers, and the TPWD, GLO, and TNRCC have initiated comprehensive planning to address seagrass problems and promote effective conservation and management solutions.

#### **5.4.2 Texas Programs Implementing Wetland and Riparian Area Management Measures**

Texas achieves the requirements of the federal management measures for wetlands and riparian areas through a mixture of regulatory authorities and voluntary programs. Some of these programs, including §401 Water Quality Certification, the TMDL process, and §26.121 and §26.177 of the Texas Water Code are discussed in Chapter 4. Additional programs that will be used to implement the wetlands and riparian areas management measures are listed below and discussed in the following sections.

State concern about the trend in wetland loss has led to the development of new programs and the strengthening of current efforts to protect wetland resources. These include:

- *A State-owned Coastal Wetlands Conservation Plan* that includes both regulatory and nonregulatory components. This plan was jointly produced by the GLO and TPWD and addresses state-owned coastal wetlands.
- *A Seagrass Conservation Plan for Texas*. This plan was produced by TPWD, GLO, and TNRCC and is a subset of the *State-owned Coastal Wetlands Conservation Plan*.
- *Texas Coastal Wetlands: A Handbook for Local Governments*, which provides local governments with guidance on coastal wetlands issues, such as protection and conservation techniques.
- *A State Wetlands Conservation Plan* that emphasis landowner incentives and other nonregulatory programs. This plan was produced by TPWD and addresses privately owned wetlands throughout the state.

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<sup>6</sup>National Oceanic and Atmospheric Administration, Office of Ocean Resources Conservation Assessment. 1996.

National Estuarine Eutrophication Survey Project Report. NOAA, Strategic Environmental Assessments Division, Silver Spring, Maryland.

- A water quality certification process under §401 of the Clean Water Act to protect wetlands.
- Coastal Management Program goals and policies that provide enforceability and consistency to the overall effort to protect, preserve, and restore coastal wetlands.

#### **5.4.2.1 State-owned Coastal Wetlands Conservation Plan**

Texas Parks and Wildlife Code §§14.001-14.003 directs the Texas Parks and Wildlife Department (TPWD) and the General Land Office to develop and adopt a *State-owned Coastal Wetlands Conservation Plan*. The following are required components of the plan:

- Definition of the term “wetlands” consistent with state and federal law.
- A policy framework for achieving a goal of no overall net loss of state-owned coastal wetlands including monitoring and enforcement.
- Provisions for an inventory to determine gains and losses in areal extent, wetland types, functions, and the causes of wetlands alterations.
- Provisions for an inventory of sites for compensatory mitigation, enhancement, restoration and acquisition priorities.
- Clarification and unification of mitigation policies between state agencies.
- Development of guidelines for mitigation banking.
- Evaluation of freshwater inflow requirements.
- Preparations for a long-range navigational dredging and disposal plan.
- Provisions for scientific studies examining the effects of boat traffic in sensitive areas and education of the public with regard to boating techniques.
- Provisions to encourage the reduction of nonpoint source pollution of coastal wetlands including the monitoring and adoption of standards.
- Development of a networking strategy to improve coordination among existing agencies with respect to permitting, review and protection responsibilities.
- A public education program.
- Participation in the establishment of a national wetlands information center by the federal government.

- Evaluation of the feasibility and effect of sediment bypassing from reservoirs to bays and estuaries.
- Consideration of sea level rise as it relates to coastal wetlands.
- Provisions consistent with the TPWD's *State Wetlands Conservation Plan*.
- A plan to acquire coastal wetlands.

#### 5.4.2.2 Seagrass Conservation Plan for Texas

A comprehensive *Seagrass Conservation Plan for Texas (SCPT)*<sup>7</sup> has recently been developed as a subset of the Texas State-owned Coastal Wetlands Conservation Plan. This coastwide plan identifies critical seagrass research issues, management/policy issues, and education/public outreach measures. It proposes and recommends objectives and strategies that address the problems, as well as a coordinated process for implementing priority actions. Nonpoint source runoff is recognized in this plan as a major agent of nutrient loadings and seagrass habitat quality deterioration.

The TPWD, GLO, and TNRCC have sponsored development of the SCPT because of certain legislative authority pertaining to seagrasses or the coastal waters where they occur, including:

- Chapter 14 of the Parks and Wildlife Code authorizes the TPWD to develop a State-owned Coastal Wetlands Conservation Plan in conjunction with the GLO. Special provisions extend to determination of seagrass impacts and protection of seagrasses from various processes (such as boat traffic, altered hydrology, dredging, and nonpoint source pollution). GLO is authorized to manage state public submerged lands where seagrasses grow.
- The TNRCC has regulatory jurisdiction to ensure water quality protection and to develop water quality criteria.
- The TPWD and TNRCC are the state agencies charged with reviewing either §404 permit impacts or §401 Water Quality Certification in coastal wetlands, respectively. Because of its responsibility for water quality protection, the TNRCC can consider the addition of seagrasses as a beneficial aquatic-life use in the Texas Surface Water Quality Standards. TNRCC can also develop more defined procedures for conducting §401 certifications of federal permits which could affect seagrasses and other coastal habitats. Coordination procedures in the §404 permit review process can be strengthened and integrated between the GLO, TNRCC, U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Army Corps of Engineers, and EPA. Procedures and guidelines dealing with dredging discharges and mitigation projects should be reevaluated and redesigned where necessary to protect existing

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<sup>7</sup>Seagrass Conservation Plan for Texas. 1998. Resource Protection Division, Texas Parks and Wildlife Department, Austin, Texas.

seagrass beds. The TNRCC relies on coordination with the TPWD and other resource agencies in order to promote consistency and effectiveness of regulatory and watershed management programs which protect coastal water quality and seagrass habitat.

#### **5.4.2.3 Wetlands Handbook for Local Governments**

The GLO, with funding from the EPA, developed *Texas Coastal Wetlands: A Handbook for Local Governments*. This handbook stresses the critical role that local governments have in protecting and managing coastal wetlands. The handbook provides relevant information for local officials, citizens, landowners, and groups interested in conserving, creating, or restoring coastal wetlands. The handbook outlines the steps for developing a local wetlands plan and describes the role of local governments in wetlands protection, techniques for wetland acquisition, financing, mitigation banking, use of constructed wetlands for treating wastewater effluent, strategies for public participation, and successful local case studies. Over 1,500 copies of the handbook have been distributed to local governments and individuals interested in coastal wetlands planning from the local perspective.

#### **5.4.2.4 Texas Parks and Wildlife Programs Protecting Wetlands**

The Texas Parks and Wildlife Department is an active participant in several projects designed to conserve and restore wetlands.

**State Wetlands Conservation Plan:** General recommendations on the functions and values of the different types of wetlands found throughout the state as well as protection strategies.

**Wetlands Assistance Guide for Landowners:** Technical information and advice, financial contributions for practices that provide long-term improvements in wetland values, and payment at fair market rates for permanent protection of wetland areas.

**Private Lands Enhancement Program:** Department expertise to landowners on the development and conservation of wildlife habitat including wetlands.

**Private Lands Initiative:** Enables private landowners to cost-share the expense of projects which enhance wildlife habitat, including wetlands, with the National Fish and Wildlife Foundation under department technical assistance.

**TPWD-managed lands:** State parks and wildlife management areas along the coast are operated in ways designed to protect and restore wetlands.

#### **Coordination with Other State Agencies and Programs:**

- The TPWD has a memorandum of agreement with the Texas Department of Transportation (TxDOT) which allows the department to have active input into TxDOT activities which threaten habitat or fish and wildlife.

- The TPWD participates with the TNRCC and the Texas Water Development Board in the development of freshwater inflow recommendations for bays which provide sediment and nutrient supplies for wetlands and assure viable salinity tolerances for wetland plant species.
- The TPWD participates as a trustee in Natural Resource Damage Assessment, discussed below. Many of the restoration projects focus on restoration and replacement of damaged wetlands. The department regularly comments on Corps of Engineers §404 permits and TNRCC §401 certifications.

#### **5.4.2.5 Coastal Management Program**

Through its activities, the Texas Coastal Management Program (CMP) is committed to preserving and enhancing the environmental and economic well-being of coastal natural resource areas (CNRAs), which include coastal wetlands, seagrasses, oyster reefs, tidal sand and mudflats, and other coastal natural resources. Two important goals of the CMP are to protect, preserve, restore, and enhance the diversity, quality, quantity, functions, and values of CNRAs and to educate the public about the principal coastal problems of state concern and technology available for the protection and improved management of CNRAs.

##### ***CZMA Consistency Review***

One of the tools used by the CMP to protect, preserve, and enhance coastal natural resource areas is federal consistency review. Certain federal agency activities which affect the coast must undergo review by the Coastal Coordination Council to ensure that the activities are consistent with the CMP. The Council is in the process of designating natural resource damage assessment (NRDA) activities as actions subject to consistency review under the CMP. Federal restoration activities under NRDA include approval of restoration of damage from illegal dredging, propwashing, construction, or other activities regulated by permit under the CWA or the Rivers and Harbors Act as well as approval of restoration of damage from oil or hazardous substance spills under the federal Oil Pollution Act of 1990 and the Comprehensive Environmental Response, Compensation, and Liability Act of 1990 (CERCLA).

##### ***CMP Policies Related to Wetlands***

The CMP has developed a number of policies related to coastal wetlands which apply to the coastal nonpoint program, including policies for development in critical areas.<sup>8</sup> This policy category is fashioned after the §404(b)(1) guidelines of the Clean Water Act.

Additional advisory policies of the CMP that apply to wetlands include

**Planning:** Local governments are encouraged to protect CNRAs and guide development to areas where the necessary infrastructure already exists.

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<sup>8</sup>Texas Coastal Management Program, Chapter 4, Policy Category 8, page 29.

**Acquisition:** State agencies, local governments, federal agencies, and private nonprofit entities are strongly encouraged to acquire coastal lands (including coastal wetlands) to conserve CNRAs.

**Conservation/Preservation:** Local governments are encouraged to develop plans or other mechanisms that designate areas for preservation of CNRAs and for educational and scientific research on CNRAs where commercial development will be limited to activities supporting these functions (e.g., ecotourism).

**Restoration:** Restoration of previously degraded or destroyed coastal wetlands is strongly encouraged.

**Public Access/Recreation:** Boaters are encouraged to avoid adversely affecting submerged aquatic vegetation and coastal wetlands (e.g., propwashing and scarring).

**Construction/Development:** The use of marsh buggies in critical areas is discouraged.

### ***5.4.3 Funding Implementation of Wetland and Riparian Area Management Measures***

A number of funding sources are available for landowners interested in protecting or restoring wetlands on their property and for communities interested in wetlands restoration, protection, and construction.

The CMP Grants Program contains a funding priority for critical areas enhancement. The goal of this funding category is to protect, preserve, restore, and enhance the diversity, quality, quantity, functions, and values of coastal natural resource areas. Projects funded under this category include: acquisition of sensitive coastal wetlands, local wetlands protection planning, enhancement of degraded wetlands, demonstration of innovative techniques for enhancing critical areas, construction of wetlands to improve water quality, and improvement of protection of critical areas through local ordinance-making.

In March 1998, the Coastal Coordination Council approved CMP grants guidance to provide additional funding for implementation of nonpoint source measures in the coastal zone. Projects funded in this category are: (1) development of programs to control urban sources of nonpoint pollution in furtherance of §26.177 of the Texas Water Code; (2) development and implementation of water quality management plans in compliance with S.B. 503 (§201.026 of the Agriculture Code); and (3) projects that demonstrate BMPs for nonpoint source pollution control.

The GLO's *Texas Coastal Wetlands: A Handbook for Local Government* provides a list of federal, state, and private programs that may provide financial or technical assistance to local governments for conserving, restoring, or managing coastal wetlands, such as the USFWS Coastal Ecosystem Program, the USDA-NRCS Watershed Protection and Flood Prevention Program, and the Ducks Unlimited Matching Aid to Restore States Habitat (MARSH) program. In addition to these existing programs, the handbook provides guidance on financing coastal wetlands conservation through local

initiatives, such as property tax abatements, density transfers, user fees, impact fees, flood control taxation, and incentive zoning.

#### **5.4.4 Wetland and Riparian Area Management Measure Implementation Goals and Strategies**

Texas has several goals to protect wetlands and implement BMPs. These include:

- Maintain a policy to achieve no overall net loss of existing wetland resources with respect to function and values.
- Maintain an active §401 certification program.
- Work with private landowners to protect wetlands.
- Implement wetland BMPs on an as-needed basis.

#### **5.4.5 Wetland and Riparian Area §6217(g) Management Measures**

EPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* contains three management measures addressing the protection and restoration of wetlands and riparian areas. These three management measures encompass (1) protection of wetlands and riparian areas; (2) restoration of wetlands and riparian areas; and (3) promotion of the use of vegetated treatment systems, such as constructed wetlands and vegetated filter strips. The management measures and their implementation strategies are summarized in Table 5.6.

These three measures address multiple categories of nonpoint source pollution that affect coastal waters, taking into consideration the multiple functions and values wetland ecosystems provide in the reduction and control of nonpoint source pollution. The primary nonpoint source pollutants addressed by the management measures are sediment, nitrogen, phosphorous, and temperature.

In Chapter 4, exemptions from the §6217 requirements were discussed for sources covered by other federal programs, such as §401 Certification. Section 401 of the Clean Water Act provides for the protection of the state's water resources by ensuring that federal discharge permits are consistent with the Texas Surface Water Quality Standards (SWQS). Under §401, states are given the authority to review federally permitted or licensed activities that may result in a discharge of pollutants to waters of the United States, such as the discharge of dredge or fill material. Section 401 is a very important tool because it is a cooperative federal/state program. It gives states authority to review federal activities in or affecting state waters, including wetlands, and reflects the state role at the forefront in administering water quality programs.

A description of each of the Wetland and Riparian Area management measures and the programs that will be used to implement each measure follows.

##### **5.4.5.1 Management Measure for Protection of Wetlands and Riparian Areas**

*Protect from adverse effects wetlands and riparian areas that are serving a significant NPS abatement function and maintain this function while protecting the other existing functions*

*of these wetlands and riparian areas as measured by characteristics such as vegetative composition and cover, hydrology of surface water and ground water, geochemistry of the substrate, and species composition.*

### **Purpose and Applicability**

The purpose of this management measure is to protect the existing water quality improvement functions of wetlands and riparian areas as a component of nonpoint source programs. The overall approach is to establish a set of practices that maintains functions of wetlands and riparian areas and prevents adverse impacts to areas serving a nonpoint source pollution abatement function.

### **Implementation**

**GLO Lease Conditions.** The Texas General Land Office (GLO) manages all state-owned submerged lands and has special lease conditions for construction of marinas, piers, docks, and other waterfront appurtenances (TEX. NAT. RES. CODE ANN. §§33.2053(a)(3), (5), (7), (8), and (9)). Certain provisions of the Oil Spill Prevention and Response Act also apply (TEX. NAT. RES. CODE ANN. Ch. 40). These lease conditions are designed to protect sensitive shorelines, shallow water habitat, emergent marshes, oyster reefs, seagrasses, and water quality. The conditions are enforced through the cancellation of leases and civil and administrative penalties under chapters 33 and 51 of the Texas Natural Resources Code.

The following GLO lease conditions apply to the construction of marinas, piers, docks, and other waterfront appurtenances on state-owned submerged lands. In addition to the standard lease conditions outlined below which are in conformance with this (g) measure, the GLO has the authority to implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution through the GLO lease conditions.

- Proposed walkways shall not be placed less than 1.5 feet above the top of the existing emergent vegetation.
- Impacts to seagrasses, emergent marsh, or oyster reefs are to be strictly avoided.

**The CMP Grants Program** contains a funding priority for critical areas enhancement. The goal of this funding category is to protect, preserve, restore, and enhance the diversity, quality, quantity, functions, and values of coastal natural resource areas. Projects funded under this category include: acquisition of sensitive coastal wetlands, local wetlands protection planning, enhancement of degraded wetlands, demonstration of innovative techniques for enhancing critical areas, construction of wetlands to improve water quality, and improvement of protection of critical areas through local ordinance-making.

**The USDA-NRCS Wetlands Reserve Program** places emphasis on retaining wetlands functions and values by limiting use on privately owned wetlands in return for financial incentives. Three financial incentive packages are available: (1) permanent easements, (2) 30-year easements, and (3) restoration cost-share agreements of minimum 10-year duration. Compatible uses are allowed if they are fully consistent with the protection and enhancement of the wetland.

**The Texas Prairie Wetland Project**, created by Ducks Unlimited, the TPWD, NRCS, and the U.S. Fish and Wildlife Service, is designed to restore, conserve, enhance, and maintain the historic Gulf Coast Prairie of Texas. Cooperators interested in the program set up a management agreement with their local soil and water conservation district to carry out range management practices such as brush management and re-establishment of native grasses. Technical assistance and financial incentives are available to landowners interested in improving the status of waterfowl and wetlands on their property.

**Watershed Action Plans** developed for impaired water bodies through the TMDL process will include management measures as needed to address specific source impacts. For watersheds within the §6217 Management Area, (g) measures or alternatives that are as effective in controlling nonpoint source pollution will be selected. Watershed Action Plans are discussed in detail in Chapter 4.

**WQMPs.** WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide as well as those published in Texas Forestry Best Management Practices by the Texas Forestry Association. A number of these criteria address wetlands protection and management on agricultural and silvicultural lands. The WQMP program is discussed further in Chapter 4.

**§401 Certification.** The TNRCC rules governing §401 certifications (30 TAC Ch. 279) have a policy of no overall net loss of the existing wetlands resource base with respect to functions and values. All §401 certifications of permits impacting wetlands must be in compliance with this policy for the functions wetlands provide. In some instances, the TNRCC can require separate mitigation for stormwater management and habitat functions when habitat functions can only be mitigated off-site and the water quality functions must be provided on-site.

#### **5.4.5.2 Management Measure for Restoration of Wetlands and Riparian Areas**

*Promote the restoration of the preexisting functions in damaged and destroyed wetlands and riparian systems in areas where the systems will serve a significant NPS pollution abatement function.*

##### **Purpose and Applicability**

This management measure is intended to restore the full range of wetlands and riparian functions in areas where the systems have been degraded and destroyed and where they can serve a significant nonpoint source abatement function.

##### **Implementation**

**GLO Lease Conditions.** The following GLO lease conditions apply to the construction of marinas, piers, docks, and other waterfront appurtenances on state-owned submerged lands. In addition to the standard lease conditions outlined below which are in conformance with this (g) measure, the

GLO has the authority to design site-specific lease special conditions which further protect coastal areas.

- Unavoidable impacts to smooth cordgrass marshes shall be compensated for. Existing stands of smooth cordgrass located on state-owned land may be used as source material, provided no more than one 6-inch diameter plug per one square yard is taken. Incidental damage to borrow areas and/or existing adjacent seagrass beds shall be strictly avoided. If the GLO determines that excessive impacts occurred to any of these areas, Grantee shall be responsible for restoration of the areas and compensation for said impacts.
- Impacts to seagrasses, emergent marsh, or oyster reefs are to be strictly avoided.

**The CMP Grants Program** contains a funding priority for critical areas enhancement. The goal of this funding category is to protect, preserve, restore, and enhance the diversity, quality, quantity, functions, and values of coastal natural resource areas. Projects funded under this category include: acquisition of sensitive coastal wetlands, local wetlands protection planning, enhancement of degraded wetlands, demonstration of innovative techniques for enhancing critical areas, construction of wetlands to improve water quality, and improvement of protection of critical areas through local ordinance-making.

**The Texas Prairie Wetland Project**, created by Ducks Unlimited, the TPWD, the NRCS, and the U.S. Fish and Wildlife Service, is designed to restore, conserve, enhance, and maintain the historic Gulf Coast Prairie of Texas. Cooperators interested in the program set up a management agreement with their local soil and water conservation district to carry out range management practices such as brush management and re-establishment of native grasses. Technical assistance and financial incentives are available to landowners interested in improving the status of waterfowl and wetlands on their property.

**Watershed Action Plans** developed for impaired water bodies through the TMDL process will include management measures as needed to address specific source impacts. For watersheds within the §6217 Management Area, (g) measures or alternatives that are as effective in controlling nonpoint source pollution will be selected. Watershed Action Plans are discussed in detail in Chapter 4.

**WQMPs.** WQMPs are site-specific plans which include production practices, land treatment practices, and technologies for the reduction of nonpoint source pollution. In Texas, WQMPs encompass all aspects of agricultural and silvicultural production on a given operating unit. WQMPs are based on Resource Management System criteria established by the USDA-NRCS Field Office Technical Guide as well as those published in Texas Forestry Best Management Practices by the Texas Forestry Association. A number of these criteria address wetlands protection and management on agricultural and silvicultural lands. The WQMP program is discussed further in Chapter 4.

**§401 Certification.** In the draft Regulatory Guidance Document (RGD) for §401 certifications, TNRCC establishes a preference for restoration of preexisting wetlands over creation of new wetlands. In the review of site-specific data for each certification, the need and opportunity for restoring wetlands that provide a significant nonpoint source pollution abatement function is evaluated. In those situations where this evaluation indicates that opportunities to restore or enhance

nonpoint source pollution abatement exist, the TNRCC will incorporate them into the §401 certification.

#### **5.4.5.3 Management Measure for Vegetated Treatment Systems**

*Promote the use of engineered vegetated treatment systems such as constructed wetlands or vegetated filter strips where these systems will serve a significant NPS pollution abatement function.*

#### **Purpose and Applicability**

The purpose of this measure is to encourage the use of engineered systems or wetlands or vegetated treatment systems in areas where these systems will effectively treat nonpoint source pollution.

#### **Implementation**

**The CMP Grants Program** contains a funding priority for critical areas enhancement. The goal of this funding category is to protect, preserve, restore, and enhance the diversity, quality, quantity, functions, and values of coastal natural resource areas. Projects funded under this category include: acquisition of sensitive coastal wetlands, local wetlands protection planning, enhancement of degraded wetlands, demonstration of innovative techniques for enhancing critical areas, construction of wetlands to improve water quality, and improvement of protection of critical areas through local ordinance-making.

**TNRCC Standards for Constructed Wetlands.** The TNRCC is working with members of the regulated community to develop a process for correlating data from experimental and demonstration constructed wetlands projects that will enable the TNRCC to establish standards for the design and installation of constructed wetlands for on-site sewage disposal. Several projects currently being funded under §319(h) of the Clean Water Act will be included in this process. They are scheduled for completion in two years.

**TxDOT Guidance Documents.** TxDOT guidance for the construction and restoration of roads, highways, and bridges encourages the use of vegetated filter strips, or buffer zones, for temporary or permanent storm water management. The guidance emphasizes that buffer zones are particularly effective on floodplains, next to wetlands, along stream banks, and on steep, unstable slopes.

## 5.5 Hydromodification

### ***5.5.1 Sources and Activities Resulting in Nonpoint Source Pollution***

Freshwater inflow is often called the lifeblood of estuaries, affecting physical, chemical, and biological characteristics of these coastal systems. Along the Texas coast, the U.S. Geological Survey has identified 17 major streams that discharge directly into the six major estuaries or near shore waters of the Gulf of Mexico. The spatial and temporal characteristics of this inflow are determinant of bay salinities and nutrient and sediment loading, the most important factors affecting the health of the state's coastal natural resources.

Anthropogenic activities in all of the major watersheds, including, but not limited to diversions, channel modifications, and dam and reservoir construction, have led to both qualitative and quantitative changes in freshwater inflows. While it does not appear that changes which have taken place to date have resulted in catastrophic effects on the state's coastal resources, the potential for deleterious effects exists, and without sound resource management practices, the balance found in the major estuarine systems could be disrupted.

Channel modification to accommodate navigation or flood runoff has created conditions which reduce the resident time for streamflows, allowing more contaminants/nutrients to reach the coastal waters. Left unabated, the potential exists for increased contamination of shellfish waters and more frequent occurrences of harmful algal blooms.

With the exception of Caddo Lake along the Texas-Louisiana border and Green Lake, in Calhoun County just outside the coastal zone, Texas has no natural lakes of significance and must rely on the construction and maintenance of reservoirs for water supply, flood control, and surface (flat) water recreation. These features affect the volume and timing of freshwater reaching the coast. They also act as a sink for sediments and nutrients within the watershed, robbing the coastal systems of valuable building blocks. Releases of nutrient-rich waters from some impoundments have resulted in fish kills downstream, at times extending into the tidally influenced segments along the coast.

Concerns about the effects of streamflow alterations, especially from the construction of dams and reservoirs, have led to the implementation of both structural design changes and operational changes in an attempt to minimize the effects of channel modifications. Future strategies will have to balance the needs and influences of human activities and the needs of the estuaries.

### **Impacts Associated with Channelization and Hydromodification**

Channel modification activities can deprive wetlands and estuarine shorelines of enriching sediments, change the ability of natural systems to both absorb hydraulic energy and filter pollutants from surface waters, and interrupt various life stages of aquatic organisms. Channel modification activities can also alter instream water temperature and sediment characteristics, as well as the rates and paths of sediment erosion, transport, and deposition. A frequent result of channelization and channel modification is a diminished suitability of instream and riparian habitat for fish and wildlife. Hardening

of banks along waterways has eliminated instream and riparian habitat, decreased the quantity of organic matter entering aquatic systems, and increased the movement of nonpoint source pollutants from the upper reaches of watersheds into coastal waters.

Channel modification projects undertaken in streams or rivers to straighten, enlarge, or relocate the channel usually require regularly scheduled maintenance activities to preserve and maintain completed projects. These maintenance activities may result in a continual disturbance of instream and riparian habitat. In some cases, there can be substantial displacement of instream habitat due to the magnitude of the changes in surface water quality, morphology and composition of the channel, stream hydraulics and hydrology, and the burying of wetlands and riparian habitat with dredged material.

Excavation projects can result in reduced flushing, lowered dissolved oxygen levels, saltwater intrusion, loss of streamside vegetation, accelerated discharge of pollutants, and changed physical and chemical characteristics of bottom sediments in surface waters surrounding channelization or channel modification projects. Reduced flushing, in particular, can increase the deposition of finer-grained sediments and associated organic materials or other pollutants.

Levees may reduce overbank flooding and the subsequent deposition of sediment needed to nourish riverine and estuarine wetlands and riparian areas. Levees can cause increased transport of suspended sediment to coastal and near-coastal waters during high-flow events. Levees located close to stream banks can also prevent the lateral movement of sediment-laden waters into adjacent wetlands and riparian areas that would otherwise serve as depositories for sediment, nutrients, and other nonpoint source pollutants. Levees also interrupt natural drainage from upland slopes and can cause concentrated, erosive flows of surface waters.

The resulting changes in the distribution, amount, and timing of flows caused by flow alterations can affect a wide variety of living resources. Where tidal flow restrictors cause impoundments, there may be a loss of streamside vegetation, disruption of riparian habitat, changes in the historic plant and animal communities, and decline in sediment quality. Restricted flows can impede the movement of fish or crustaceans. Flow alteration can reduce the level of tidal flushing and the exchange rate for surface waters within coastal embayments, with resulting impacts on the quality of surface waters and on the rates and paths of sediment transport and deposition.

One of the more significant changes in instream habitat associated with channelization and channel modification projects is in sediment supply and delivery. Changes in sediment supply can include problems such as increased sedimentation to some areas (an estuary, for example) or decreased sediment to other areas (such as streamside wetlands or estuarine marshes). Other changes may be beneficial, however, such as a diversion that delivers sediment to eroding marshes or increasing the flushing and the elimination of unwanted sediment in the spawning area of a stream.

Salinity above threshold levels is considered to be a form of nonpoint source pollution in freshwater supplies. Reduced freshwater availability for municipal, industrial, or agricultural purposes can result from some channelization and channel modification practices. Similarly, alteration of the salinity regime in portions of a channel can result in ecological changes in vegetation in the streamside area. Diversion of fresh water by flood- and hurricane-protection levees can reduce freshwater inputs to

adjacent marshes. A benefit of diversion projects can be a reduction of freshwater inputs to estuarine areas that were becoming too fresh because of overall increases in fresh water from changes in land use within a watershed.

Channelization and channel modification projects can lead to an increased quantity of pollutants and accelerated rate of delivery of pollutants to downstream sites. Alterations that increase the velocity of surface water or that increase flushing of the streambed can lead to more pollutants being transported to downstream areas at possibly faster rates. Some excavation projects have resulted in poor surface water circulation along with increased sedimentation and other surface water quality problems within the excavated basin. In some of these cases, additional, carefully designed channel modifications can increase flushing rates, which deliver accumulated pollutants from the basin to points downstream that are able to assimilate or otherwise beneficially use the accumulated materials.

Instream hydraulic changes can decrease or interfere with surface water contact to overbank areas during floods or other high-water events. Channelization and channel modification activities that lead to a loss of surface water contact in overbank areas also may result in reduced filtering of nonpoint source pollutants by streamside area vegetation and soils. Areas of the overbank that are dependent on surface water contact (i.e., riparian areas and wetlands) may change in character and function as the frequency and duration of flooding change.

Channelization and channel modification activities can lead to loss of instream and riparian habitat and ecosystem benefits such as pathways for wildlife migration and conditions suitable for reproduction and growth. Eroded sediment may be deposited in new areas, covering benthic communities or altering instream habitat. The effects on fish population that result from altering the hydrologic regime with hydraulic structures such as channels can include: deterioration of spawning habitat and conditions, resulting in lower recruitment of river species; increases in stocks of summer spawning river species; and changes in types and amounts of food organisms.

### ***5.5.2 Texas Programs Implementing Hydromodification Management Measures***

Texas achieves the requirements of the federal management measures for hydromodification through a mixture of regulatory authorities and voluntary programs. Some of these programs, including §401 Water Quality Certification, the TMDL process, and §26.121 and §26.177 of the Texas Water Code are discussed in Chapter 4. Additional programs and regulatory authorities which will be used to implement the hydromodification management measures are listed below and discussed in the following sections.

#### **5.5.2.1 Texas Water Code**

A number of chapters of the Texas Water Code address hydromodification activities and the (g) measures related to hydromodification. Six chapters containing provisions for implementation of the hydromodification (g) measures are described briefly below.

##### ***TWC Chapter 11: Water Rights***

Chapter 11 of the Texas Water Code and 30 TAC Chapter 297 regulate the use of state water. Sections 11.147-11.152 require the TNRCC to assess the effects, if any, of the issuance of a permit to store, take, or divert water, on bays and estuaries, existing instream uses, water quality, and fish and wildlife habitats. For activities which have the potential for significant adverse environmental impacts, the TNRCC may include provisions in the permit to avoid, minimize, or mitigate those impacts. TWC Chapter 11 and 30 TAC Chapter 70 provide for administrative and civil penalties.

***TWC Chapter 12: Provisions Generally Applicable to Water Rights***

Section 12.051 of the Texas Water Code requires authorization from the Texas Water Development Board for federal projects to construct, enlarge, or extend a dam, lake, reservoir, or other water-storage or flood-control work or a drainage, reclamation, or canalization undertaking.

Section 12.052 of the Texas Water Code and 30 TAC Chapter 299 regulate the construction, maintenance, and repair and removal of dams and provide for civil penalties for noncompliance.

***TWC Chapter 16: Provisions Generally Applicable to Water Development***

Chapter 16 and 57 of the Texas Water Code and 30 TAC Chapter 301 establish a centralized and coordinated method for planning and review of drainage and reclamation activity.

Section 16.236 prohibits the construction or maintenance of levees without TNRCC approval. The enforcement provisions for this section include administrative penalties, which are contained in §16.237 of the Texas Water Code and 30 TAC Chapter 70.

***TWC Chapter 26: Water Quality Control***

Section 26.121 of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity. The corresponding enforcement provisions include administrative, civil, and criminal penalties which are contained in Chapter 7 of the Water Code and 30 TAC Chapter 70.

Section 26.177 requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to non-permitted sources of pollution, (2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 Management Area, municipalities will implement (g) measures or alternatives that

are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

#### ***TWC Chapter 51: Water Control and Improvement Districts***

Chapter 51 of the Texas Water Code authorizes the creation of Water Control and Improvement Districts which can provide for construction and maintenance of dams and canals, and the protection of water and natural resources.

Section 51.127 authorizes a district to issue regulations to preserve the sanitary condition of water controlled by the district. Section 49.003 provides a civil penalty against a district for failure to make filing to the TNRCC. Section 49.004 authorizes a district to set penalties for violations of district rules.

#### ***TWC Chapter 57: Levee Improvement Districts***

Chapter 57 of the Texas Water Code authorizes the creation of Levee Improvement Districts which must operate pursuant to a reclamation plan approved by the TNRCC. The construction of a levee or other improvement must be inspected and approved by the TNRCC. Criminal penalties are provided in §§57.103 and 57.119 for injuring levees or interfering with authorized work.

Chapters 57 and 16 of the Texas Water Code establish a centralized and coordinated method for planning and review of drainage and reclamation activity.

### **5.5.2.2 Texas Local Government Code**

#### ***Chapter 401: Water Control by Municipalities***

Section 401.001 of the Local Government Code authorizes a water control body, including municipalities with a population of 150,000 to 239,999, to change or abate by mechanical means a harmful excess of water. A water control body includes a county, levee district, water control and improvement district, water improvement district, navigation district, or other political body created under the laws of the state with statutory powers concerned with the control of harmful excess of water.

#### ***Chapter 402: Municipal Utilities***

Section 402.041 et seq., the Municipal Drainage Utility Act, authorizes all municipalities to establish municipal drainage utility systems to protect the public health from pollution arising from nonpoint source runoff. Section 402.045 authorizes a municipality by ordinance to adopt and enforce rules to operate the drainage utility system.

### **5.5.2.3 Texas Health and Safety Code**

#### ***Chapter 341: Minimum Standards of Sanitation and Health Protection Measures***

Chapter 341, Subchapter B, of the Texas Health and Safety Code regulates nuisances created by sewage, human excreta, wastewater, waste products, offal, polluting material, spent chemicals,

lacquers, brines, garbage, refuse, and used tires. The corresponding enforcement provisions include civil and criminal penalties which are contained in Chapter 341, Subchapter F, of the Code.

#### ***Chapter 361: Solid Waste Disposal Act***

Chapter 361 of the Texas Health and Safety Code regulates the storage, processing, or disposal of hazardous waste. The corresponding enforcement provisions include administrative, civil, and criminal penalties which are contained in Chapter 7 of the Texas Water Code and 30 TAC Chapter 70.

#### **5.5.2.4 Section 401 Certification**

In Chapter 4, exemptions from the §6217 requirements were discussed for sources covered by other federal programs, such as §401 Certification. Section 401 of the Clean Water Act provides for the protection of the state's water resources by ensuring that federal discharge permits are consistent with the Texas Surface Water Quality Standards (SWQS). Under §401, states are given the authority to review federally permitted or licensed activities that may result in a discharge of pollutants to waters of the United States, such as the discharge of dredge or fill material. Section 401 is a very important tool because it is a cooperative federal/state program. It gives states authority to review federal activities in or affecting state waters, including wetlands, and reflects the state role at the forefront in administering water quality programs.

#### ***5.5.3 Funding Implementation of Hydromodification Management Measures***

The majority of activities related to hydromodification are funded through state general revenues.

However, as more TMDLs are completed in the §6217 Management Area, if hydromodification activities are identified as a source of water quality impairment, then State Revolving Funds (see Section 5.2.3) may be used for targeted projects.

In March 1998, the Coastal Coordination Council approved CMP grants guidance to provide additional funding for implementation of nonpoint source measures in the coastal zone. Projects funded in this category are: (1) development of programs to control urban sources of nonpoint pollution in furtherance of §26.177 of the Texas Water Code; (2) development and implementation of water quality management plans in compliance with S.B. 503 (§201.026 of the Agriculture Code); and (3) projects that demonstrate BMPs for nonpoint source pollution control.

#### ***5.5.4 Hydromodification Management Measure Implementation Goals and Strategies***

Texas has several goals related to hydromodification activities. These include:

- Maintain an active §401 certification program.

- Determine areas impacted by hydromodification activities through TMDLs and other monitoring programs.
- Implement hydromodification BMPs on an as-needed basis.

### **5.5.5 Hydromodification §6217(g) Management Measures**

EPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* contains six management measures addressing the hydromodification activities affecting coastal waters. These six management measures are organized into three categories of sources; (1) channelization and channel modification; (2) dams; and (3) streambank and shoreline erosion. The management measures and their implementation strategies are summarized in Table 5.7.

A description of each of the hydromodification management measures and the programs that will be used to implement the measure follows.

#### **5.5.5.1 Channelization and Channel Modification: Management Measure for Physical and Chemical Characteristics of Surface Waters**

- (1) Evaluate the potential effects of proposed channelization and channel modification on the physical and chemical characteristics of surface waters in coastal areas.
- (2) Plan and design channelization and channel modification to reduce undesirable impacts.
- (3) Develop an operation and maintenance program for existing modified channels that includes identification and implementation of opportunities to improve physical and chemical characteristics of surface waters in those channels.

#### **Purpose and Applicability**

This management measure addresses three effects of channelization and channel modification on the physical and chemical characteristics of surface waters: (1) changed sediment supply; (2) reduced freshwater availability; and (3) accelerated delivery of pollutants. The purpose of this management measure is to ensure that the planning process for new hydromodification projects addresses these three effects. For existing projects, the purpose is to ensure that operation and maintenance programs incorporate available opportunities to improve the physical and chemical characteristics of surface waters.

#### **Implementation**

**§401 Certification.** As part of the §401 certification, the TNRCC reviews the potential effect of channelization and channel modification on both the chemical and physical characteristics of surface waters in the coastal areas. For tidal streams, this review includes fluvial geomorphic principles to

minimize primary and secondary impacts to stream habitat and the associated aquatic life use of the stream.

Permits for channel construction in the bays may not be reviewed by the TNRCC. This is based on the Corps of Engineers opinion that permits issued under §10 of the Rivers and Harbors Act do not require §401 certifications. For purposes of Coastal Management Program consistency determinations, the General Land Office is responsible for the technical review and consistency determination for §10 only permits. If a permit involves discharge of dredged materials and therefore requires a §404 permit, the TNRCC will be responsible for reviewing the entire project. For §10 and §404 permits, both physical and chemical impacts are evaluated in the §401 certification decision-making process.

Operation and maintenance of federal navigation channels are being coordinated through interagency workgroups in association with the Coastal Coordination Council. Included in these reviews is an evaluation of opportunities to improve the physical and chemical characteristics of surface waters. Possible alternatives include changing the method and/or location of disposal of maintenance dredging materials, and beneficial use of the dredged material to create habitat or other physical enhancements for the coastal surface waters.

***TWC Chapter 12: Provisions Generally Applicable to Water Rights***

Section 12.051 of the Texas Water Code requires authorization from the Texas Water Development Board for federal projects to construct, enlarge, or extend a dam, lake, reservoir, or other water-storage or flood-control work or a drainage, reclamation, or canalization undertaking.

***TWC Chapter 16: Provisions Generally Applicable to Water Development***

Chapters 16 and 57 of the Texas Water Code and 30 TAC Chapter 301 establish a centralized and coordinated method for planning and review of drainage and reclamation activity.

Section 16.236 prohibits the construction or maintenance of levees without TNRCC approval. The enforcement provisions for this section include administrative penalties which are contained in §16.237 of the Texas Water Code and 30 TAC Chapter 70.

***TWC Chapter 51: Water Control and Improvement Districts***

Chapter 51 of the Texas Water Code authorizes the creation of Water Control and Improvement Districts which can provide for construction and maintenance of dams and canals, and the protection of water and natural resources.

Section 51.127 authorizes a district to issue regulations to preserve the sanitary condition of water controlled by the district. Section 49.003 provides a civil penalty against a district for failure to make filing to the TNRCC. Section 49.004 authorizes a district to set penalties for violations of district rules.

***TWC Chapter 57: Levee Improvement Districts***

Chapter 57 of the Texas Water Code authorizes the creation of Levee Improvement Districts which must operate pursuant to a reclamation plan approved by the TNRCC. The construction of a levee or other improvement must be inspected and approved by the TNRCC. Criminal penalties are provided in §§57.103 and 57.119 for injuring levees or interfering with authorized work.

***Chapter 401: Water Control by Municipalities***

Section 401.001 authorizes a water control body, including municipalities with a population of 150,000 to 239,999, to change or abate by mechanical means a harmful excess of water. A water control body includes a county, levee district, water control and improvement district, water improvement district, navigation district, or other political body created under the laws of the state with statutory powers concerned with the control of harmful excess of water.

***Chapter 402: Municipal Utilities***

Section 402.041 et seq., the Municipal Drainage Utility Act, authorizes all municipalities to establish municipal drainage utility systems to protect the public health from pollution arising from nonpoint source runoff. Section 402.045 authorizes a municipality by ordinance to adopt and enforce rules to operate the drainage utility system.

**5.5.5.2 Channelization and Channel Modification: Instream and Riparian Habitat Restoration Management Measure**

- (1) Evaluate the potential effects of proposed channelization and channel modification on instream and riparian habitat in coastal areas;
- (2) Plan and design channelization and channel modification to reduce undesirable impacts; and
- (3) Develop an operation and maintenance program with specific timetables for existing modified channels that includes identification of opportunities to restore instream and riparian habitat in those channels.

**Purpose and Applicability**

The purpose of this management measure is to correct or prevent detrimental changes to instream riparian habitat from the impacts of channelization and channel modification projects. This measure applies to surface waters where channelization and channel modification have altered or have the potential to alter instream and riparian habitat such that historically present fish or wildlife are adversely affected.

**Implementation**

***TWC Chapter 11: Water Rights***

Chapter 11 of the Texas Water Code and 30 TAC Chapter 297 regulate the use of state water. Sections 11.147-11.152 require the TNRCC to assess the effects, if any, of the issuance of a permit to store, take, or divert water, on bays and estuaries, existing instream uses, water quality, and fish

and wildlife habitats. For activities which have the potential for significant adverse environmental impacts, the TNRCC may include provisions in the permit to avoid, minimize, or mitigate those impacts. TWC Chapter 11 and 30 TAC Chapter 70 provide for administrative and civil penalties.

***TWC Chapter 51: Water Control and Improvement Districts***

Chapter 51 of the Texas Water Code authorizes the creation of Water Control and Improvement Districts which can provide for construction and maintenance of dams and canals, and the protection of water and natural resources.

Section 51.127 authorizes a district to issue regulations to preserve the sanitary condition of water controlled by the district. Section 49.003 provides a civil penalty against a district for failure to make filing to the TNRCC. Section 49.004 authorizes a district to set penalties for violations of district rules.

***TWC Chapter 57: Levee Improvement Districts***

Chapter 57 of the Texas Water Code authorizes the creation of Levee Improvement Districts, which must operate pursuant to a reclamation plan approved by the TNRCC. The construction of a levee or other improvement must be inspected and approved by the TNRCC. Criminal penalties are provided in §§57.103 and 57.119 for injuring levees or interfering with authorized work.

Chapters 57 and 16 of the Texas Water Code establish a centralized and coordinated method for planning and review of drainage and reclamation activity.

***Chapter 401: Water Control by Municipalities***

Section 401.001 authorizes a water control body, including municipalities with a population of 150,000 to 239,999, to change or abate by mechanical means a harmful excess of water. A water control body includes a county, levee district, water control and improvement district, water improvement district, navigation district, or other political body created under the laws of the state with statutory powers concerned with the control of harmful excess of water.

***Chapter 402: Municipal Utilities***

Section 402.041 et seq., the Municipal Drainage Utility Act, authorizes all municipalities to establish municipal drainage utility systems to protect the public health from pollution arising from nonpoint source runoff. Section 402.045 authorizes a municipality to adopt by ordinance and enforce rules to operate the drainage utility system.

***§401 Certification.*** The TNRCC, TPWD, and GLO address these (g) measures in their review of Corps of Engineers permits, federal consistency determinations, and participation in Interagency Review Teams.

Operation and maintenance of federal navigation channels are being coordinated through interagency workgroups in association with the Coastal Coordination Council. Included in these reviews is an evaluation of opportunities to improve the physical and chemical characteristics of surface waters. Possible alternatives include changing the method and/or location of disposal of maintenance

dredging materials, and beneficial use of the dredged material to create habitat or other physical enhancements for the coastal surface waters.

### **5.5.5.3 Dams: Erosion and Sediment Control Management Measure**

- (1) Reduce erosion and, to the extent practicable, retain sediment on-site during and after construction.
- (2) Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

#### **Purpose and Applicability**

The purpose of this measure is to prevent sediment from entering surface waters during the construction or maintenance of dams. This measure does not apply to projects which fall under NPDES jurisdiction.

#### **Implementation**

##### ***TWC Chapter 12: Provisions Generally Applicable to Water Rights***

Section 12.051 of the Texas Water Code requires authorization from the Texas Water Development Board for federal projects to construct, enlarge, or extend a dam, lake, reservoir, or other water-storage or flood-control work or a drainage, reclamation, or canalization undertaking.

Section 12.052 of the Texas Water Code and 30 TAC Chapter 299 regulate the construction, maintenance, and repair and removal of dams and provide for civil penalties for noncompliance.

##### ***TWC Chapter 26: Water Quality Control***

Section 26.177 requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to nonpermitted sources of pollution, (2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 Management Area, municipalities will implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

##### ***TWC Chapter 11: Water Rights***

Chapter 11 of the Texas Water Code and 30 TAC Chapter 297 regulate the use of state water. Sections 11.147-11.152 require the TNRCC to assess the effects, if any, of the issuance of a permit to store, take, or divert water, on bays and estuaries, existing instream uses, water quality, and fish

and wildlife habitats. For activities which have the potential for significant adverse environmental impacts, the TNRCC may include provisions in the permit to avoid, minimize, or mitigate those impacts. Chapter 11 and 30 TAC Chapter 70 provide for administrative and civil penalties.

Under Chapter 11, plans and specifications for the construction of dam and reservoir facilities requiring TNRCC authorization must be submitted to the TNRCC for approval before construction can begin. Further, actions regulated under state and federal authority which would increase pollutant loads must comply with the antidegradation policy contained in 30 TAC §307.5.

#### **5.5.5.4 Dams: Management Measure for Chemical and Pollutant Control**

- (1) *Limit application, generation, and migration of toxic substances.*
- (2) *Ensure the proper storage and disposal of toxic materials.*
- (3) *Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface waters.*

#### **Purpose and Applicability**

The purpose of this management measure is to prevent downstream contamination from pollutants associated with dam construction activities.

#### **Implementation**

##### ***TWC Chapter 12: Provisions Generally Applicable to Water Rights***

Section 12.052 of the Texas Water Code and 30 TAC Chapter 299 regulate the construction, maintenance, and repair and removal of dams and provide for civil penalties for noncompliance.

**Section 26.121** of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity. The corresponding enforcement provisions include administrative, civil, and criminal penalties which are contained in Chapter 7 of the Water Code and 30 TAC Chapter 70.

##### ***Chapter 341: Minimum Standards of Sanitation and Health Protection Measures***

Chapter 341, Subchapter B, of the Texas Health and Safety Code regulates nuisances created by sewage, human excreta, wastewater, waste products, offal, polluting material, spent chemicals, lacquers, brines, garbage, refuse, and used tires. The corresponding enforcement provisions include civil and criminal penalties which are contained in Chapter 341, Subchapter F, of the Code.

##### ***Chapter 361: Solid Waste Disposal Act***

Chapter 361 of the Texas Health and Safety Code regulates the storage, processing, or disposal of hazardous waste. The corresponding enforcement provisions include administrative, civil, and criminal penalties which are contained in Chapter 7 of the Texas Water Code and 30 TAC Chapter 70.

#### **5.5.5.5 Dams: Management Measure for Protection of Surface Water Quality and Instream and Riparian Habitat**

*Develop and implement a program to manage the operation of dams in coastal areas that includes an assessment of:*

- (1) surface water quality and instream and riparian habitat and potential for improvement, and*
- (2) significant nonpoint source pollution problems that result from excessive surface water withdrawals.*

#### **Purpose and Applicability**

The purpose of this management measure is to protect the quality of surface waters and aquatic habitat in reservoirs and in the downstream portions of rivers and streams that are influenced by the quality of water contained in the releases (tailwaters) from reservoir impoundments. This management measure should be applied to dam operations that result in the loss of desirable surface water quality and of desirable instream and riparian habitat.

#### **Implementation**

**Watershed Action Plans** will be developed for all §303(d) listed priority watersheds in the state. These Action Plans will provide a written, quantitative assessment of water quality problems and contributing sources as well as an implementation plan identifying responsible parties at the state, regional, and local levels and specifying actions needed to restore and protect water quality standards. Watersheds within the §6217 Management Area will utilize the §6217(g) measures or alternatives that are as effective in controlling nonpoint source pollution. Watershed Action Plans are discussed at length in Chapter 4.

#### ***TWC Chapter 11: Water Rights***

Chapter 11 of the Texas Water Code and 30 TAC Chapter 297 regulate the use of state water. Sections 11.147-11.152 require the TNRCC to assess the effects, if any, of the issuance of a permit to store, take, or divert water, on bays and estuaries, existing instream uses, water quality, and fish and wildlife habitats. For activities which have the potential for significant adverse environmental impacts, the TNRCC may include provisions in the permit to avoid, minimize, or mitigate those impacts. Chapter 11 and 30 TAC Chapter 70 provide for administrative and civil penalties. Criminal penalties are provided in §7.142 of the Water Code.

#### ***TWC Chapter 12: Provisions Generally Applicable to Water Rights***

Section 12.051 of the Texas Water Code requires authorization from the Texas Water Development Board for federal projects to construct, enlarge, or extend a dam, lake, reservoir, or other water-storage or flood-control work or a drainage, reclamation, or canalization undertaking.

Section 12.052 of the Texas Water Code and 30 TAC Chapter 299 regulate the construction, maintenance, and repair, and removal of dams and provide for civil penalties for noncompliance.

#### **5.5.5.6 Management Measure for Eroding Streambanks and Shorelines**

- (1) Where streambank or shoreline erosion is a nonpoint source pollution problem, streambanks and shorelines should be stabilized. Vegetative methods are strongly preferred unless structural methods are more cost-effective, considering the severity of wave and wind erosion, offshore bathymetry, and the potential adverse impact on other streambanks, shorelines, and offshore areas.
- (2) Protect streambank and shoreline features with the potential to reduce NPS pollution.
- (3) Protect streambanks and shorelines from erosion due to uses of either the shorelands or adjacent surface waters.

#### **Purpose and Applicability**

The purpose of this measure is to control eroding shorelines in coastal bays and eroding streambanks in coastal rivers and creeks which constitute a nonpoint source problem in surface waters.

#### **Implementation**

**§401 Certification.** For those activities associated with a §401 certification, the TNRCC can require shoreline stabilization as conditions to the §401 certification for any shorelines impacted by the certified project. When projects to stabilize shorelines are submitted for §401 certification, the TNRCC prefers soft methods such as vegetation. The TNRCC requires that areas disturbed during development of a permitted activity be stabilized after construction. Again, the preference is for vegetation or a similar best management practice (BMP). The TNRCC has authority to require conditions in the §401 certification of federal permits; these conditions become part of the permit.

**GLO Technical Assistance.** The GLO consults with private waterfront landowners to design appropriate shoreline stabilization techniques. Field office personnel encourage the use of vegetative or other “soft” methods wherever shoreline wave energy regimes allow. Fill of shallow water habitat along shorelines is prohibited.

**GLO Lease Conditions.** The Texas General Land Office manages all state-owned submerged lands and has special lease conditions for construction of marinas, piers, docks, and other waterfront appurtenances (TEX. NAT. RES. CODE ANN. §§33.2053(a)(3), (5), (7), (8), and (9)). Certain

provisions of the Oil Spill Prevention and Response Act also apply (TEX. NAT. RES. CODE ANN. CH. 40). These lease conditions are designed to protect sensitive shorelines, shallow water habitat, emergent marshes, oyster reefs, seagrasses, and water quality. The conditions are enforced through the cancellation of leases and civil and administrative penalties under chapters 33 and 51 of the Texas Natural Resources Code. The following GLO lease conditions apply to the construction of marinas, piers, docks, and other waterfront appurtenances on state-owned submerged lands. In addition to the standard lease conditions outlined below which are in conformance with this (g) measure, the GLO has the authority to design site-specific lease special conditions which further protect coastal areas.

- Shoreline Protection: Riprap materials shall consist of approved material such as concrete block, interlocking brick, sakrete, rock large enough not to be displaced by storms, or concrete rubble which is free of protruding rebar. Tires, automobile bodies or parts, appliances, trash, debris, asphalt, tree limbs, and other unconsolidated material is not acceptable and shall not be used.

**Table 5.1 Summary of Authorities Implementing Agricultural Management Measures**

<b>EPA Management Measures for Agriculture</b>	<b>Implementing Authorities</b>
<p><b>Erosion and Sediment Control Management Measure</b></p> <p><b>Management Measure for Facility Wastewater and Runoff from Confined Animal Facility Management (Large and Small Units)</b></p> <p><b>Nutrient Management Measure</b></p> <p><b>Pesticide Management Measure</b></p> <p><b>Grazing Management Measure</b></p> <p><b>Irrigation Water Management</b></p>	<p><b>Section 201.026 of the Texas Agriculture Code,<sup>1</sup></b></p> <p><b>Section 26.121 of the Texas Water Code,<sup>2</sup> and</b></p> <p><b>Section 26.1311 of the Texas Water Code.<sup>3</sup></b></p> <p><b>Section 303(d) of the Clean Water Act<sup>4</sup></b></p> <p><b>CZMA Consistency Review<sup>5</sup></b></p> <p><b>Programs that promote the implementation of BMPs, including the Environmental Quality Incentive Program, Wetlands Reserve Program, and Texas Prairie Wetland Project</b></p> <p><b>In addition to the above authorities, the Federal Insecticide, Fungicide and Rodenticide Act and the Agricultural Resources Protection Authority apply to the Pesticide Management Measure.</b></p>

<sup>1</sup> (1) Established the State Board as lead state agency for activities relating to abatement of agricultural and silvicultural nonpoint source pollution to include representing the state before USEPA or other federal agencies on matters relating to these activities; (2) established a water quality management program in designated areas; (3) provided resolution of complaints involving agricultural and silvicultural activities; and (4) provided for cost-share assistance for landowners or operators for the installation of soil and water conservation land improvement measures consistent with the purpose of controlling erosion, conserving water, or protecting water quality.

<sup>2</sup> Prohibits discharge of agricultural or silvicultural waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state, unless the discharge complies with the person 's certified water quality management plan approved by the State Soil and Water Conservation Board.

<sup>3</sup> The State Soil and Water conservation Board and its authorized agents are responsible for the abatement and prevention of pollution resulting from agricultural or silvicultural nonpoint source pollution as provided by Section 201.026, Agriculture Code.

<sup>4</sup> The TSSWCB is developing and implementing agricultural and silvicultural components for TMDLs via the planning process as required to attain water quality standards

<sup>5</sup> Under Section 16 USCA §1456(c)(3)(A) of the Coastal Zone Management Act (CZMA) of 1972, states with approved coastal management programs are authorized to review all applications for federal licenses or permits for consistency with their coastal zone management programs.

**Table 5.2 Summary of Authorities Implementing Silvicultural Management Measures**

EPA Management Measures for Forestry	Implementing Authorities
<p><b>Preharvest Management Measure</b></p> <p><b>Streamside Management Areas (SMAs)</b></p> <p><b>Road Construction/Reconstruction</b></p> <p><b>Road Management</b></p> <p><b>Timber Harvesting</b></p> <p><b>Site Preparation and Forest Regeneration</b></p> <p><b>Fire Management</b></p> <p><b>Revegetation of Disturbed Areas</b></p> <p><b>Forest Chemical Management</b></p> <p><b>Wetlands Forest</b></p>	<p><b>Section 201.026 of the Texas Agriculture Code,<sup>1</sup></b></p> <p><b>Section 26.121 of the Texas Water Code,<sup>2</sup> and</b></p> <p><b>Section 26.1311 of the Texas Water Code.<sup>3</sup></b></p> <p><b>Section 303(d) of the Clean Water Act<sup>4</sup></b></p> <p><b>CZMA Consistency Review<sup>5</sup></b></p> <p><b>Programs that promote the implementation of BMPs, including the Texas Forest Service’s nonpoint source pollution prevention program, wildfire program, and pest control program</b></p>

<sup>1</sup> (1) Established the State Board as lead state agency for activities relating to abatement of agricultural and silvicultural nonpoint source pollution to include representing the state before the EPA or other federal agencies on matters relating to these activities; (2) established a water quality management program in designated areas; (3) provided resolution of complaints involving agricultural and silvicultural activities; and (4) provided for cost-share assistance for landowners or operators for the installation of soil and water conservation land improvement measures consistent with the purpose of controlling erosion, conserving water, or protecting water quality.

<sup>2</sup> Prohibits discharge of agricultural or silvicultural waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state, unless the discharge complies with the person’s certified water quality management plan approved by the State Soil and Water Conservation Board.

<sup>3</sup> The State Soil and Water conservation Board and its authorized agents are responsible for the abatement and prevention of pollution resulting from agricultural or silvicultural nonpoint source pollution as provided by §201.026 of the Agriculture Code.

<sup>4</sup> The TSSWCB is developing and implementing agricultural and silvicultural components for TMDLs via the planning process as required to attain water quality standards.

<sup>5</sup> Under 16 USCA §1456(c)(3)(A), the Coastal Zone Management Act (CZMA) of 1972, states with approved coastal management programs are authorized to review all applications for federal licenses or permits for consistency with their coastal zone management programs.

**Table 5.3 Summary of Authorities Implementing Urban Management Measures**

EPA Management Measures for Urban and Developing Areas	Implementing Authorities
<p><b>Urban Runoff:</b>  <b>New Development</b>            <b>Watershed Protection</b>            <b>Site Development</b>  <b>Construction Activities:</b>            <b>Construction Site Erosion &amp; Sediment Control</b>            <b>Construction Site Chemical Control</b>  <b>Existing Development</b>  <b>New Onsite Disposal Systems</b>  <b>Operating Onsite Disposal Systems</b>  <b>Roads, Highways, and Bridges:</b>            <b>Planning, Siting and Developing Roads and Highways</b>            <b>Bridges</b>            <b>Construction Projects</b>            <b>Construction Site Chemical Control</b>            <b>Operation and Maintenance</b>            <b>Road, Highway, and Bridge Runoff Systems</b>  <b>Pollution Prevention</b></p>	<p><b>Section 26.177 of the Texas Water Code<sup>1</sup></b>   <b>Section 26.121 of the Texas Water Code<sup>2</sup></b>   <b>Title 30 TAC Chapter 285<sup>3</sup></b>   <b>Section 303(d) of the Clean Water Act<sup>4</sup></b>   <b>Programs that promote the implementation of BMPs, including the Texas Nonpoint Sourcebook; Model NPS Ordinances; and TxDOT guidance documents</b></p>

<sup>1</sup> Section 26.177 requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to nonpermitted sources of pollution, (2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 management area, municipalities will implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

<sup>2</sup>Section 26.121 of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

<sup>3</sup> The TNRCC On-Site Wastewater Program establishes standards for installation of OSSFs and outlines licensing and educational requirements for installers. On February 4, 1997, the TNRCC adopted rules (30 TAC Chapter 285) to provide minimum levels of acceptable criteria to assure that the proper onsite sewage facilities will be installed in the state in order to eliminate and prevent health hazards for the public and the waters in the state.

<sup>4</sup> Watershed Action Plans will be developed for all §303(d) listed priority watersheds in the state. These Action Plans will provide a written, quantitative assessment of water quality problems and contributing sources as well as an implementation plan identifying responsible parties at the state, regional, and local levels and specifying actions needed to restore and protect water quality standards. Watersheds within the §6217 Management Area will implement the §6217(g) measures or alternatives that are as effective in controlling nonpoint source pollution. Watershed Action Plans are discussed at length in Chapter 4.

**Table 5.4 On-Site Wastewater System Applications Processed From 1/1/96 Through 12/1/96**

<b>ENTITY</b>	<b>TOTAL REPORTED</b>
Aransas County	285
Brazoria County	811
Calhoun County	66
Cameron County	890
Chambers County	129
City of Beach City	19
City of Brookside Village	10
City of Manvel	57
Fort Bend County	302
Galveston County	344
Harris County	1,327
Hidalgo County	2,702
Jackson County	106
Jefferson County	176
Kleberg County	11
Liberty County	730
Matagorda County	300
Nueces County	127
Orange County	454
Refugio County	21
San Patricio County	140
Victoria County	212
Wharton County	113
Willacy County	54
<b>TOTAL</b>	<b>9,386</b>

**Table 5.5 Summary of Authorities Implementing Marinas and Recreational Boating Management Measures**

<b>EPA Management Measures for Marinas and Recreational Boating</b>	<b>Implementing Authorities</b>
<p><b>Marina Flushing</b>  <b>Water Quality Assessment</b>  <b>Habitat Assessment</b>  <b>Shoreline Stabilization</b>  <b>Storm Water Runoff</b>  <b>Fueling Station Design</b>  <b>Sewage Facility</b>  <b>Solid Waste</b>  <b>Fish Waste</b>  <b>Liquid Material</b>  <b>Petroleum Control</b>  <b>Boat Cleaning</b>  <b>Public Education</b>  <b>Maintenance of Sewage Facilities</b>  <b>Boat Operation Maintenance</b></p>	<p><b>Section 26.177 of the Texas Water Code<sup>1</sup></b></p> <p><b>Section 26.121 of the Texas Water Code<sup>2</sup></b></p> <p><b>Section 401 of the Clean Water Act<sup>3</sup></b></p> <p><b>Section 303(d) of the Clean Water Act<sup>4</sup></b></p> <p><b>Section 33.2053 of the Texas Natural Resources Code<sup>5</sup></b></p> <p><b>Programs that promote the implementation of BMPs and boater awareness, including the Sea Grant Marine Advisory Service marine sanitary discharge manuals, development of pumpout stations, recycling guide, and BMP manual for marina operators</b></p>

<sup>1</sup> Section 26.177 requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to nonpermitted sources of pollution, (2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 management area, municipalities will implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

<sup>2</sup>Section 26.121 of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

<sup>3</sup> Section 401 of the Clean Water Act provides for the protection of the state’s water resources by ensuring that federal discharge permits are consistent with the Texas Surface Water Quality Standards (SWQS). Under §401, states are given the authority to review federally permitted or licensed activities that may result in a discharge of pollutants to waters of the United States, such as the discharge of dredge or fill material. Section 401 is a very important tool because it is a cooperative federal/state program. It gives states authority to review federal activities in or affecting state waters and reflects the state role at the forefront in administering water quality programs.

<sup>4</sup> Watershed Action Plans will be developed for all §303(d) listed priority watersheds in the state. These Action Plans will provide a written, quantitative assessment of water quality problems and contributing sources as well as an implementation plan identifying responsible parties at the state, regional, and local levels.<sup>5</sup> The Texas General Land Office manages all state-owned submerged lands and has special lease conditions for construction of marinas, piers, docks, and other waterfront appurtenances. Certain provisions of the Oil Spill Prevention and Response Act also apply (TEX. NAT. RES. CODE ANN. Ch. 40). These lease conditions are designed to protect sensitive shorelines, shallow water habitat, emergent marshes, oyster reefs, seagrasses, and water quality. The conditions are enforced through the cancellation of leases and civil and administrative penalties under chapters 33 and 51 of the Texas Natural Resources Code.

**Table 5.6 Summary of Authorities Implementing Wetlands and Riparian Areas Management Measures**

EPA Management Measures for Wetlands and Riparian Areas	Implementing Authorities
<p><b>Protection of Wetlands and Riparian Areas</b></p> <p><b>Restoration of Wetland and Riparian Areas</b></p> <p><b>Vegetated Treatment Systems</b></p>	<p><b>Section 26.177 of the Texas Water Code<sup>1</sup></b></p> <p><b>Section 26.121 of the Texas Water Code<sup>2</sup></b></p> <p><b>Section 401 of the Clean Water Act<sup>3</sup></b></p> <p><b>Section 303(d) of the Clean Water Act<sup>4</sup></b></p> <p><b>Section 33.2053 of the Texas Natural Resources Code<sup>5</sup></b></p> <p><b>Programs that promote the implementation of BMPs and public awareness, as well as no net loss of existing wetland resources with respect to functions and values, including the Wetlands Handbook for Local Governments, CMP Grants Program, USDA-NRCS Wetlands Reserve Program, and Texas Parks Wildlife Programs Protecting Wetlands</b></p>

<sup>1</sup> Section 26.177 requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to non-permitted sources of pollution, (2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 management area, municipalities will implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

<sup>2</sup>Section 26.121 of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

<sup>3</sup> Section 401 of the Clean Water Act provides for the protection of the state’s water resources by ensuring that federal discharge permits are consistent with the Texas Surface Water Quality Standards (SWQS). Under §401, states are given the authority to review federally permitted or licensed activities that may result in a discharge of pollutants to waters of the United States, such as the discharge of dredge or fill material. Section 401 is a very important tool because it is a cooperative federal/state program. It gives states authority to review federal activities in or affecting state waters and reflects the state role at the forefront in administering water quality programs.

<sup>4</sup> Watershed Action Plans will be developed for all §303(d) listed priority watersheds in the state. These Action Plans will provide a written, quantitative assessment of water quality problems and contributing sources as well as an implementation plan identifying responsible parties at the state, regional, and local level, and specifying actions needed to restore and protect water quality standards. Watersheds within the §6217 Management Area will implement the §6217(g) measures or alternatives that are as effective in controlling nonpoint source pollution. Watershed Action Plans are discussed at length in Chapter 4.

## **Table 5.6, continued**

<sup>5</sup> The Texas General Land Office manages all state -owned submerged lands and has special lease conditions for construction of marinas, piers, docks, and other waterfront appurtenances. Certain provisions of the Oil Spill Prevention and Response Act also apply (TEX. NAT. RES. CODE ANN. Ch. 40). These lease conditions are designed to protect sensitive shorelines, shallow water habitat, emergent marshes, oyster reefs, seagrasses, and water quality. The conditions are enforced through the cancellation of leases and civil and administrative penalties under chapters 33 and 51 of the Texas Natural Resources Code.

**Table 5.7 Summary of Authorities Implementing Hydromodification Management Measures**

<b>EPA Management Measures for Hydromodification: Channelization and Channel Modification, Dams, and Streambanks and Shoreline Erosion</b>	<b>Implementing Authorities</b>
<p><b>Channelization and Channel Modification:</b></p> <p style="padding-left: 40px;"><b>Physical and Chemical Characteristics of Surface Waters</b></p> <p style="padding-left: 40px;"><b>Instream and Riparian Habitat Restoration</b></p> <p><b>Dams:</b></p> <p style="padding-left: 40px;"><b>Erosion and Sediment Control</b></p> <p style="padding-left: 40px;"><b>Chemical and Pollutant Control</b></p> <p style="padding-left: 40px;"><b>Protection of Surface Water Quality and Instream and Riparian Habitat</b></p> <p><b>Eroding Streambanks and Shorelines</b></p>	<p><b>Section 26.177 of the Texas Water Code<sup>1</sup></b></p> <p><b>Section 26.121 of the Texas Water Code<sup>2</sup></b></p> <p><b>Section 401 of the Clean Water Act<sup>3</sup></b></p> <p><b>Chapter 11 of the Texas Water Code<sup>4</sup></b></p> <p><b>Chapter 12 of the Texas Water Code<sup>5</sup></b></p> <p><b>Chapter 16 of the Texas Water Code<sup>6</sup></b></p> <p><b>Chapter 51 of the Texas Water Code<sup>7</sup></b></p> <p><b>Chapter 57 of the Texas Water Code<sup>8</sup></b></p> <p><b>Texas Local Government Code: Water Control by Municipalities</b></p> <p><b>Texas Health and Safety Code: Minimum Standards of Sanitation and Health Protection Measures</b></p> <p><b>Texas Health and Safety Code: Solid Waste Disposal Act</b></p>

<sup>1</sup> Section 26.177 requires cities with populations greater than 10,000 persons to establish water pollution control and abatement programs when: (1) water quality assessments and studies identify water pollution in the city which is attributable to nonpermitted sources of pollution, (2) after the city has had reasonable time to correct the problem, and (3) after a public hearing has been held on the matter. Under §26.177, a water pollution control and abatement program must include, among other things, the development and execution of reasonable and realistic plans for controlling and abating pollution or potential pollution resulting from generalized discharges of waste which are not traceable to a specific source, such as storm sewer discharges and urban runoff from rainwater. Within the §6217 management area, municipalities will implement (g) measures or alternatives that are as effective in controlling nonpoint source pollution when developing and implementing water pollution control and abatement programs. Section 26.177 is discussed in greater detail in Chapter 4.

## Table 5.7, continued

<sup>2</sup>Section 26.121 of the Texas Water Code prohibits the unauthorized discharge of sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state. It also prohibits the discharge of any other waste into or adjacent to any water in the state which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state. This includes nonpoint sources of pollution. This authority has generally been used as the basis for enforcement permitting to address unpermitted pollution when no specific permitting authority covers the activity.

<sup>3</sup> Section 401 of the Clean Water Act provides for the protection of the state's water resources by ensuring that federal discharge permits are consistent with the Texas Surface Water Quality Standards (SWQS). Under §401, states are given the authority to review federally permitted or licensed activities that may result in a discharge of pollutants to waters of the United States, such as the discharge of dredge or fill material. Section 401 is a very important tool because it is a cooperative federal/state program. It gives states authority to review federal activities in or affecting state waters and reflects the state role at the forefront in administering water quality programs.

<sup>4</sup> Chapter 11 of the Texas Water Code and 30 TAC Chapter 297 regulate the use of state water. Sections 11.147-11.152 require the TNRCC to assess the effects, if any, of the issuance of a permit to store, take, or divert water, on bays and estuaries, existing instream uses, water quality, and fish and wildlife habitats. For activities which have the potential for significant adverse environmental impacts, the TNRCC may include provisions in the permit to avoid, minimize, or mitigate those impacts. Chapter 11 and 30 TAC Chapter 70 provide for administrative and civil penalties.

<sup>5</sup> Section 12.051 of the Texas Water Code requires authorization from the Texas Water Development Board for federal projects to construct, enlarge, or extend a dam, lake, reservoir, or other water-storage or flood-control work or a drainage, reclamation, or canalization undertaking. Section 12.052 of the Texas Water Code and 30 TAC Chapter 299 regulate the construction, maintenance, and repair and removal of dams and provide for civil penalties for noncompliance.

<sup>6</sup> Chapter 16 and 57 of the Texas Water Code and 30 TAC Chapter 301 establish a centralized and coordinated method for planning and review of drainage and reclamation activity. Section 16.236 prohibits the construction or maintenance of levees without TNRCC approval. The enforcement provisions for this section includes administrative penalties which are contained in §16.237 of the Texas Water Code and 30 TAC Chapter 70.

<sup>7</sup> Chapter 51 of the Texas Water Code authorizes the creation of Water Control and Improvement Districts which can provide for construction and maintenance of dams and canals, and the protection of water and natural resources. Section 51.127 authorizes a district to issue regulations to preserve the sanitary condition of water controlled by the district. Section 49.003 provides a civil penalty against a district for failure to make filing to the TNRCC. Section 49.004 authorizes a district to set penalties for violations of district rules.

<sup>8</sup> Chapter 57 of the Texas Water Code authorizes the creation of Levee Improvement Districts which must operate pursuant to a reclamation plan approved by the TNRCC. The construction of a levee or other improvement must be inspected and approved by the TNRCC. Criminal penalties are provided in §§57.103 and 57.119 for injuring levees or interfering with authorized work. Chapters 57 and 16 of the Texas Water Code establish a centralized and coordinated method for planning and review of drainage and reclamation activity.

**Figure 5.1 Regulations Addressing Urban Nonpoint Sources of Pollution**

1. Texas Water Code (TWC) §26.177 - Water Pollution Control Duties of Cities
2. TWC §26.121 - Unauthorized Discharges Prohibited
3. Title 30 Texas Administrative Code (TAC) Chapter 70 - Administrative Enforcement Actions
4. TWC Chapter 7 - Enforcement Provisions
5. Title 30 TAC Chapter 285 and Texas Health and Safety Code (THSC) Chapter 366 - On-site Systems
6. TWC §§26.261-26.268 - Texas Hazardous Substances Spill Prevention and Control Act
7. TWC §§26.341-26.363 - Underground and Aboveground Storage Tanks
8. Title 30 TAC §331.5 - Underground Injection Control - Pollution Prevention
9. Title 30 TAC §317.2 Design Criteria for Sewerage Systems
10. Title 30 TAC §324 and THSC Chapter 371 - Used Oil
11. THSC Chapter 365 - Illegal Dumping
12. THSC Chapter 361, Subchapter Q - Pollution Prevention Program
13. THSC Chapter 341, Subchapter B - Regulates Nuisances

## Chapter 6. Additional Management Measures

EPA and NOAA's *Program Development and Approval Guidance* for Coastal Nonpoint Pollution Control Programs outlines the requirements for implementation of Additional Management Measures under §6217. Under §6217, additional management measures provide a "second tier of pollution control efforts" after implementation of the §6217(g) management measures. The *Program Guidance* states,

*If the general level of protection provided by the first management tier is insufficient to enable coastal waters to meet water quality standards and protect designated uses, then the state must implement the second tier which consists of additional management measures. The purpose of the second tier is to restore coastal waters and, in the case of critical areas, to protect against future pollution problems.*

In keeping with NOAA and EPA's guidance, the State of Texas will follow an iterative process for implementing (g) management measures, assessing their effectiveness in achieving water quality goals and determining the need for additional management measures. Texas' use of this iterative process will meet the requirements for implementing additional management measures, as described below.

### 6.1 Requirements for Implementation of Additional Management Measures

#### 6.1.1 *Identify coastal waters that are not attaining or maintaining applicable water quality standards*

The State of Texas uses the following report in identifying threatened or impaired waters:

Coastal waters listed in the State of Texas 1998 Clean Water Act §303(d) List and Schedule for Development of Total Maximum Daily Loads, where listing is due at least in part to nonpoint sources.

The State of Texas also uses the following reports to identify threatened or impaired waters that are placed on the CWA §303(d) List:

- a. Coastal waters identified in the State of Texas 1998 Clean Water Act §305(b) Water Quality Inventory as "partially meeting" or "not meeting" designated uses or as "threatened";
- b. Coastal waters listed in the State of Texas 1998 Clean Water Act §303(d) List and Schedule for Development of Total Maximum Daily Loads, where listing is due at least in part to nonpoint sources;
- c. Coastal waters listed by the state under Clean Water Act §304(l) as impaired by nonpoint source pollution; and

- d. Coastal waters identified as impaired or threatened by nonpoint source pollution in the State Nonpoint Source Program Clean Water Act §319 Assessment.

### ***6.1.2 Identify land uses that individually or cumulatively cause or threaten water quality impairments in those coastal waters***

As discussed in Chapter 4, Texas takes a water quality-based, watershed approach to water resource management. Watershed assessments conducted as a part of the TMDL process are a crucial element of the watershed approach. These assessments involve the collection of representative data from the watershed through targeted monitoring programs. Such assessments are needed to identify the sources and causes of water resource degradation, understand the relationships between land and water within the watershed, and ultimately evaluate the effectiveness of water resource management actions.

Additional information that will be utilized to identify land uses causing impairments in coastal waters includes existing land use maps for counties within the §6217 Management Area and characterization studies by national estuary programs and others that provide data on linkages between land uses and water impairments within specific watersheds. Coastal land use maps are provided in Attachments 1 and 2.

The Statewide Nonpoint Source Program also contains information on land uses known or believed to contribute to water quality impairments throughout the state.

### ***6.1.3 Identify critical coastal areas***

Four areas along the Texas coast are currently designated as Texas Coastal Preserves and are considered critical coastal areas: Welder Flats in San Antonio Bay, South Bay in the Laguna Madre, and Christmas Bay and Armand Bayou in Galveston Bay.

Welder Flats is in the San Antonio Bay system near the intersection of the Victoria Barge Canal and the Gulf Intracoastal Waterway (GIWW). Tidal marshes, salt-tolerant vegetation, an abundant food supply, and a mild climate attract migratory waterfowl, including the endangered species, the whooping crane. Whoopers started using Welder Flats in 1973 when two birds set up a territory there. Recently, the numbers have increased to 15 birds, including five nesting pairs. Impacts to Welder Flats include frequent small oil and chemical spills from barge and boat traffic on the GIWW.

South Bay is the southernmost extension of the lower Laguna Madre and is located near Port Isabel in Cameron County. South Bay is a highly productive nursery area for shrimp and finfish and is especially valuable to the sportfishing industry, with some potential value for commercial finfishing. South Bay contains four species of seagrasses, black mangroves bordering the bay, extensive algal flats, and marsh vegetation. The eastern oyster is found in the bay. It has been subjected to heavy siltation, extreme salinities and essentially unrestricted harvest, yet it continues to survive. Some finfish species normally associated with tropical waters are found in South Bay.

Christmas Bay is a near-pristine embayment in the southwest portion of Galveston Bay. Christmas Bay is unique in that it is home to three of four seagrass species found virtually nowhere else in the bay, as well as eight endangered or threatened species.

Armand Bayou is a waterway located on the western shore of Galveston Bay. The hardwood and prairie bayou is surrounded by undeveloped flood plain as well as some urban and industrial land uses, including the NASA Johnson Space Center, a petrochemical complex, an oilfield, and an airport. Impacts to the Bayou include eutrophication and wetlands loss due to subsidence from both groundwater and petroleum withdrawal.

In an effort to be proactive in the preservation of these areas, local, state, and federal officials with much public support, designated these waters as Texas Coastal Preserves. Designation as preserves gives the areas permanent protection of water quality, living resources, and human health. The designation included the development of a multi-agency-approved resource management plan.

The Texas Coastal Preserves project established a precedent for interagency cooperation and illustrated that designating water bodies as preserves can help ensure that their resources are protected, conserved, and enhanced on a long-term basis. This process will be encouraged for future designations of additional critical coastal areas.

#### ***6.1.4 Develop a process for determining whether additional measures are necessary to attain or maintain water quality standards in the waters identified above***

The State of Texas believes that implementation of the §6217(g) measures through the use of existing state programs as described in Chapter 5 will be sufficient to attain or maintain water quality standards of the coastal waters impaired by nonpoint sources. However, adequate processes exist to evaluate the effectiveness of the management measures implemented under the Coastal Nonpoint Program and determine the need for additional management measures.

Through the TMDL process, watershed action plans will be developed to address water quality problems in impaired water bodies. The TMDL process includes measures for assessing effectiveness of the management measures implemented under a watershed action plan. Other programs which will be used to implement the Coastal Nonpoint Program, such as the development of Water Quality Management Plans (WQMPs) for agricultural lands, have similar evaluation procedures. If initial management measures are found to be insufficient to address observed water quality problems, then additional management measures will be implemented. Monitoring and evaluation of the Coastal Nonpoint Program is discussed in Chapter 9.

### **6.1.5 Describe the additional management measures the state will apply to the identified land uses and critical coastal areas**

If it is determined that additional management measures are needed to address coastal water impacts in a specific area, the selection of additional management measures will rely heavily on the input of local governments and the public within the impacted region. The watershed approach taken by the State of Texas is designed to ensure meaningful public participation in the decision-making process.

Watershed management throughout Texas follows a statewide schedule known as the basin management schedule. This schedule sets specific time frames for developing TMDLs and watershed action plans. Under the basin management schedule, five sequenced activities are repeated for each basin at fixed five-year intervals to ensure that management implementation strategies are routinely updated and progressively implemented. Phase Four of the basin management cycle involves Strategy Development. In this phase, the TNRCC, TSSWCB, and experts from partner agencies work with basin stakeholders to identify, evaluate, and select management strategies that will be effective in achieving pollutant reduction goals for priority watersheds. Within the §6217 Management Area, the requirements for developing additional management measures under §6217 will be considered during the Watershed Action Plan evaluation process and the Phase Four Strategy Development process. Options for designating additional measures will include the following.

- The development of specific management measures based on local site conditions and community input.
- A more intensive application of a measure or measures specified in the §6217(g) guidance.
- A more stringent application of a measure or measures specified in the §6217(g) guidance.
- The development of new management measures for land and water uses not identified in the (g) guidance, or for sources initially excluded from the §6217 program.
- The development of innovative approaches as additional management measures, such as pollution trading.

### **6.1.6 Develop a program to ensure implementation of the additional management measures within the 15-year program implementation time frame**

As discussed in Chapter 4 and elsewhere in this document, once Texas receives full or conditional approval from NOAA and EPA of the Coastal Nonpoint Program, the state will submit a 15-year program strategy for achieving full implementation of the §6217(g) management measures. Nested within the 15-year strategy will be a more specific 5-year implementation plan. These plans will include the process for monitoring and evaluating the success of management measures in conformity with the (g) guidance as well as the time frame for implementation of additional management measures if such measures are needed.

## Chapter 7. Technical Assistance

An important element in achieving the state's goals for maintaining water quality is technical assistance and education for agricultural producers, cities, and others in the development and implementation of BMPs. There are several ongoing technical assistance programs and activities which can be utilized in implementing the Coastal Nonpoint Program and (g) measures (such as Section 319 CWA, EQIP, and CRP). However, because these programs have limited resources and must address nonpoint source pollution problems statewide, Texas will continue to coordinate with other programs wherever practicable.

Some of the ongoing technical assistance activities applicable to the Coastal Nonpoint Program are described below. Additional programs are discussed in Chapter 5.

### 7.1 Technical Assistance for Agriculture and Silviculture

Technical assistance to landowners is central to both the state's soil and water resource conservation efforts and the agricultural and silvicultural nonpoint source management program. Not only does providing technical assistance assure that the highest standards in BMP implementation application are achieved, it also serves as an incentive for developing and implementing water quality management plans on private property. Technical assistance has historically been provided through soil and water conservation districts by the USDA-NRCS in accordance with memoranda of understanding. Under these same arrangements, work is directed through local SWCDs in Texas, according to the terms of memoranda of understanding with each district. After an agricultural nonpoint source pollution problem is identified and best management practices are selected for the affected area, the NRCS will work with individual landholders to develop and implement plans to abate the problems. When necessary, the State Soil and Water Conservation Board and the local SWCDs will provide or coordinate supplementary technical assistance.

#### 7.1.1 *Texas Agricultural Extension Service*

The Texas Agricultural Extension Service (TAEX) is a partnership among USDA, Texas A&M University, and county commissioners courts. The basic mission of the TAEX is education and dissemination of information relating to agriculture, home economics/consumer sciences, community development, and 4-H/youth. County extension agents are the basic educational unit of the Agricultural Extension Service. These county agents, supported by specialists based at College Station and 12 regional centers throughout Texas, provide technical information and respond to individual problems and questions, conduct educational meetings, and establish and evaluate demonstrations to show the benefits of using practices based on the latest scientific research. They also provide educational information through radio and television programs, newspapers, newsletters and bulletins. Water quality and conservation is one of six major program issues being addressed by agents and specialists on an interdisciplinary basis.

TAEX has the organizational framework and outreach capabilities to help implement the informational and educational programs that will be an essential part of any voluntary pollution abatement effort. The TSSWCB is currently working with TAEX to develop educational programs concerning agricultural nonpoint source pollution. The programs will address everything from general awareness of the problem, to evaluation of specific water quality problems, to selection and installation of management practices.

TAEX also is responsible for training in relation to the state pesticide applicator certification program. The TSSWCB will work with TAEX to include nonpoint source water quality management education in that training.

TAEX, through the Sea Grant College Program, places marine extension agents in coastal counties. In this way, the efforts of the TAEX can be coordinated to address specific concerns in coastal waters.

The TSSWCB and the Texas A&M University System, including TAEX, have a longstanding memorandum of understanding.

### ***7.1.2 Texas Agricultural Experiment Station***

The Texas Agricultural Experiment Station (TAES) is the State Agricultural Research Agency for Texas. It is administered by the Board of Regents of the Texas A&M University System. TAES cooperates with other state and federal agencies and colleges and universities in planning and conducting agricultural research. Programs of TAES are designed to provide the scientific base to develop the full agricultural potential of Texas and improve the utilization and conservation of natural resources. TAES is headquartered in College Station on the Texas A&M University campus and has regional research centers at Weslaco, Beaumont, Bushland, Overton, Temple, San Angelo, Uvalde, Vernon, El Paso, Dallas, Corpus Christi, and Stephenville. The TSSWCB will coordinate research needs relative to nonpoint source management programs and will utilize pertinent information developed through soil and water conservation and water quality research programs of the TAES. During each fiscal year, any needed program coordination mechanisms will be developed and implemented.

The TSSWCB and the Texas A&M University System, including TAES, have a longstanding memorandum of understanding.

### ***7.1.3 Texas Forestry Association***

The Texas Forestry Association (TFA) is a tax-exempt, nonprofit organization which serves as the voice of the forest industry in eastern Texas. Within the TFA, information and training are provided for both the logger and the landowner through the work of various committees.

The TFA provides an excellent avenue for reaching those who own and manage forest resources and those employed in the forest industry. Members of TFA are committed to carrying out programs in water quality, education, and the continued production of forest resources.

## **7.2 Technical Assistance for Urban Sources**

The TNRCC has been active on several fronts in spreading the word about nonpoint source issues and solutions. The following are nonpoint source §319(h) grant fund projects along the Texas coast.

### ***7.2.1 Statewide Urban Nonpoint Source Pollution Prevention Project, TNRCC Nonpoint Source Program, Texas Watch Program, and Clean Texas 2000 Program, Funded FY 1994***

The objective of this project is to prevent nonpoint source pollution through a combination of educational and other nonstructural best management practices. Educational outreach activities are focused in communities surrounding the cities of Lubbock, Harlingen, Corpus Christi, and Fort Worth, as well as in communities in the Galveston Bay and Corpus Christi Bay watersheds. The TNRCC NPS Team has hired two outreach contractors, Moorhouse Associates, Inc., and the Galveston Bay Foundation, to conduct nonpoint source prevention activities in the Lubbock, Harlingen, Corpus Christi Bay, and Galveston Bay areas. These contractors are working in local communities to recruit citizens to participate in learning activities and workshops which emphasize pollution prevention. The Clean Cities 2000 program has completed a community storm-drain stenciling manual and has distributed mylar stencils to all 16 TNRCC Regional Field Offices. These stencils are available for citizens to use free of charge. School and civic group presentations, storm drain stenciling, and watershed festivals are a few of the educational activities that have taken place within the last year. The Texas Watch citizens' monitoring program has continued to train and recruit monitors in each of the five project areas to monitor water chemistry and biological indicators. River authorities and governmental entities have been providing additional support to local volunteers where feasible. Texas Watch has also developed the *Manual for Conducting a Watershed Land Use Survey*. This publication helps people learn about the impacts of nonpoint source pollution in their watershed by conducting visual and background surveys. The Watershed Survey has received a number of favorable reviews and is currently being implemented in several watersheds. A benthic macroinvertebrate manual for volunteer training is still in the developmental stages.

### ***7.2.2 On-Site Constructed Wetland for Wastewater Treatment in Matagorda County, LCRA, Funded FY 1994***

The goal of this project is to demonstrate the use of artificial wetlands wastewater disposal technology as a viable and economical BMP in the treatment of septic tank effluent in a coastal zone area. In 1997 the LCRA completed construction of two 5' x 20' demonstration wetlands in a residential area of Blessing, Texas. These wetlands are being evaluated to test their effectiveness in domestic wastewater disposal in clay soils of the coastal zone. The LCRA has been collecting bimonthly samples from the effluent of both wetlands to measure their pollutant-removal capabilities. A covered shelter was built over one of the wetlands to evaluate the system's performance without the influence of rainfall. Results from this demonstration project will be incorporated into a TNRCC on-site wastewater study that is evaluating experimental systems for development of wetlands design standards.

### ***7.2.3 NPS Pollution Abatement in the Galveston County Health District, Funded 1996***

The Galveston County Health District (GCHD) will assure storm sewer integrity, map sanitary sewer system overflows, conduct public education activities, coordinate household hazardous waste collection programs, and assist cities in the district in adopting ordinances related to NPS pollution. In 1997, GCHD obtained the TNRCC's guidance document for staging household hazardous waste collection days to use as a starting point for a document specific to Galveston County. GCHD is currently working on the education program plan that will provide the framework for substantial public education activities to be conducted under the grant. GCHD has received several complaints from individuals regarding suspected cross connections or illicit discharges to storm sewers. These have been investigated and resolved without significant monitoring.

### ***7.2.4 Alternative On-Site Wastewater Initiative, Houston-Galveston Area Council, Funded 1997***

The goal of the project is to reduce fecal coliform bacteria levels contributed from failing on-site sewage facilities by providing technical assistance to affected parties regarding alternative fiscal options and best management practices.

### ***7.2.5 Integrated Landscape Management; Urban Best Management Practices in the Arroyo Colorado Watershed; Texas Agricultural Experiment Station (TAEX), Funded 1992***

The goal of this project is to reduce nutrient loadings in rainfall runoff from urban landscapes by managing routine activities such as watering, fertilizing, and pest management based on an analysis of actual landscape conditions determined through sampling and other technical observations. The BMP is being demonstrated on the municipal golf course in Harlingen. Local landscape managers will be trained in integrated landscape management (ILM) procedures. The project has provisions for public awareness activities. TAEX conducted the ILM training for site staff on topics such as nutrient management, soil sample collection and analysis, and irrigation water management and were given an overview of monitoring devices. TAEX also developed and distributed an ILM brochure, a 60-second public service announcement, a promotional display, and a slide/tape/lecture program.

### ***7.2.6 Town Resaca System Approach for Resaca Storm Water Runoff Control and Rehabilitation; City of Brownsville, Funded 1994 and 1995***

The objective of this two-phase project is to restore the natural functioning of the Town Resaca in Brownsville through the design, construction, and monitoring of best management practices in sub-basins contributing storm water runoff to the resaca. The project also has provisions for the city to institute a public awareness campaign and stream bank restoration activities. It is expected that this project will be completed in 1999.

### ***7.2.7 Environmental Monitoring and Outreach Activities in Brownsville and Surrounding Counties, TNRCC Texas Watch Program, 1995***

This project recruits volunteers to conduct water quality monitoring in coordination with the city of Brownsville's storm water management and resaca rehabilitation program. The project also seeks to recruit volunteers to perform other water quality educational activities such as storm drain stenciling, stream bank revegetation, watershed inventories, and interpretive streamwalks. Additionally, Texas Watch and City of Brownsville staff have implemented citywide storm drain stenciling projects that have stenciled over 100 drains this year. Final plans were developed to implement habitat restoration and revegetation projects in 1998 with the city and its consultants.

### ***7.2.8 Hamshire-Fannett Independent School District Wetlands Wastewater Treatment Facility, Funded 1996***

This project will reduce pollution from poorly functioning on-site wastewater treatment systems by constructing a wetland collection and treatment system for the local high school. Contracts were executed in 1997. The start of this project has been delayed by problems in acquiring necessary lands.

### ***7.2.9 Other Urban Activities***

The Marine Advisory Service initiated and is continuing to develop and implement a project entitled "Galveston Bay, Yards and Neighbors." The purpose of the project is to educate and to introduce bay-friendly landscapes and lawn care and home-care practices to participating neighborhoods adjacent to Galveston Bay. The program stresses the use of native or adapted plants for landscaping to prevent excessive watering and to reduce the use of herbicides and pesticides. Successful demonstrations have been completed, publications have been produced, and numerous neighborhoods are now participating. All participants receive monthly newsletters and a schedule of programs for composting, proper pesticide and fertilizer application, landscaping with native plants, proper water conservation, and attracting wildlife. Making small changes in landscape and lawn care practices will not only improve the water quality of Galveston Bay but will also reduce maintenance costs and efforts. A model "Bay Friendly" landscape at a community site now serves as a hands-on demonstration tool. This project is in its third and final year. Thereafter it is envisioned that this effort will continue through local governments, conservation foundations, and community groups.

## **7.3 Technical Assistance for Marinas and Recreational Boating Sources**

The Marine Advisory Service "Potty-Training for Boaters along the Texas Gulf Coast" educates marina owners and boaters about the use of sewage pumpout facilities in coastal marinas and provides technical assistance for installation and use of these facilities.

The Marine Advisory Service has provided technical assistance in the Clear Lake area, where there are 22 marinas which collectively possess over 6,000 wet slips. Many of these marina basins and

connecting access channels are located in areas with minimal water circulation that often result in large fish kills in the summer months because of oxygen depletion. Cleaning up these fish kills can be very costly and result in a disruption of services to boaters using the marina facilities. For example, one recent fish kill cost a marina operator \$60,000 for cleanup and removal. It is believed that most fish kills could be prevented if the areas of depleted oxygen received some sort of aeration. Therefore, a demonstration project was initiated in conjunction with marina operators to determine and test various types of aeration/circulation systems in an attempt to reduce or eliminate fish kills in the summer months. The projects were successful, and marina operators are being trained in basic water quality testing and are adopting the technology to reduce fish kill events.

## **7.4 Technical Assistance for Wetlands and Riparian Areas**

There are numerous technical assistance programs for landowners and local governments related to the protection and restoration of wetlands. Many of these programs are discussed in Chapter 5, Section 5.4.2, including the State Wetlands Conservation Plan, Wetlands Handbook for Local Governments, and Wetlands Assistance Guide for Landowners.

## **7.5 Technical Assistance for Hydromodification**

The TNRCC dam safety team performs evaluations and hydrologic studies on existing dams. Dam owners and operators are provided with a copy of *Guidelines for the Operation and Maintenance of Dams in Texas* (1991) to assist them in the use and maintenance of these structures.

TNRCC has a flood management team that assists local governments with floodplain studies upon request. The NRCS also is involved in local floodplain studies and stream stabilization projects for small creeks and watersheds.

## **Chapter 8. Public Participation**

### **8.1 Public Participation in the Development of the Coastal Nonpoint Program**

In order for Texas to fully develop a coastal nonpoint source program which identifies sources of nonpoint source pollution, strives to achieve workable implementation strategies, and establishes improved coordination, frequent and meaningful public participation is required. Texas began its public participation process for the coastal nonpoint source program through scoping meetings held throughout the coastal area in development of the Texas Coastal Management Program. Unlike many other states, the CZARA and §6217 requirements were in force at the time of program development. Many public discussions on the §6217 Management Area boundary took these requirements into consideration.

Shortly after program approval in January 1997, a Coastal Nonpoint Source work group was formed which includes a public member of the Coastal Coordination Council and representatives of the line agencies responsible for Coastal Nonpoint Program development. Four public meetings were scheduled to obtain initial public input and to develop a list of interested stakeholders. Two of these meetings were organized by the TNRCC in conjunction with the Galveston Bay and Corpus Christi Bay estuary programs. These meetings focused on the urban sources of nonpoint source pollution in the urbanized Clear Lake and Corpus Christi areas and outlined some of the rules and incentive programs which would be a part of the plan. The second two meetings were part of the Texas State Soil and Water Conservation Board's Nonpoint Source Conferences. These meetings concentrated on agricultural issues and were held in the farming communities of Wharton and Weslaco.

While the meetings did not yield a large amount of public comment, the level of interest was high, and approximately 80 individuals requested copies of the discussion draft of the program. Program drafting time lines and other significant development milestones have been reported at meetings of Coastal Coordination Council and its Executive Committee, which are open to the public and held in coastal cities as well as in Austin.

Texas proposes to publish the draft Coastal Nonpoint Source Control Management Program twice in the Texas Register for public comment before submitting the final program to NOAA and EPA in July 1999. Several public meetings will be held along the coast to discuss this document with local government officials and residents.

### **8.2 Public Participation in the Implementation of the Coastal Nonpoint Program**

As discussed in Chapter 4, the development of Watershed Action Plans under the TMDL process will be one of the primary programs used to implement the Coastal Nonpoint Program and meet the requirements of §6217. Public participation is an integral part of the TMDL process, as discussed below.

Public participation is a key aspect of all phases of the basin management cycle. As a basic principle, the state will rely on existing forums and mechanisms as the starting point for strengthening public participation. In the first year of the cycle, the state will participate in public meetings to establish basin goals, monitoring objectives, and TMDL priorities, and to recruit stakeholders from priority watersheds to participate in the process. In Year 2, the state will conduct public meetings to inform and obtain input from local stakeholders who have been recruited to assist in identifying management strategies for priority watersheds. Once the monitoring and assessment phases are complete, additional public meetings will be held in Year 3 to inform stakeholders in the basin and in priority watersheds of assessment results. In Year 4, public meetings will be held in priority watersheds to give stakeholders the opportunity to play a role in adopting watershed action plans and other management strategies for priority watersheds. At the end of the basin management cycle, during the implementation phase, meetings will be held to assist as many interested parties as possible with the watershed management strategies to be implemented and to support stakeholder roles in implementing them.

### **8.2.1 Basin Steering Committees**

Basin steering committees, currently required under the Clean Rivers Program and administered by program contractors, provide the primary forum for coordinating stakeholder involvement at the basin level. Currently, basin steering committees established through the Clean Rivers Program provide direction, recommendations, and goals relevant to the basin wide perspective. Under the watershed management framework, the basin steering committee concept will be continued and expanded. Basin steering committees should include a broad, balanced spectrum of stakeholders so that decisions on priorities for targeting watershed management efforts within a basin and communication of basin management needs are truly representative. Primary functions of the committees will include:

- **Communication:** Basin steering committees provide a consistent forum for communicating watershed management goals, priorities, management strategies, and implementation activities among local, regional, state, and federal stakeholders. Committees meet at strategic times during the management cycle to ensure that key information and issues are shared and discussed.
- **Advice (basin-specific):** At the beginning of the management cycle, the basin steering committees will provide the forum for dialogue regarding priorities related to watershed management activities in their basins. Discussions will include input on §303(d) listed waters (i.e., impaired or threatened waters designated for development of total maximum daily loads) and identifying other basin priorities, nonpoint source program updates, and strategic data collection and monitoring needs to fill information gaps and support action plan development for priority watersheds. Later in the cycle, committees may be called upon to recommend how to target available stakeholder resources for the basin in light of competing needs among the priority watersheds.
- **Recruitment of Local Participants:** The steering committees will function as recruiters, actively encouraging participation of key local stakeholders in priority watershed subcommittees that

will assist the development of watershed action plans. This function is based on the premise that basin steering committee members will be in a better position to identify and network with key local officials, business leaders, landowners, citizen groups, and others to be included in the process.

- **Basin Document Review:** Basin steering committees will review key basin reports and outreach documents (e.g., basin summary reports and financial summary reports) to ensure that contents accurately communicate steering committee involvement and how efforts are related to basin priorities.

### ***8.2.2 Priority Watershed Subcommittees***

Priority watershed subcommittees, comprised of key stakeholders from priority watersheds, will provide valuable input about local conditions necessary to design and implement site-specific watershed management strategies. These subcommittees will not be active in all watersheds at the same time because of administrative constraints. Rather, a limited number of subcommittees will be formed during each iteration of the management cycle to focus coordination efforts on priorities identified by the basin steering committee and the state.

Clean Rivers Program priority watershed subcommittees represent a new forum to both increase public involvement in implementing management solutions and provide the TNRCC with more local stakeholder input in the development of management priorities and activities. Local stakeholders need an easily accessible venue for providing input on management goals and objectives for their watershed, and they are usually in the best position to know what is feasible regarding management actions that can be implemented at the grassroots level. Priority watershed subcommittees would be set up, therefore, to support the following key functions for the framework:

- **Advice (watershed-specific):** After priority watershed subcommittees are formed, the subcommittees will become the primary forum for obtaining input to establish and implement watershed action plans. Initial activities in a given cycle will include clarifying watershed-specific management goals and objectives and identifying the most promising management options that appear to be both technically and politically feasible. Throughout the remainder of the cycle, subcommittees will act in an advisory capacity, providing feedback on management option evaluations, action plan documentation, and implementation considerations.
- **Technical Planning:** Subcommittees will use technical expertise (provided by local, regional, state, and federal entities and private consultants) to evaluate proposed management options to ensure that they meet the objectives established for water quality within the watershed. Based on the results of these evaluations, the subcommittees will then select optimal management strategies. The subcommittee forum will also be used to identify and document key components of the action plan, including implementation means and funding, roles and responsibilities of key stakeholders, and implementation milestones and schedules.

## Chapter 9. Monitoring and Evaluation

Monitoring is a primary component of the state's Watershed Management Approach and is needed not only to target nonpoint source pollution activities at impaired water bodies, but to assess and evaluate progress in achieving water quality goals.

This chapter describes Texas' Monitoring Program administered by the TNRCC as part of the agency's overall water quality management program as well as the steps that will be taken by the Coastal Nonpoint Source Program to specifically evaluate progress in reducing the impacts of nonpoint source pollution in the §6217 Management Area through the implementation of management measures in conformity with the (g) guidance. Monitoring information will be used as needed to identify coastal waters not attaining or maintaining applicable water quality standards or protecting designated uses; identify land uses that individually or cumulatively cause or threaten water quality impairments in coastal waters; develop additional management measures as needed to address water quality impairments; and identify critical coastal areas where new or substantially expanding land uses may cause or contribute to the impairment of coastal water quality.

### 9.1. Program Overview

Clean water is critical to the health, economic well-being, and quality of life of those residing or working along the Texas coast. Most water users rely on surface water for such basic needs as water supply and/or wastewater disposal. In addition, many businesses and residents rely directly or indirectly on healthy waterways for their livelihoods. Commercial fishermen, water-oriented real estate and building industries, and businesses that serve local recreational needs such as fishing, boating, and vacationing are some examples. To these groups and the public they serve, it is important that the waters support viable fish and shellfish resources. In addition, full enjoyment of boating and swimming along the coast requires that the waters be relatively safe (low risk of contracting waterborne disease) and aesthetically desirable (free of objectionable colors and odors). Yet maintaining clean water has become increasingly difficult and expensive as the population grows and as competition for resources increases. To assure that water quality throughout the coast and state is maintained at levels that protect the uses described above, Texas established a surface water quality standards and monitoring program in the late 1960s.

#### ***Applicability of Water Quality Standards to Nonpoint Sources***

State water quality standards establish instream goals which are applicable to regulatory actions that could affect water quality. Applicable numeric standards as well as narrative water quality standards apply to all waters in the state. Additionally, the Antidegradation Policy in the Texas water quality standards states the following: "The antidegradation policy and implementation procedures . . . shall apply to actions regulated under state and federal authority which would increase pollutant loads to water in the state. Such actions include authorized wastewater discharges, waste load evaluations,

and any other miscellaneous actions, such as those related to man-induced nonpoint sources of pollution, which may impact the water in the state.”<sup>1</sup>

## 9.2 Water Quality Standards

The basis of any water quality program is the setting and enforcing of water quality standards. Explicit water quality goals are established for Texas through the development of the Texas Surface Water Quality Standards.<sup>2</sup> Diverse entities have shaped standards development, including cities, industries, environmental interests, and the U.S. Environmental Protection Agency, which has approval authority over state water quality standards.

Regional hydrologic and geologic diversity is given consideration by dividing major river basins, bays, and estuaries into defined segments (referred to as classified or designated segments). Segment-specific standards identify appropriate uses for specific water bodies (aquatic life, contact or noncontact recreation, drinking water, etc.) and list upper and lower limits for common indicators (criteria) of water quality such as dissolved oxygen, temperature, pH, dissolved minerals, and fecal coliform bacteria. Other standards such as toxic criteria, to protect aquatic life and human health, are applied statewide. Statewide standards may be revised on a site-specific basis when sufficient information is available.

Water quality standards are publicly revised at least every three years to incorporate new information on potential pollutants and additional data about water quality conditions in specific water bodies, and to address new state and federal regulatory requirements. The current standards were substantially revised during 1994 and 1995 and were adopted by the TNRCC on June 14, 1995. Limited standard revisions were also adopted by TNRCC on March 19, 1997. All of these revisions were approved by EPA Region 6 on March 11, 1998.

Elements of the Texas Water Quality Standards which apply to the tidal waters of Texas:

- General Criteria
- Antidegradation Policy
- Chronic Marine Toxic Criteria to Protect Aquatic-Life Uses
- Human-Health Marine Toxic Criteria to Protect for Fish Consumption
- Requirements to Monitor and Control Whole-Effluent Toxicity (Biomonitoring)

### 9.2.1 General Criteria

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<sup>1</sup>Texas Administrative Code, Title 30, Chapter 307.5.

<sup>2</sup>Texas Administrative Code, Title 30, Chapter 307.

The Texas Surface Water Quality Standards include several key sections which are essential to their overall effectiveness. The General Criteria<sup>3</sup> contain a variety of narrative statewide provisions which define the general goals to be attained by all waters in the state. The narrative provisions address parameters such as taste and odor in drinking water, changes in color and transparency, oil and grease contamination, floating debris, suspended solids, and nutrients. The General Criteria also specify procedures which are used to develop site-specific standards for small unclassified water bodies.

### **9.2.2 Antidegradation Policy**

In Texas, the Antidegradation Policy<sup>4</sup> establishes extra protection for high-quality water bodies. In accordance with EPA requirements, this policy stipulates that no degradation will be allowed in high-quality waters unless the resulting degradation is demonstrated to be economically and socially justified. Most of the bays and estuaries of Texas are designated as having a high-quality aquatic life use. Therefore, they are considered to be high-quality waters under the provisions of the Antidegradation Policy. The Antidegradation Policy also provides for establishing Outstanding National Resource Waters, in which no degradation is allowed under any circumstances. Currently, there are no designated Outstanding National Resource Waters in Texas.

### **9.2.3 Toxic Standards**

Water quality standards for toxic materials<sup>5</sup> include numerical criteria (as maximum instream concentrations) for 39 toxic pollutants in order to protect aquatic life. Human consumption of fish and drinking water is protected by numerical criteria for 65 toxic pollutants. These standards also require larger wastewater dischargers to conduct biomonitoring, which involves exposing selected aquatic organisms to samples of the discharge effluent. Any significant toxicity observed during biomonitoring must then be evaluated and eliminated.

### **9.2.4 Uses and Criteria**

To support various water-quality-related uses in the state, appropriate numerical criteria are applied. For conditions when a portion of the standards do not apply, such as in mixing zones near discharge points or at unusually low stream flows, site-specific standards are used.<sup>6</sup> To determine if standards are being attained, sampling and analytical procedures are used to assess the condition of individual water bodies.<sup>7</sup> Site-specific standards for individual water bodies along the coast are listed in Attachment 8.

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<sup>3</sup>Texas Administrative Code, Title 30, Chapter 307.4.

<sup>4</sup>Texas Administrative Code, Title 30, Chapter 307.5.

<sup>5</sup>Texas Administrative Code, Title 30, Chapter 307.6.

<sup>6</sup>Texas Administrative Code, Title 30, Chapters 307.7 and 307.8.

<sup>7</sup>Texas Administrative Code, Title 30, Chapter 307.9.

## 9.3 Water Quality Monitoring

Beginning in the late 1960s, an initiative to set instream standards for water quality conditions in major water bodies required a survey of ambient water quality conditions across the state including the estuaries and coastal regions. In 1967, a Statewide Water Quality Monitoring (SWQM) Program was established to meet consistent methods of sample collection, analysis, and data management. The Monitoring Program encompasses the activities required to obtain, manage, store, share, assess and report water quality information to other TNRCC teams (Water Quality Standards and TMDL teams), TNRCC management, other agencies, local government, and the public. These activities include:

- collecting water, sediment, and biological samples at scheduled sites on streams, reservoirs, and estuaries;
- maintaining quality assurance when samples are collected and analyzed at the laboratory and when the data is transcribed and managed; and
- managing and making data available in a complete and timely manner to users.

In the late 1960s and early 1970s, the major objective of the program was to characterize water quality in all of the major water bodies in Texas. Measurements were made of parameters such as flow, total dissolved solids, chlorides, fecal coliform, ammonia, or dissolved oxygen. Measurements of these parameters are used to determine the suitable uses of the water and to track the effectiveness of point source controls. Numerical criteria or standards are set for some of these parameters and other contaminants for the 372 segments of streams, lakes, and estuaries across Texas. Standards development and monitoring to determine if water quality meets the existing instream standards is one of the major objectives of the monitoring program. An exhaustive review of standards compliance, in which water quality data is compared to numerical criteria in each segment, is published as the State Water Quality Inventory §305(b) report.

Important objectives of the monitoring program include:

- characterizing existing water quality conditions, including compliance with instream water quality standards and identification of spatial and temporal trends;
- identifying the causes of water quality problems and sources of contaminants;
- evaluating the effectiveness of point source controls and best management practices for controlling nonpoint source pollution; and
- water quality and hydraulic measurements to support modeling for wasteload allocation.

### 9.3.1 Monitoring Network

The TNRCC has subdivided river and coastal basins into classified segments for water quality management activities. In many instances, lengthy streams (rivers) and large estuaries have been

further subdivided into subsegments. In the coastal counties, monitoring is conducted on 15 freshwater segments, 23 tidal segments, 30 estuary segments, and one segment for the entire Gulf of Mexico. Minor streams, reservoirs, and estuaries are treated as unclassified waters by the TNRCC. Table 9.2 indicates the number of stations monitored in each watershed.

The number of fixed stations monitored each year and the frequency at which they are sampled vary from year to year depending on the amount of funding the SWQM program receives and the manner in which the funds are allocated. In 1998, the TNRCC monitored 147 stations in the coastal counties. The number of sampling events has remained fairly stable over the past five years. Most of these stations are truly fixed as long-term sites; others are moved to new locations as needed.

The fixed stations are typically sampled quarterly; however, sampling frequencies do vary. Parametric coverages include flow, field measurements, routine water chemistry, and fecal coliform analysis. Additional coverages may include toxic substances in water, sediment, or fish tissue; toxicity testing of water and sediment; and analysis of fish and/or macrobenthos community structure.

### **9.3.2 Ambient Monitoring**

Field measurements, routine water chemistry, fecal coliform densities, and flow are common to all sites. The objectives of monitoring these parameters are to detect and describe spatial and temporal changes, determine impacts of point and nonpoint sources, and assess compliance with water quality standards. Dissolved oxygen, water temperature, and pH are field measurements for which water quality criteria are established for each classified water body. Secchi disk measurements are used to determine the transparency of the water column at each site. Conductivity and salinity are monitored to estimate the total concentration of dissolved solids, to evaluate mixing of fresh and salt water in estuaries, and to determine density stratification. Many chemical and biological processes in the aquatic environment are affected by field measurements. Also, the assessment of these field measurements can provide complementary information necessary in evaluating chemical and biological data. In order to relate chemical concentrations and flow, instantaneous flow measurements are made at most sites concurrently with the collection of water samples.

The routine water chemistry parameters analyzed in the laboratory include nutrients, chlorophyll *a*, sulfate, chloride, alkalinity, total dissolved solids, total organic carbon, total suspended solids, and volatile and suspended solids. Due to the difficulty in culturing specific pathogens, the TNRCC monitors fecal coliform bacteria as indicators of human pathogen densities in order to assess the recreational potential of water bodies. Water samples for fecal coliform analysis are typically filtered and incubated with portable field equipment.

### **9.3.3 Toxics Monitoring**

The TNRCC's SWQM program monitors a large number of organic substances in water, sediment, and fish tissue at selected fixed stations; included are 40 pesticides, 31 volatile, and 63 semivolatile organic substances. Also monitored at selected sites are 12 metals in water, 13 in sediment, and 7

in fish tissue. The SWQM program focuses most toxic substances monitoring on those sites deemed likely to be contaminated. Sampling stations are carefully selected on the basis of criteria that include: sites near dischargers that have shown receiving water or effluent toxicity, sites that have shown recurrent ambient water and/or sediment toxicity, sites near large industrial or domestic discharges, areas that receive high nonpoint source loads, areas with exceptional recreational uses, sites near hazardous waste facilities, sites downstream of major metropolitan areas, areas adjacent to Superfund sites, and sites which exhibit biological impairment.

Toxic substances in water, sediment, and fish tissue are monitored to determine their prevalence and magnitude, to detect and describe spatial and temporal changes, and to evaluate compliance with applicable water quality standards. Water quality criteria to protect aquatic life and human health have been established by the TNRCC for some metals and organic substances. During 1998, fixed station monitoring will be conducted in the coastal counties at 13 stations for metals in water and at eight stations for organic substances in water.

Although criteria do not presently exist for sediments, they represent a major sink for many toxic chemicals. The results of monitoring sediment chemistry may be used to evaluate the condition of the benthic habitat, to determine point and nonpoint source contaminants, and to monitor rates of recovery following establishment of pollution controls or improved wastewater treatment. In addition to monitoring toxic chemical contaminants in sediments, conventional parameters in sediment are also measured: percent solids, for determination of water content; oil and grease or total petroleum hydrocarbons, for petrochemical influences; sediment grain size, for availability of contaminants; total organic carbon, for bioavailability of contaminants that adsorb to organic particulates; and acid volatile sulfide, for bioavailability and potential toxicity of metal contaminants. During 1998, metals in sediment and organic substances in sediment will be monitored in the coastal counties at 57 and 32 SWQM program fixed stations, respectively.

### **9.3.4 Biological Monitoring**

The SWQM program uses biological monitoring (fish and macrobenthos) to provide integrated evaluations of water quality. Biological communities are useful in assessing water quality for a variety of reasons, including their sensitivities to low-level disturbances and their function as continuous monitors. Monitoring of resident biota, therefore, increases the possibility of detecting episodic spills and dumping of pollutants, wastewater treatment plant malfunctions, toxic nonpoint source pollution, or other impacts that periodic chemical sampling is unlikely to detect. Perturbations of the physical habitat such as sedimentation from stormwater runoff, dredging, channelization, and erosion may also be detected through biological monitoring.

The objectives of monitoring fish and macrobenthic communities are to detect and describe spatial and temporal changes in structure and function. These results can be used to assess impacts of point and nonpoint sources, assess community condition or health, determine appropriate aquatic life uses, monitor rates of recovery following implementation of improved wastewater treatment, and provide early warning of potential impacts. In 1998, biological community monitoring will be conducted at 24 stations in the coastal counties. Continuous dissolved oxygen monitoring will be conducted over

several days concurrently on 14 of these water bodies to determine if the conditions are optimum for aquatic life.

### **9.3.5 Other Monitoring Programs**

#### **TNRCC Clean Rivers Program**

In 1991, the Texas Legislature passed the Texas Clean Rivers Act in response to growing concern that water resource issues were not being addressed in a holistic manner. This legislation requires that ongoing water quality assessments be conducted for each river basin in Texas using an approach that integrates water quality issues within a river basin or watershed. Legislation adopted by the 75th Texas Legislature expanded the program to include more opportunities for data collection and a reduction in reporting requirements. The program is being coordinated with the wastewater permitting cycle (see Chapter 4) and is coordinated with other data collection programs to reduce duplicative monitoring efforts. The steering committees required for the program will assist with the development of the TMDL process.

The TNRCC initiated the Clean Rivers Program in 1991 by forming a partnership with 16 regional entities, including river authorities, municipal water authorities, and councils of governments, to conduct individual assessments for 21 of 23 river and coastal basins throughout the state. In those basins, an existing partner is identified as the lead agency with primary responsibility for the river/coastal basin assessment. The TNRCC performs the assessments for the remaining two basins, where no partner is available to participate in the program.

#### **TNRCC Texas Watch Program**

In 1991, a new volunteer monitoring program called Texas Watch was established to help the TNRCC protect the Texas environment. Texas Watch is a network of nearly 3,000 trained volunteers and supportive citizen partners that have been trained to monitor the health of Texas lakes, rivers, streams, wetlands, bays, bayous, and estuaries. Texas Watch addresses two significant needs: the need for accurate, usable information about the environment to support environmental management decisions; and the need to effectively communicate with the public about environmental issues.

Texas Watch embraces three principal goals: (1) to produce environmental information which agencies, waste generators, and the public need to make environmentally sound decisions; (2) to improve communication about the environment and environmental issues; and (3) to resolve conflicts over environmental impacts through positive cooperation. These goals are based on the premises that water quality and quantity issues are inextricably linked with air, biological, land, and human resource issues, and that the protection of our natural resources requires the cooperative participation of all Texans.

Participation in Texas Watch is open to any group or individual in Texas interested in collecting, using, and sharing information about the environment. The number of Texas Watch volunteer groups across the state has grown from about 70 in 1992 to more than 300 today. These groups range in size from one person monitoring one site to large groups monitoring multiple sites, such as the

Galveston Bay Foundation, whose members monitor over 40 sites. Texas Watch supports a wide range of monitoring activities, including a rigorous certified water quality monitoring program and nonpoint source monitoring projects.

Two major Texas Watch initiatives which have begun under the nonpoint source monitoring program are Urban Watch and benthic macroinvertebrate monitoring. Urban Watch, Texas Watch's answer to monitoring highly urbanized drainage systems, is designed to look for illicit discharges into storm drain systems. The sampling of benthic macroinvertebrates is taking on greater importance in both professional and volunteer monitoring, particularly in the study of nonpoint source pollution.

### **Texas Water Development Board**

The Texas Water Development Board (TWDB) is the state agency with primary responsibility for development of a statewide water plan and administration of the state's various water assistance and financing programs. Additionally, in 1975, the 64th Texas Legislature enacted Senate Bill 137, giving the TWDB general jurisdiction over the preparation of "comprehensive studies of the effects of freshwater inflows upon the bays and estuaries of Texas." In subsequent legislation, the TWDB, in conjunction with the Texas Parks and Wildlife Department (TPWD) and other appropriate governmental agencies, was charged with augmenting studies completed under the 1975 mandate by: (1) establishing and maintaining a continuous bay and estuary data collection and evaluation program, and (2) conducting studies and analyses "to determine bay conditions necessary to support a sound ecological environment." Results of these assessments are to be utilized by the TNRCC and TPWD to identify those beneficial inflows necessary to maintain the proper salinity, nutrient budget, and sediment loading regime for the maintenance of productivity of economically important and ecologically characteristic sport or commercial fish and shellfish species and estuarine life upon which such fish and shellfish are dependent and to provide information for management of the state's water resources.

### **Texas Department of Health**

The Texas Department of Health (TDH) has two monitoring programs that are relevant to the identification of NPS pollution in the state. These programs collect water quality, fish tissue, and associated data as part of their effort to maintain safe seafood for public consumption. The shellfish program collects fecal coliform samples in Texas bays and estuaries on a regular basis. These data are collected frequently and are often associated with rainfall events, making them some of the best available data for assessing NPS pollution impacts. The edible fish program collects tissue samples for analysis of toxic contaminants. Both programs make an effort to determine the cause and source of the pollutants and provide important information about NPS impacts. The Seafood Safety Division publishes *Fish Advisories and Bans*, which provides information on potential health effects from chemical and organic contaminants in fish, information about areas under advisory or closure due to contaminants in fish, and maps indicating the location of areas under advisory or closure.

### **TNRCC Source Water Protection Program**

This TNRCC program focuses on the protection of public drinking water supplies obtained from surface waters. This voluntary program works with municipalities to delineate water protection zones based on watershed boundaries. The Source Water Protection Program draws on applicable BMPs and develops new BMPs through analysis and implementation. These BMPs include signs to increase public awareness, educational programs, site-specific protection plans, and local ordinances. GIS models are used to delineate protection zones, and site-specific reports are prepared for each community in the program.

## **9.4 Monitoring and Evaluation of the Coastal Nonpoint Program**

Monitoring and evaluation of the Coastal Nonpoint Program will take place through a number of existing monitoring plans associated with the various programs that will be used to implement the Coastal Nonpoint Program and (g) measures, such as monitoring under the TMDL process, monitoring and evaluation of individual WQMPs, and monitoring of individual action plan demonstration projects. These and other monitoring efforts will be used to assess the effectiveness of individual (g) measures and programs in addressing nonpoint source pollution from the source categories covered by the Coastal Nonpoint Program. The 15-year program strategy and 5-year implementation plans will include these monitoring and evaluation efforts in addition to a schedule for assessing the effectiveness of public education and outreach, technical assistance, and program coordination and administration.

### ***9.4.1 Monitoring and Evaluation Associated with the TMDL Process***

Watershed Action Plans developed from TMDL watershed projects will include a monitoring plan designed to determine the effectiveness of the action plans. These plans will include a plan for assessing the improvement in ambient water quality conditions, a plan for assessing whether control actions (management measures for nonpoint sources of pollution) are being implemented as planned, and a plan for assessing the effectiveness of control actions. These plans will indicate who is responsible for the monitoring activities and the funding available.

Watershed Action Plans developed from TMDL watershed projects will include measurable milestones for determining whether the implementation plan is being properly executed, and for determining whether applicable water quality standards are being achieved. This will include appropriate incremental, numeric ambient water quality targets to ensure that progress is being made and milestones for implementing control actions. Milestones will be sufficient to demonstrate adherence to the implementation plan and improvements in water quality.

Any failures to meet these milestones will be provided in the Watershed Action Plans developed from TMDL watershed projects. The reasons for failure will depend on why, and the degree to which, the milestones were not met. These reasons will also explain the TMDL corrective mechanism, including how and when it is appropriate to make corrective actions that can be taken without "reopening" the TMDL and, as a last resort, when the TMDL (and/or implementation plan component) will need to be modified.

### ***9.4.2 Monitoring and Evaluation of Demonstration Projects***

The Galveston Bay Estuary Program and the Corpus Christi National Estuary Program will monitor and evaluate the effectiveness of demonstration projects conducted in these estuary program areas.

TNRCC staff and project coordinators will monitor and evaluate the effectiveness of CWA §319 demonstration projects. These projects will also be evaluated to determine their applicability to other areas of the state. Chapter 7 contains a list of ongoing demonstration projects along the Texas coast.

### ***9.4.3 Monitoring and Evaluation of Management Measures for Individual Categories***

#### **Agriculture and Forestry**

In addition to the monitoring conducted as a part of the TMDL process discussed above, the TSSWCB uses two mechanisms to monitor implementation and maintenance of practices scheduled in certified WQMPs. All certified WQMPs are subject to an annual status review at the end of one full fiscal year following certification. In addition, those plans that contain cost-share practices must have the implementation of the practice certified prior to release of the cost-share funds.

Annual status reviews are conducted on a minimum of ten percent of all the WQMPs in each district that have been certified long enough to be subject to the annual status review. Annual status reviews are conducted on at least two WQMPs in each district unless the district has only one plan. WQMPs on which annual status reviews are to be conducted are randomly selected. TSSWCB staff conducts these reviews.

If state cost-share funds are used for implementation of practices scheduled in a WQMP, the SWCD verifies that the practices have been implemented in accordance with standards and specifications. The SWCD signs a Performance Certification certifying that the practices have been properly implemented. This is the basis for releasing the cost-share funds to the individual. The detailed cost-share assistance rules and procedures can be found in 31 TAC §523.6.

## **Urban**

Documentation of the implementation, operation, and maintenance of management measures is an important component of nonpoint source management programs if correlations are to be developed between program implementation and water quality conditions. Management measure data can be evaluated in association with water quality data and other information to determine the effectiveness of these programs. Monitoring plans included as part of watershed action plans under the TMDL process will be the primary means by which the effectiveness of urban management measures will be addressed.

Currently, Texas does not have additional monitoring programs outside of the TMDL process and monitoring associated with programs such as the National Estuary Programs. Comprehensive monitoring of the implementation, operation, and maintenance of management measures for urban sources of nonpoint pollution is an extremely resource-intensive activity. Comprehensive monitoring of the implementation of urban management measures will require the dedication of significant financial and staff resources which are not currently available in the state. Texas will seek funding from federal sources and qualified organizations to determine the extent to which management measures are implemented in urban areas in accordance with guidance issued under §6217 of the Coastal Zone Act Reauthorization Amendments. Funding and personnel will be sought to inventory representative urban management measures, design statistically-based sampling programs, execute sampling programs, evaluate sampling data, and report the results of the sampling on a periodic basis. The project will generate a database on the implementation, operation, and maintenance of urban management measures in areas affecting coastal waters in Texas.

## **Roads and Bridges**

The Texas Department of Transportation has a database on the number and types of construction projects currently ongoing in each county of the state. This database also has information on the types of management measures that have been implemented at each construction site.

## **Marinas**

All GLO leases are monitored through renewal inspections, which are scheduled on a five-year rotation. Noncompliance with special conditions is reported and rectified through further lease negotiations with the applicant. The Sea Grant/Marine Advisory Service has a database that stores and organizes relevant activities conducted by marine specialists and agents. Some of the environmental activities tracked in the database include workshops conducted, presentations and demonstrations given, field trips/tours conducted, and the number of participants in each event.<sup>8</sup>

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<sup>8</sup>Personal communication with Mike Hightower, Deputy Director, Texas Sea Grant Program, May 8, 1998.

**Wetlands**

The TNRCC has a database that tracks §401 certification processing times and the conditions required under each permit. The §401 database also notes when BMPs to control nonpoint pollution are added as requirements to the certification. As the TNRCC continues its §401 certification program, collected information will be available to other TNRCC and state programs to evaluate and determine if additional management measures or practices are necessary.

**Hydromodification**

The TNRCC has a database that inventories dam facilities in the state. This database also includes inspection reports for these facilities. As more TMDLs are completed in the §6217 Management Area, hydromodification activities may be identified as a source of water quality impairment. This database will be available to TNRCC and other state agency programs to evaluate and determine the need for additional management measures or practices.

**Table 9.1: Examples of Saltwater Toxic Criteria Standards (parts per billion)**

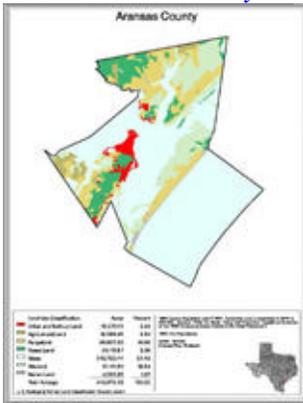
Parameter	Aquatic Life: Acute	Aquatic Life: Chronic	Human Health
Benzene	-----	-----	208
Cadmium	45.6	10.0	-----
Copper	16.3	4.37	-----
Dioxins	-----	-----	0.0000007
Lead	140	5.60	3.85
Mercury	2.10	1.10	0.0250
Nickel	119	13.2	-----
PCB	10.0	0.03	0.0009
Silver	2.30	-----	-----
Zinc	98.0	89.0	-----

**Table 9.2: TNRCC Surface Water Quality Monitoring in the Coastal Counties**

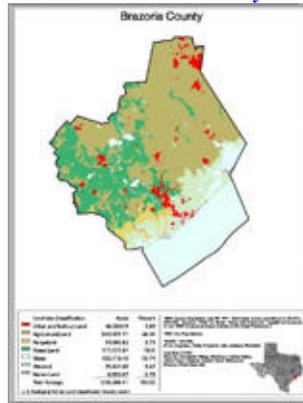
Basin Number	Watershed Name	Number of Stations
06	Neches	5
07	Neches-Trinity	4
08	Trinity	1
09	Trinity-San Jacinto	2
10	San Jacinto	22
11	San Jacinto	15
12	Brazos	1
13	Brazos-Colorado	3
15	Colorado-Lavaca	2
18	Guadalupe	2
21	Nueces	1
22	Nueces-Rio Grande	8
24	Bays and Estuaries	76
25	Gulf of Mexico	5

# Attachment 1: Land Use Maps for Section §6217 Management Area Counties

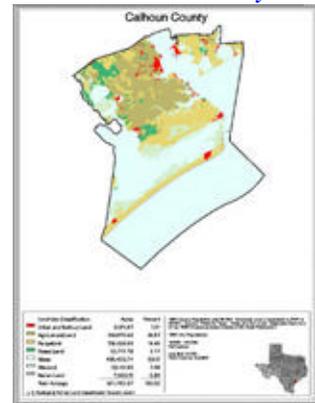
*Aransas County*



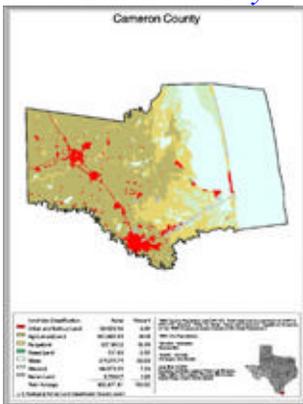
*Brazoria County*



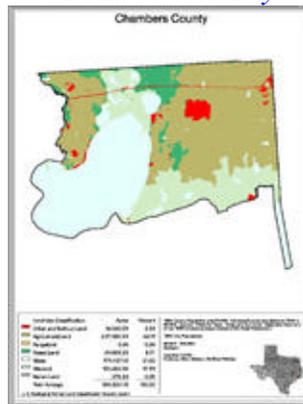
*Calhoun County*



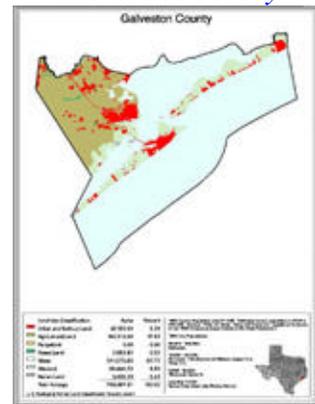
*Cameron County*



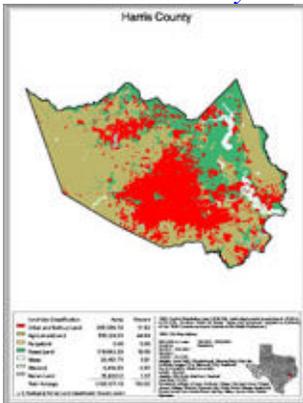
*Chambers County*



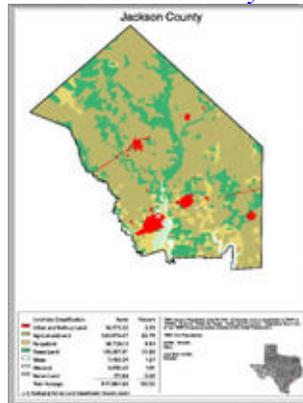
*Galveston County*



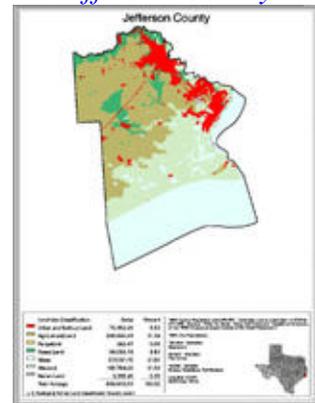
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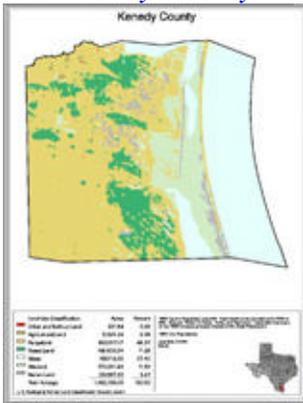
*Jackson County*



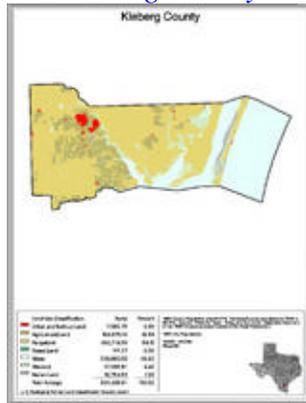
*Jefferson County*



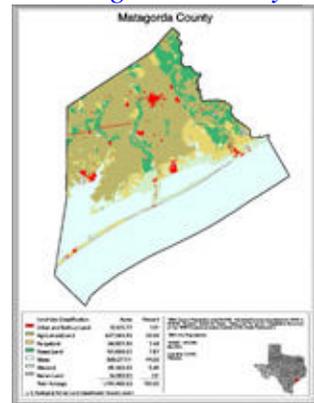
### Kenedy County



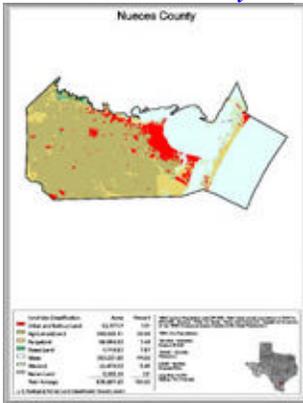
### Kleberg County



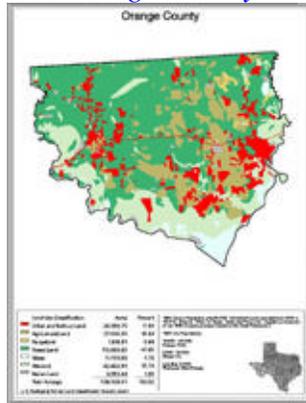
### Matagorda County



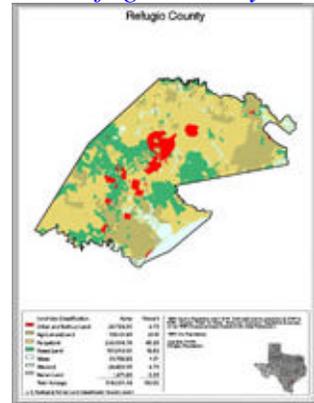
### Nueces County



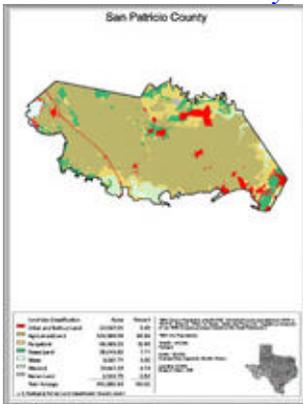
### Orange County



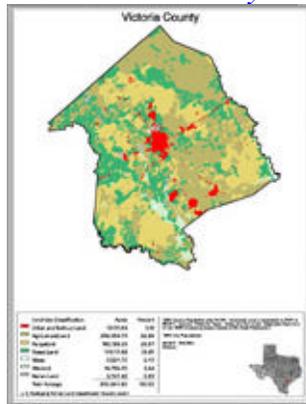
### Refugio County



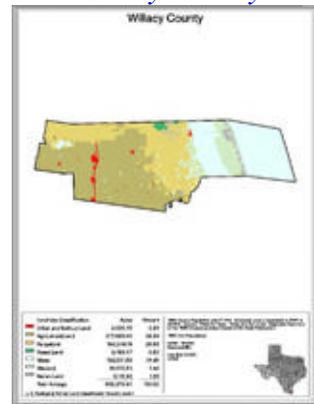
### San Patricio County



### Victoria County



### Willacy County







# **Attachment 3: Impaired Coastal Segments in Texas River Basins**

## **Attachment 3: Impaired Coastal Segments in Texas River Basins**

The final 1998 §303(d) list, which was published in June of 1998, identifies the state's impaired water bodies. In addition, for coastal waters, the TNRCC water quality staff identified possible sources of pollution and determined the magnitude of the contribution from each source. In their review of the data, staff determined the types of impairments (bacteria, metals, etc.) and the general sources of impairment (point source, nonpoint source, or both). If nonpoint source pollution was identified, then a specific nonpoint source category (urban, agriculture, industrial, unknown) was determined whenever possible.

The magnitude (major, moderate, minor) of each source's contribution to the impairment was also determined for both point and nonpoint sources. The following definitions were used for each source to determine their relative contribution to the impairment:

Major - The source is the only one responsible for nonsupport of any designated use; or the source predominates over other sources responsible for nonsupport.

Moderate - The source is the only one responsible for partial support of any use; or the source predominates over the other sources responsible for partial support; or the source is one of multiple sources responsible for nonsupport.

Minor - The source is one of multiple sources responsible for nonsupport or partial support and is judged to contribute relatively little to nonattainment.

The remainder of this Attachment contains a series of individual maps depicting Texas' coastal and river basins that flow into Texas coastal bays and estuaries. Accompanying each map is a description of the impaired coastal segments within the basin.

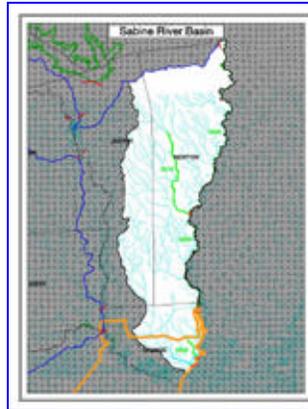
## IMPAIRED COASTAL SEGMENTS IN THE SABINE RIVER BASIN

**Sabine River Below Toledo Bend Reservoir, Segment 0503** - In the lower 25 miles of the segment, bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. In the lower 25 miles of the segment, concentrations of dissolved lead and cadmium in water sometimes exceed the criteria established to protect aquatic life. Unknown point and nonpoint sources are noted as minor contributors to the magnitude of impairment for bacteria levels.

**Adams Bayou Tidal, Segment 0508** - Dissolved oxygen concentrations are sometimes lower than the standard established to assure optimum habitat conditions for fish and aquatic life, and bacterial levels sometimes exceed the criterion established to assure the safety of contact recreation. Sluggish flow coupled with organic loadings from industrial and municipal wastewater discharges probably contribute to the problem. Industrial and municipal point sources and unknown nonpoint sources are noted as minor contributors to the magnitude of impairment for dissolved oxygen.

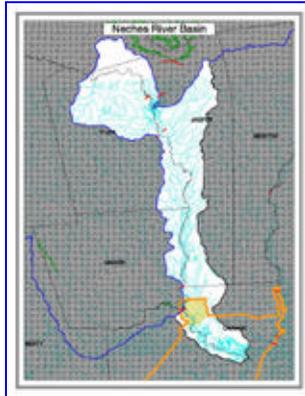
**Big Cow Creek, Segment 0513** - Concentrations of dissolved aluminum in water occasionally exceed the criterion established to protect aquatic life in the lower 25 miles of the segment. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for aluminum.

*Sabine River Basin*



**No impaired coastal stream segments in the Neches River Basin are listed in the Draft 1998 §303(d) list.**

*Neches River Basin*



## IMPAIRED COASTAL SEGMENTS IN THE NECHES-TRINITY COASTAL BASIN

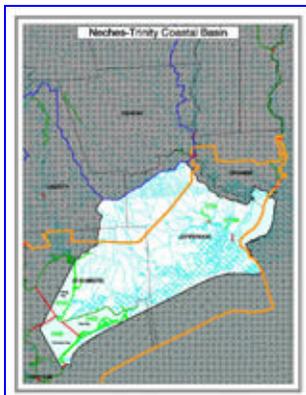
**Taylor Bayou Above Tidal, Segment 0701** - Dissolved oxygen concentrations are occasionally lower than the standard established to assure optimum habitat conditions for fish and aquatic life in the lower 25 miles of the segment. Sluggish flow, industrial and municipal discharges, and agricultural activities likely contribute to the problem. Industrial and municipal point sources and unknown nonpoint sources are noted as minor contributors to the magnitude of impairment for dissolved oxygen.

**Alligator Bayou, Segment 0702-A** - The water body does not support the designated intermediate aquatic life use as a result of significant effects in ambient toxicity tests. The water body does not meet the segment criterion for sulfates to protect aquatic life, water supply, and other water quality uses. Alligator Bayou is effectively isolated from tidal influence by a hurricane barrier. Criteria for segment 0701, Taylor Bayou Above Tidal, were used as screening criteria for this water body. Industrial point sources are noted as a moderate contributor and unknown nonpoint sources are noted as a minor contributor to the magnitude of impairment for dissolved oxygen.

**Hillebrandt Bayou, Segment 0704** - Dissolved oxygen concentrations are occasionally lower than the standard established to assure optimum habitat conditions for fish and aquatic life. Industrial and municipal point sources and unknown nonpoint sources are noted as minor contributors to the magnitude of impairment for dissolved oxygen.

**East Bay, Segment 2423** - The average mercury concentration in water exceeded the human health criterion for saltwater fish in eight square miles between Marsh and Elm Grove points. This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. Based on Texas Department of Health shellfish maps, 22.1 percent of the bay (11.5 mi<sup>2</sup> at the east end of the bay near East Bay Bayou and Intracoastal Waterway) does not support and 77.9 percent of the bay (the remaining 40.6 mi<sup>2</sup>) fully supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for mercury in water and shellfish. Oyster waters contamination is unknown.

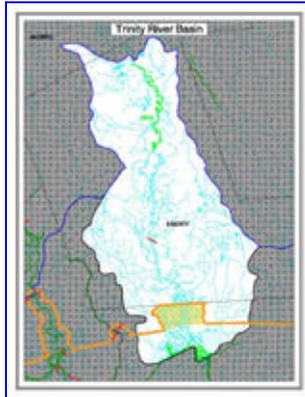
### *Neches-Trinity Coastal Basin*



## IMPAIRED COASTAL SEGMENTS IN THE TRINITY RIVER BASIN

Trinity River Below Lake Livingston, Segment 802 - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation in the lower 25 miles of the segment. Municipal discharge point sources and unknown nonpoint sources are noted as moderate contributors to the magnitude of impairment for bacteria levels.

*Trinity River Basin*



## **IMPAIRED COASTAL SEGMENTS IN THE TRINITY . SAN JACINTO COASTAL BASIN**

**Cedar Bayou Tidal, Segment 0901** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Municipal and industrial point sources are noted as moderate contributors to the magnitude of impairment for bacteria levels. Also, unknown nonpoint sources are noted as a minor contributor to the magnitude of impairment for bacteria levels.

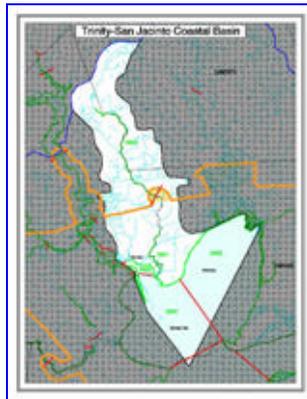
**Cedar Bayou Above Tidal, Segment 0902** - Dissolved oxygen concentrations are occasionally lower than the standard established to assure optimum habitat conditions for fish and aquatic life. A recent draft waste load evaluation addressed dissolved oxygen. Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. The criterion for total dissolved solids to protect aquatic life, water supply, and other water quality uses is not met in the segment. Municipal and industrial point sources are noted as moderate contributors to the magnitude of impairment for dissolved oxygen and bacteria levels. Also, unknown nonpoint sources are noted as a minor contributor to the magnitude of impairment for bacteria levels.

**Upper Galveston Bay, Segment 2421** - The fish consumption use was not supported in the 22 square miles (mi<sup>2</sup>) from Red Bluff Point to Five Mile Cut Marker to Houston Point, north to Morgan's Point. A restricted-consumption advisory for the general population and a no-consumption advisory for children and women of childbearing age were issued by the Texas Department of Health due to elevated levels of dioxin in blue crabs and catfish. Based on Texas Department of Health shellfish maps, 55 percent of the bay (59.5 mi<sup>2</sup> of the outer perimeter) does not support and 19 percent of the bay (20.6 mi<sup>2</sup> of the area adjacent to the nonsupporting area) partially supports the oyster water use. The remaining 26 percent (40.6 mi<sup>2</sup>) fully supports the oyster water use. Partially supporting areas are conditionally approved for the growing and harvesting of shellfish. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential water quality concerns. Industrial and municipal point source discharges and urban nonpoint sources are noted as major contributors to the magnitude of impairments for dioxin and shellfish. Oyster waters contamination is unknown.

**Trinity Bay, Segment 2422** - The average mercury concentration in water exceeded the human health criterion for saltwater fish in eight square miles north of Exxon C-1 platform. This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. Based on Texas Department of Health shellfish maps, 69.3 percent of the bay (90.2 mi<sup>2</sup> of the outer perimeter) does not support and 13.8 percent of the bay (17.9 mi<sup>2</sup> of the area adjacent to the nonsupporting area) partially supports the oyster water use. The remaining 16.9 percent (22 mi<sup>2</sup>) fully supports the oyster water use. Partially supporting areas are conditionally approved for the growing and harvesting of shellfish. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential water quality concerns. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for mercury in water and shellfish. Oyster waters contamination is unknown.

**Tabbs Bay, Segment 2426** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Municipal wastewater discharges and unidentified nonpoint sources are probable contributors to this condition. The fish consumption use is not supported through the entire segment, based on a fish consumption advisory issued by the Texas Department of Health in 1990 due to elevated levels of dioxin in fish and crab tissue. Industrial point source discharges are noted as a major contributor to the magnitude of impairment for dioxin.

*Trinity-San Jacinto Coastal Basin*



## **IMPAIRED COASTAL SEGMENTS IN THE SAN JACINTO RIVER BASIN**

**San Jacinto River Tidal, Segment 1001** - The average mercury concentration in water exceeded the human health criterion for saltwater fish. This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels and mercury.

**Lake Houston, Segment 1002** - The average mercury concentration in water exceeded the human health criterion for freshwater fish. This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for mercury.

**Houston Ship Channel/San Jacinto River Tidal, Segment 1005** - The average mercury concentration in water exceeded the human health criterion for saltwater fish. This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. A restricted-consumption advisory for the general population and a no-consumption advisory for children and women of childbearing age were issued by the Texas Department of Health due to elevated levels of dioxin in blue crabs and catfish. A TMDL for nickel (listed in the 1996 §303(d) list) is in preparation for this water body. Industrial point source discharges are noted as a major contributor to the magnitude of impairment for dioxin and a moderate contributor to the magnitude of impairment for mercury. Also, urban nonpoint sources are noted as a moderate contributor to the magnitude of impairment for mercury.

**Houston Ship Channel Tidal, Segment 1006** - The average mercury concentration in water exceeded the human health criterion for saltwater fish. This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. A restricted-consumption advisory for the general population and a no-consumption advisory for children and women of childbearing age were issued by the Texas Department of Health due to elevated levels of dioxin in blue crabs and catfish. A TMDL for nickel (listed in the 1996 §303(d) list) is in preparation for this water body. Industrial point source discharges are noted as a major contributor to the magnitude of impairment for dioxin and mercury. Also, urban nonpoint sources are noted as a moderate contributor to the magnitude of impairment for mercury.

**Patrick Bayou, Segment 1006A** - Ambient water toxicity sometimes exceeds the screening levels established to provide optimum habitat conditions for aquatic life. Water temperature values sometimes exceed the criterion to protect aquatic life and other water quality uses. Sediment toxicity sometimes exceeds the screening levels established to provide optimum habitat for aquatic life. This is substantiated by a degraded benthic macroinvertebrate community structure observed in the segment. In addition, arsenic, chromium, copper, mercury, nickel, zinc, anthracene, flouranthene, pyrene, bis(2-ethyhexyl) phthalate and aroclor 1248 in sediment were

elevated in comparison with screening levels for estuarine sediments. These screening levels are designed to evaluate concerns related to narrative standards for the protection of water quality. Point source discharges are noted as a major contributor to the magnitude of impairment for temperature, sediment toxicity, and water toxicity. Also, unknown nonpoint sources are noted as a minor contributor to the magnitude of impairment for sediment toxicity and water toxicity.

**Houston Ship Channel/Buffalo Bayou Tidal, Segment 1007-** The average mercury concentration in water exceeded the human health criterion for saltwater fish. This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. A restricted-consumption advisory for the general population and a no-consumption advisory for children and women of childbearing age were issued by the Texas Department of Health due to elevated levels of dioxin in blue crabs and catfish. A TMDL for nickel (listed in the 1996 §303(d) list) is in preparation for this water body. Industrial point source discharges are noted as a major contributor to the magnitude of impairment for dioxin and mercury. Also, urban nonpoint sources are noted as a moderate contributor to the magnitude of impairment for mercury.

**Vince Bayou, Segment 1007A** - Toxicity in sediment occasionally exceeds the levels established to provide optimum habitat conditions for aquatic life. Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Point source and unknown nonpoint source discharges are noted as moderate contributors to the magnitude of impairment for bacterial levels and sediment toxicity.

**Spring Creek, Segment 1008** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Dissolved oxygen concentrations are sometimes lower than the standard established to assure optimum habitat conditions for fish and aquatic life. Lower dissolved oxygen levels are due to natural conditions and low flow in the head waters. Unknown nonpoint source discharges are noted as a major contributor to the magnitude of impairment for dissolved oxygen and bacteria levels. Also, municipal point sources are noted as a moderate contributor to the magnitude of impairment for bacteria levels.

**Cypress Creek, Segment 1009-** Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Average total dissolved solids values exceeded the segment criterion to protect aquatic life, water supply, and other water quality uses. A draft TMDL for dissolved oxygen is in preparation for this water body. Urban nonpoint source discharges and municipal point sources are both noted as moderate contributors to the magnitude of impairment for bacteria levels.

**Buffalo Bayou Tidal, Segment 1013** - The average mercury concentration in water exceeded the human health criterion for saltwater fish. This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Mean copper concentration in water exceeded the criterion established to protect aquatic life from chronic exposure. Urban nonpoint source discharges are noted as a major contributor to the magnitude of impairment for bacteria levels.

Unknown nonpoint source discharges are noted as a major contributor to the magnitude of impairment for mercury and copper.

**Buffalo Bayou Above Tidal, Segment 1014** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Urban nonpoint source discharges and municipal point sources are each noted as a moderate contributor to the magnitude of impairment for bacteria levels.

**Greens Bayou Above Tidal, Segment 1016** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Mean lead concentration in water exceeded the criterion established to protect aquatic life from chronic exposure. A TMDL for dissolved oxygen is in preparation for this water body. Municipal point sources and urban nonpoint source runoff are each noted as a moderate contributor to the magnitude of impairment for bacteria levels. Unknown nonpoint source runoff is noted as a major contributor to the magnitude of impairment for lead.

**Whiteoak Bayou Above Tidal, Segment 1017** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Mean lead in water concentration exceeded the criterion established to protect aquatic life from chronic exposure. Municipal point sources and urban nonpoint source runoff are each noted as a moderate contributor to the magnitude of impairment for bacteria levels. Unknown nonpoint source runoff is noted as a major contributor to the magnitude of impairment for lead.

**San Jacinto Bay, Segment 2427** - The fish consumption use is not supported through the entire segment, based on a fish consumption advisory issued by the Texas Department of Health in 1990 due to elevated levels of dioxin in fish and crab tissue. Industrial point source discharges are noted as a major contributor to the magnitude of impairment for dioxin. Nonpoint sources are not noted as a contributor to impairment.

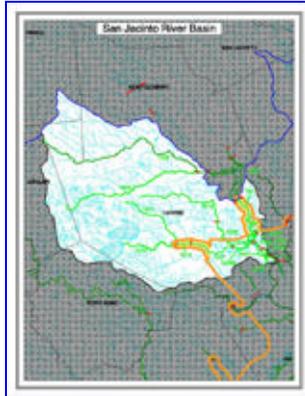
**Black Duck Bay, Segment 2428** - The fish consumption use is not supported through the entire segment, based on a fish consumption advisory issued by the Texas Department of Health in 1990 due to elevated levels of dioxin in fish and crab tissue. Industrial point source discharges are noted as a major contributor to the magnitude of impairment for dioxin.

**Scott Bay, Segment 2429** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Municipal wastewater discharges are a probable contributor to this condition. The fish consumption use is not supported through the entire segment, based on a fish consumption advisory issued by the Texas Department of Health in 1990 due to elevated levels of dioxin in fish and crab tissue. Industrial point source discharges are noted as a major contributor to the magnitude of impairment for dioxin.

**Burnett Bay, Segment 2430** - The fish consumption use is not supported through the entire segment, based on a fish consumption advisory issued by the Texas Department of Health in 1990 due to elevated levels of dioxin in fish and crab tissue. Industrial point source discharges are noted as a major contributor to the magnitude of impairment for dioxin.

**Barbours Cut, Segment 2436** - The fish consumption use is not supported through the entire segment, based on a fish consumption advisory issued by the Texas Department of Health in 1990 due to elevated levels of dioxin in fish and crab tissue. Industrial point source discharges are noted as a major contributor to the magnitude of impairment for dioxin. Nonpoint sources are not noted as a contributor to impairment.

*San Jacinto River Basin*



## **IMPAIRED COASTAL SEGMENTS IN THE SAN JACINTO-BRAZOS COASTAL BASIN**

**Clear Creek Tidal, Segment 1101** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. A no-consumption advisory was issued by the Texas Department of Health in 1993 for Clear Creek. The advisory applies to an 8.3-mile reach upstream of SH 3 in Clear Creek Tidal and warns against consumption of any fish and blue crabs taken from the affected area. Test results reveal dichloroethane, trichloroethane, carbon disulfide, and chlordane in fish and crab tissues. Management strategies are in place for industrial contaminants. Municipal point sources and urban nonpoint source runoff are noted as moderate contributors to the magnitude of impairment for bacteria levels. Also, industrial point sources and urban nonpoint source runoff are noted as major contributors to the magnitude of impairment for toxic chemicals.

**Clear Creek Above Tidal, Segment 1102** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation in the lower 25 miles of the segment. A noconsumption advisory was issued for the general population by the Texas Department of Health in November 1993 for Clear Creek. The advisory applies to all of Clear Creek Above Tidal, and warns against consumption of any fish or blue crabs taken from the affected area. Test results reveal dichloroethane, trichloroethane, carbon disulfide, and chlordane in fish and crab tissues. Municipal point sources and urban nonpoint source runoff are noted as moderate contributors to the magnitude of impairment for bacteria levels. Also, industrial point sources and urban nonpoint source runoff are noted as major contributors to the magnitude of impairment for toxic chemicals.

**Dickinson Bayou Tidal, Segment 1103** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Dissolved oxygen concentrations are occasionally below the standard established to assure optimum habitat conditions for fish and aquatic life, from IH-45 southeast of Dickinson downstream to one-half mile upstream of SH 6. A TMDL for dissolved oxygen is in preparation for this water body. Unknown nonpoint source runoff is noted as a major contributor to the magnitude of impairment for bacteria levels.

**Dickinson Bayou Above Tidal, Segment 1104** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. A TMDL for dissolved oxygen is in preparation in conjunction with the TMDL for Segment 1103. Unknown nonpoint source runoff is noted as a major contributor to the magnitude of impairment for bacteria levels.

**Chocolate Bayou Above Tidal, Segment 1108** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Unknown nonpoint source runoff is noted as a major contributor to the magnitude of impairment for bacteria levels.

**Oyster Creek Tidal, Segment 1109** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Unknown nonpoint source runoff is noted as a major contributor to the magnitude of impairment for bacteria levels.

**Oyster Creek Above Tidal, Segment 1110**- In the lower 25 miles of the segment, southwest of

the City of Angleton in Brazoria County, bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation, and dissolved oxygen concentrations are sometimes lower than the standard established to assure optimum habitat conditions for fish and aquatic life. Municipal point sources and urban nonpoint source runoff are noted as minor contributors to the magnitude of impairment for bacteria levels. Unknown nonpoint source runoff is noted as a major contributor to the magnitude of impairment for dissolved oxygen.

**Old Brazos River Channel Tidal, Segment 1111** - The average mercury concentration in water exceeded the human health criterion for saltwater fish. This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. Industrial point sources and urban nonpoint source runoff are noted as major contributors to the magnitude of impairment for mercury.

**Armand Bayou Tidal, Segment 1113-** Dissolved oxygen concentrations are sometimes below the standard established to assure optimum habitat conditions for fish and aquatic life in the upper two miles of the segment. These low dissolved oxygen levels maybe due to natural conditions associated with poor flushing capability and high sediment oxygen demand. Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. A TMDL to address low dissolved oxygen levels is in preparation for this water body. The sources for dissolved oxygen and bacteria levels are unknown.

**Armand Bayou Above Tidal, Segment 1113-A** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation, and dissolved oxygen concentrations are sometimes lower than the standard established to assure optimum habitat conditions for fish and aquatic life in a three-mile, perennial, freshwater reach of Armand Bayou upstream of tidal. This water body (not part of segment 1113) was not evaluated in 1996. A TMDL to address low dissolved oxygen levels in Armand Bayou is under development and will include Armand Bayou Above Tidal. The sources for dissolved oxygen and bacteria levels are unknown.

West Bay, Segment 2424 - The average mercury concentration in water exceeded the human health criterion for saltwater fish in eight square miles near Carancahua Reef This criterion was established to protect consumers from bioaccumulation of toxicants in fish. Risk of exposure to mercury from fish consumption has not been assessed. Due to elevated mercury (chronic) and copper (chronic) in water, the high aquatic life use was not supported in eight square miles of the bay near Carancahua Reef. Based on Texas Department of Health shellfish maps, 35.2 percent of the bay (24.4 mi<sup>2</sup> at the east end near the Galveston and Texas City) does not support, and 64.8 percent of the bay (the remaining 44.9 mi<sup>2</sup>) fully supports, the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Unknown nonpoint sources are noted as major contributors to the magnitude of impairment for mercury and copper. Also, urban nonpoint sources are noted as a major contributor to the magnitude of impairment for shellfish.

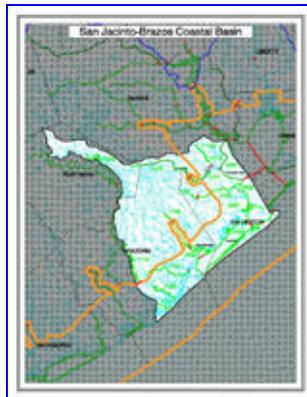
**Chocolate Bay, Segment 2432** - Based on Texas Department of Health shellfish maps, the entire bay does not support the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial

contamination. Municipal point source discharges are noted as a major contributor and unknown nonpoint sources are noted as a minor contributor to the magnitude of impairment for bacteria levels.

**Texas City Ship Channel, Segment 2437** - Dissolved oxygen concentrations are occasionally below the standard established to assure optimum habitat conditions for aquatic life. Industrial point sources are noted as a minor contributor to the magnitude of impairment for dissolved oxygen.

**Lower Galveston Bay, Segment 2439** - The average mercury concentration exceeded the human health criterion for saltwater fish in 16 square miles near Redfish Island and the Galveston Channel-FLR 2. This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. The mean dissolved copper concentration in water exceeds the criterion established to protect aquatic life from chronic exposure. Based on Texas Department of Health shellfish maps, 43.5 percent of the bay (60.7 mi<sup>2</sup> of the outer perimeter, Galveston and Texas City) does not support and 9.9 percent of the bay (13.8 mi<sup>2</sup> of the area adjacent to the nonsupporting area) partially supports the oyster water use. The remaining 46.6 percent (65 mi<sup>2</sup>) fully supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Partially supporting areas are conditionally approved for the growing and harvesting of shellfish. Unknown point and nonpoint sources are each noted as moderate contributors to the magnitude of impairment for mercury, copper, and shellfish.

### *San Jacinto-Brazos Coastal Basin*

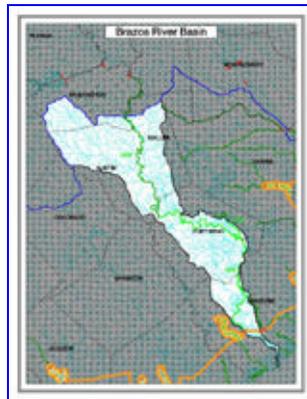


## IMPAIRED COASTAL SEGMENTS IN THE BRAZOS RIVER BASIN

**Brazos River below Navasota River, Segment 1202** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Municipal point source discharges are noted as a moderate contributor and unknown nonpoint sources are noted as minor contributor to the magnitude of impairment for bacterial levels.

**Upper Oyster Creek, Segment 1245** - Dissolved oxygen concentrations are sometimes below the standard established to assure optimum habitat conditions for fish and aquatic life in the area from the Texas Department of Corrections Jester Unit downstream to the confluence of Stafford Run. Dissolved oxygen levels have been historically depressed in the segment due to a complex series of diversion dams, oxygen-demanding wastes, high sediment oxygen demand, low reaeration rates, and nearly stagnant velocities. A draft waste load evaluation, based on intensive survey data, indicates that dissolved oxygen criteria supportive of the intermediate use should be attainable at the recommended effluent limits (advanced treatment with nitrification). Municipal and industrial point source discharges and urban nonpoint sources are noted as major contributors to the magnitude of impairment for dissolved oxygen.

*Brazos River Basin*



## IMPAIRED COASTAL SEGMENTS IN THE BRAZOS-COLORADO COASTAL BASIN

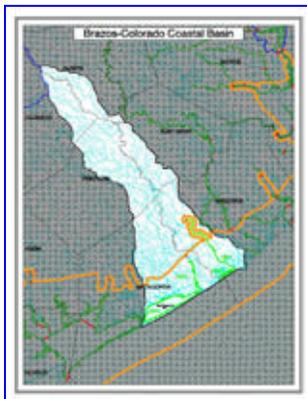
**San Bernard River Tidal, Segment 1301** - Dissolved oxygen concentrations are occasionally below the standard established to assure optimum habitat conditions for fish and aquatic life, and bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Unknown nonpoint sources are noted as moderate contributors to the magnitude of impairment for dissolved oxygen and bacteria levels.

**Caney Creek Tidal, Segment 1304** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Unknown nonpoint sources are noted as a moderate contributor to the magnitude of impairment for bacteria levels.

**East Matagorda Bay, Segment 2441** - Based on Texas Department of Health shellfish maps, 2.6 percent of the bay (1.5 mi<sup>2</sup> near the Caney Creek confluence with the bay, Intracoastal Waterway, marsh, and fishing cabins) does not support and 2.9 percent of the bay (1.7 mi<sup>2</sup> near the Live Oak Bayou confluence) partially supports the oyster water use. The remaining 94.5 percent (55.8 mi<sup>2</sup>) fully supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Partially supporting areas are conditionally approved for the growing and harvesting of shellfish. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

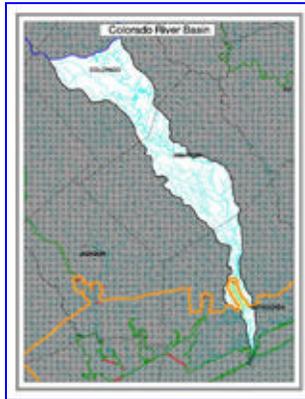
**Cedar Lakes, Segment 2442** - Based on Texas Department of Health shellfish maps, the entire area does not support the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

### *Brazos-Colorado Coastal Basin*



**There are no impaired coastal stream segments in the Colorado River Basin listed in the Draft 1998 §303(d) list.**

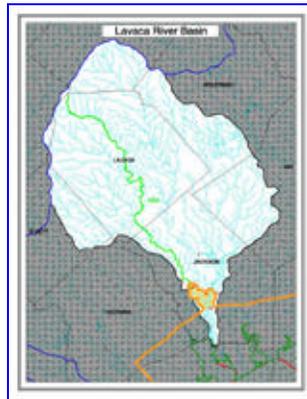
*Colorado River Basin*



## IMPAIRED COASTAL SEGMENTS IN THE LAVACA RIVER BASIN

Lavaca River Above Tidal, Segment 1602 - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. The Railroad Commission of Texas has identified oil field wastes — a problem in the segment. Unknown nonpoint sources — noted as a moderate contributor to the magnitude of impairment for bacteria levels.

*Lavaca River Basin*



## **IMPAIRED COASTAL SEGMENTS IN THE COLORADO-LAVACA COASTAL BASIN**

**Matagorda Bay/Powderhorn Lake, Segment 2451** - Based on Texas Department of Health shellfish maps, 8.3 percent of the bay (21.7 mi<sup>2</sup> at the west end) does not support and 1.7 percent of the bay (4.4 mi<sup>2</sup> of Powderhorn Lake) partially supports the oyster water use. The remaining 90 percent (235.5 mi<sup>2</sup>) fully supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Partially supporting areas are conditionally approved for the growing and harvesting of shellfish. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

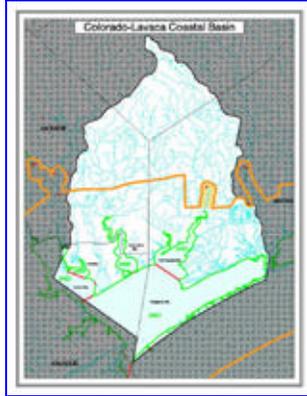
**Tres Palacios Bay, Segment 2452** - Based on Texas Department of Health shellfish maps, 49 percent of the bay (7.2 mi<sup>2</sup> of the upper half) does not support and 51 percent of the bay (7.5 mi<sup>2</sup> of the lower half) partially supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Partially supporting areas are conditionally approved for the growing and harvesting of shellfish. Probable cause for nonsupport is Tres Palacios Creek. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

**Lavaca Bay/Chocolate Bay, Segment 2453** - The Texas Department of Health has issued an aquatic life closure for 2.5 square miles of the segment due to elevated mercury levels in finfish and crab tissue. Mercury contamination is residual from historical sources. Based on Texas Department of Health shellfish maps, 34.1 percent of the bay (18.7 mi<sup>2</sup> at the north-northwest end of the bay near the Lavaca River confluence and the area around Port Lavaca, including Chocolate Bay) does not support and 37.7 percent of the bay (20.7 mi<sup>2</sup> of the area adjacent to the nonsupporting area on the west side of the bay) partially supports the oyster water use. The remaining 28.2 percent (15.4 mi<sup>2</sup>) fully supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Partially supporting areas are conditionally approved for the growing and harvesting of shellfish. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

**Cox Bay, Segment 2454** - The Texas Department of Health has issued an aquatic life closure for 1.7 square miles of the segment due to elevated mercury levels in fish and crab tissue. Based on Texas Department of Health shellfish maps, 16.2 percent of the bay (0.5 mi<sup>2</sup> at the north end of the bay and Cox Creek) does not support the oyster water use. The remaining 83.8 percent (2.4 mi<sup>2</sup>) of the bay fully supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

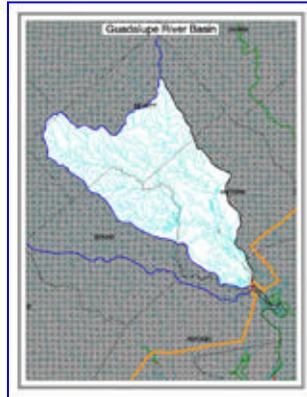
**Carancahua Bay, Segment 2456** - Based on Texas Department of Health shellfish maps, 48.4 percent of the bay (9.2 mi<sup>2</sup> at the north end of the bay and Carancahua Creek) does not support the oyster water use. The remaining 51.6 percent (9.8 mi<sup>2</sup>) of the bay fully supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

*Colorado-Lavaca Coastal Basin*



**There are no impaired coastal stream segments in the Guadalupe River Basin listed in the Draft 1998 §303(d) list.**

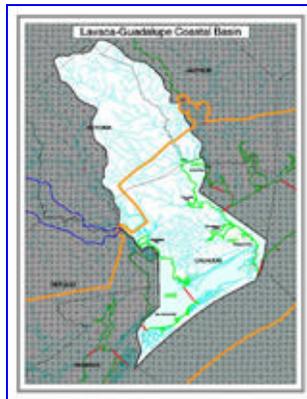
*Guadalupe River Basin*



## IMPAIRED COASTAL SEGMENTS IN THE LAVACA-GUADALUPE COASTAL BASIN

**San Antonio Bay/Hynes Bay/Guadalupe Bay, Segment 2462** - Based on Texas Department of Health shellfish maps, 8.5 percent of the bay (10.2 mi<sup>2</sup> at the north end of the bay near the San Antonio and Guadalupe River confluences and the area adjacent to Seadrift) does not support and 50.9 percent (60.8 mi<sup>2</sup> of the area south of the nonsupporting area, including Hynes Bay up to the Intracoastal Waterway) of the bay partially supports the oyster water use. The remaining 40.6 percent (48.5 mi<sup>2</sup>) of the bay fully supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Partially supporting areas are conditionally approved for the growing and harvesting of shellfish. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

*Lavaca-Guadalupe Coastal Basin*



## IMPAIRED COASTAL SEGMENTS IN THE SAN ANTONIO-NUECES COASTAL BASIN

**Mission River Above Tidal, Segment 2002** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. Nonpoint source runoff contributes to high levels of bacterial contaminants. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

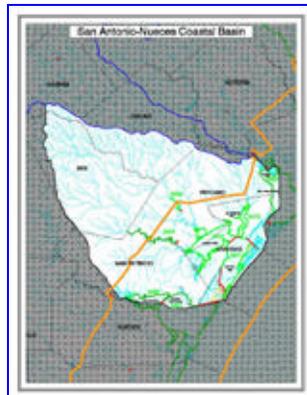
**Aransas River Above Tidal, Segment 2004** - The average level of total dissolved solids (TDS) is elevated above the criterion to protect aquatic life, water supply, and other water quality uses in the lower part of the segment. High TDS in the lower part of this segment is likely to be the result of saltwater mixing during periods of low flow. Point and nonpoint sources are not noted as contributors to impairment.

**Aransas Bay, Segment 2471** - Based on Texas Department of Health shellfish maps, 7.8 percent of the bay (6.8 mi<sup>2</sup> along the northern edge of the bay and Rockport) does not support the oyster water use. The remaining 92.2 percent (81.0 mi<sup>2</sup>) of the bay fully supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

**Copano Bay, Segment 2472** - Based on Texas Department of Health shellfish maps, 20.6 percent of the bay (13.4 mi<sup>2</sup> near the Intracoastal Waterway, shoreline and Aransas/Mission rivers) does not support the oyster water use. The remaining 79.4 percent (51.8 mi<sup>2</sup>) of the bay fully supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

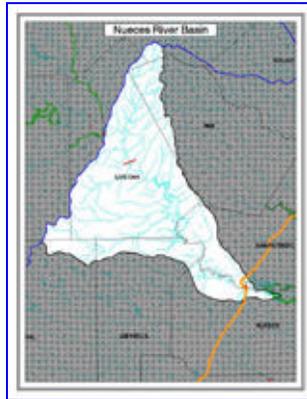
**St. Charles Bay, Segment 2473** - Based on Texas Department of Health shellfish maps, 1.5 percent of the bay (6.7 mi<sup>2</sup> of the northern half tributary and marsh drain) does not support the oyster water use. The remaining 48.5 percent (6.4 mi<sup>2</sup>) of the bay fully supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

### *San Antonio-Nueces Coastal Basin*



**There are no impaired coastal stream segments in the Nueces River Basin listed in the Draft 1998 §303(d) list.**

*Nueces River Basin*



## **IMPAIRED COASTAL SEGMENTS IN THE NUECES-RIO GRANDE COASTAL BASIN**

**Arroyo Colorado Tidal, Segment 2201** - Dissolved oxygen concentrations are sometimes lower than the standard established to assure optimum habitat conditions for aquatic life. Comments received from the Texas Parks and Wildlife Department suggest that depressed dissolved oxygen impairs aquatic life in the upper 16 miles of the segment, and point out that the segment provides important habitat for many economically, ecologically, and recreationally valuable species. A TMDL is underway. Municipal point source discharges and agricultural and urban nonpoint sources are noted as major contributors to the magnitude of impairment for dissolved oxygen.

**Arroyo Colorado Above Tidal, Segment 2202** - The Texas Department of Health issued a restricted consumption advisory for the general population in September 1980 due to elevated levels of chlordane, toxaphene, and DDE in fish tissue. The advisory, which applies to the entire segment, recommends that consumption be limited to one meal per month for any type of fish. Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. A TMDL is in preparation for this water body. The Texas Department of Health issued an aquatic life closure for Donna Reservoir, an unclassified, 333-acre lake which stores water pumped from the Rio Grande, in February 1994 due to elevated levels of PCBs in fish tissue. The closure applies to the entire reservoir and the canal system that connects it to the Rio Grande. The sources of PCBs are unknown. Point source discharges and agricultural and urban nonpoint sources are noted as major contributors to the magnitude of impairment for toxic chemicals.

**Rio Grande Below Falcon Reservoir, Segment 2302** - Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation. All other uses and water quality standards are supported. This segment was included in the multi-phase Binational Rio Grande Toxic Substance Study. Unknown nonpoint sources are noted as a moderate contributor to the magnitude of impairment for bacteria levels.

**Corpus Christi Bay, Segment 2481** - Based on Texas Department of Health shellfish maps, 13.0 percent of the bay (16.0 mi<sup>2</sup> near Corpus Christi) does not support the oyster water use. The remaining 87.0 percent (107.1 mi<sup>2</sup>) of the bay fully supports the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to potential microbial contamination. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

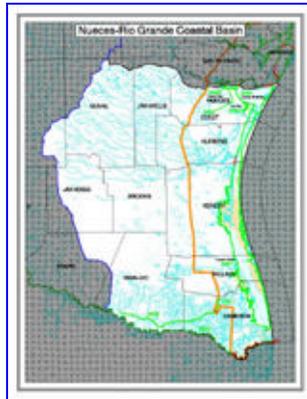
**Nueces Bay, Segment 2482** - Based on Texas Department of Health shellfish maps, 100 percent of the bay (28.9 mi<sup>2</sup>) does not support the oyster water use. Nonsupporting areas are restricted or prohibited for the growing and harvesting of shellfish for direct marketing due to zinc in oyster tissue. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

**Corpus Christi Inner Harbor, Segment 2484** - Dissolved oxygen concentrations are occasionally below the standard established to assure optimum habitat conditions for aquatic life in the Avery and Viola turning basins. Natural conditions of the dredged ship channel contribute to the low dissolved oxygen levels. No point or nonpoint sources are noted as contributors to the magnitude of impairment for dissolved oxygen.

**Oso Bay, Segment 2485** - Dissolved oxygen concentrations are occasionally lower than the standard established to assure optimum habitat conditions for aquatic life in the lower portion of the bay. Based on Texas Department of Health shellfish maps, 100 percent of the bay (7.2 mi<sup>2</sup>) does not support the oyster water use. Nonsupporting areas are restricted for the growing and harvesting of shellfish for direct marketing, or prohibited due to potential microbial contamination. Studies and analyses are underway or pending. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

**Laguna Madre, Segment 2491** - Based on Texas Department of Health shellfish maps, 5.2 percent of the bay (18.1 mi<sup>2</sup> near the Arroyo Colorado) does not support the oyster water use, and 38.8 percent (134.8 mi<sup>2</sup>) of the bay fully supports the oyster water use. The remaining 56 percent (194.6 mi<sup>2</sup>) of Laguna Madre, from Port Mansfield to Corpus Christi, has not been assessed. Nonsupporting areas are restricted for the growing and harvesting of shellfish for direct marketing, or prohibited due to potential microbial contamination. Unknown nonpoint sources are noted as a major contributor to the magnitude of impairment for bacteria levels.

*Nueces-Rio Grande Coastal Basin*



# **Attachment 4: TNRCC Guidance for Assigning Priority for TMDL Development**

## **Attachment 4: TNRCC Guidance for Assigning Priority for TMDL Development**

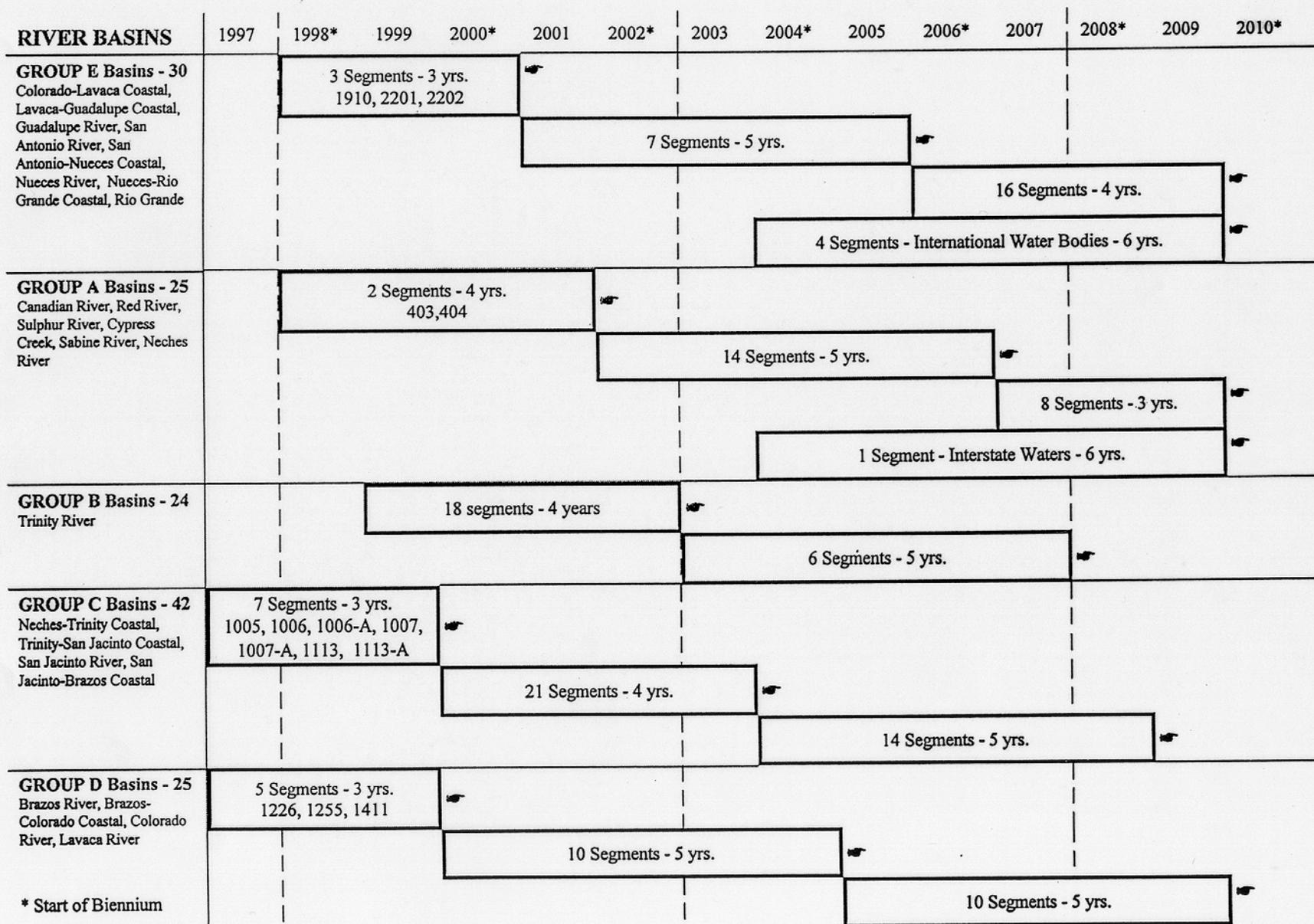
The TNRCC *1998 Statewide Schedule for TMDL Candidates* provides a schematic layout showing when each water body on the 1998 CWA §303(d) list will be targeted for action over the next eleven years, and the basin group with which each water body is associated. To the extent possible, multiple pollutants will be addressed concurrently as TMDLs are developed for listed water bodies. As conveyed by the schedule, the TNRCC projects that it will require a minimum of three years and a maximum of six years to address any given TMDL. However, that does not preclude completion of TMDL efforts in certain water bodies sooner than the proposed time line. Conversely, some water bodies might take longer than anticipated for a variety of unforeseen reasons. As a result, the EPA, the TNRCC, and watershed interest groups participating in the development of TMDLs must collaborate in an efficient manner, allowing some acceptable level of flexibility in the schedule.

As a general rule, the TNRCC will target impaired water bodies with the highest priority assignments first, within the constraints of the basin planning cycle. Schedules for the TMDL development will coordinate with the basin planning cycle by initiating TMDL activities for the highest priority water bodies within the current basin each year. This means that each basin will begin a cluster of TMDL actions at five-year intervals; statewide, a different basin will be initiating TMDLs each year of the five-year cycle. If there are no water bodies listed with a High priority within a basin, then TMDL activities will focus on those listed as Medium priority, and then on those listed as Low. This prioritization is not absolute and can be changed with significant stakeholder information to support the need to target a threatened segment first. For each basin group, this schematic layout will be refined as the TNRCC works with each Clean Rivers Program steering committee to determine the order in which segments will be addressed over time in their respective basins.

# **Attachment 5: Draft TNRCC Statewide Schedule for TMDL Candidates**

## Attachment 5: DRAFT TNRCC Statewide Schedule for TMDL Candidates

April 23, 1998



\* Start of Biennium

☛ Implementation begins

# **Attachment 6: Dryland Rowcrop Agriculture Exemption Figures and Tables**

Period-of-record averages of nutrient and productivity parameters  
by component bay

<i>component bay</i>	<i>parameter</i>			
	<i>Mg/L</i> WQAMMN	<i>Mg/L</i> WQNO3N	<i>Mg/L</i> WQTOTP	WQSIO2
Aransas Bay	0.051	0.018	0.069	5.04
Copano Bay	0.064	0.486	0.133	9.15
St Charles	0.076	0.043	0.099	7.76
Mesquite	0.056	0.057	0.123	5.59
Redfish	0.068	0.064	0.054	3.63
Corpus Christi	0.079	0.035	0.066	2.63
CCSC (bay)	0.061	0.043	0.065	2.07
Inner Harbor	0.278	0.153	0.112	3.22
Nueces Bay	0.085	0.064	0.145	2.80
Aransas Pass	0.118	0.055	0.054	2.93
Causeway N	0.069	0.047	0.062	3.21
Causeway S	0.037	0.018	0.051	3.61
Laguna (King Ranch)	0.069	0.025	0.055	4.70
Laguna (Baffin)	0.068	0.031	0.051	4.90
Baffin Bay	0.061	0.020	0.157	7.15
GOM inlet	0.179	0.037	0.081	
		WQTOC	WQCHLA	WQPHEO
Aransas Bay		10.7	48.8	1.6
Copano Bay		15.8	13.2	1.6
St Charles		12.7	10.3	1.1
Mesquite		11.8	11.6	4.5
Redfish		9.33	3.8	1.2
Corpus Christi		11.3	7.1	1.7
CCSC (bay)		6.85	7.8	2.4
Inner Harbor		578	15.3	0.9
Nueces Bay		7.41	9.0	6.1
Aransas Pass		6.99	15.1	1.8
Causeway N		6.49	4.5	1.6
Causeway S		3.20	5.7	1.3
Laguna (King Ranch)		7.17	5.1	1.1
Laguna (Baffin)		7.05	9.8	1.6
Baffin Bay		11.5	12.4	1.1
GOM inlet		7.80	3.1	1.3

Table 1

## FIELD MEASUREMENTS AND WATER CHEMISTRY

Parameter	Standards Criteria	Screening Levels	Number of Samples	Number of Detects	Minimum	Maximum	Mean	Number of Values Outside Criteria or Screening Levels	Mean of Values Outside Criteria or Screening Levels	Percent of Values Outside Criteria or Screening Levels
WATER TEMPERATURE (C)	35.00		16	16	11.00	31.10	23.619	0	0.0	0.0%
DISSOLVED OXYGEN (MG/L)	5.00		16	16	4.07	12.00	8.044	1	4.1	6.2%
PH (SU)	6.50- 9.00		16	16	7.40	8.70	8.267	0	0.0	0.0%
CHLORIDE (MG/L)			16	16	569.00	18100.00	10861.188	0	0.0	0.0%
SULFATE (MG/L)			16	16	124.00	2200.00	1306.437	0	0.0	0.0%
SPECIFIC CONDUCTANCE (UMHOS/CM)			38	38	2530.00	49000.00	29067.895	0	0.0	0.0%
TOTAL DISS SOLIDS (MG/L)			16	16	1644.50	31525.00	18385.250	0	0.0	0.0%
AMMONIA (MG/L)		0.40	16	15	0.01	0.29	0.066	0	0.0	0.0%
NITRITE + NITRATE (MG/L)		0.40	16	11	0.01	0.67	0.072	1	0.7	6.25%
ORTHOPHOSPHORUS (MG/L)		0.20	15	15	0.02	0.24	0.091	1	0.2	6.67%
TOTAL PHOSPHORUS (MG/L)		0.40	16	16	0.06	0.25	0.139	0	0.0	0.0%
CHLOROPHYLL A (UG/L)		30.00	16	14	1.00	33.00	12.582	1	33.0	6%
FECAL COLIFORM (#/100 ML)										
Contact Recreation	400.0		67	2.00	230.00	10.303		0	0.0	0.0%
Oyster Waters	43.0		67	2.00	230.00	10.303		5	85.2	7%

Table 2

## FIELD MEASUREMENTS AND WATER CHEMISTRY

Parameter	Standards Criteria	Screening Levels	Number of Samples	Number of Detects	Minimum	Maximum	Mean	Number of Values Outside Criteria or Screening Levels	Mean of Values Outside Criteria or Screening Levels	Percent of Values Outside Criteria or Screening Levels
WATER TEMPERATURE (C)	35.00		12	12	14.60	31.00	23.733	0	0.0	0.0%
DISSOLVED OXYGEN (MG/L)	5.00		11	11	6.30	9.30	7.803	0	0.0	0.0%
PH (SU)	6.50- 9.00		11	11	7.80	9.00	8.414	0	0.0	0.0%
CHLORIDE (MG/L)			12	12	584.00	15100.00	9734.500	0	0.0	0.0%
SULFATE (MG/L)			12	12	124.00	2040.00	1310.500	0	0.0	0.0%
SPECIFIC CONDUCTANCE (UMHOS/CM)			17	17	20400.00	39900.00	28158.824	0	0.0	0.0%
TOTAL DISS SOLIDS (MG/L)			12	12	13260.00	25935.00	19190.834	0	0.0	0.0%
AMMONIA (MG/L)		0.40	12	12	0.01	0.11	0.048	0	0.0	0.0%
NITRITE + NITRATE (MG/L)		0.40	12	6	0.02	0.13	0.035	0	0.0	0.0%
ORTHOPHOSPHORUS (MG/L)		0.20	11	10	0.01	0.13	0.068	0	0.0	0.0%
TOTAL PHOSPHORUS (MG/L)		0.40	12	12	0.03	0.18	0.105	0	0.0	0.0%
CHLOROPHYLL A (UG/L)		30.00	12	8	1.00	126.00	31.493	3	96.6	25%
FECAL COLIFORM (#/100 ML)										
Contact Recreation	400.0		92	86	2.00	920.00	34.848	1	920.0	1%
Oyster Waters	43.0		92	86	2.00	920.00	34.848	11	251.3	12%

Table 3

## SEGMENT 2472 Copano Bay/Port Bay/Mission Bay

## TOXICS SUBSTANCES IN SEDIMENT

Storet Code	Parameter	Units	Screening Levels	Number of Samples	Number of Detects	Minimum	Maximum	Mean	Number of Detects Exceeding Screening Levels	Percent of Detects Exceeding Screening Levels
01003	ARSENIC	MG/KG	6.900	2	2	2.400	3.900	3.150	0	0.00
01008	BARIUM	MG/KG	397.000	2	2	680.000	780.000	730.000	2	100.00
01028	CADMIUM	MG/KG	0.830	2	1	0.450	3.000	1.725	1	50.00
01029	CHROMIUM	MG/KG	29.000	2	2	18.000	19.000	18.500	0	0.00
01043	COPPER	MG/KG	24.000	2	2	12.000	21.000	16.500	0	0.00
01052	LEAD	MG/KG	32.000	2	1	0.500	18.000	9.250	0	0.00
01058	MANGANESE	MG/KG	630.000	2	2	308.000	550.000	429.000	0	0.00
71921	MERCURY	MG/KG	0.324	2	1	0.015	0.070	0.043	0	0.00
01068	NICKEL	MG/KG	18.000	2	2	14.000	16.000	15.000	0	0.00
01148	SELENIUM	MG/KG	1.700	2	0	0.100	0.600	0.350	0	0.00
01078	SILVER	MG/KG	1.600	2	0	0.100	0.400	0.250	0	0.00
01098	ZINC	MG/KG	110.000	2	2	50.000	54.000	52.000	0	0.00

Table 4

## FIELD MEASUREMENTS AND WATER CHEMISTRY

Parameter	Standards Criteria	Screening Levels	Number of Samples	Number of Detects	Minimum	Maximum	Mean	Number of Values Outside Criteria or Screening Levels	Mean of Values Outside Criteria or Screening Levels	Percent of Values Outside Criteria or Screening Levels
WATER TEMPERATURE (C)	35.00		16	16	12.90	30.70	22.300	0	0.0	0.0%
DISSOLVED OXYGEN (MG/L)	5.00		16	16	3.85	10.50	7.480	1	3.8	6.2%
PH (SU)	6.50- 9.00		16	16	7.60	9.00	8.275	0	0.0	0.0%
CHLORIDE (MG/L)			16	16	2840.00	19400.00	12069.375	0	0.0	0.0%
SULFATE (MG/L)			16	16	161.00	15600.00	2442.625	0	0.0	0.0%
SPECIFIC CONDUCTANCE (UMHOS/CM)			52	52	10650.00	57200.00	35652.117	0	0.0	0.0%
TOTAL DISS SOLIDS (MG/L)			16	16	6922.50	36660.00	22279.156	0	0.0	0.0%
AMMONIA (MG/L)		0.40	15	15	0.02	0.25	0.068	0	0.0	0.0%
NITRITE + NITRATE (MG/L)		0.40	16	13	0.02	0.32	0.057	0	0.0	0.0%
ORTHOPHOSPHORUS (MG/L)		0.20	15	13	0.01	0.13	0.051	0	0.0	0.0%
TOTAL PHOSPHORUS (MG/L)		0.40	16	16	0.03	0.18	0.087	0	0.0	0.0%
CHLOROPHYLL A (UG/L)		30.00	16	10	1.00	34.90	8.441	1	34.9	6%
FECAL COLIFORM (#/100 ML)										
Contact Recreation	400.0		393	2.00	1600.00	8.723		1	1600.0	0%
Oyster Waters	43.0		393	2.00	1600.00	8.723		9	231.7	2%

Table 5

## FIELD MEASUREMENTS AND WATER CHEMISTRY

Parameter	Standards Criteria	Screening Levels	Number of Samples	Number of Detects	Minimum	Maximum	Mean	Number of Values Outside Criteria or Screening Levels	Mean of Values Outside Criteria or Screening Levels	Percent of Values Outside Criteria or Screening Levels
WATER TEMPERATURE (C)	35.00		56	56	11.40	31.10	22.907	0	0.0	0.0%
DISSOLVED OXYGEN (MG/L)	5.00		56	56	5.00	10.20	7.255	0	0.0	0.0%
PH (SU)	6.50- 9.00		51	51	7.30	8.85	8.288	0	0.0	0.0%
CHLORIDE (MG/L)			57	57	5.04	22500.00	12837.456	0	0.0	0.0%
SULFATE (MG/L)			57	57	148.00	2570.00	1779.474	0	0.0	0.0%
SPECIFIC CONDUCTANCE (UMHOS/CM)			133	133	3970.00	51700.00	36992.633	0	0.0	0.0%
TOTAL DISS SOLIDS (MG/L)			56	56	2580.50	31330.00	23035.885	0	0.0	0.0%
AMMONIA (MG/L)		0.40	57	53	0.01	1.20	0.136	5	0.8	8.77%
NITRITE + NITRATE (MG/L)		0.40	57	39	0.01	0.36	0.091	0	0.0	0.0%
ORTHOPHOSPHORUS (MG/L)		0.20	57	57	0.02	0.14	0.067	0	0.0	0.0%
TOTAL PHOSPHORUS (MG/L)		0.40	57	57	0.04	0.32	0.142	0	0.0	0.0%
CHLOROPHYLL A (UG/L)		30.00	57	42	1.00	79.70	10.604	6	56.5	11%
FECAL COLIFORM (#/100 ML)										
Contact Recreation	400.0	301	272	2.00	540.00	26.463		2	540.0	1%
Dyster Waters	43.0	301	272	2.00	540.00	26.463		37	173.9	12%

Table 6

## FIELD MEASUREMENTS AND WATER CHEMISTRY

Parameter	Standards Criteria	Screening Levels	Number Of Samples	Number Of Detects	Minimum	Maximum	Mean	Number of Values Outside Criteria or Screening Levels	Mean of Values Outside Criteria or Screening Levels	Percent of Values Outside Criteria or Screening Levels
WATER TEMPERATURE (C)	35.00		101	101	12.60	31.10	22.753	0	0.0	0.0%
DISSOLVED OXYGEN (MG/L)	5.00		99	99	1.73	10.33	7.099	6	4.1	6.1%
PH (SU)	6.50- 9.00		98	98	7.49	8.70	8.089	0	0.0	0.0%
CHLORIDE (MG/L)			60	60	2700.00	29900.00	16253.667	0	0.0	0.0%
SULFATE (MG/L)			60	60	22.00	3360.00	2345.200	0	0.0	0.0%
SPECIFIC CONDUCTANCE (UMHOS/CM)			350	350	24200.00	56100.00	45945.145	0	0.0	0.0%
TOTAL DISS SOLIDS (MG/L)			101	101	15730.00	35880.00	28641.832	0	0.0	0.0%
AMMONIA (MG/L)		0.40	62	56	0.01	0.21	0.032	0	0.0	0.0%
NITRITE + NITRATE (MG/L)		0.40	62	25	0.01	0.22	0.029	0	0.0	0.0%
ORTHOPHOSPHORUS (MG/L)		0.20	62	62	0.01	0.08	0.036	0	0.0	0.0%
TOTAL PHOSPHORUS (MG/L)		0.40	62	62	0.03	0.29	0.079	0	0.0	0.0%
CHLOROPHYLL A (UG/L)		30.00	62	50	1.00	55.70	8.642	3	39.5	5%
FECAL COLIFORM (#/100 ML)										
Contact Recreation	400.0		483	436	3.00	653.00	15.975	3	577.7	1%
Oyster Waters	43.0		483	436	3.00	653.00	15.975	35	164.3	7%

Table 7

## FIELD MEASUREMENTS AND WATER CHEMISTRY

Parameter	Standards Criteria	Screening Levels	Number of Samples	Number of Detects	Minimum	Maximum	Mean	Number of Values Outside Criteria or Screening Levels	Mean of Values Outside Criteria or Screening Levels	Percent of Values Outside Criteria or Screening Levels
WATER TEMPERATURE (C)	35.00		18	18	14.10	33.00	24.250	0	0.0	0.0%
DISSOLVED OXYGEN (MG/L)	5.00		18	18	4.40	12.10	7.794	2	4.4	11.1%
PH (SU)	6.50- 9.00		18	18	8.00	8.80	8.417	0	0.0	0.0%
CHLORIDE (MG/L)			18	18	20.00	24600.00	13336.667	0	0.0	0.0%
SULFATE (MG/L)			18	18	32.00	3500.00	1698.111	0	0.0	0.0%
SPECIFIC CONDUCTANCE (UMHOS/CM)			18	18	18800.00	60600.00	38350.000	0	0.0	0.0%
TOTAL DISS SOLIDS (MG/L)			18	18	12220.00	39390.00	24927.500	0	0.0	0.0%
AMMONIA (MG/L)		0.40	18	18	0.01	1.31	0.181	1	1.3	5.56%
NITRITE + NITRATE (MG/L)		0.40	18	12	0.02	0.24	0.078	0	0.0	0.0%
ORTHOPHOSPHORUS (MG/L)		0.20	18	18	0.03	0.31	0.122	2	0.3	11.11%
TOTAL PHOSPHORUS (MG/L)		0.40	18	18	0.07	0.68	0.221	1	0.7	5.56%
CHLOROPHYLL A (UG/L)		30.00	18	14	1.00	63.00	14.473	3	44.5	17%
FECAL COLIFORM (#/100 ML)										
Contact Recreation	400.0		14	10	3.00	980.00	170.714	2	871.5	14%
Oyster Waters	43.0		14	10	3.00	980.00	170.714	7	331.9	50%

Table 8

## FIELD MEASUREMENTS AND WATER CHEMISTRY

Parameter	Standards Criteria	Screening Levels	Number of Samples	Number of Defects	Minimum	Maximum	Mean	Number of Values Outside Criteria or Screening Levels	Mean of Values Outside Criteria or Screening Levels	Percent of Values Outside Criteria or Screening Levels
WATER TEMPERATURE (C)	35.00		92	92	10.50	32.00	23.467	0	0.0	0.0%
DISSOLVED OXYGEN (MG/L)	5.00		91	91	3.80	11.70	7.124	9	4.6	10%
PH (SU)	6.50- 9.00		88	88	7.30	8.80	8.278	0	0.0	0.0%
CHLORIDE (MG/L)			92	92	3620.00	31100.00	17172.283	0	0.0	0.0%
SULFATE (MG/L)			91	91	19.00	4800.00	2476.769	0	0.0	0.0%
SPECIFIC CONDUCTANCE (UMHOS/CM)			327	327	12260.00	77900.00	47794.066	0	0.0	0.0%
TOTAL DISS SOLIDS (MG/L)			92	92	7969.00	49855.00	29627.863	0	0.0	0.0%
AMMONIA (MG/L)		0.40	92	78	0.01	0.48	0.048	2	0.5	2.17%
NITRITE + NITRATE (MG/L)		0.40	92	53	0.01	1.85	0.118	8	1.0	8.70%
ORTHOPHOSPHORUS (MG/L)		0.20	92	90	0.01	0.25	0.046	2	0.2	2.17%
TOTAL PHOSPHORUS (MG/L)		0.40	92	92	0.02	0.30	0.077	0	0.0	0.0%
CHLOROPHYLL A (UG/L)		30.00	92	81	1.00	91.10	17.790	18	45.4	20%
FECAL COLIFORM (#/100 ML)										
Contact Recreation	400.0		327	261	2.00	240.00	6.141	0	0.0	0.0%
Oyster Waters	43.0		327	261	2.00	240.00	6.141	9	88.9	3%

Table 9

SEGMENT 2492 Baffin Bay/Alazan Bay/Cayo del Grullo/Laguna Salada

TOXICS SUBSTANCES IN SEDIMENT

Storet Code	Parameter	Units	Screening Levels	Number of Samples	Number of Detects	Minimum	Maximum	Mean	Number of Detects Exceeding Screening Levels	Percent of Detects Exceeding Screening Levels
01003	ARSENIC	MG/KG	6.900	6	6	2.700	5.300	4.300	0	0.00
01008	BARIUM	MG/KG	397.000	6	6	360.000	740.000	476.500	3	50.00
01028	CADMIUM	MG/KG	0.830	6	0	0.100	0.400	0.225	0	0.00
01029	CHROMIUM	MG/KG	29.000	6	6	14.000	53.000	28.833	2	33.33
01043	COPPER	MG/KG	24.000	6	6	2.000	46.000	18.367	2	33.33
01052	LEAD	MG/KG	32.000	6	3	0.500	17.000	7.100	0	0.00
01053	MANGANESE	MG/KG	630.000	6	6	290.000	520.000	423.500	0	0.00
71921	MERCURY	MG/KG	0.324	6	4	0.010	0.040	0.028	0	0.00
01068	NICKEL	MG/KG	18.000	6	5	0.100	24.000	11.450	1	16.67
01148	SELENIUM	MG/KG	1.700	6	1	0.100	0.800	0.392	0	0.00
01078	SILVER	MG/KG	1.600	6	2	0.100	90.000	17.358	2	33.33
01093	ZINC	MG/KG	110.000	6	6	35.000	159.000	80.667	1	16.67

Table 10

## FIELD MEASUREMENTS AND WATER CHEMISTRY

Parameter	Standards Criteria	Screening Levels	Number of Samples	Number of Defects	Minimum	Maximum	Mean	Number of Values Outside Criteria or Screening Levels	Mean of Values Outside Criteria or Screening Levels	Percent of Values Outside Criteria or Screening Levels
WATER TEMPERATURE (C)	35.00		16	16	15.30	30.10	22.894	0	0.0	0.0%
DISSOLVED OXYGEN (MG/L)	5.00		15	15	5.60	11.80	7.800	0	0.0	0.0%
PH (SU)	6.50- 9.00		15	15	7.15	8.80	8.067	0	0.0	0.0%
CHLORIDE (MG/L)			16	16	15800.00	36800.00	20787.500	0	0.0	0.0%
SULFATE (MG/L)			16	16	1970.00	3650.00	2589.375	0	0.0	0.0%
SPECIFIC CONDUCTANCE (UMHOS/CM)			30	30	43140.00	59000.00	48826.668	0	0.0	0.0%
TOTAL DISS SOLIDS (MG/L)			16	16	2990.00	39200.00	30790.313	0	0.0	0.0%
AMMONIA (MG/L)		0.40	16	12	0.01	0.09	0.025	0	0.0	0.0%
NITRITE + NITRATE (MG/L)		0.40	16	6	0.01	0.05	0.020	0	0.0	0.0%
ORTHOPHOSPHORUS (MG/L)		0.20	16	13	0.01	0.05	0.024	0	0.0	0.0%
TOTAL PHOSPHORUS (MG/L)		0.40	16	16	0.03	0.59	0.086	1	0.6	6.25%
CHLOROPHYLL A (UG/L)		30.00	16	9	1.00	13.60	3.145	0	0.0	0.0%
FECAL COLIFORM (#/100 ML)										
Contact Recreation	400.0		179	165	2.00	49.00	3.453	0	0.0	0.0%
Oyster Waters	43.0		179	165	2.00	49.00	3.453	1	49.0	1%

Table 11

Number of Measurements and Pesticide Concentrations at Oso and Seco Gages from 1970 to 1995 (USGS)

Pesticide	Type	Seco Gage #08201500 (primarily rangeland)		Oso Gage #08211520 (primarily cropland)	
		No.	Amount	No.	Amount
Ametryn	Herbicide	3	<0.10	NA	NA
Atrazine	Herbicide	3	<0.10	NA	NA
Cyanazine	Herbicide	1	<0.10	NA	NA
		2	<0.20		
Diazinon	Insecticide	22	<0.01	9--	0.20*
		19	ND	NA	NA
Disyston	Insecticide	9	<0.01	NA	NA
Endosulfan	Insecticide	22	<0.01	1	<0.01
		9	ND	8 -	ND
Ethion	Insecticide	22	<0.01	1 -	<0.01
		12	ND	8 -	ND
Lindane	Insecticide	22	<0.01	5	0.05*
				1	<0.01
		18	ND	4	ND
Malathion	Insecticide	22	<0.01	1	<0.01
				1	0.01
		19	ND	7	ND
Methomyl	Insecticide	1	<2.0	NA	NA
Methyl Parathion	Insecticide	21	<0.01	1	0.05
		1	0.02		
		19	ND	8	ND
Phorate	Insecticide	1	<0.10	NA	NA
		9	<0.01		
Prometryn	Herbicide	3	<0.10	NA	NA
Carbaryl	Insecticide	1	<2.0	NA	NA
Simazene	Herbicide	3	<0.10	NA	NA
Toxephene	Insecticide	22	<1.0	1	<0.10
		17	ND	8	ND
2,4-D	Herbicide	1	0.01	3	0.02*
		24	<0.01	1	<0.01
		18	ND	5	ND
1,3 Dichloropropene	Fungicide	2	<0.20	NA	NA

\* Average value of detectable measurements

All amount values are given in µg/L

NA represents Not Applicable (Not sampled for)

ND represents No Detection during analysis (Below limit at the time of test)

81 different samples taken for gage #08201500 and 35 samples for gage #08211520

Table 12

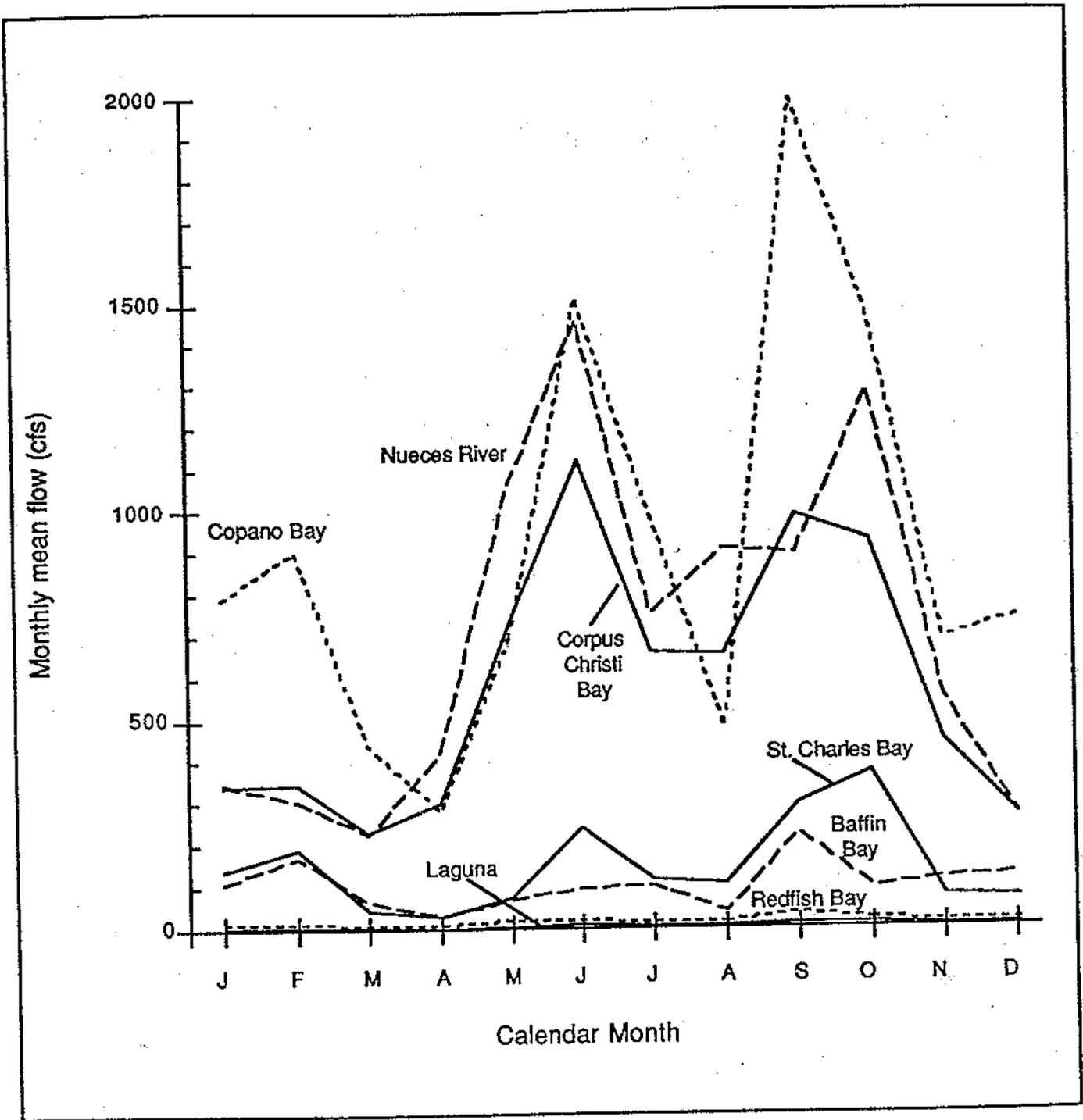
**Rainfall and Runoff for 2775 acre Odem Ranch Watershed**

1995	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (inches) <sup>1</sup>	0.45	2.65	1.15	1.75	2.05	1.95	1.45	4.45	1.20	4.80	2.10	2.80	26.8
Runoff (watershed inches) <sup>2</sup>								0	0	0	0	0	0
Runoff Coefficient								0	0	0	0	0	0.000
<sup>1</sup> 1995 Rainfall estimated from TAES Weather Station located approx. 6 miles east of study watershed.													
<sup>2</sup> Streamflow gage installed in August 1995													
1996	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (inches)	0.01	0	0.41	0.24	0.04	6.63	0	6.48	1.33	0.56	1.23	1.28	18.21
Runoff (watershed inches)	0	0	0	0	0	0.25	0	0.195	0	0	0	0	0.445
Runoff Coefficient	0	0	0	0	0	0.038	0	0.030	0	0	0	0	0.024
1997	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (inches)	0.68	1.02	3.81	2.89	4.86	6.22	0.01	0.31	2.59	9.45	1.74	0.25	33.83
Runoff (watershed inches)	0	0	0	0	0	0.03	0	0	0	1.28	0	0	1.31
Runoff Coefficient	0	0	0	0	0	0.005	0	0	0	0.135	0	0	0.039
1998	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (inches)	0.47	3.33	1.83	0.44	0.00								6.07
Runoff (watershed inches)	0	0	0	0	0								0.00
Runoff Coefficient	0	0	0	0	0								0.000

**Rainfall and Runoff for 46,400 acre San Fernando/Petronila Watershed**

1996	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (inches)	0	0	0.04	1.03	0.47	0.27	0.08	4.34	3.08	0.38	0.99	0.48	11.16
Runoff (watershed inches)	0	0	0	0	0.03	0	0	0.001	0.02	0	0	0	0.051
Runoff Coefficient	0	0	0	0	0.064	0	0	0.000	0.006	0	0	0	0.005
1997	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (inches)	0.31	0.78	2.86	6.23	5.86	0	0	0.44	5.62	11.67	1.93	0.01	35.71
Runoff (watershed inches)	0	0	0.01	2.75	0.96	0	0	0	0.007	4.9	0	0	8.627
Runoff Coefficient	0	0	0.003	0.44	0.16	0.000	0	0	0.001	0.42	0	0	0.242
1998	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (inches)	0.48	2.57	1.12	0.26	0								4.43
Runoff (watershed inches)	0	0.02	0	0	0								0.02
Runoff Coefficient	0	0.008	0.000	0.00	0.00								0.005

**Table 13**



Monthly mean inflows (1968-93) for principal watersheds draining into Corpus Christi Bay Study Area

Figure 1

# 3.21 Aransas Bay TX

## PHYSICAL CHARACTERISTICS

### Dimensions

Volume (cu. ft.)	3.06 x 10 <sup>10</sup>
Surface Area (sq. mi.)	208
Average Daily Inflow (cfs)	1,000
Estuarine Drainage Area (sq. mi.)	2,768
%EDA Land within coastal counties	55
Fluvial Drainage Area (sq. mi.)	NA
Total Drainage Area (sq. mi.)	2,768

### Pollution Susceptibility

Dissolved Concentration Potential (mg/l)	6.02	(H)
Particle Retention Efficiency (C/l)	0.97	(M)

## NUTRIENT CHARACTERISTICS

### Estimated Loadings (tons/year)

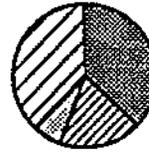
	TKN	Phosphorus
Point	172	20
Nonpoint	3,664	790
Upstream	69	78
<b>Total</b>	<b>3,905 (M)</b>	<b>888 (M)</b>

### Predicted Concentration Status (load in tons/yr)

	Concentration mg/l	Class	To Change Conc. Class.			
			Increase by		Decrease by	
			Load	%	Load	%
TKN	2.350	(H)	NA	NA	2,244	57
Phosphorus	0.535	(H)	NA	NA	722	81

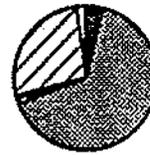
Abbreviations: cfs, cubic feet per second; mg/l, milligrams per liter; NA, not applicable; L, low; M, medium; H, high; C/l, volume/inflow; TKN, total Kjeldahl nitrogen.

### Land Use



- Agriculture
- Forest
- Urban
- Range & Other Nonurban

### TKN

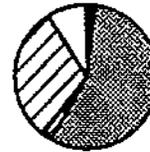


- ### Point Sources
- Wastewater Trt. Plants
  - Industrial Facilities

### Nonpoint Sources

- Agriculture
- Forest
- Urban
- Other Nonurban

### Phosphorus



- ### Upstream Sources
- 

Note: Data based on 91% of coastal county portion of EDA. Nutrient discharge estimates are unavailable for wetlands and barren lands.

## INTERPRETATION

Aransas Bay is estimated to have a high susceptibility for concentrating dissolved substances. This dissolved concentration potential combined with the estimated nutrient loadings results in predicted concentrations within the high range for both nitrogen and phosphorus. In Aransas Bay, these high concentration classifications are not likely to be influenced by minor changes (<20%) in nutrient loadings.

Strategic Assessment Branch  
 Ocean Assessments Division  
 Office of Oceanography and Marine Assessment  
 National Ocean Service  
 National Oceanic and Atmospheric Administration

College of Marine Studies  
 University of Delaware

Office of Marine and Estuarine Protection  
 Office of Water  
 U.S. Environmental Protection Agency

Figure 2

# 3.22 Corpus Christi Bay TX

## PHYSICAL CHARACTERISTICS

### Dimensions

Volume (cu. ft.)	4.20 x 10 <sup>10</sup>
Surface Area (sq. mi.)	192
Average Daily Inflow (cfs)	1,200

Estuarine Drainage Area (sq. mi.)	1,991
%EDA Land within coastal counties	100
Fluvial Drainage Area (sq. mi.)	15,630
Total Drainage Area (sq. mi.)	17,621

### Pollution Susceptibility

	Conc	Class
Dissolved Concentration Potential (mg/l)	4.67	(H)
Particle Retention Efficiency (C/I)	1.11	(H)

## NUTRIENT CHARACTERISTICS

### Estimated Loadings (tons/year)

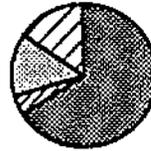
	TKN	Phosphorus
Point	3,811	820
Nonpoint	2,241	468
Upstream	801	861
<b>Total</b>	<b>6,853 (M)</b>	<b>2,149 (H)</b>

### Predicted Concentration Status (load in tons/yr)

	Concentration mg/l	Class	To Change Conc. Class.			
			Increase by		Decrease by	
			Load	%	Load	%
TKN	3,200	(H)	NA	NA	4,712	69
Phosphorus	1,004	(H)	NA	NA	1,935	90

Abbreviations: cfs, cubic feet per second; mg/l, milligrams per liter; NA, not applicable; L, low; M, medium; H, high; C/I, volume/inflow; TKN, total Kjeldahl nitrogen.

### Land Use



- Agriculture
- Forest
- Urban
- Range & Other Nonurban

### TKN



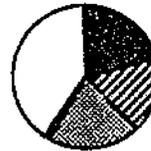
### Point Sources

- Wastewater Trt. Plants
- Industrial Facilities

### Nonpoint Sources

- Agriculture
- Forest
- Urban
- Other Nonurban

### Phosphorus



### Upstream Sources

- 

Note: Data based on 92% of coastal county portion of EDA. Nutrient discharge estimates are unavailable for wetlands and barren lands.

## INTERPRETATION

Corpus Christi Bay is estimated to have a high susceptibility for concentrating dissolved substances. This dissolved concentration potential combined with the estimated nutrient loadings results in concentrations within the high range for both nitrogen and phosphorus. In Corpus Christi Bay, the high concentration classifications are not likely to be influenced by minor reductions (<20%) in the nutrient loadings.

College of Marine Studies  
University of Delaware

Office of Marine and Estuarine Protection  
Office of Water  
U.S. Environmental Protection Agency

Strategic Assessment Branch  
Ocean Assessments Division  
Office of Oceanography and Marine Assessment  
National Ocean Service  
National Oceanic and Atmospheric Administration

Figure 3

# 3.23 Laguna Madre TX

## PHYSICAL CHARACTERISTICS

### Dimensions

Volume (cu. ft.)	3.13 x 10 <sup>10</sup>
Surface Area (sq. mi.)	582
Average Daily Inflow (cfs)	2,700

Estuarine Drainage Area (sq. mi.)	11,280
%EDA Land within coastal counties	44
Fluvial Drainage Area (sq. mi.)	NA
Total Drainage Area (sq. mi.)	11,280

### Pollution Susceptibility

	Conc	Class
Dissolved Concentration Potential (mg/l)	0.34	(M)
Particle Retention Efficiency (C/l)	0.13	(M)

## NUTRIENT CHARACTERISTICS

### Estimated Loadings (tons/year)

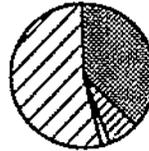
	TKN	Phosphorus
Point	564	204
Nonpoint	17,509	3,081
Upstream	1,009	639
<b>Total</b>	<b>19,082 (H)</b>	<b>3,924 (H)</b>

### Predicted Concentration Status (load in tons/yr)

Concentration mg/l	Class	To Change Conc. Class.			
		Increase by		Decrease by	
		Load	%	Load	%
Nitrogen	0.649 (M)	10,330	54	16,141	85
Phosphorus	0.133 (H)	NA	NA	983	25

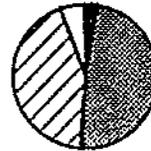
Abbreviations: cfs, cubic feet per second; mg/l, milligrams per liter; NA, not applicable; L, low; M, medium; H, high; C/l, volume/inflow.

### Land Use



- Agriculture
- Forest
- Urban
- Range & Other Nonurban

### TKN

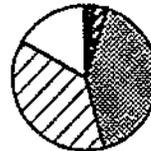


- ### Point Sources
- Wastewater Trt. Plants
  - Industrial Facilities

### Nonpoint Sources

- Agriculture
- Forest
- Urban
- Other Nonurban

### Phosphorus



- ### Upstream Sources
- 

Note: Data bases on 86% of coastal county portion of EDA. Nutrient discharge estimates are unavailable for wetlands and barren lands.

## INTERPRETATION

Laguna Madre is estimated to have a medium susceptibility for concentrating dissolved substances. This dissolved concentration potential (DCP) combined with the existing nitrogen (TKN) loading results in a predicted concentration within the medium range for nitrogen. The DCP combined with the existing phosphorus loading results in a predicted concentration in the high range for phosphorus. In Laguna Madre, the present concentration classifications are not likely to be influenced by minor changes (<20%) in nutrient loadings.

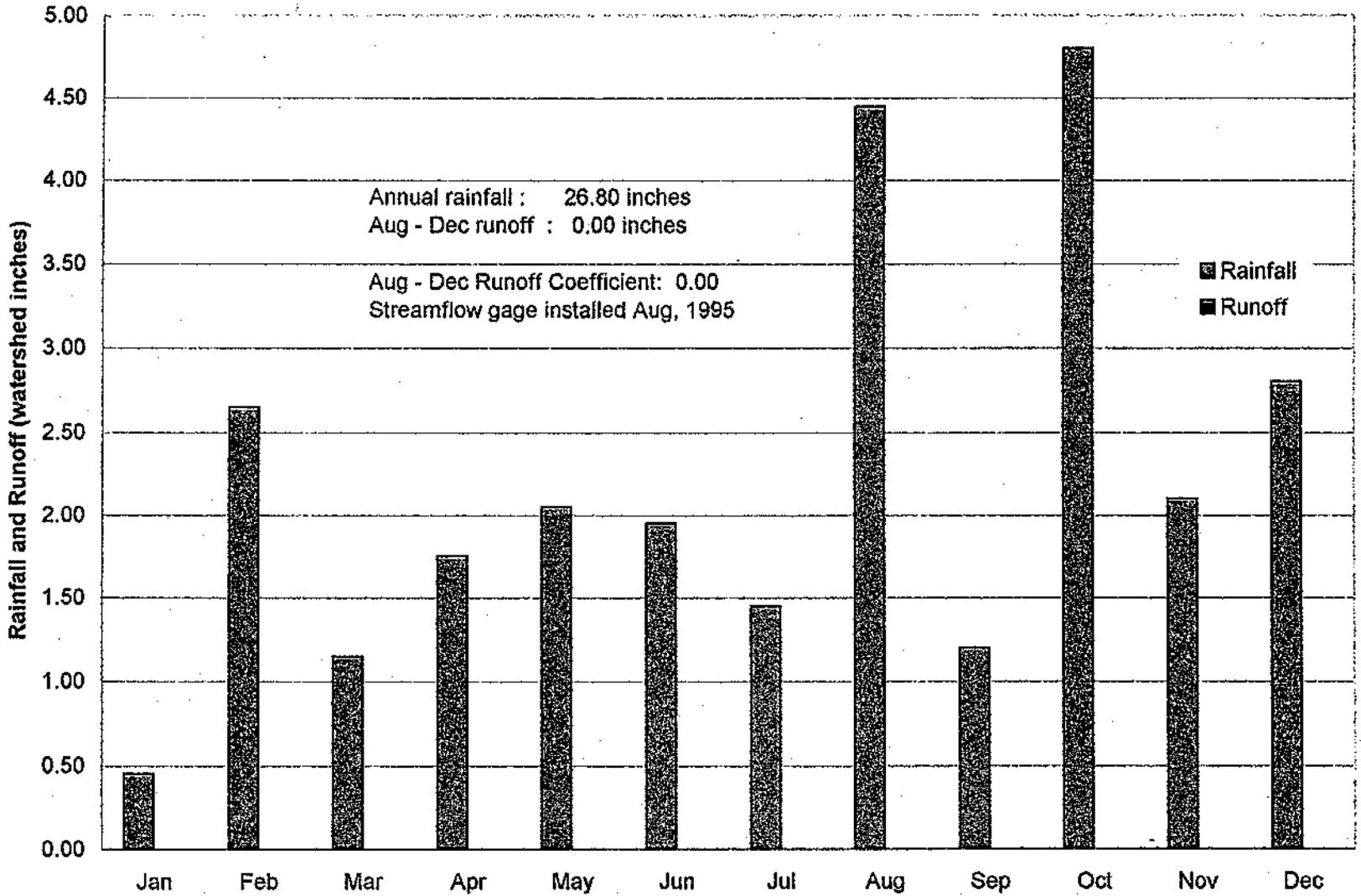
Strategic Assessment Branch  
Ocean Assessments Division  
Office of Oceanography and Marine Assessment  
National Ocean Service  
National Oceanic and Atmospheric Administration

College of Marine Studies  
University of Delaware

Office of Marine and Estuarine Protection  
Office of Water  
U.S. Environmental Protection Agency

Figure 4

**Monthly Rainfall and Runoff - 1995**  
**2775 acre Odem Ranch Watershed**



**Figure 5**

### Monthly Rainfall and Runoff - 1996 2775 acre Odem Ranch Watershed

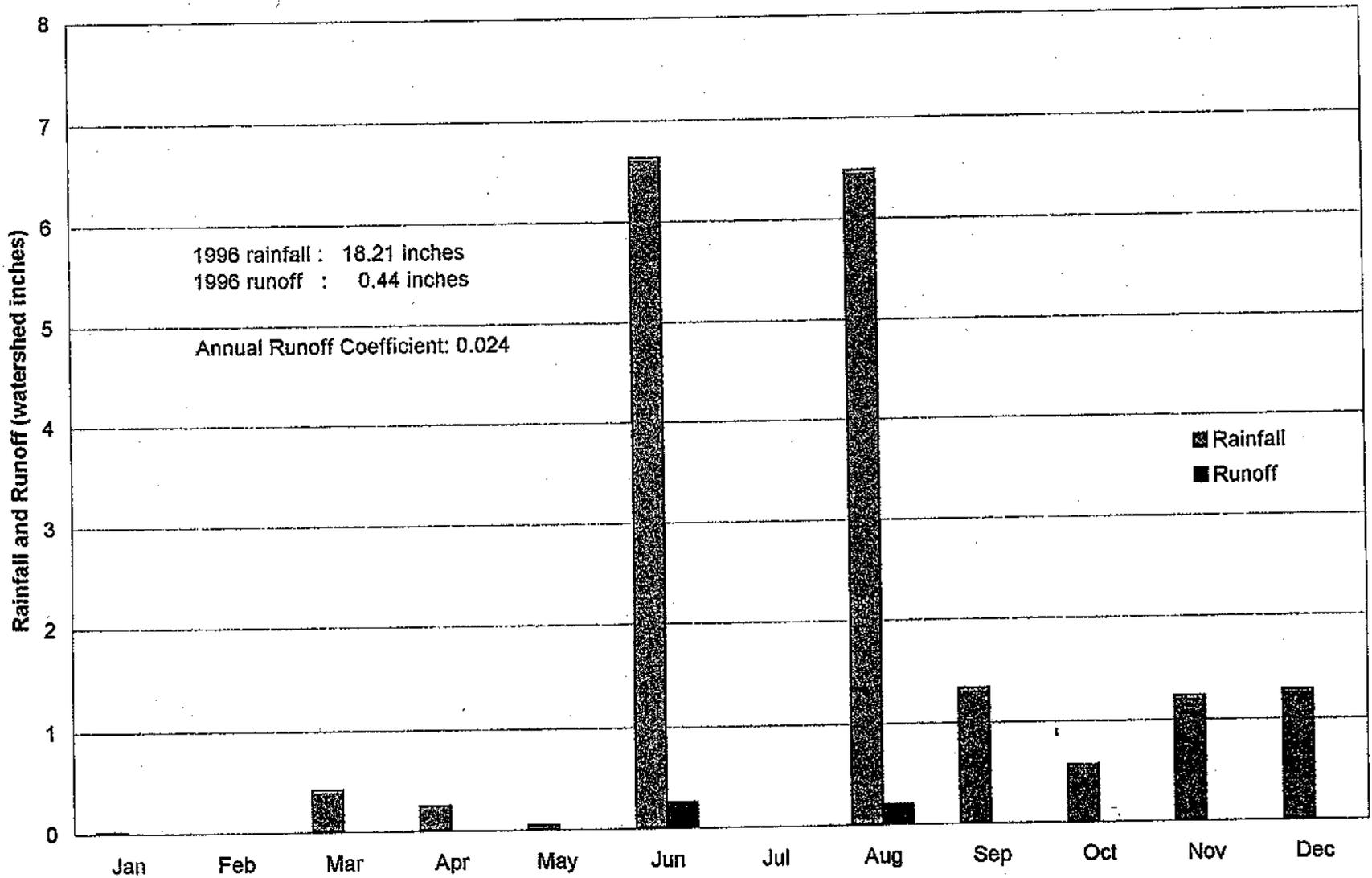
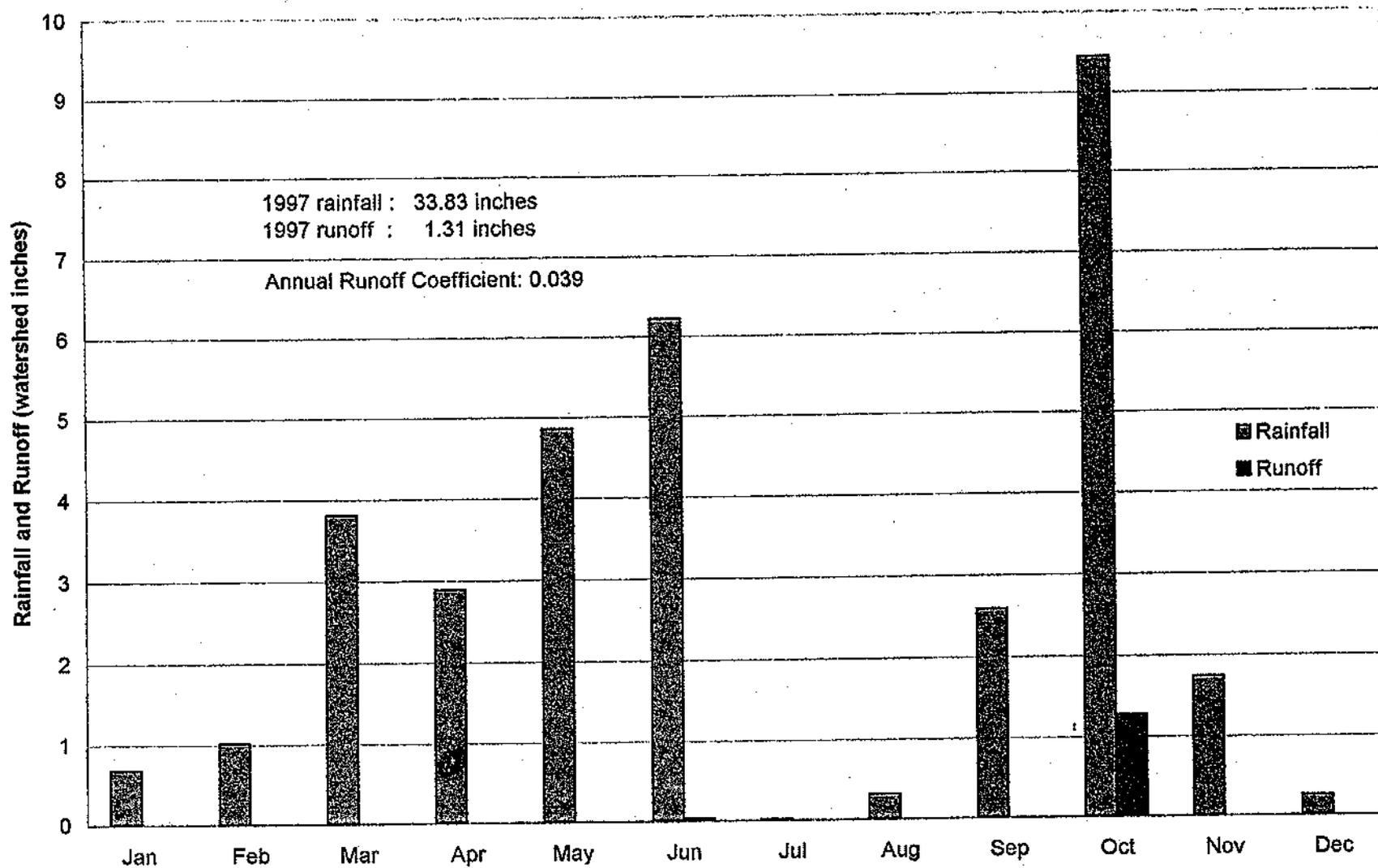


Figure 6

**Monthly Rainfall and Runoff - 1997**  
**2775 acre Odem Ranch Watershed**



**Figure 7**

Monthly Rainfall and Runoff Jan - May, 1998  
2775 acre Odem Ranch Watershed

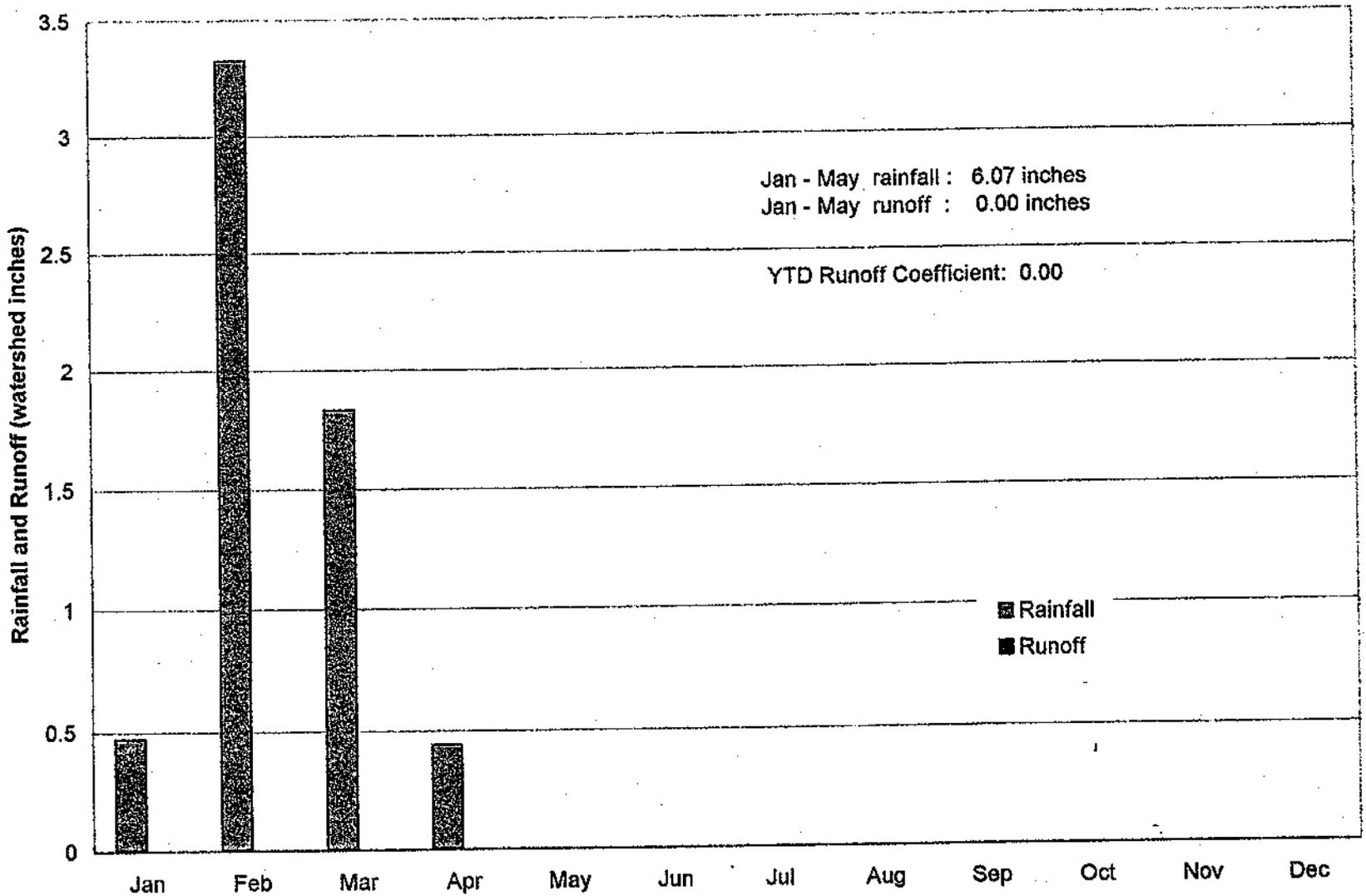


Figure 8

# Odem Ranch Watershed, Edroy, Texas -- Cumulative Rainfall and Runoff

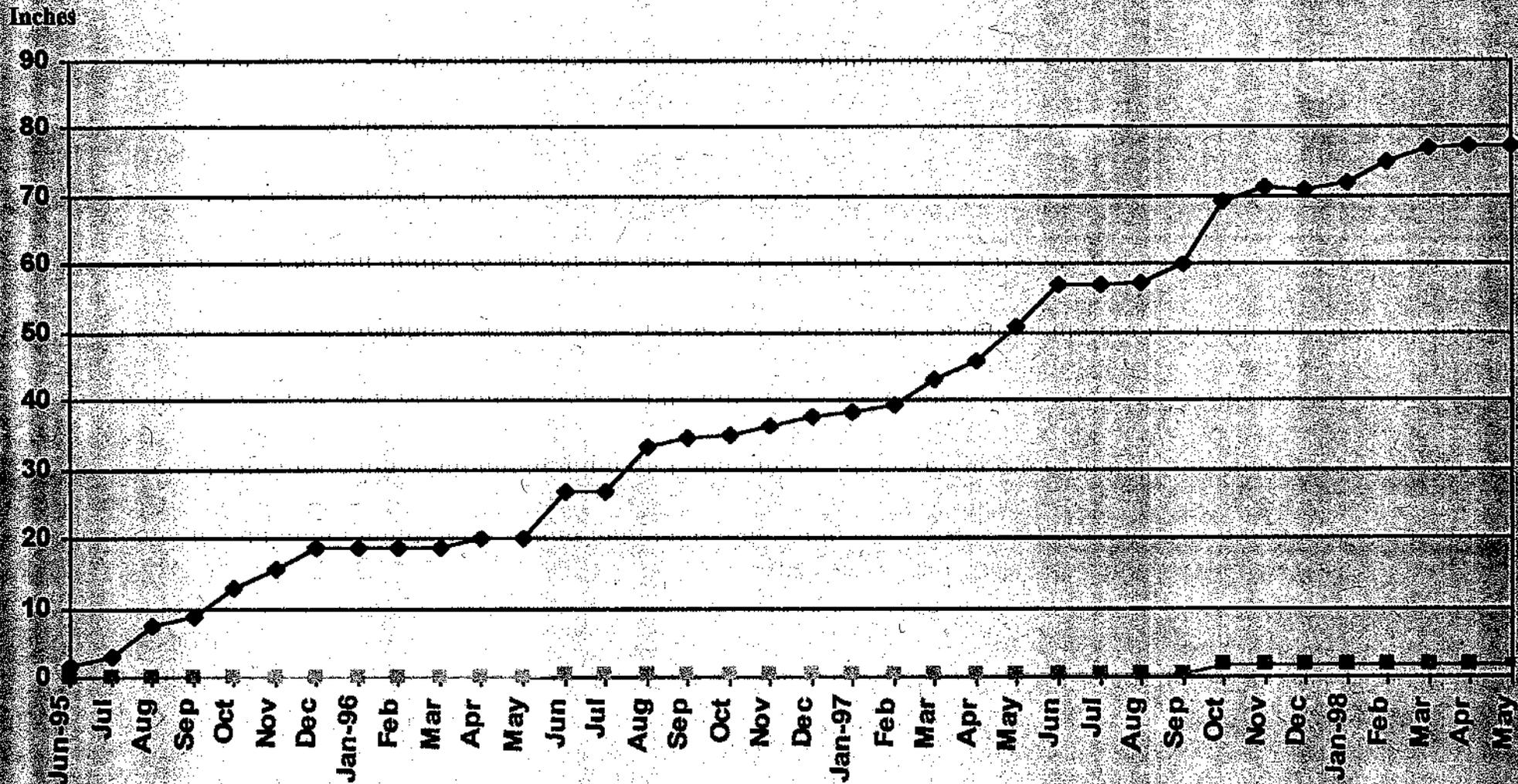
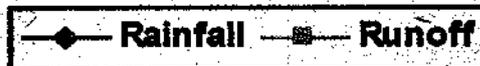


Figure 9



Monthly Rainfall and Runoff - 1996  
46,400 acre San Fernando/Petronila Watershed

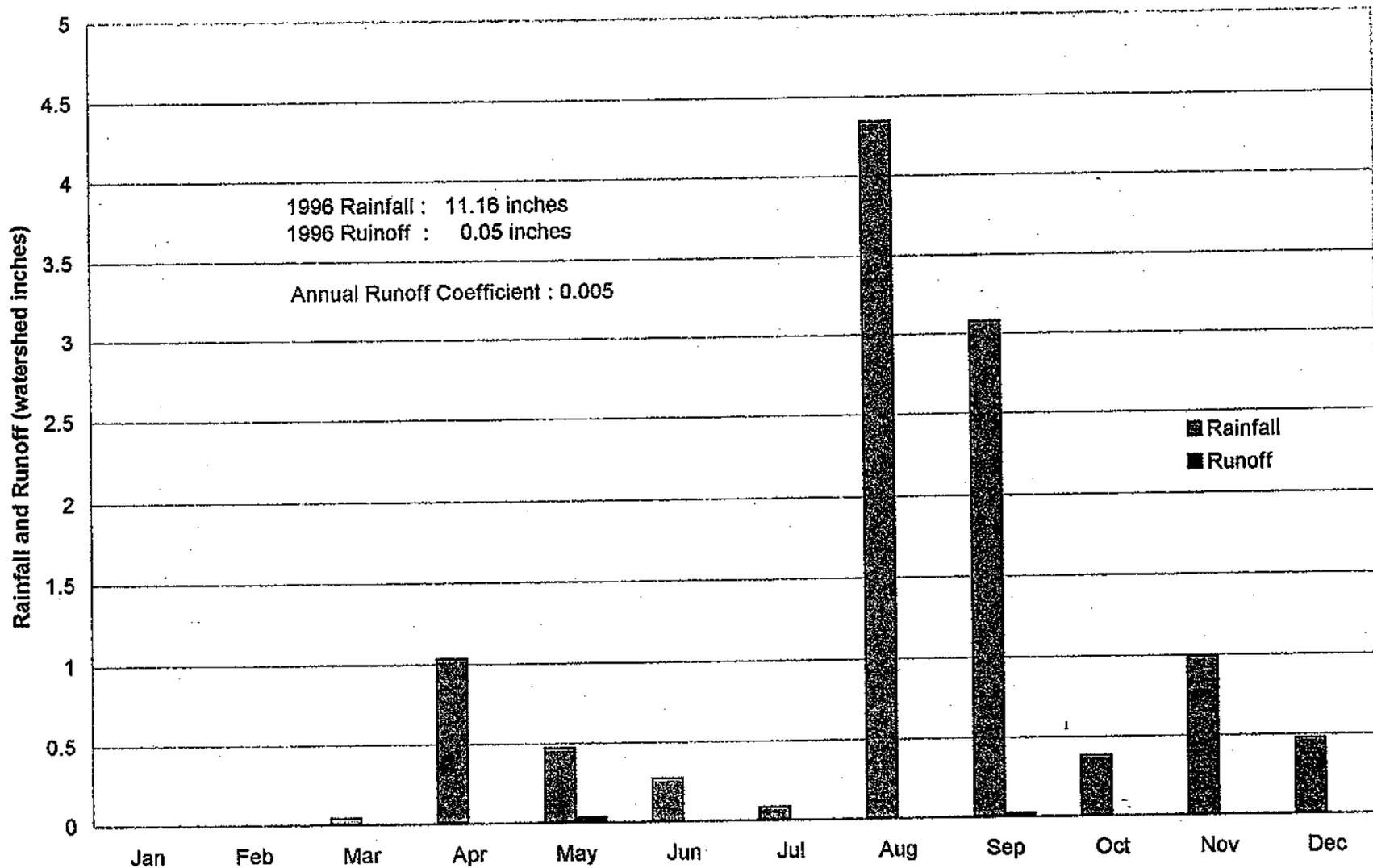
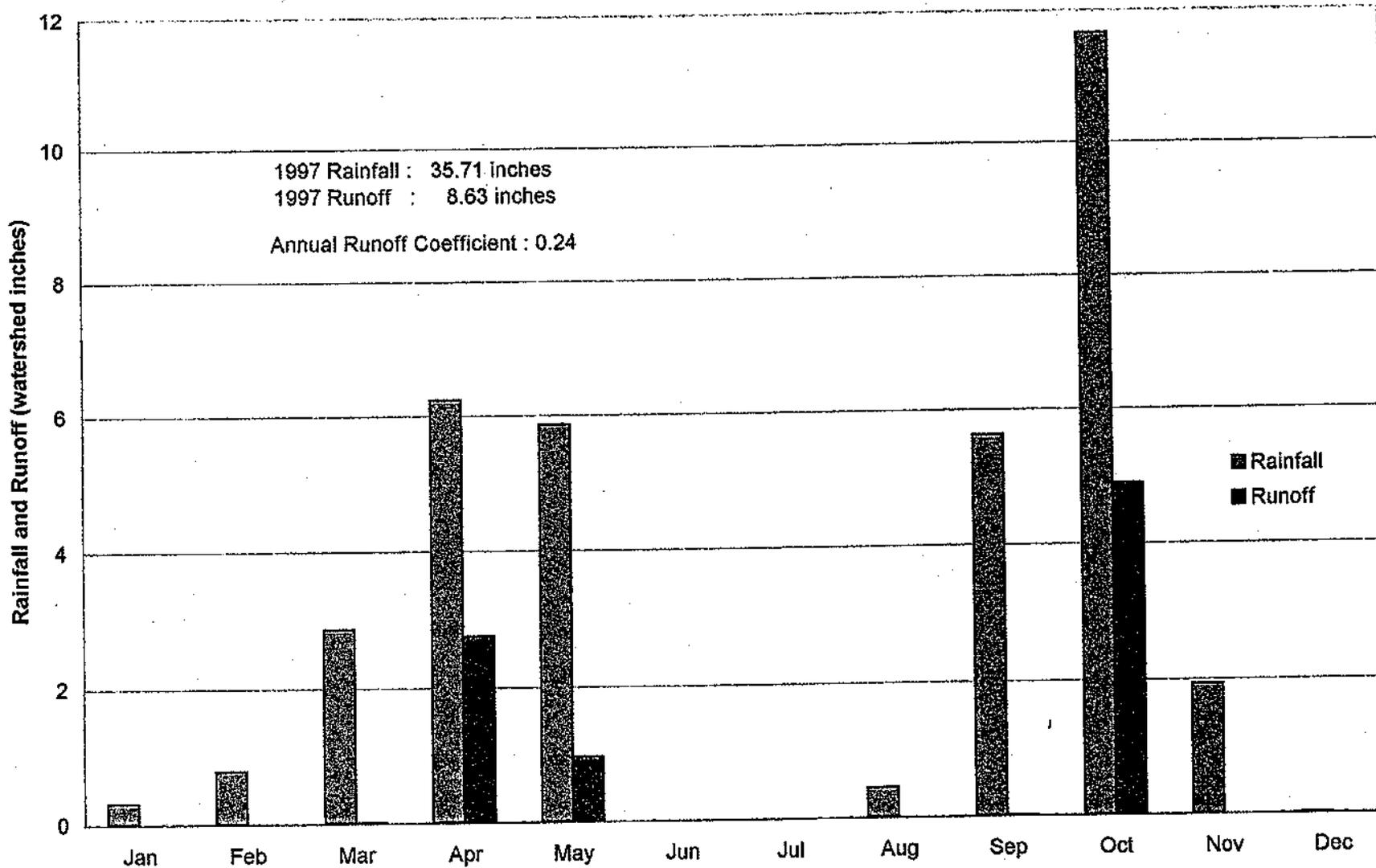


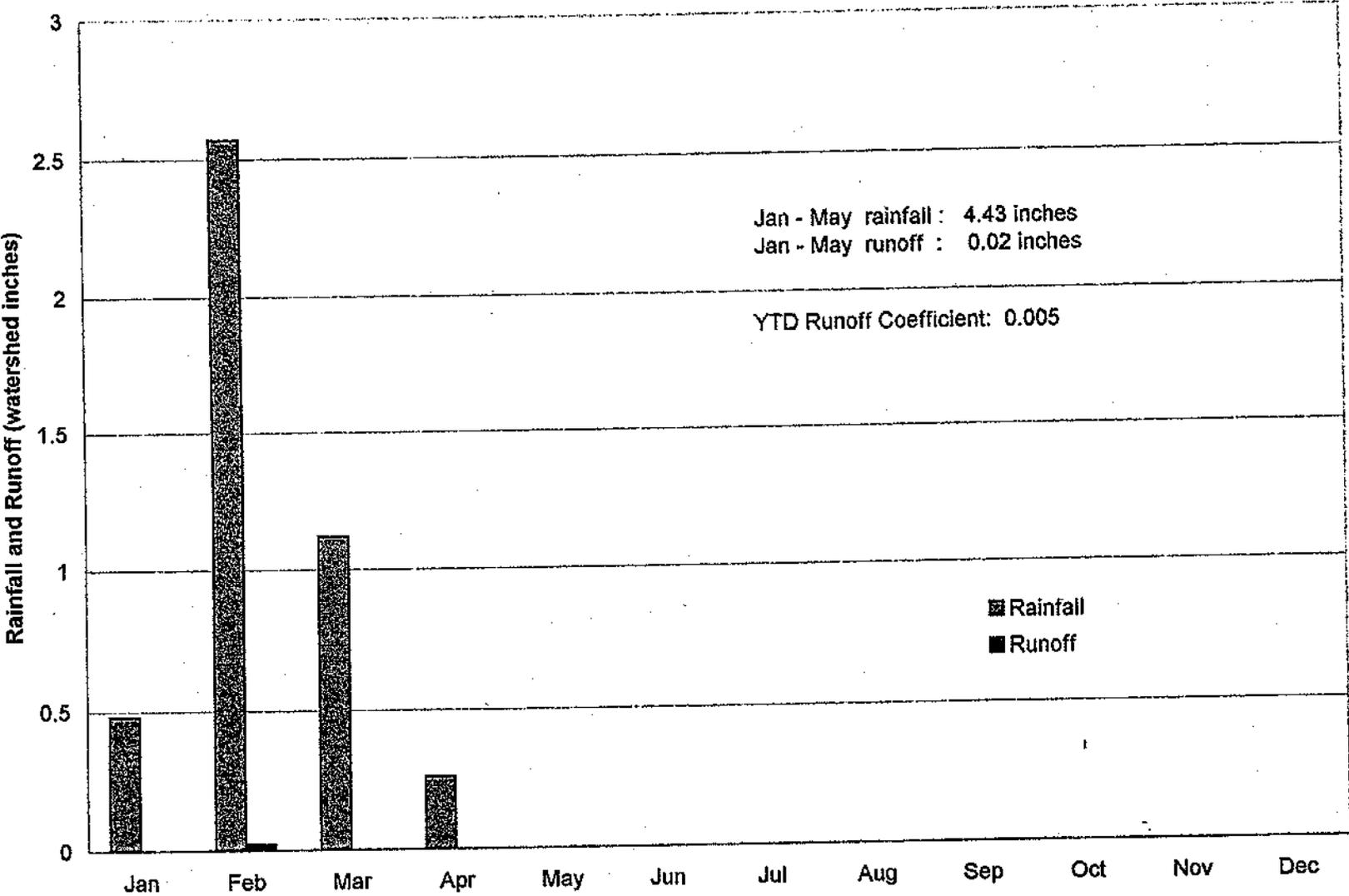
Figure 10

**Monthly Rainfall and Runoff - 1997**  
**46,400 acre San Fernando/Petronila Watershed**



**Figure 11**

**Monthly Rainfall and Runoff Jan - May, 1998**  
**46,400 acre San Fernando/Petronila Watershed**



**Figure 12**

# King Ranch Croplands, Kingsville, TX. -- Cumulative Rainfall and Runoff

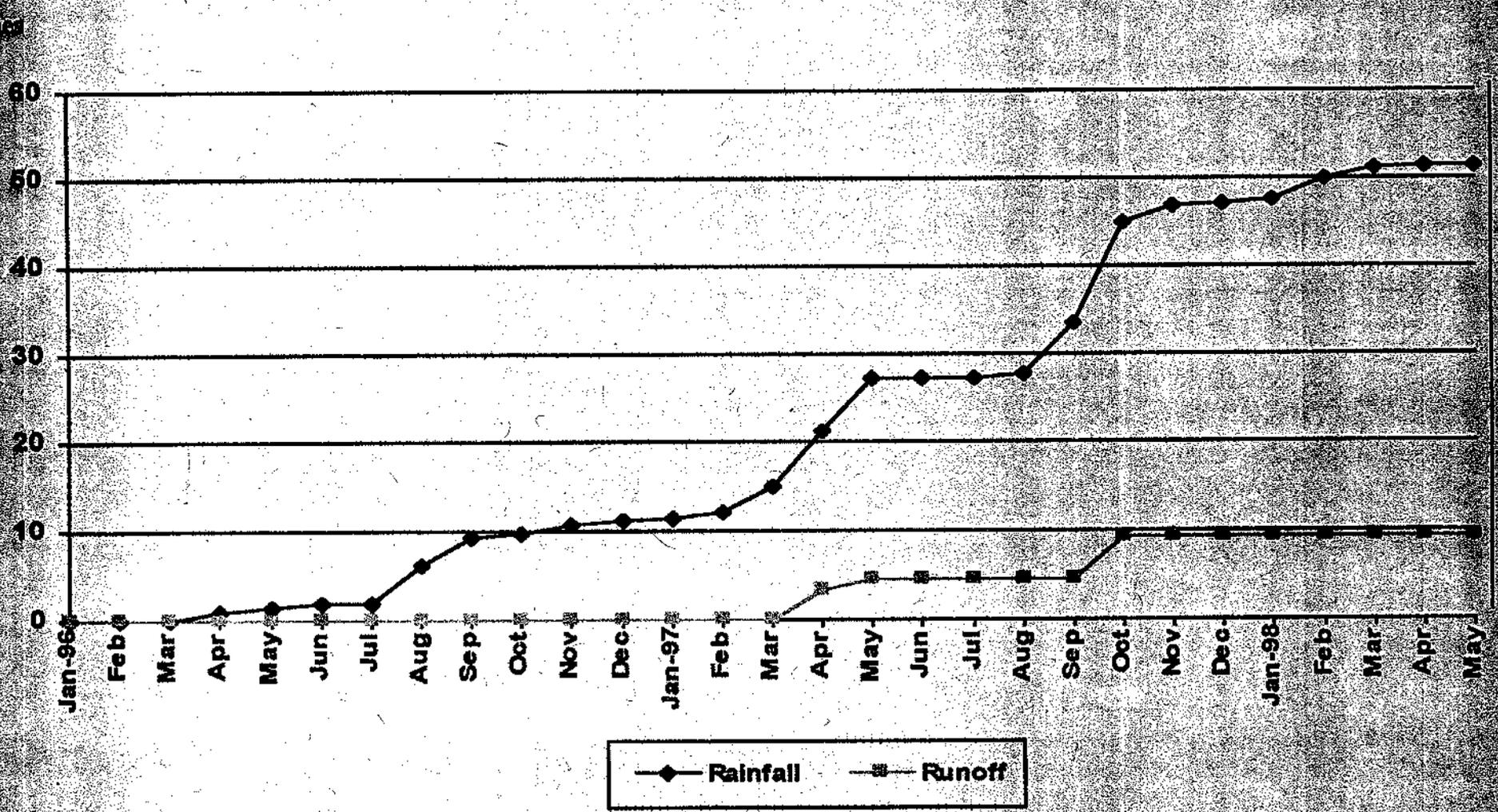


Figure 13

# **Attachment 7: Statement of Legal Authority for TNRCC Regulation of NPS Pollution**

STATEMENT OF LEGAL AUTHORITY THAT § 26.121 OF THE  
TEXAS WATER CODE CAN BE USED TO PREVENT NONPOINT SOURCE  
POLLUTION AND REQUIRE MANAGEMENT MEASURE IMPLEMENTATION

As the Deputy Director of the Office of Legal Services of the Texas Natural Resource Conservation Commission (TNRCC or commission), I am authorized to represent the Executive Director of the TNRCC in administrative enforcement actions and rulemaking. The legal foundation for many of these actions includes reliance on § 26.121 of the Texas Water Code as the basis for enforcement actions and rulemaking related to nonpoint source (NPS) pollution.

This statement certifies that the TNRCC has existing enforcement policies and mechanisms to regulate nonpoint source (NPS) pollution. In addition to the proposed Texas Coastal Nonpoint Source Pollution Control Program and specific authorities cited therein, § 26.121 of the Texas Water Code generally prohibits any discharge of waste into or adjacent to waters in the state except as authorized by the TNRCC. The term "to discharge" is defined in Section 26.001(20) of the Texas Water Code as "... to deposit, conduct, drain, emit, throw, run, allow to seep, or otherwise release or dispose of, or allow, permit, or suffer any of these acts or omissions." Based on this definition, the TNRCC can regulate NPS pollution that constitutes a discharge under § 26.121. The TNRCC relies on § 26.121 to regulate NPS pollution both through regulatory programs and through direct enforcement of § 26.121.

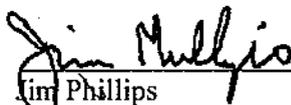
Section 26.121 provides statutory authority for adopting rules to prevent nonpoint source pollution and to require implementation of management measures for that purpose. Some of the existing TNRCC rules that regulate NPS pollution are listed in Table 2: Texas Nonpoint Source Programs of the proposed Texas Coastal Nonpoint Source Pollution Control Program. The TNRCC uses these rules to prevent NPS pollution and has the authority to amend them as necessary. In addition to enforcing these rules, the TNRCC may regulate NPS pollution by directly enforcing the prohibition against identifiable discharges as provided in § 26.121.

Enforcement actions may be initiated under Chapter 7 of the Texas Water Code for violations of § 26.121 of the Texas Water Code. Remedies include requiring unauthorized dischargers to pay penalties and remediate pollution. Corrective actions may include either remediating existing pollution or eliminating potential sources of future NPS pollution, or both.

The TNRCC relies on § 26.121 both as its primary authority for implementing regulatory programs to prevent NPS pollution and as backup authority to address existing NPS pollution. This strategy has proven effective and will continue to be used to regulate NPS pollution.

11/24/98

Date



Jim Phillips

Deputy Director

TNRCC, Office of Legal Services

# **Attachment 8: Classified Segments and Site-Specific Standards in the Texas Coastal Management Program**

## Attachment 8: Classified Segments and Site-specific Standards in the Texas Coastal Management Program

CR = Contact Recreation      NCR = Noncontact Recreation      TDS = Total Dissolved Solids

Aquatic Life Uses:    E = Exceptional      H = High      I = Intermediate      O = Oyster Waters

Other Uses:            PS = Public Water Supply      IS = Industrial Water Supply      N = Navigation

COASTAL RIVERS		USES				CRITERIA						
		Recreation	Aquatic Life	Domestic Water Supply	Other	Cl <sup>-1</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	TDS (mg/L)	Dissolved Oxygen (mg/L)	pH Range (SU)	Fecal Coliform #/100ml	Temperature (°F)
Segment No.	SEGMENT NAME											
0501	Sabine River Tidal	CR	H						4.0	6.5-9.0	200	95
0508	Adams Bayou Tidal	CR	H						4.0	6.5-9.0	200	95
0511	Cow Bayou Tidal	CR	H						4.0	6.5-9.0	200	95
0601	Neches River Tidal	CR	I						3.0	6.5-9.0	200	95
0701	Taylor Bayou Above Tidal	CR	I		400	100	1,100	4.0	6.5-9.0	200	95	
0702	Intracoastal Waterway Tidal	CR	H					4.0	6.5-9.0	200	95	
0703	Sabine-Neches Canal Tidal	CR	H					4.0	6.5-9.0	200	95	
0704	Hillebrandt Bayou	CR	I		250	100	600	4.0	6.5-9.0	200	95	
0801	Trinity River Tidal	CR	H					4.0	6.5-9.0	200	95	
0901	Cedar Bayou Tidal	CR	H					4.0	6.5-9.0	200	95	
1001	San Jacinto River Tidal	CR	H					4.0	6.5-9.0	200	95	

Attachment 8, continued

COASTAL RIVERS		USES				CRITERIA					
		Recreation	Aquatic Life	Domestic Water Supply	Other	Cl <sup>-1</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	TDS (mg/L)	Dissolved Oxygen (mg/L)	pH Range (SU)	Fecal Coliform #/100ml
Segment No.	SEGMENT NAME										
1005	Houston Ship Channel/San Jacinto River Tidal	NCR	H					4.0	6.5-9.0	200	95
1006*	Houston Ship Channel Tidal				N/IS			2.0	6.5-9.0	168**	95
1007*	Houston Ship Channel/Buffalo Bayou Tidal				N/IS			1.0	6.5-9.0	168**	95
1013	Buffalo Bayou Tidal	CR	I					3.0	6.5-9.0	200	95
1101	Clear Creek Tidal	CR	H					4.0	6.5-9.0	200	95
1103	Dickinson Bayou Tidal	CR	H					4.0	6.5-9.0	200	95
1105	Bastrop Bayou Tidal	CR	H					4.0	6.5-9.0	200	95
1107	Chocolate Bayou Tidal	CR	H					4.0	6.5-9.0	200	95
1109	Oyster Creek Tidal	CR	H					4.0	6.5-9.0	200	95
1111	Old Brazos River Channel Tidal	CR	H					4.0	6.5-9.0	200	95
1113	Armand Bayou Tidal	CR	H					4.0	6.5-9.0	200	95
1201	Brazos River Tidal	CR	H	PS***				4.0	6.5-9.0	200	95
1301	San Bernard River Tidal	CR	H					4.0	6.5-9.0	200	95
1304	Caney Creek Tidal	CR	H					4.0	6.5-9.0	200	95
1401	Colorado River Tidal	CR	H					4.0	6.5-9.0	200	95
1501	Tres Palacios Creek Tidal	CR	E					5.0	6.5-9.0	200	95
1601	Lavaca River Tidal	CR	H					4.0	6.5-9.0	200	95
1603	Navidad River Tidal	CR	H	PS				4.0	6.5-9.0	200	95

Attachment 8, continued

COASTAL RIVERS		USES				CRITERIA						
		Recreation	Aquatic Life	Domestic Water Supply	Other	Cl <sup>-1</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	TDS (mg/L)	Dissolved Oxygen (mg/L)	pH Range (SU)	Fecal Coliform #/100ml	Temperature (°F)
Segment No.	SEGMENT NAME											
1701	Victoria Barge Canal Tidal	NCR	H						4.0	6.5-9.0	200	95
1801	Guadalupe River Tidal	CR	E						5.0	6.5-9.0	200	95
2001	Mission River Tidal	CR	H						4.0	6.5-9.0	200	95
2003	Aransas River Tidal	CR	H						4.0	6.5-9.0	200	95
2004	Aransas River Above Tidal	CR	H		300	50	600	5.0	6.5-9.0	200	95	
2101	Nueces River Tidal	CR	E					5.0	6.5-9.0	200	95	
2201	Arroyo Colorado Tidal	CR	H					4.0	6.5-9.0	200	95	
2203	Petronila Creek Tidal	CR	H					4.0	6.5-9.0	200	95	
2204	Petronila Creek Above Tidal****	CR	I		1,500	500	4,000	4.0	6.5-9.0	200	95	
2301	Rio Grande Tidal	CR	E					5.0	6.5-9.0	200	95	
									6.5-9.0	200	95	

\* Chronic numerical toxic criteria and chronic total toxicity requirements apply to Segments 1006 and 1007.

\*\* 30-day geometric mean enterococci density (colonies/100ml); the maximum enterococci density in 10% of samples in a 30-day period if greater than 10 samples or in a single sample if fewer than 10 samples are collected is 500 colonies/100ml.

\*\*\* The public supply designation for Segment 1201 only applies from the upstream boundary to 300 meters (330 yards) downstream of SH 332 in Brazoria County.

\*\*\*\* High concentrations of chlorides, sulfates and total dissolved solids in Segment 2204 are due to past brine discharges which were halted effective 1/10/87 by order of the Texas Railroad Commission. Water quality is expected to improve as residual brines are flushed from the system. These estimated criteria are subject to modification as improvement in water quality is documented.

Attachment 8, continued

BAYS AND ESTUARIES		USES				CRITERIA						
		Recreation	Aquatic Life	Domestic Water Supply	Other	Cl <sup>-1</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	TDS (mg/L)	Dissolved Oxygen (mg/L)	pH Range (SU)	Fecal Coliform #/100ml	Temperature (°F)
Segment No.	SEGMENT NAME											
2411	Sabine Pass	CR	E/O						5.0	6.5-9.0	14	95
2412	Sabine Lake	CR	H/O						4.0	6.5-9.0	14	95
2421	Upper Galveston Bay	CR	H/O						4.0	6.5-9.0	14	95
2422	Trinity Bay	CR	H/O						4.0	6.5-9.0	14	95
2423	East Bay	CR	H/O						4.0	6.5-9.0	14	95
2424	West Bay	CR	H/O						4.0	6.5-9.0	14	95
2425	Clear Lake	CR	H						4.0	6.5-9.0	200	95
2426	Tabbs Bay	CR	H						4.0	6.5-9.0	200	95
2427	San Jacinto Bay	CR	H						4.0	6.5-9.0	200	95
2428	Black Duck Bay	CR	H						4.0	6.5-9.0	200	95
2429	Scott Bay	CR	H						4.0	6.5-9.0	200	95
2430	Burnett Bay	CR	H						4.0	6.5-9.0	200	95
2431	Moses Lake	CR	H						4.0	6.5-9.0	200	95
2432	Chocolate Bay	CR	H/O						4.0	6.5-9.0	14	95
2433	Bastrop Bay/Oyster Lake	CR	H/O						4.0	6.5-9.0	14	95
2434	Christmas Bay	CR	H/O						4.0	6.5-9.0	14	95
2435	Drum Bay	CR	H/O						4.0	6.5-9.0	14	95
2436	Barbours Cut	CR	H						4.0	6.5-9.0	200	95
2437	Texas City Ship Channel	NCR	H						4.0	6.5-9.0	200	95

Attachment 8, continued

BAYS AND ESTUARIES		USES				CRITERIA					
		Recreation	Aquatic Life	Domestic Water Supply	Other	Cl <sup>-1</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	TDS (mg/L)	Dissolved Oxygen (mg/L)	pH Range (SU)	Fecal Coliform #/100ml
Segment No.	SEGMENT NAME										
2438	Bayport Channel	NCR	H					4.0	6.5-9.0	200	95
2439	Lower Galveston Bay	CR	H/O					4.0	6.5-9.0	14	95
2441	East Matagorda Bay	CR	E/O					5.0	6.5-9.0	14	95
2442	Cedar Lakes	CR	H/O					4.0	6.5-9.0	14	95
2451	Matagorda Bay/Powderhorn Lake	CR	E/O					5.0	6.5-9.0	14	95
2452	Tres Palacios Bay/Turtle Bay	CR	E/O					5.0	6.5-9.0	14	95
2453	Lavaca Bay/Chocolate Bay	CR	E/O					5.0	6.5-9.0	14	95
2454	Cox Bay	CR	E/O					5.0	6.5-9.0	14	95
2455	Keller Bay	CR	E/O					5.0	6.5-9.0	14	95
2456	Carancahua Bay	CR	E/O					5.0	6.5-9.0	14	95
2461	Espiritu Santo Bay	CR	E/O					5.0	6.5-9.0	14	95
2462	San Antonio Bay/Hynes Bay/Guadalupe Bay	CR	E/O					5.0	6.5-9.0	14	95
2463	Mesquite Bay/Carlos Bay/Ayres Bay	CR	E/O					5.0	6.5-9.0	14	95
2471	Aransas Bay	CR	E/O					5.0	6.5-9.0	14	95
2472	Copano Bay/Port Bay/Mission Bay	CR	E/O					5.0	6.5-9.0	14	95
2473	St. Charles Bay	CR	E/O					5.0	6.5-9.0	14	95
2481	Corpus Christi Bay	CR	E/O					5.0	6.5-9.0	14	95
2482	Nueces Bay	CR	E/O					5.0	6.5-9.0	14	95
2483	Redfish Bay	CR	E/O					5.0	6.5-9.0	14	95

Attachment 8, continued

BAYS AND ESTUARIES		USES				CRITERIA						
		Recreation	Aquatic Life	Domestic Water Supply	Other	Cl <sup>-1</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	TDS (mg/L)	Dissolved Oxygen (mg/L)	pH Range (SU)	Fecal Coliform #/100ml	Temperature (°F)
Segment No.	SEGMENT NAME											
2484	Corpus Christi Inner Harbor	NCR	I						3.0	6.5-9.0	200	95
2485	Oso Bay	CR	E/O						5.0	6.5-9.0	14	95
2491	Laguna Madre	CR	E/O						5.0	6.5-9.0	14	95
2492	Baffin Bay/Alazan Bay/Cayo del Grullo/Laguna Salada	CR	H/O						4.0	6.5-9.0	14	95
2493	South Bay	CR	E/O						5.0	6.5-9.0	14	95
2494	Brownsville Ship Channel	NCR	E						5.0	6.5-9.0	200	95

GULF OF MEXICO		USES				CRITERIA						
		Recreation	Aquatic Life	Domestic Water Supply	Other	Cl <sup>-1</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	TDS (mg/L)	Dissolved Oxygen (mg/L)	pH Range (SU)	Fecal Coliform #/100ml	Temperature (°F)
Segment No.	SEGMENT NAME											
2501	Gulf of Mexico	CR	E/O						5.0	6.5-9.0	14	95

# **Attachment 9: Public Comments**

**FEDERAL AGENCY ACTIVITIES:**

Applicant: Gulf of Mexico Fishery Management Council; Project Number: 98-0245-F2; Description of Proposed Activity: Pursuant to Section 305(b)(1)(A and B) of the Magnuson Stevens Fishery Conservation and Management Act, the applicant proposes a "Generic Amendment Addressing Essential Fish Habitat Requirements in Fishery Management Plans of the Gulf of Mexico." The amendment identifies and describes essential fish habitat (EFH) for species managed by the Council. It also identifies threats to EFH and discusses conservation and enhancement measures for EFH. No management measures are proposed at this time.

Pursuant to §306(d)(14) of the Coastal Zone Management Act of 1972 (16 U.S.C.A. §§1451-1464), as amended, interested parties are invited to submit comments on whether a proposed action should be referred to the Coastal Coordination Council for review and whether the action is or is not consistent with the Texas Coastal Management Program goals and policies. All comments must be received within 30 days of publication of this notice and addressed to Janet Fatheree, Council Secretary, 1700 North Congress Avenue, Room 617, Austin, Texas 78701-1495.

TRD-9809315

Garry Mauro

Chairman

Coastal Coordination Council

Filed: June 10, 1998

◆ ◆ ◆  
**Notice of Availability and Request for Public Comment**

The Coastal Coordination Council (Council) announces the availability of a draft document describing the Texas Coastal Nonpoint Source Program for public review and comment. The program is being developed under §6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (Public Law 101-508, Title VI, §6217, November 5, 1990, 104 Statutes 1308-314, codified at 16 U.S.C. §1455b). This section requires Texas and all other states administering feder-

ally approved coastal management programs to develop a program for implementing certain measures to manage nonpoint sources of pollution to coastal waters. The proposed Texas Coastal Nonpoint Source Program would, as required by §6217, be closely coordinated with other state water quality programs, including those under the Clean Water Act. Accordingly, lead agencies for preparation of the draft document have been the Texas Natural Resource Conservation Commission and the State Soil and Water Conservation Board. The Texas Department of Transportation and the General Land Office also contributed to the draft document.

Written comments will be accepted for a period of 30 days from the date this notice is published. A revised draft of the document will then be produced taking these comments into consideration. The Council anticipates making the revised draft available for public review and comment later this year. When the final document describing the Texas Coastal Nonpoint Source Program is approved by the Council, it will be submitted to the National Oceanographic and Atmospheric Administration and the U.S. Environmental Protection Agency for approval.

The draft document is available either via the internet at [www.glo.state.tx.us/coastal/nps.html](http://www.glo.state.tx.us/coastal/nps.html) or in hard copy by contacting Janet Fatheree, Council Secretary, at (512) 463-5385. Comments on the document should be submitted to Ms. Fatheree, General Land Office, 1700 North Congress Avenue, Room 617, Austin, Texas 78701-1495; by Fax: (512) 475-0680. The deadline for comments is 5:00 p.m., Monday, July 20, 1998.

TRD-9809270

Garry Mauro

Chairman

Coastal Coordination Council

Filed: June 9, 1998

◆ ◆ ◆  
**Comptroller of Public Accounts**

Local Sales Tax Rate Changes Effective July 1, 1998

**From:** Helen Drummond <HDRUMMON@tnrcc.state.tx.us>  
**To:** GLO.WPGATE("jfather@glo.state.tx.us")  
**Date:** 7/15/98 11:06pm  
**Subject:** Texas Coastal NPS Program Draft

GBEPs comments are outlined below:

1. In general, the report was comprehensive; however, there was little information on how implementation of the program is going to be funded.
2. Page 82, Chapter 5. This section mentions the State's Approach to Managing NPS and the use of watershed management and TMDLs. It would be beneficial to incorporate how the different programs will be implemented and how the existing regional programs will be used.
3. Page 93, Section 5.4. See Attached. Please note that additions are redlined.

**CC:** GLO.WPGATE("mbrownin@tnrcc.state.tx.us")

The Galveston Bay Estuary Program is a partnership of bay stakeholders currently working to implement *The Galveston Bay Plan*. ~~There are action plans dealing with habitat and species protection, freshwater inflows, spills and dumping, exotic species, point sources of pollution and nonpoint sources of pollution, identified in The Plan to protect and restore the health of the estuary while supporting economic and recreational activities.~~ *The Plan* outlines nine action plans in the areas of habitat and species protection, freshwater inflows, spills and dumping, exotic species, shoreline management, point sources of pollution, nonpoint sources of pollution, and public health, to protect and preserve the economic, ecological and recreational viability of the estuary. There are 82 initiatives outlined under these nine action plans with the GBEP taking a leading role in facilitating and coordinating the implementation of these initiatives.

Nonpoint source pollution is the number one identified water quality problem. The Plan identifies the following actions to address this problem. They include:

Developing and implementing a Galveston Bay public education program aimed at pollution reduction from residential areas;

Compiling a Galveston Bay BMP Performance Document to inventory NPS Control techniques which have been evaluated;

Identifying and correcting priority watershed pollutant problems by maintaining and publishing an inventory of NPS concerns in the bay watershed;

Working with local and regional entities to adopt regional construction standards for NPS reduction and implement toxics and nutrient control practices;

Encouraging sewage pumpout, storage and provisions for treatment; and

Implementing storm water programs for local municipalities.

~~To accomplish this GBEP convened a forum for information sharing amongst Galveston Bay stakeholders involved in nonpoint source pollution prevention/control activities, provides technical assistance to local and county governments, and educates and reaches out to children and adult citizens.~~

The GBEP facilitates and coordinates implementation of these actions by conducting demonstration projects, providing technical and informational assistance to local and county governments and the public, and by providing a forum for information sharing amongst Galveston Bay stakeholders involved in nonpoint source pollution prevention/control activities. This year the GBEP is partnering with the Houston-Galveston Area Council, Galveston County Health District, the Galveston Bay Foundation and the Texas A&M Sea Grant Program to:

provide technical assistance to local governments on storm water management;

conduct a project to provide technical assistance to small businesses on implementation of waste minimization strategies and general best management practices;

develop, maintain, and publish an inventory of NPS concerns in the bay watershed;

implement a bay-wide public education program aimed at pollution reduction from residential areas through illustration, presentations and workshops; and

conduct voluntary inspections and provide information assistance to reduce bacterial pollution caused by malfunctioning septic systems.

From: Tom Remaley <TREMALE@mailgw.dot.state.tx.us>  
To: GLO.WPGATE("JFathere@glo.state.tx.us")  
Date: 7/20/98 4:02pm  
Subject: Comments on Coastal NPS Document

The staff of the Texas Department of Transportation would like to provide the following comments on the document titled "TEXAS COASTAL NONPOINT SOURCE POLLUTION CONTROL PROGRAM."

First, a minor clerical mistake can be found in the Table of Contents which incorrectly enumerates the section on "Roads, Highways and Bridges."

More importantly, the authoring agencies have added a great deal of material to this section. It calls for management measures which were not included in the version of this section which was provided to them by TxDOT. TxDOT cannot support all of these additions and will discuss this further as we move toward finalization of the document.

Most notably, TxDOT cannot support the requirement that management systems be developed and implemented for currently existing roadways. (see pages 146-147). While we recognize that the authoring agencies derived this language from EPA guidance, we must stress that, as guidance, it does not need to be made a part of the Texas plan in every detail.

Further, the need for this requirement is questionable in light of a lack of identified instream water quality impairments which can be linked to in-place transportation infrastructure.

Finally, the wording pertaining to these additional management measures is confusing. We suggest that the phrase "management measure specifications" be replaced with simply "management measures" throughout the section.

We appreciate the opportunity to provide these comments and look forward to working with you in the future as Texas implements the Coastal Zone Management Plan.