Texas Nonpoint Source Management Program

Texas Commission on Environmental Quality

Texas State Soil and Water Conservation Board

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Texas Nonpoint Source Management Program

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Prepared by the

Texas Commission on Environmental Quality
and the
Texas State Soil and Water Conservation Board

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CHAPTER 1 INTRODUCTION

Water quality is degraded when storm water runoff carries pollutants such as motor oil from automobiles, fertilizers from landscapes or farms, and sediments from construction sites into downstream creeks, rivers, lakes, aquifers, and estuaries. This is nonpoint source (NPS) water pollution. Decisions made today about how to manage nonpoint sources of pollution determine the quantity and quality of water resources for future generations. A dynamic and effective nonpoint source program, implemented now, that focuses on planning, good science, and fiscal responsibility will save future generations the expense of cleaning up what we leave behind and provide good-quality water for the use and enjoyment of all Texans.

> ***NPS pollution*** is caused by rainfall or snowmelt moving over and through the ground. As the water moves over, or through, the ground, it picks up and carries away natural and human-made pollutants, eventually depositing them into lakes, rivers, wetlands, coastal waters, and groundwater. These pollutants include:
>
> - excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas;
> - oil, grease, and toxic chemicals from urban runoff and energy production;
> - sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks;
> - salt from irrigation practices, petroleum production, acid drainage from abandoned mines, and natural salt deposits;
> - bacteria and nutrients from livestock, pet wastes, faulty septic systems, and wildlife;
> - atmospheric deposition and hydromodification.

This report outlines Texas' comprehensive management strategy to protect and restore water impacted by nonpoint sources of pollution and is jointly developed by the Texas Commission on Environmental Quality (TCEQ) and the Texas State Soil and Water Conservation Board (TSSWCB). NPS management is a collaborative effort and the responsibility of all programs described in this document. This document represents a toolbox for the state to manage NPS pollution by listing the programs and processes throughout the state that address NPS pollution. This plan provides for the coordination of NPS related activities, establishment of statewide goals, prioritization of assessment and implementation activities, and elimination of duplication of effort among participating stakeholders.

Nine Elements of Texas' NPS Management Program

As prescribed by current Nonpoint Source EPA guidelines, Texas' program incorporates EPA's nine key elements of an effective program, which allow for maximum flexibility in managing NPS pollution. These elements are listed below, with a summary of how the state has addressed them in its program. Many specific examples of the state's application of the nine key elements may be found throughout this document in the descriptions of various state programs and their management strategies for NPS pollution.

Element 1

Explicit short- and long-term goals, objectives and strategies that protect surface and groundwater.

The section "Goals for NPS Management", as described in Chapter 2, details TSSWCB and TCEQ long and short term goals of the Nonpoint Source Program. Many individual programs have also established long and short term goals that are compatible with these goals.

Element 2

Working partnerships and linkages to appropriate state, interstate, tribal, regional, and local entities, private sector groups, and Federal agencies.

Surface water and aquifers are not limited by political boundaries and, as a result, environmental solutions often cross federal, state, and local levels of responsibility. With the extent and variety of water quality issues across Texas, the need for cooperation at all levels is essential.

The state coordinates, develops, and implements the NPS program by using the existing infrastructure of the Clean Rivers Program (CRP), Soil and Water Conservation Districts (SWCDs), Texas Groundwater Protection Committee (TGPC), and the University System in order to leverage the efforts of state, federal, regional, and local entities. Through this infrastructure, the state establishes working partnerships for obtaining consensus and input on NPS issues. TCEQ and TSSWCB programs use the statewide Watershed Approach, as described in Chapter 3, to organize the participation of all stakeholders to:

- identify priority watersheds with NPS water quality problems;
- formulate the steps necessary to alleviate any known water quality problems within those watersheds; and
- secure and target resources in order to develop and implement NPS strategies that restore water quality.

A description of various agencies and stakeholder programs, along with coordination of roles and table of MOAs / MOUs between the partners, can be found in Chapter 4.

Element 3

Balanced approach that emphasizes both state-wide nonpoint source programs and on-the-ground management of individual watersheds.

Activities in Texas that address NPS pollution involve both statewide strategies and local initiatives. NPS activities are managed with a geographical focus where work is directed at the level in which it can be most effective. For example, one of the Texas' primary statewide efforts is public outreach and education, which is accomplished through activities of the TCEQ and TSSWCB Nonpoint Source Programs. The TSSWCB educates producers throughout the state on how their activities may contribute to NPS pollution, measures they can take to minimize their impacts, and money that is available to help them implement these measures. This is accomplished through state-wide conferences, news articles, and educational brochures. The TCEQ has numerous programs throughout the agency that play significant roles in the area of statewide public education. In addition to statewide public outreach and education efforts, the Texas Clean Rivers Program and local Soil and Water Conservation Districts provide the framework for public outreach on a local watershed level. Other nonpoint source state, regional, and local management efforts are described in detail throughout this Management Program document.

Element 4
Abatement of water quality impairments from nonpoint source pollution and prevention of significant threats to water quality from present and future nonpoint source activities.

The TCEQ and TSSWCB Nonpoint Source Programs use a Watershed Approach to focus on the most significant NPS water quality problems. The *Texas Water Quality Inventory and 303(d) list* and category structure provide a basis for prioritizing assessment, implementation, and education projects to address water quality impairments from existing sources. In selecting projects for funding, the TCEQ and the TSSWCB give the highest consideration to projects which address the most significant threats to water quality and have the best potential to prevent or reduce nonpoint sources of pollution and improve water quality.

Many TSSWCB and TCEQ programs are preventive in nature or incorporate pollution prevention activities. Texas also uses regulatory approaches to prevent pollution. The TCEQ, TSSWCB, and other state programs that carry out nonpoint source management activities are described in Chapter 6.

Element 5
The state program identifies waters and their watersheds impaired by nonpoint source pollution and identifies important unimpaired waters that are threatened or otherwise at risk. Further, the state establishes a process to progressively address these identified waters by conducting more detailed watershed assessments and developing watershed implementation plans, and then by implementing the plans.

Texas routinely assesses and monitors water quality under programs administered by the TCEQ. These data are collected by federal, state, regional, and local agencies and are compiled into the Clean Water Act

§305(b) Report and §303(d) List (otherwise known as the *Texas Water Quality Inventory and 303(d) list*). The Texas Water Quality Inventory categorizes water bodies impaired by nonpoint source pollution, according to their status, and sets forth the method by which the state will approach identified nonpoint source problems. CWA§303(d)-listed water bodies are further categorized to determine the priorities for doing further water quality assessments or implementing restoration activities. This strategy is described in Chapter 3 under TCEQ's Watershed Approach.

The management strategies detailed in the Watershed Approach lay out the processes that the TCEQ will use to progressively address impaired or threatened water bodies. The TSSWCB works closely with the TCEQ in each water body impaired by agricultural or silvicultural activities to perform additional targeted water quality assessments. The TSSWCB leads the development of TMDLs, implementation plans, and watershed protection plans for water bodies primarily impacted by agricultural or silvicultural sources, and will implement practices in those watersheds to mitigate the water quality problems. The TCEQ leads the development of TMDLs, implementations plans and watershed protection plans in areas affected by all other nonpoint sources.

Element 6

The state reviews, upgrades, and implements all program components required by §319(b) of the Clean Water Act, and establishes flexible, targeted, and iterative approaches to achieve and maintain beneficial uses of water as expeditiously as practicable. The state programs include:

- *A mix of water quality-based and/or technology-based programs designed to achieve and maintain beneficial uses of water; and*
- *A mix of regulatory, non-regulatory, financial, and technical assistance as needed to achieve and maintain beneficial uses of water as expeditiously as practicable.*

The state's Watershed Approach is based on a water quality management cycle which has five phases that are iterative in nature as described in Chapter 3. If water bodies are identified during the Assessment and Targeting phase as being impaired, the state considers a variety of approaches to implement solutions.

Since the state does not have statutory authority to enact certain types of NPS regulatory measures, it must work cooperatively with local authorities to implement solutions. As noted in Key Element 2, annual meetings with the CRP partners and stakeholders are used to coordinate data collection on a regional level. CRP partners assist the state with the development of strategies for restoring water quality and are actively involved in implementation solutions.

Development of a TMDL or a watershed protection plan (WPP) are the first steps of an effective NPS implementation program. The TMDL is the scientific basis for the second step, which is the formulation of an implementation plan to restore water quality. Where a NPS TMDL has not yet been developed and approved or is not yet being developed for an impaired water body, a WPP may be developed in the absence of the TMDL. The successful implementation of these protection plans will largely be dependent on the early participation and involvement of stakeholders in the watershed. Participation and involvement of a large number of local stakeholders are critical to developing accurate and comprehensive data for each plan. Early stakeholder participation and buy-in also provides the best possible setting for implementing subsequent management strategies called for in the action plans. Chapters 5, 6, and 7 describe established implementation strategies and activities, regional and local programs and best management practices that the state and regional agencies use.

Element 7
The state identifies federal lands and activities which are not managed consistently with state nonpoint source program objectives. Where appropriate, the state seeks EPA assistance to help resolve issues.

As described in Chapter 4, the state has established formal agreements with key state and federal agencies to enhance the state's ability to provide a coordinated response to needs identified in priority watersheds.

Element 8
The state manages and implements its nonpoint source program efficiently and effectively, including necessary financial management.

The state takes its fiduciary responsibilities, related to the management of public funds, very seriously. The TSSWCB and TCEQ have established operating procedures and tracking systems to ensure the effective use of CWA §319 grant funds for addressing identified water quality problems. Both agencies conduct training at the beginning of all projects, with all contractors, to review what will be required of them throughout the course of the project. Agency staff maintain close contact with project managers and provide oversite throughout the course of each project, provide review of all invoices, and stay in continuous contact with the EPA project officer regarding the status of the program. In order to enhance the efficiency and effectiveness of grant management as well as strengthen policies and procedures that govern the contracting process, both agencies continually review and update contractor performance criteria, invoice review criteria, contract manager qualification criteria, and contract shells.

Element 9
The state periodically reviews and evaluates its nonpoint source management program using environmental and functional measures of

success, and revises its nonpoint source assessment and its management program at least every five years.

The TCEQ and TSSWCB are committed to thoroughly updating the state’s Nonpoint Source Management Program every five years. TSSWCB and TCEQ Nonpoint Source Program staff will produce and review the management program and provide annual updates to the management program as necessary to reflect any new activities planned through the watershed approach. These updates will serve as the basis for work plans with specific targeted output measures that can be reviewed for success at the end of the year.

Major Issues Facing Water Quality in Texas

In response to a favorable climate, adequate water, and a strong economy, Texas’ population has shown robust growth since 1900. The forecast is for continued moderate growth, with the population nearly doubling to 36,671,000 residents by 2050. Currently, agricultural irrigation accounts for the largest percentage of water use, but as the population continues to grow, combined water use by municipalities and industries is projected to surpass agricultural usage.

Physical changes in the environmental landscape can greatly increase the amount and effects of NPS pollution. For example, urban growth typically results in dramatic increases in the amount of land covered by impervious surfaces, such as buildings, roadways, and parking lots. An EPA report on coastal NPS pollution (EPA, 1993) identifies many impacts from impervious cover. These changes can result in higher runoff volumes, increased pollutant loadings, a greater potential for downstream flooding, erosion of stream channels, reduced base flows, and reduced groundwater infiltration. Urban development also results in modifications to natural drainage systems. The loss of wetlands, riparian areas, and stream buffers reduces the environment’s natural ability to absorb storm flows and to filter contaminants before they reach nearby water bodies.

Effective state and local management and oversight of decentralized wastewater treatment systems are crucial to correcting and avoiding NPS problems in many developing areas where On-Site Sewage Facilities (OSSFs), or septic tanks, may be the most cost effective option available. About 25 percent of the population in the United States depend upon decentralized wastewater treatment systems or OSSFs, and these systems are expected to be used in almost 40 percent of new development, primarily in low-density urban and suburban areas. Results of a survey by the Texas On-Site Wastewater Treatment Research Council in 2000 indicated that 13 percent of OSSFs in Texas were malfunctioning. Improved operation and performance of on-site or decentralized systems are essential to NPS management.

Possible nonpoint source pollutants associated with agricultural and silvicultural activities include sediment, nutrients, pesticides, organic matter, and bacteria. Sediment, resulting from erosion from cropland, pastureland, rangeland, forest lands and stream banks, fills up ponds and drainage ditches, chokes streams, and fills in estuaries. Sediment can also carry fertilizers and pesticides to surface waters. Excess nutrients and pesticides can also be carried in solution by runoff into surface waters and can seep into groundwater. Nutrients, pesticides, and other pollutants can come from a variety of sources including over-fertilized fields, runoff from improperly managed animal operations and waste applications, inaccurate pesticide sprayer settings, and dozens of other sources. Chapter 6 discusses, in greater detail, the problems the state faces with regards to NPS pollution and some of the programs in place to address the issue. The table below lists some of the sources and activities that contribute to NPS pollution.

Table 1.1 Nonpoint Source Pollution: Sources and Activities

Urban/Suburban Development	**Industrial/Commercial Operations**	**Agricultural Operations**
Impervious Cover	Impervious Cover	Pesticides-crops
Storm Water Runoff	Storm Water Runoff	Fertilizers-crops
Construction	Materials Storage/Handling	Concentrated Animal Feeding Operations (CAFO)
Roadways and Vehicle Use	Leaks/Spills	
Pesticides: lawns/gardens	Waste Management	Silviculture
Fertilizers: lawns/gardens	Air Deposition	Irrigation
Septic Systems	Oil Field Brine Discharges	Wetland and Riparian Loss
Stream Channelization	Wetland and Riparian Loss	
Wetland and Riparian Loss	Stream/Estuary Modification	
Illegal Dumping		

Despite the abundance of water available in Texas, it is not uniformly distributed around the State. During recent periods of drought, surface water and groundwater supplies have been nearly depleted in some localized areas. Surface and groundwater supplies have already limited growth and agricultural production in some areas of the state. As the Texas population has continued to grow at a rapid pace, the need to conserve, protect, and restore surface water and groundwater supplies has never been more paramount.

The future success of reducing NPS pollution impacts will depend upon a coordinated effort of state and local officials, planners, developers, and citizens. Technical assistance and outreach to local and regional governments is an integral component of urban NPS implementation efforts. Land use management decisions are best made in the local arena where buy-in by the affected parties is crucial to success. Government planners and zoning authorities around the United States are beginning to tie together the disciplines of urban planning with the need for water conservation, NPS pollution abatement and water quality improvement.

Other challenges to NPS pollution management in Texas are low public awareness of the issues, the size and complexity of the problem, the lack of rigorous scientific definition of NPS problems, institutional barriers to directing multiple sources of funding to a single problem, and availability or lack of awareness of funding sources other than CWA§319(h) grants to address the problems or conduct assessment activities. In addition, it is difficult, and in some cases impossible, to measure NPS pollution or to quantify in-stream load reductions due to NPS implementation activities.

Because of its diffuse nature, NPS pollution is more difficult and costly to characterize and control than point source pollution. The amount and variety of precipitation, land use, and geography all determine the effects from nonpoint source pollution. The lack of a single identifiable source of pollution sometimes makes it difficult to establish specific cause-and-effect relationships. In addition, there is a problem of cumulative impacts resulting from what may be very small problems at an individual source.

CHAPTER 2 TEXAS' PLAN FOR NONPOINT SOURCE POLLUTION MANAGEMENT

THE NONPOINT SOURCE PROGRAM

Because they cannot be easily distinguished, nonpoint sources of pollution are largely unregulated and a majority of the activities designed to reduce their impact on water quality falls on the states' Nonpoint Source Programs administered under CWA§319. Texas addresses the requirements of CWA§319, to manage nonpoint source pollution in surface and ground water, through the Nonpoint Source Program jointly administered by the TCEQ and the TSSWCB. The TSSWCB administers the Nonpoint Source Program for agricultural and silvicultural NPS management and the TCEQ administers the Nonpoint Source Program for all other nonpoint sources. The CWA§319 Nonpoint Source Program consists of three broad components as defined by §319(a), §319(b) and §319(h). Table 2.1, below, lists those requirements.

Table 2.1 The Nonpoint Source Program

Assessment Report CWA §319(a)	Management Program CWA §319(b)	Grant Program CWA §319(h)
Identifies water bodies impacted by nonpoint sources that do not meet water quality standards	Identifies the BMPs and measures to reduce pollutant loadings from nonpoint sources.	Outlines application requirements, including an identification and description of the best management practices and measures
Identifies categories of nonpoint sources which add significant pollution to impacted water bodies	Identifies programs* to achieve implementation of the BMPs	Identifies how grant funds will be allocated
Describes the process for identifying best management practices and measures to control nonpoint sources	Includes a schedule with milestones for utilization of the program* implementation methods and implementation of the BMPs	Identifies priorities for grant funds
Identifies and describes State and local programs for controlling pollution added from nonpoint sources	Identifies sources of federal and other assistance and funding and purposes for which it will be used	States the requirement for annual reporting to the EPA regarding progress toward milestones and as appropriate, reductions in loadings and improvements in water quality

*Programs may include: nonregulatory or regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer, and demonstration projects.

State Priorities for CWA § 319 Funding

One of the tools to assist states in NPS management is the CWA§319 Nonpoint Source grant. Funding is provided to states under CWA§319(h), defined in the above chart, to implement its *Nonpoint Source Management Program*. Due to a lack of adequate resources, Texas must establish priorities for its CWA§319 grant funding. Highest priority is given to funding those projects or activities which address water bodies not meeting water quality standards due to NPS pollution, as identified in the Texas CWA§303(d) List of impaired water bodies. To ensure fiscal responsibility and adequately focus limited resources, the state's Nonpoint Source Program uses the *Texas Water Quality Inventory and 303(d) List* process to establish its priorities (see Chapter 5). Appendices B and C represent a listing of the state's priority water bodies based on the *2002 Texas Water Quality Inventory and 303(d) List*. This list will change as the *Texas Water Quality Inventory and 303(d) List* is updated.

In addition, Texas will adopt TMDLs in impaired waterbodies identified as impacted by nonpoint source pollution in the state's CWA§305(b) assessment. The state will facilitate 100 percent of the state-approved Implementation Plans developed for NPS TMDLs adopted to eliminate significant impacts to water quality from present and future activities to the extent practicable under state and federal statutes, programs, and resources. Texas will also implement Watershed Protection Plans to address NPS water quality issues which, may not have a TMDL Implementation Plan to the extent practicable under state statutes, programs, and resources. The state will continue to conduct activities to prevent the degradation of water quality. The state will also facilitate implementation of activities to restore and protect groundwater quality where feasible.

The TCEQ and TSSWCB encourage the participation of all eligible grant recipients in the CWA §319(h) grant program. Local participation in the program provides the following benefits: improves the quality and quantity of information used to identify and develop water quality restoration activities, ensures a local perspective in decision making, helps stakeholders gain insight into the nature of water quality problems and solutions, and promotes local stewardship of water resources through voluntary actions to curb or prevent nonpoint source pollution.

Resource Leveraging

The majority of the State of Texas' annual CWA §319 grant allocation is "passed through" to political subdivisions by the TCEQ and TSSWCB through the execution of interagency or interlocal contracts. CWA§319(h) contractors are considered sub-recipients and, as such, are subject to all applicable federal regulations and statutes.

For the State's NPS Program to be effective on both a statewide and watershed level, the TCEQ and TSSWCB must work closely with other state, regional, and local organizations to implement management measures and optimize the use of all available resources. The magnitude of resources needed to restore beneficial uses and address nonpoint sources of pollution is much larger than the amount of funding available from the CWA§319(h) grant program. Therefore, the State of Texas NPS Program encourages the use of leveraged resources when feasible.

Federal Match Requirement

The Nonpoint Source Grant Program requires that federal funds be matched forty percent (40%) with non-federal funds. "Match" refers to funds or services used to conduct a project that are not borne by grant funds. All project match must: (1) relate directly to the project for which the match is being applied; (2) be reasonably valued; and (3) be supported by documentation. The cost share does not have to originate with the grant recipient but can come from individuals, outside organizations, other local governments, or state agencies as long as the source of the matching funds is non-federal and is not being used to match another federal grant program.

Matching or cost share can be financed in several ways:

Cash

These are costs that relate directly to the project for which the match is being applied and which are paid by the grant recipient. This is the most common method of fulfilling the federal match requirement.

In-Kind Services

In-kind services are typically defined as a donation separate from the grantee which has a cash value associated with it but may not require a cash outlay during the grant period. In-kind contributions may consist of the donation of real property, space and equipment, or a donation of time or services directly benefitting the grant project and specifically identifiable with it. The use of "third-party" or "in-kind" donations to meet grant matching requirements is regulated in 40 CFR 30.307, 40 CFR 31.24 (6) and (7) and is also covered in OMB Circular A. Third party in-kind contributions may be necessary to accomplish program activities and are allowable under applicable cost principles if the grantee was required to pay for them.

Clean Water Act State Revolving Fund

Another funding tool available to Texas for NPS management is the Clean Water Act State Revolving Fund (CWSRF). The Texas Water Development Board (TWDB) can provide loans for NPS pollution abatement projects through the CWSRF at interest rates lower than the market offers. Loans can be made to towns, counties, conservation districts, and other public agencies, as well as private individuals and non-profit organizations. A water quality based priority system is used to rank potential applicants and fund projects with the greatest environmental benefits. Some of the activities that are eligible for funding include agricultural, rural, and urban runoff control, estuary improvement, nonpoint source education, wet weather flow control including stormwater and sewer overflows that are not associated with a Texas Pollutant Discharge Elimination System (TPDES) permit. Repayments on CWSRF loans provided from non-federal sources can be used as eligible match to CWA §319(h) grant funds.

Partnerships for Conducting Work

The State primarily uses the infrastructure of the Clean Rivers Program (CRP), Soil and Water Conservation Districts (SWCDs), Texas Groundwater Protection Committee (TGPC), and the University System to coordinate, develop, and implement its NPS Program. These entities are each charged with certain water quality stewardship responsibilities and can bring a great deal of experience related to research, assessment, laboratory analysis, and implementation and education activities. In addition, these entities conduct meetings and coordinate activities with a variety of local, regional, and state level stakeholders to pursue effective solutions to reduce or prevent nonpoint source pollution.

A group, consisting of nonpoint source stakeholders, was established to assist in the preparation and review of the *Texas Nonpoint Source Pollution Management Program*. This stakeholder group was established to ensure involvement by local public and private agencies and organizations which have expertise in control of nonpoint sources of pollution.

Goals for NPS Management

The state's management program for nonpoint source pollution utilizes baseline water quality management programs and regulatory, non-regulatory, financial, and technical assistance approaches to achieve a balanced NPS management program. Nonpoint source pollution is managed through assessment, implementation, and education. The TCEQ and TSSWCB have established long and short-term goals and objectives for NPS management for guiding and tracking the progress of NPS management in Texas. The goals describe high-level guiding principles for all activities under the Program. The objectives specify the key methods that will be used to accomplish the goals. Success in achieving the goals and objectives are reported annually in the State’s NPS Annual Report, which is submitted to EPA in accordance with CWA§319(h)(11). This report is also available by contacting the TCEQ or TSSWCB or visiting their Web sites.

Long-Term Goal

The long-term goal of the State of Texas nonpoint source pollution program is to protect and restore water quality from nonpoint source pollution through assessment, implementation, and education.

Objectives

- Focus NPS abatement efforts, implementation strategies, and available resources in watersheds identified as impacted by nonpoint source pollution.
- Support the implementation of state, regional, and local programs to prevent nonpoint source pollution through assessment, implementation, and education.
- Support the implementation of state, regional, and local programs to reduce NPS pollution, such as the implementation of strategies defined in state-approved TMDL Implementation Plans and Watershed Protection Plans.
- Support the implementation of state, regional, and local programs to reduce NPS pollution to groundwater through the Groundwater Protection Strategy, based on the potential for degradation with respect to use.
- Develop partnerships, relationships, memoranda of agreement, and other instruments to facilitate collective, cooperative approaches to manage NPS pollution.
- Increase overall public awareness of NPS issues and prevention activities.
- Enhance public participation and outreach by providing forums for citizens and industry to contribute their ideas and concerns about the water quality management process.

Short-Term Goals and Milestones

Goal One - Data Collection and Assessment

Coordinate with appropriate federal, state, regional, and local entities, private sector groups, and citizen groups and target CWA §319(h)grant funds towards water quality assessment activities in high priority, nonpoint source-impacted watersheds, vulnerable and impacted aquifers, or areas where additional information is needed.

Objectives

Evaluate the condition of the State's water bodies, on a biennial basis, and prepare a report containing this evaluation, as required by CWA§305(b) to determine: a) water bodies not meeting water quality standards due, at least in part, to nonpoint source pollution, and; b) the cause of the impairment.

- Identify surface waterbodies and aquifers from the *Texas Water Quality Inventory and 303(d) List* and *Joint Groundwater Report* that need additional information to characterize non-attainment of designated uses and quality standards. This information is used during annual coordinated monitoring meetings and during special project planning to focus on high priority waters.
- Ensure that monitoring procedures meet quality assurance requirements and are in compliance with EPA-approved TCEQ and/or TSSWCB Quality Management Plans.
- Conduct special studies to determine sources of NPS pollution and gain information to target TMDL activities and BMP implementation.
- Develop and adopt, at the state level, TMDLs, Implementation Plans and Watershed Protection Plans to maintain and restore water quality in waterbodies identified as impacted by NPS pollution.
- Conduct monitoring to determine effectiveness of TMDL Implementation Plans, Watershed Protection Plans, and BMP implementation as appropriate.

Goal Two - Implementation

Coordinate and administer the NPS program to support the implementation of TMDL Implementation Plans and/or Watershed Protection Plans and other state, regional, and local plans/programs to reduce NPS pollution. Manage all CWA§319 grant funds efficiently and effectively to target implementation activities to the areas identified as impacted, or potentially degraded with respect to use by NPS pollution.

Objectives

Prevent and reduce NPS pollutant loadings in the surface water bodies, groundwater aquifers, wetlands, and coastal areas, through the execution of TMDL implementation Plans, Watershed Protection Plans, recommendations from the Joint Groundwater Monitoring and Contamination Report, the Groundwater Protection Strategy, and various agricultural / silvicultural activities.

- Work with regional and local entities to determine priority areas and develop and implement strategies to address NPS pollution in those areas.
- Develop and implement BMPs to address constituents of concern or water bodies not meeting water quality standards in watersheds identified as impacted by NPS pollution.
- Develop and implement BMPs to address NPS constituents of concern or water bodies not meeting water

quality standards in aquifers identified with impacts or as vulnerable in the latest state approved *Texas Water Quality Inventory and 303(d) List* or in Chapter 5 of this document.

- Implement state-approved TMDL Implementation Plans and Watershed Protection Plans developed to restore and maintain water quality in water bodies identified as impacted by nonpoint source pollution.

Goal Three - Education

Conduct education and technology transfer activities to help increase awareness of NPS pollution and prevent activities contributing to the degradation of water bodies, including aquifers, by NPS pollution.

Objectives

Reduce the amount of NPS pollution entering the water bodies of Texas through pollution prevention activities and education.

- Enhance existing outreach programs at the state, regional, and local levels to maximize the effectiveness of NPS education.
- Administer programs to educate citizens about water quality and their potential role in causing NPS pollution.
- Where applicable, expedite development of technology transfer activities to be conducted upon completion of BMP implementation.
- Conduct outreach through the Clean Rivers Program, Texas Cooperative Extension, Soil and Water Conservation Districts, and others to facilitate broader participation and partnerships. Enable stakeholders and the public to participate in decision-making and provide a more complete understanding of water quality issues and how they relate to each citizen.
- Implement outreach activities identified in the *Texas Groundwater Protection Strategy* to prevent NPS impacts to groundwater.
- Implement public outreach and education to maintain and restore water quality in waterbodies impacted by NPS pollution.

The long-term goal will remain the goal of NPS management as long as nonpoint source water pollution is an issue. Short- term goals will be examined every five years. Measurement of the goal achievement progress, within the priority water bodies, will be reported on an annual basis in the State's NPS Annual Report. The TCEQ and the TSSWCB will evaluate the management program, on an annual basis, to determine a need for revision and revise the document at least every five years.

Milestones

Water bodies with completed TMDLs, those undergoing current TMDL-work, and water bodies currently implementing Watershed Protection Plans have been listed in Appendix C, in table format, in order to gauge progress, through a time line, against the detailed milestones that are included below and in the first column of each table within the appendix.

- Employ or develop a local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.
- Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.
- Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.
- Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.
- Develop a detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocation, strategy for load allocation, timetable for implementation, and a list of expected results.
- Implement voluntary and regulatory actions in the watershed and adust the BMP implementation based on follow-up verification monitoring of effectiveness.

The programs discussed throughout this document are responsible for NPS management and implementation of the goals, objectives, and milestones. Nonpoint source management must be a coordinated effort to be successful. Therefore, the goals and milestones are over-arching for all nonpoint source programs of Texas.

CHAPTER 3 TEXAS' WATERSHED APPROACH

The watershed approach described in this chapter provides an overview of Texas' management strategy for surface water quality. Some of the topics in this chapter are covered in more detail in other parts of this document.

In order to protect water quality, we must define and measure it, identify the types and sources of pollution, and implement plans to protect or restore it. Under the federal Clean Water Act, Texas and other states must establish standards that describe how the water bodies are used, and carry out a program to regularly monitor the status of water quality against those standards. Texas uses several strategies to protect water quality, such as issuing permits for discharges to streams and lakes, or devising watershed protection plans with local stakeholders. When these protective strategies are not sufficient to keep surface water bodies clean enough to be used in ways that meet the standards for them, the state takes action to restore water quality.

A WATERSHED APPROACH

By looking at a *watershed*—the geographic area that drains to a common body of water—Texas can evaluate all the sources of pollution that may be affecting water quality. This approach is used to identify water quality problems and issues, to establish statewide and local water quality priorities, to develop community-based solutions, and to cooperate with local stakeholders to implement those solutions. The watershed approach is based on four basic principles:

> A watershed is a geographic area in which water, sediments, and dissolved materials drain into a common outlet. This outlet could be a stream, lake, playa, estuary, or ocean. Watersheds are also commonly called basins or drainage areas.
>
> Everything that is done in a watershed can affect the quality of the receiving water body.

- geographic focus based on hydrology rather than political boundaries
- water quality-based objectives based on scientific data
- coordinated priorities and integrated solutions
- diverse, well-integrated partnerships

These principles guide all activities of the TCEQ water quality programs. They provide the framework for coordinating people and activities to achieve the state's clean water goals.

Protecting our lakes, bays, and streams is a complex process—not only in terms of the number of sources of pollution and the variety of water body types and interactions, but also in the number of people that must be involved. Using a watershed approach, we often find that problems seen at one point in a stream or lake are caused further upstream. With this in mind, we identify and remedy water quality problems at their source.

Managing Surface Water by Geographic Area

Texas uses the major watersheds—or river and coastal basins—of the state as the geographic units around which it builds its watershed approach to managing surface water quality.

> Surface waters in the state include lakes, bays, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, wetlands, marshes, inlets, canals, the Gulf of Mexico inside the territorial limits of the state, and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, navigable or non-navigable. This includes the beds and banks of all water-courses and bodies of surface water that are wholly or partially inside or bordering the state or subject to the jurisdiction of the state; except that waters in treatment systems that are authorized by state or federal law, regulation, or permit, and that are created for the purpose of waste treatment are not considered to be water in the state.

Classifying Waters by Geographic Area

Because of the vast extent of surface waters in Texas, and the ecological diversity of the state, the major rivers, lakes, and estuaries have been subdivided and assigned tracking numbers, called classified segments. The classified segments are given numbers that correspond to the major river basin in which they are located.

For example, the Brazos River, one of the state's longest rivers, has been divided into 57 separate segments and designated as Basin 12. Many lakes also lie within the Brazos River basin, and are given segment numbers. All the segment numbers have four digits—the first two indicate the basin number, and the second two indicate the specific segment. For example, Segment 1210 is Lake Mexia in the Brazos River Basin; Segment 1427 is Onion Creek in the Colorado River Basin.

The areas of the classified segments are defined in the Texas Surface Water Quality Standards. Most of the perennial (always flowing) rivers in the state, and lakes and estuaries with large areas, are classified. Figure 3.1 shows the state's major rivers and coastal basins, and the basin numbers assigned to them.

However, not all bodies of water in Texas are classified in the Standards. For example, when managing a classified segment of the Brazos River, it may be necessary to examine water quality in the tributaries that flow into that segment—which are part of the segment's watershed. Some of these tributaries may not be part of the classified segment system. When that happens, for management purposes, the tributary is assigned a tracking number, which is referred to as an *unclassified segment*.

This unclassified tributary will be assigned the number of the classified segment in whose watershed it resides, along with a letter. For instance, Segments 1806A, 1806B, and so on. The same numbering system applies to unclassified lakes. Both classified and unclassified segments are referred to generically as *segments*. The term water body is used to refer to entire rivers, reservoirs, or estuaries.

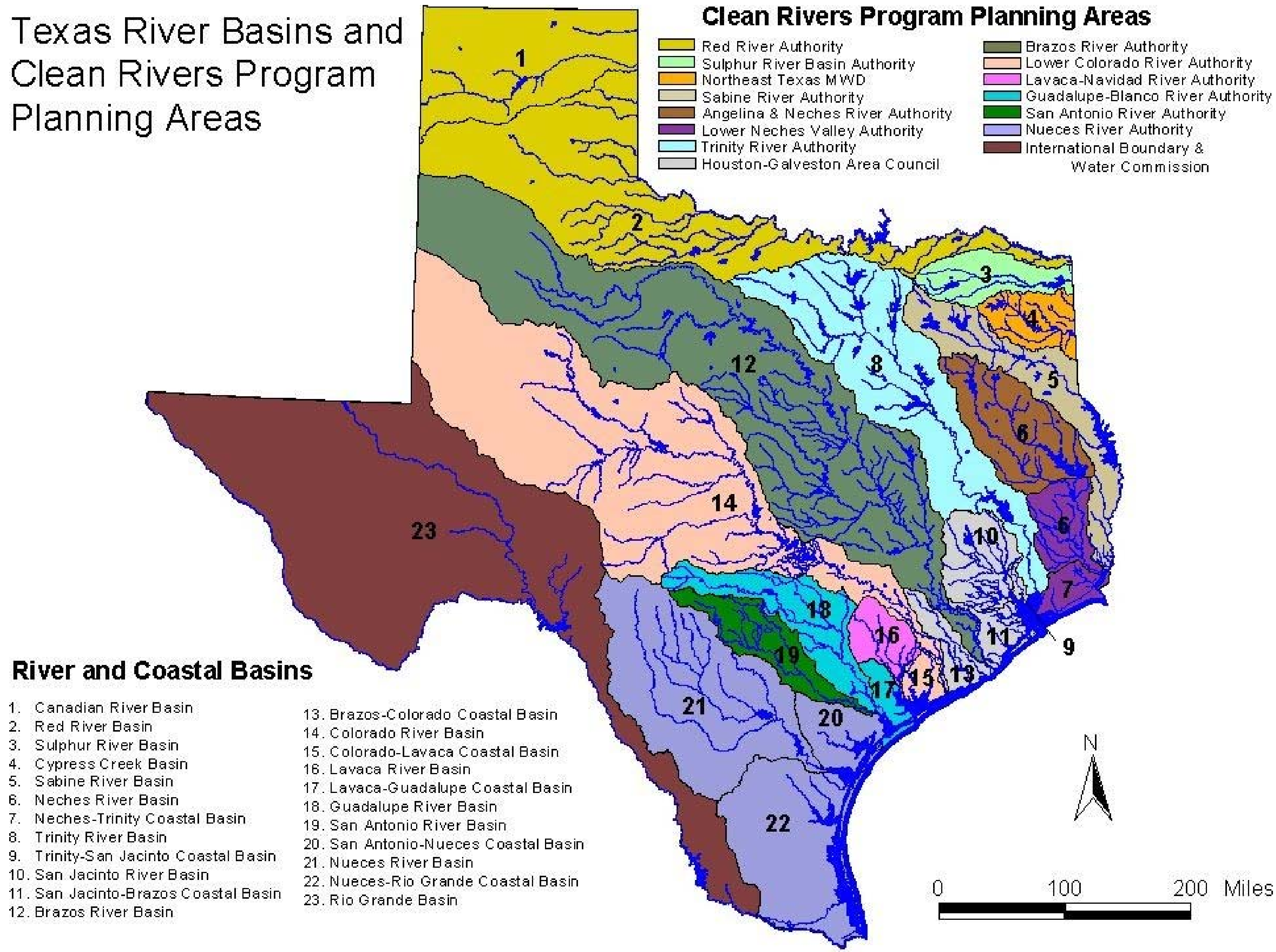

Figure 3.1 Major River Basins and Planning Areas in Texas

The Water Quality Management Cycle

The *water quality management cycle* is the process through which the state works with other organizations and with local residents who have a stake in water quality. This approach is used to continuously identify water quality problems, to establish statewide and local water quality priorities, to develop community-based solutions, and to collaborate with local stakeholders to implement those solutions.

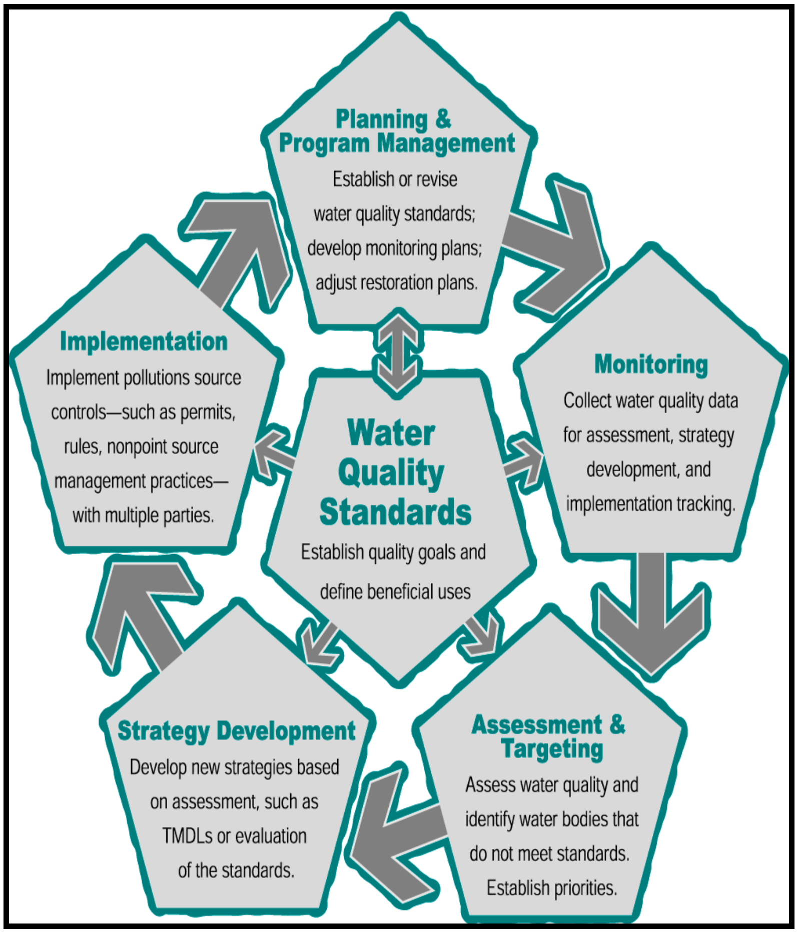

Figure 3.2. The Water Quality Management Cycle

Because environmental planning and implementation are rarely one-time activities, the water quality management cycle has five phases that are repeated regularly (Figure 3.2). This iterative cycle reflects the dynamic nature of watershed management.

A successful management framework must be flexible enough to accommodate this dynamic nature in an orderly manner over time.

Figure 3.2 demonstrates the dynamic nature of this cycle and the major steps in the process of managing the quality of the state's surface waters.

Managing water quality through a watershed approach requires an ongoing cycle of tasks:

- **Standards and Planning**: setting standards for surface water quality and revising or formulating monitoring plans;
- **Monitoring**: collecting data to monitor the condition of surface waters;

- **Assessment and Targeting**: assessing data to determine water quality status and to identify any impairments;
- **Developing Strategies**: for protecting, improving, or restoring water quality with pollutant source controls and practices; and
- **Implementing Pollution Controls**: for both point and non-point sources and evaluating progress, which may lead back to revising those plans or formulating new ones.

Standards and Planning

Water quality standards are the foundation for managing surface water quality. A water quality standard is the combination of:

- a designated use and
- the criteria necessary to attain and maintain that use

Standards define the goals for a body of water. The uses prescribe the purposes for which the water should be fit—such as recreation, support of aquatic life, or drinking water supply.

Five general categories for water use are defined under the Texas Surface Water Quality Standards:

- aquatic life use
- contact recreation
- public water supply
- fish consumption
- general uses

The criteria define the instream conditions necessary to support those uses. Criteria are either:

- numeric—a limit on the amount of a certain pollutant that a water body may contain; or
- narrative—a prohibition on a certain condition in the water, such as color, odor, or turbidity.

Water quality standards are the basis for :

- evaluating monitoring data to see if water quality is being maintained,
- setting levels of treatment for permitted wastewater discharges, and

- establishing water quality targets to set total maximum daily loads of pollutants.

Some standards are applied generally to many different water bodies, while some are site-specific. Any one water body will usually have multiple uses designated for it. For example, a lake or stream may be designated for use as a source of drinking, for recreation, and as a healthy environment for fish and other aquatic organisms.

The standards also define an antidegradation policy that protects existing uses and the state's highest quality waters. The complete Texas Surface Water Quality Standards are available in Title 30 of the Texas Administrative Code (TAC), Chapter 307.

> Water quality standards are the foundation for managing surface water quality. A standard consists of two parts:
>
> - a use, or the purposes for which surface water will be used; and
> - criteria, or the indicators that will be used to determine if the use is met.
>
> Uses and criteria are paired to set the standards for water quality. For example, one use is habitat for fish and other aquatic organisms. It is called the "aquatic life use" in the standards. Criteria used to determine whether the aquatic life use is met may include how much dissolved oxygen is present in the water, how much water flows through a stream and how deep it is, and how diverse the population of aquatic organisms.

The standards assign specific uses for most medium to large water bodies, and general uses for all water bodies. For example, Possum Kingdom Lake must meet requirements for the specific uses of public water supply, swimming and other recreation, and a high quality environment for fish and other aquatic species. Each use defined in the standards is linked to measurements for specific conditions or pollutants. These measurements are used to evaluate whether water quality is good enough to maintain its designated uses.

Other basic uses — such as navigation, agricultural water supply, and industrial water supply — are applicable to all water in the state where they can be achieved.

Some indicators of water quality, such as the narrative requirements in the general criteria, are intended to protect multiple uses and aesthetic conditions.

Aquatic Life

Standards associated with the *aquatic life use* are designed to protect plant and animal species that live in and around the water. Some pollutants or conditions that may result in harm to aquatic species include low levels of dissolved oxygen or the presence of toxic substances such as metals or pesticides in water. Because oxygen is necessary to support life, its concentration in water is an easy-to-measure characteristic that generally reflects the ability of a water body to support a healthy, diverse aquatic population. Other important indicators of suitability for the aquatic life use include concentrations of substances that can be toxic, such as certain metals—like selenium, mercury, and zinc, and some toxic organic pollutants—such as pesticides and some industrial chemicals).

Contact Recreation

The standard associated with the *contact recreation use* is designed to ensure that water is safe for swimming or other water sports that involve direct contact with the water, especially with the possibility of ingesting it. High concentrations of certain bacteria in water indicate that there may be a risk of becoming ill from recreational activities. Though it is possible to swim in water that does not meet this standard without becoming ill, the probability of becoming ill is higher.

Public Water Supply

Standards associated with the *public water supply* use indicate whether water from a lake or river is suitable for use as a source for a public water supply system. Source water is treated before it is delivered to your tap; a separate set of standards governs treated drinking water. Indicators used to measure the safety or usability of surface water bodies as a source for drinking water include the presence or high concentrations of substances such as pesticides or some metals. Concentrations of dissolved minerals, such as sulfate or chloride, are also measured, since treatment to remove high levels of minerals from drinking water may be expensive. Too many dissolved minerals in drinking water may cause a disagreeable taste, odor or color, even after it is treated by public water supply organizations.

Fish Consumption

Standards associated with the *fish consumption use* are designed to protect people from eating fish or shellfish that may be contaminated. These standards identify levels at which certain toxic substances dissolved in water may accumulate in the tissue of aquatic species. In addition, fish tissue is examined for accumulated toxins to determine the risk to human health from consuming fish or shellfish. If significant risk is identified, the Texas Department of Health issues advisories for such water bodies that restrict or limit consumption of fish taken from them. The standards also specify limits on bacteria levels in marine waters to ensure that oysters or other shellfish are safe for public sale and consumption.

Monitoring

Water quality data are gathered regularly to monitor the condition of the state's surface waters. For example, chemical, physical, biological, hydrological, hydraulic, and land use data are collected by the TCEQ, the regional agencies of the Clean Rivers Program, and other organizations, such as state and federal agencies, educational institutions, volunteer monitoring groups, and private organizations under contract to the state. Monitoring plans are guided by quality assurance project plans (QAPPs) that ensure that data are collected according to generally accepted practices and are of sufficient quality to be used in making scientific assessments and management decisions.

Texas conducts five main types of data collection to monitor the status of water bodies:

- routine monitoring
- systematic monitoring
- targeted monitoring
- permit support monitoring
- effectiveness monitoring

Routine monitoring is designed to assess the status and trends of overall water quality throughout the state, and for each river basin. Data are collected using a monitoring network of key sites on the major water bodies in each basin on a regular basis. Monitoring sites may also include smaller water bodies to support characterization of ecoregions and/or basin-specific conditions.

Systematic monitoring focuses on evaluating subwatersheds and unclassified water bodies. Its purpose is to investigate and detect areas of concern, and isolate issues that require further study. It also includes monitoring at sites to check the status of water bodies (identify improvements or concerns). This monitoring strategy rotates resources around the river basin to gather information on water bodies that would not normally be included in the routine monitoring program.

Targeted monitoring is conducted on water bodies where there is reason to believe there is a threat or a concern for water quality, to establish the extent and degree of an impairment, or to determine the best strategy for restoring water quality. Sometimes called special studies, targeted monitoring activities usually involve intensive periods of data collection at sites where routine or systematic monitoring identified impacts, concerns, or impaired uses.

Permit support monitoring is used to address specific areas where additional information is need to support the development of permits that allow wastewater discharges. This may include studies to gather site-specific information for use in developing permits.

Effectiveness monitoring is conducted to evaluate whether management practices, regulatory measures, and watershed improvement and restoration plans are producing the desired results.

The CRP plays a key role in the TCEQ's yearly integration of these various monitoring needs into a coordinated monitoring schedule for the entire state. The schedule shows all surface water monitoring being conducted by the TCEQ or under its contracts or cooperative agreements for each planning year. It does not include coordination of monitoring by wastewater dischargers that is reported to the state as a condition of their permits.

Planning and development of the coordinated monitoring schedule takes place from January through May preceding the state fiscal year for which the plan is developed. To support coordinated monitoring, the TCEQ has developed guidance for selecting sites and for sampling methods for routine, systematic, and targeted monitoring. The coordinated monitoring schedule is hosted by the Lower Colorado River Authority, a CRP agency, on its Web site at *http://cms.lcra.org/*.

Coordination of State and Regional Priorities

The TCEQ works in partnership with the Texas Clean Rivers Program (CRP) to set regional priorities for protecting and improving the state's surface waters. The CRP brings together state, regional, and federal agencies to:

- eliminate duplication in monitoring surface water quality and thereby leverage resources;
- support data sharing and quality assurance by creating uniformity in methods;
- establish regional stakeholder forums to involve the public in identifying, prioritizing, and managing local water quality issues;
- set priorities and schedules for monitoring; and
- identify problems and preventive or remedial measures.

To support those goals and the TCEQ's overall water quality management program, the CRP's long-term action includes nine key methods:

- Ensure efficient use of public funds.
- Enhance public participation and outreach.
- Encourage comprehensive and cooperative watershed planning.
- Maintain basin-wide water quality monitoring programs.
- Develop and maintain a river basin water quality database clearinghouse.
- Provide quality-assured data to the TCEQ for use in water quality decision-making.
- Focus on priority issues and address local initiatives.

- Identify, analyze, and report on water quality issues and potential causes of pollution.
- Identify and evaluate alternatives for preventing and reducing pollution.

Through its activities, the CRP plays a vital role in ensuring clean, useable water supplies for Texas. The partner agencies for the CRP, and the regions for which they are responsible, are shown in Figure 3.1.

Assessment and Targeting

Every two years, the states must assess the quality of their water and target those water bodies for which additional data collection or restoration efforts are required. This information is submitted to the U.S. Environmental Protection Agency (EPA) in a report that details the extent to which each water body in the state meets water quality standards. The TCEQ publishes this biennial assessment as the *Texas Water Quality Inventory and 303(d) List*.

> Assessment is the evaluation of data and information against a set of standards or benchmarks.

In the past, Texas published two different reports, often referred to as the 305(b) Report and 303(d) List, after the sections in the Clean Water Act that describe the requirements of the assessment. Since 2002, both reports have been published as one document, in accordance with guidance from the EPA. The document still has essentially two main parts: the Inventory, which gives the status of all the waters in the state, and the 303(d) List, which identifies waters that do not meet one or more of the standards established to ensure the beneficial use of the water body.

The Inventory

The Inventory describes the status of all surface water bodies of the state that were evaluated for the given assessment period. The TCEQ uses data collected during the most recent five-year period in making its assessment. The data are gathered by many different organizations that all operate according to approved quality control guidelines and sample collection procedures. The quality of waters described in the Inventory represents a snapshot of conditions during the time period considered in the assessment. Water quality is dynamic and constantly changing.

The assessment guidance is based on a set of methods that apply the surface water quality standards and criteria. These methods are developed by the TCEQ with the advice of a diverse group of stakeholders, and are made available to partner organizations and stakeholders every two years, prior to the biennial assessment in which they will be used.

The 303(d) List

The 303(d) List is an important management tool produced as part of the assessment. It identifies waters for which preventive measures have not been sufficient to achieve water quality standards. The 303(d) List is subject to review and approval by the EPA.

When a water body is identified on the 303(d) list, certain new requirements may apply for facilities that discharge wastewater into the listed water body. Importantly, the TCEQ may not allow any new or expanded discharges of a listed pollutant into a Category 5 water body if it contributes to the impairment. Other possible effects on permits that may result from a restoration plan for the water body include:

- TCEQ may initiate amendments to impose new limits, or may impose them with routine renewals or amendments.
- Permitted loading from existing facilities may be substantially reduced.
- New facilities may be required to meet more stringent effluent limits than expected.
- In some cases or areas, storm water permits may receive new or more stringent limits.
- Dischargers may no longer be eligible for general permits.
- Additional monitoring and reporting requirements may be added.

Additional nonpoint source management practices may also be required, such as:

- Management of runoff by such means as detention basins, filter strips, infiltration basins, porous pavement, retention ponds, and swales.
- Management of operations to decrease or eliminate pollutants in runoff, such as spill prevention and control, source controls, and education.

Categories Indicate Water Quality Status

The Inventory assigns each assessed water body to one of five categories to provide information to the public, the EPA, and internal agency programs about water quality status and management activities (see Table 1). The categories indicate the status of the water body, and how the state will approach identified water quality problems.

Higher category numbers correspond to higher levels of effort required to manage water quality. For example, water bodies in Category 5 constitute the 303(d) List, and require remedial action by the state to restore water quality. For water bodies in Category 5a, the state must develop a scientific model called a *total maximum daily load* (TMDL) and a plan to implement it (these are discussed in more detail in the section "Restoring Water Quality"). Water bodies in Category 1 are meeting all their uses, and require routine monitoring and preventive action.

Table 3.1 Categories of Use Attainment in the Water Quality Inventory

Category 1	Attaining all water quality standard and no use is threatened.
Category 2	Attaining some of the designated uses; no use is threatened; and insufficient or no data and information are available to determine if the remaining uses are attained or threatened.
Category 3	Insufficient or no data and information to determine if any designated use is attained.
Category 4	Standard is not supported or is threatened for one or more designated uses but does not require the development of a TMDL.
Category 4a	TMDL has been completed and approved by EPA.
Category 4b	Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future.
Category 4c	Nonsupport of the water quality standard is not caused by a pollutant.
Category 5	Category 5 is the 303(d) list. The water body does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants.
Category 5a	A TMDL is underway, scheduled, or will be scheduled.
Category 5b	A review of the water quality standards will be conducted before a TMDL is scheduled.
Category 5c	Additional data and information will be collected before a TMDL or review of the water quality standard is scheduled.

Impairment
The combination of one designated use with one pollutant or condition of concern.

Parameter
A pollutant or condition affecting a body of water; also, a criterion used to measure attainment of a particular use. Examples include low dissolved oxygen concentrations, a particular metal such as zinc, or a particular pesticide such as DDT.

Further, these categories must be applied to each combination of designated use and the *parameter* (pollutant or condition of concern) that determines support of beneficial uses. The combination of the use with the parameter is called an *impairment*. For example, the concentration of dissolved oxygen is one of the criteria used to determine the support of the aquatic life use. If dissolved oxygen concentrations are too low, one impairment would exist for the water body under examination.

Since a water body has multiple uses, it may fall into different categories for different uses. In that case, the overall category for the water body is the one with the highest category number.

For example, Spring Creek, Segment 1008 in the San Jacinto River Basin, does not support the contact recreation use (Category 5c) nor the aquatic life use (Category 5b). It supports the public water supply and general uses, and the fish consumption use has not been assessed. The designation for the entire water body is Category 5b, since that is the highest category associated with any one of its uses.

Ranking Category 5a Segments

After the draft 303(d) List is compiled, the TCEQ assigns a rank of High, Medium or Low to each impairment (see Table 3.1) of Category 5a segments. This rank is used in determining the priority for implementing TMDLs. The rank is based on criteria such as the degree to which the water quality standard is exceeded, and the level of public concern (as judged, in part, by the interest of local groups). Comments are accepted during the public review period and changes may be made as a result of public comment.

Factors considered in the ranking include:

- whether the impairment affects human health
- proximity of one impaired segment to others that have similar or related pollutants
- local and regional support for TMDL development
- data availability for immediate TMDL development
- similarity of the strategies and actions needed to address impairments

The specific criteria and point system used for scheduling waters for TMDL development is shown in Table 3.1.

Scheduling Management Activities for Listed Waters

The amount of time it takes to address a listed segment varies greatly. In some cases, a segment may be addressed within one to three years of its listing; in other cases, several years may be needed.

Several factors influence the scheduling of management activities for all three categories (5a, 5b, and 5c) of the list, such as the number of successive years a segment has been on the list, scheduled permit renewals, or administrative demands. Available funding ultimately determines how many new restoration or management projects will be initiated annually.

Schedule for TMDL Development

The TCEQ is committed to beginning development of TMDLs for all segments in Category 5a within 10 years of their initial listing. In compliance with the federal regulations, the TCEQ prepares a schedule after each Water Quality Inventory is completed that identifies the TMDLs that will be initiated within the next two years.

The most important factor in determining the schedule is the priority ranking assigned to each impairment. Others factors include additional data or information gathered since the listing and ranking, and the availability of funding. The TMDL schedule is submitted to the EPA in April of even-numbered years along with the 303(d) List.

Table 3.2 Criteria for Prioritizing TMDLs (Category 5a Waters) for Development

1. The pollutant causing the impairment is a:	**Points**
A. Threat to human health *Includes nonsupport of the following uses: public water supply, contact recreation, fish consumption, oyster waters.*	50
B. Threat to aquatic life *Includes nonsupport of the following uses: aquatic life, general, and narrative criteria*	30
C. Threat to both human health and aquatic life	30
2. Watershed proximity, related pollutants, and the ease of incorporating a newly identified parameter of nonsupport into an existing project.	**Points**
A. Ongoing TMDL in the same segment for a different pollutant	10
B. Ongoing TMDL in the same segment watershed for the same pollutant	20
C. Ongoing TMDL in the same segment watershed for a different pollutant	10
D. Ongoing TMDL in a contiguous watershed for the same pollutant	10
E. No ongoing TMDL in the same segment or contiguous watershed	0
3. Data availability for TMDL development	**Points**
A. Ongoing modeling activities in the segment	10
B. Recent targeted data collection activities within the segment, other than routine monitoring	10
C. TMDL tools still in development (for example, bacteria source tracking, mercury)	-30
4. Local and regional support for TMDL development	**Points**
A. River Authority and/or Council of Government active in current or recent TMDL project	20
B. TSSWCB or other state agency active in current or recent project	20
C. Dedicated regional staff are available in TCEQ region of the project	10
D. Positive stakeholder interest within the segment watershed	10

E. Strong opposition to the project	-10
5. Year of listing: under the commitment by TCEQ leadership in 1997 to begin development of TMDLs within 10 years of listing, water bodies listed earlier have a higher priority. If original listing year is:	**Points**
A. 1998	50
B. 2000	40
C. 2002	30
D. 2004	20
E. 2006	10
6. Best available funding information, with first priority given to ongoing projects. If project status is:	**Points**
A. ≥ 50% complete	50
B. < 50% complete	20
C. New project	0

Total Points	**Priority**
< 80	Low
90-160	Medium
> 160	High

Strategies for Protecting and Improving Water Quality

At all times, the TCEQ is protecting water quality through various programs. Just the act of monitoring and assessing water quality is a form of protection, since it informs state officials and the public about the status of Texas rivers, lakes, and estuaries and about water quality management needs. More water bodies are being assessed each year, leading to more timely identification of problems. But much more is being done on a regular basis—such as issuing permits that limit pollutant discharges to protect rivers, lakes, and bays, developing plans to protect sources of drinking water, and educating people about water quality issues.

The TCEQ's pace and progress in addressing impairments on the 303(d) list has risen sharply over the past five years. More TMDLs are being developed and implemented. The water quality standards were revised in 2000, and numerous analyses are being conducted to determine whether the currently defined uses are attainable at specific sites. In addition, other studies are underway to further improve the existing standards. More data are gathered each year to ensure that we have as sound a basis as possible for establishing existing and new controls. The TCEQ water quality programs strive at all times to provide accurate assessment, and to continually improve the tools and information used to manage water quality.

Permits to Protect Water Quality

The TCEQ issues permits that control discharges of wastewater into the surface waters of the state. Many types of discharges are regulated, such as the effluent from industries, domestic wastewater from city treatment plants, discharges from certain agricultural operations, and the storm water that runs off urban areas. The TCEQ also requires pretreatment permits for some wastewater treatment plants that are publicly owned.

The owners and operators of these facilities, called dischargers or permittees, are responsible for using the best technologies that are both available and practical to reduce pollutants in the effluent from their facilities. Many different kinds of pollutants are regulated by permit, including metals, pesticides, organic compounds, and treated human waste. Permit limits on the emission of pollutants into the air may also prevent water pollution, since pollutants in the air can settle into creeks and lakes. However, this issue is very complex, and scientists currently do not have a good understanding of how to control water pollution from air deposition.

The TCEQ works to conserve potable water sources through permits that regulate the recycling, beneficial reuse, and disposal of sludge. Sludge is the muddy solid waste produced during the water and sewage treatment processes. Texas' federal and state requirements for wastewater and sludge permitting are codified in the Texas Administrative Code.

The TCEQ also protects wetlands and other surface waters through its certification of federal permits that regulate the discharge of dredge or fill material into the waters of Texas. The state's certification that federal dredge and fill activities will not degrade wetlands or other surface waters is required under Section 401 of the federal Clean Water Act. The U.S. Army Corps of Engineers issues dredge and fill permits after certification by the TCEQ.

The TCEQ's wastewater and sludge permitting activities are required under Section 402 of the federal Clean Water Act, and implemented federally through the National Pollutant Discharge Eliminations System. In 1998, the TCEQ was authorized by the EPA to issue Section 402 permits on behalf of the federal government, with the exception of discharges associated with oil, gas, and geothermal exploration and development activities, which are regulated by the Railroad Commission of Texas. The TCEQ combined its state-issued wastewater permits with the federal permits that were delegated to it under the Texas Pollutant Discharge Elimination System.

Protecting Stream Flows

Water availability is an issue in Texas due to the increasing difficulty of meeting the needs of people, industry, wildlife, and habitats. Across the state, naturally occurring periods of low water availability are exacerbated by the increases in human population and in activities that require water. According to the State Water Plan published by the TWDB, the total demand for water is expected to increase 18 percent from 2000 to 2050.

The availability of water in streams is an issue of quality as well as quantity. Insufficient water flows in streams can affect the quality of the aquatic environment, or can reduce a stream's capacity to assimilate wastewater discharges. It can also limit the flows of fresh water into downstream estuaries, which are dependent on fresh water for their ecological health and fisheries uses.

The TCEQ cooperates with the TPWD and the TWDB to collect instream flow data collection and analyze and evaluate the information to determine the flow conditions necessary to support a sound ecological environment.

The TCEQ also conducts environmental reviews of water rights applications to assess the possible impacts of granting of a water right on fish and wildlife habitat, water quality and the instream uses associated with the affected body of water. Possible impacts to bays and estuaries are also addressed for those permits within 200 miles of the Gulf of Mexico.

The monitoring of stream flows and protection of instream uses is required and authorized under TCEQ rules, and by Texas House and Senate bills.

Protecting Sources of Drinking Water

The aquifers, lakes, and rivers that are designated by law for use as sources of drinking water are called source waters. The TCEQ protects source waters by:

- assessing their susceptibility to pollution.
- assisting local communities to develop source water protection programs.

A report assessing the vulnerability of each source water is provided to the operators of systems that supply public drinking water. The assessments consider the location of pollutant sources, intrinsic characteristics, contaminant occurrence, well construction, geology, known point sources, and land uses that occur within the capture zone of groundwater wells and within the watersheds of surface water intakes.

The assessments provide the scientific basis for the implementation of source water protection projects. Water systems are encouraged to take an active role in verifying the completeness and accuracy of the data used in the assessment report.

A water body is called “impaired” if it does not meet one or more of the standards established for its use. For example, a water body may be designated as impaired for the aquatic life use if dissolved oxygen concentrations are chronically low. The water body may be attaining all its other uses—as a source for drinking water, and as a safe place to fish or swim—but still be designated as impaired because *all* uses are not attained.

Source water protection is a program to prevent contamination of groundwater or surface water that is used as a source of public drinking water. Water suppliers implement source water protection programs by working cooperatively with community members and by educating people about issues that affect their drinking water. All public water supply systems may receive assistance in developing plans and implementation measures free of charge. Priorities for state assistance with plan development are set according to the results of the susceptibility assessments.

The protection and assessment of source waters is required and authorized under Section 1453 of the federal Safe Drinking Water Act.

Watershed Protection Plans

Watershed protection plans may be developed to protect high-quality waters, to address threatened waters before they become impaired, or to restore water bodies for which TMDLs are not planned or developed. These plans are still based on environmental targets, usually maintaining the applicable water quality standards. The types of goals and strategies that may be used in watershed protection plans are outlined in the EPA’s guidance for federal nonpoint source grants authorized under Section 319 of the Clean Water Act.

Watershed protection plans:

- describe the sources of pollution affecting a particular water body.
- define the actions needed to reduce pollution or restore water quality, both regulatory and voluntary.
- are developed in cooperation with regional and local stakeholders.

Watershed protection plans provide the opportunity to improve and protect water quality so that potential problems are addressed before the stream, lake, or bay actually fails to meet water quality standards.

Implementing Plans to Restore Water Quality

After a water body is listed in Category 5 [the 303(d) list], several different courses may be pursued to bring it into compliance with the standards. Further evaluation may be necessary to determine if the current standard is appropriate, or to determine the cause of the impairment. The TCEQ may begin a project to reduce pollution and restore the impaired use under its Total Maximum Daily Load (TMDL) Program. The TCEQ undertakes new projects to restore water quality with each new assessment, while continuing to complete and implement plans for waters listed in previous years.

For water bodies that are impaired due wholly or in part to nonpoint source (NPS) pollution, federal grant funds provided under Section 319 of the Clean Water Act play a key role in implementing restoration projects. These grants provide support for management practices that improve the quality of impaired or threatened waters, and are often used to support development and implementation of TMDLs. NPS grants are also used to implement watershed protection plans that are not associated with TMDLs; to conduct special projects that assess impacts due to NPS pollution; and to prevent the degradation of healthy rivers, lakes, and bays.

Standards Analysis

Water bodies are placed in Category 5b if there is reason to believe that one or more of the assigned standards may be inappropriate because of local conditions that are not due to human impacts. Waters in this category are slated for an analysis of their standards, called a *use attainability analysis*, or UAA.

For example, to determine appropriate aquatic life uses and related dissolved oxygen criteria, a UAA may consider aspects such as regularity of flow, habitat structure, typical water chemistry, and fish and other aquatic organisms that are characteristic in the area. Some rivers and lakes naturally support an abundant and diverse aquatic community, while other water bodies—such as small streams with intermittent flow—tend to have fewer types and total numbers of aquatic organisms. In addition, some water bodies might support a diverse aquatic community and fishery even though some components of their overall water quality are not superior under natural conditions.

Depending on the results of the UAA, uses and/or supporting criteria may be revised to be more or less stringent. Revisions of the standards are reviewed by the public, adopted by the Commission, and approved by the EPA. When a review and any resulting revisions of the standard are completed, the water body may be moved to another subcategory of the 303(d) List, or to another category of the Inventory.

Targeted for Monitoring and Additional Assessment

Water bodies in Category 5c are targeted for additional monitoring and assessment. Water bodies may be placed in this category when there is insufficient information to determine the best course of action. The TCEQ and its monitoring partners collect the additional data and information needed to determine if a standards review is appropriate, if a TMDL should be scheduled, or, more rarely, to determine the degree and geographic extent of nonsupport. Depending on the results, the water body may be moved to another subcategory of the 303(d) List, or to Category 1 or 2.

TMDLs and Implementation Plans

TMDLs and their implementation plans are developed to address water bodies listed in Category 5a. States must establish a TMDL for each impairment in each water body in Category 5a. This may mean that several TMDLs may be developed for one river or lake. A TMDL must also allocate this load to the point and nonpoint sources of pollution in the watershed. The state must then develop an implementation plan to achieve the loading allocations defined in the TMDL. TMDLs are subject to EPA approval; implementation plans are not.

Total Maximum Daily Loads

In order to restore water quality, it is first necessary to be reasonably certain of the sources and causes of pollution. One way to accomplish this is to develop a scientific model called a *total maximum daily load* (TMDL).

A TMDL:

- determines the maximum amount of a pollutant that a water body can receive and still both attain and maintain its water quality standards; and
- allocates this allowable amount (load) to point and nonpoint sources in the watershed.

TMDLs must be submitted to the Environmental Protection Agency (EPA) for review and approval. A TMDL is normally prepared for each pollutant in each impaired water body. In general, a TMDL should be completed within 13 years of the initial listing of a water body.

TMDL Implementation Plans (IPs) and Watershed Protection Plans (WPPs)

Both IPs and WPPs have the same goal — improving water quality in rivers, lakes, or bays.

❏ How they differ:
- ✓ IPs are remedial actions for impaired waters; WPPs may be either remedial or preventive.
- ✓ IPs are based on total maximum daily loads; WPPs use other measurable environmental goals for water quality.

❏ How they are alike:
- ✓ Define actions needed to reduce pollution and restore water quality.
- ✓ Include both regulatory and voluntary actions.
- ✓ Are developed in cooperation with regional and local stakeholders.
- ✓ Are based on the best available scientific methods and tools.

Implementation Plans

After a TMDL is completed, an *implementation plan* is developed that describes the regulatory and voluntary activities necessary to achieve the pollutant reductions identified in the TMDL. Management activities incorporate both nonregulatory and regulatory mechanisms, such as permit effluent limits and recommendations, nonpoint source pollution management practices, stream standard revisions, special projects, pollution prevention, public education, and watershed- specific rule recommendations. The best strategies for each individual watershed are developed in cooperation with regional and local stakeholders.

The implementation plan describes these various activities, the schedule for implementing them, and the legal authority for the regulatory measures. It also provides reasonable assurance that the voluntary practices will be undertaken. For instance, the plan may identify grant funds that have been secured to implement voluntary actions. The plan also includes the measurable results that will be achieved through the plan, along with a follow-up monitoring plan to determine its success. The ultimate goal is always the attainment of the water quality standard, but additional, interim results may be evaluated to assess progress toward that goal.

Even after plans are fully implemented, it is difficult to accurately predict how long it will take for improvements to occur in the stream, or how much improvement will be seen. For this reason, there is a schedule for phasing in implementation activities, especially those that address non-point sources of pollution. Less expensive, time-tested activities are implemented first, and their impacts are assessed. If water quality standards are not yet achieved, then another set of regulatory and/or nonregulatory activities is implemented. Through this adaptive management approach, the water body is reassessed, and adjustments are made in the implementation activities as needed to attain water quality standards in the stream.

A Joint Effort—Stakeholder Involvement

Stakeholders are involved in each of the water quality management cycle through participation in standing and special committees.

The TCEQ is designated by law as the lead state agency for water quality in Texas. The Texas State Soil and Water Conservation Board (TSSWCB) also plays an important role as the lead agency in the state for the management of agricultural and silvicultural (forestry) nonpoint source runoff. The Texas Clean Rivers Program—a partnership of regional water management authorities—plays a key role in providing forums for stakeholder involvement and coordinating water quality management activities (see Figure 3.1 - Major River Basins and Planning Areas in Texas).

Many other local, regional, state, and federal agencies have specific responsibilities that are critical to the restoration of polluted water bodies.

Nongovernment organizations, especially at the watershed level, can provide information about local concerns and infrastructure, and can help build support for the kind of pollution controls that may be required to restore water quality.

A coalition of government agencies and citizens is necessary to develop and implement water quality protection and restoration strategies. Public participation in watershed protection plans and TMDL implementation plans provides the following benefits:

- improves the quality and increases the quantity of information used as the basis for plans,
- promotes government accountability,
- ensures that state government considers the local perspective in its decisions,
- helps stakeholders gain insight into the nature of water quality problems and alternate solutions in their communities,
- leads to voluntary individual actions to curb pollution, and
- local ownership of water quality.

Who Are Stakeholders?

Stakeholders include all individuals or organizations in the watershed who have one or more of these attributes:

- are significant contributors of pollutant loadings or other impacts to water quality;
- are significantly affected by water quality problems;
- are directly affected by project outcomes or decisions;
- may be required to undertake control measures because of statutory or regulatory requirements;
- have statutory or regulatory responsibilities closely linked to water quality—for example, flood control;
- can help develop or implement actions to remedy water quality problems;
- live in the watershed or use the water resource.

Although not an exhaustive list of possible stakeholders, these categories give some examples of the kinds of groups and people who may become involved in protecting and restoring water resources:

- Wastewater dischargers–municipal and industrial.
- Public–individuals; civic groups such as those representing environmental, consumer, recreational, and community interests; schools, universities, and private landowners.

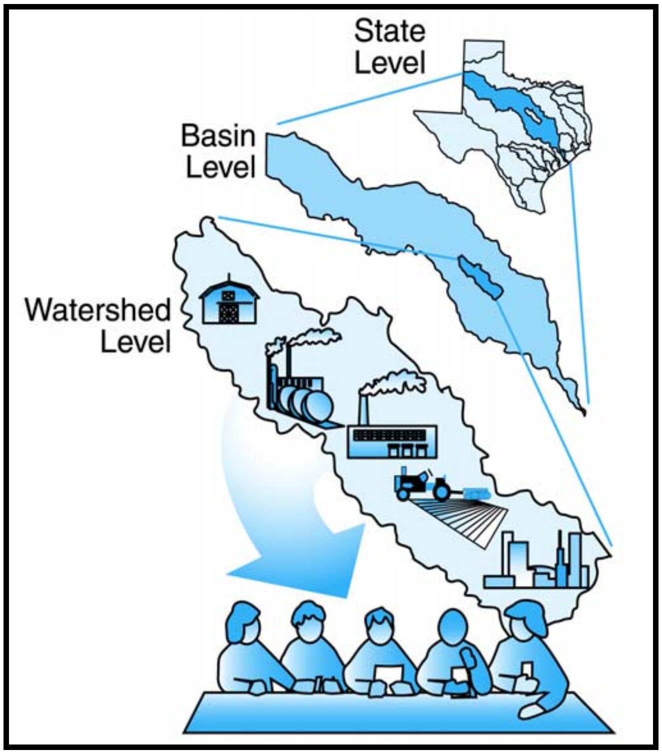

Figure 3.3 Stakeholder Forums

- Agriculture and aquaculture – corporate and individual farmers, ranchers, and producers; subsistence and commercial harvesters of fish and shellfish; agricultural groups and organizations.
- Business –commercial, residential, and industrial firms; utilities, business groups, and trade associations.
- Government–city, county, regional, state, federal, and international government agencies, tribes, utility districts, and river authorities.

Coordination of Stakeholders

Coordination of stakeholders takes place at three levels (see Figure 3.3 - Stakeholder Forums):

- **statewide** for agencies and organizations that conduct water quality management activities across the entire state, to target and synchronize their efforts.
- **regionally** to assess conditions within a basin and establish basin-specific goals and priorities.
- **locally** to develop watershed protection plans and TMDL implementation plans that have local support and input.

Clean Rivers Program Stakeholders Work Group

Comprised of staff from the regional planning agencies of the Clean Rivers Program (CRP), the work group represents stakeholder interests at the state level. The CRP Stakeholders Work Group coordinates with the TCEQ and other state agencies at annual meetings. See Figure 1 for a list of the CRP planning agencies and the regions they manage.

Basin Steering Committees

Basin steering committees of the Clean Rivers Program provide the primary forum for coordinating stakeholder involvement at the regional level. These committees carry out educational activities within the basin, such as workshops and volunteer programs. They also produce public information products and conduct promotional campaigns through various media.

Local Watershed Work Groups

These work groups, comprised of key stakeholders in priority watersheds, provide valuable input about local conditions. They develop site-specific strategies for developing watershed protection plans or TMDL implementation plans.

Education

The TCEQ has numerous projects and programs to inform the public and their representatives about issues that affect water quality and ways individuals and regulated organizations can act to protect and improve the environment. These programs range from technical assistance to business owners to ad campaigns to formation of stakeholder groups to advise the agency.

Education is integrated into most water quality programs at the TCEQ. Educational activities may include presentations to stakeholder groups, forums to share pollution reduction technologies, public awareness campaigns, or distribution of educational materials to schools and volunteer groups.

GAUGING SUCCESS

Success of the state’s water quality management program is gauged by progress made toward protecting or restoring water quality uses that benefit wildlife, people, and the environment. Some of the reports of success that the TCEQ is charged with producing include:

- progress report on environmental and program goals for the Texas Legislative Budget Board
- biennial reports to the Texas Legislature

- annual reports of TMDL implementation and nonpoint source management activities
- the Texas Water Quality Inventory and 303(d) List.

With the exception of the report to the Legislative Budget Board, these documents are available on the TCEQ's Web site at www.tceq.state.tx.us.

Making successful management decisions depends on understanding the relationships among water quality, water use, and conditions within a watershed. With the watershed approach, Texas integrates policy, science, and people to ensure clean water for years to come.

Chapter 4 Coordination

The State of Texas Nonpoint Source Program envisions a partnership among many organizations, both public and private, to protect and restore water quality. With the extent and variety of water quality issues across Texas, the need for cooperation at all levels is essential. Surface water bodies and aquifers are not limited by political boundaries and therefore environmental solutions often cross federal, state, and local levels of responsibility. By establishing a coordinated framework to share information and resources, while minimizing unnecessary duplication, the State can more effectively focus its water quality protection efforts. Chapters 6, 7, and 8 describe the programs and best management practices that are implemented to address NPS pollution. This chapter provides a description of the agencies and organizations that implement the tools described in Chapters 5, 6, and 7 to protect and restore water quality.

Interstate and International Coordination

The State of Texas coordinates with neighboring U. S. states and Mexico in protecting water resources in those watersheds or aquifers which cross political boundaries. Cooperation is multidimensional, involving governments at every level; voluntary, non-governmental organizations; private businesses; and the public. A number of programs and activities are in place to facilitate collaboration between jurisdictions.

Interstate Coordination

The TCEQ and TSSWCB are involved in interstate coordination of water resource protection activities through membership in national organizations such as American Water Works Association (AWWA), Association of State Drinking Water Administrators (ASDWA), Association for State and Interstate Water Pollution Control Administrators (ASIWPCA), Council of State Governments (CSG), National Association of State Conservation Agencies (NASCA), National Association of Conservation Districts (NACD), and the Ground Water Protection Council (GWPC).

The TCEQ and TSSWCB, working through EPA Region 6, coordinate with the states of Arkansas, Louisiana, New Mexico, and Oklahoma through scheduled State-EPA meetings and conferences. These gatherings provide a forum for information exchange and discussions on the future direction and implementation of the Nonpoint Source Program.

International Coordination

At the international level, the Border Environment Cooperation Commission and the North American Development Bank work with states and communities to develop needed water and waste infrastructure projects. In addition, Texas is one of the participants in the Ten State Initiative, which brings together environmental representatives from the U.S. and Mexican border states to discuss and act on environmental priorities.

As a result of that commitment, the TCEQ has implemented State-to-State Strategic Environmental Plans with the environmental agencies of each of Texas' four neighboring Mexican states (Tamaulipas, Nuevo León, Coahuila, and Chihuahua). A variety of programs has evolved from the communication brought about by these plans, including industry recognition and pollution prevention programs, as well as a Border Recycles Day.

The need to engage on a broad set of environmental issues resulted in the signing by the U.S. and Mexico of the La Paz Agreement in 1983. Ten years later, the North American Free Trade Agreement (NAFTA) further reinforced ties between the U.S. and Mexico. It included environmental side agreements that established both trilateral and binational entities to address environmental issues.

Various state agencies in Texas have developed programs that have an important effect on the border. Some, such as the Texas Water Development Board's Economically Distressed Areas Program, help communities plan and develop needed infrastructure. The programs discussed below are designed to improve the environment of the border region.

TCEQ Border Affairs Program

The TCEQ Border Affairs Program works closely with TCEQ regional offices in Laredo, Harlingen, El Paso, and San Antonio to resolve concerns for border residents. As an information clearinghouse, the group has daily contact with government officials on both sides of the border. Border Affairs has helped foster cross-border environmental agreements and programs with Mexican counterparts at the local, state, and federal levels and with stakeholders in the private sector and non-governmental organizations. The group has worked on environmental infrastructure matters with the Border Environment Cooperation Commission and the North American Development Bank.

Border 2012 Program

The U.S. Environmental Protection Agency, its Mexican counterpart, the Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT), the U.S. and Mexican border states, and U.S. border tribes, have developed the Border 2012 program to protect the environment and public health in the border region. The program focuses on decreasing pollution and lowering the risks of exposure to pesticides and other chemicals. The goal of the program is to achieve measurable improvements in air, water and soil quality in the border region by the year 2012.

The focus of Border 2012 is to address environmental issues at the local level by decentralizing the decision making and priority setting processes, with implementation driven by four Regional Workgroups, three Borderwide Workgroups and three Policy Forums. Regional Workgroups address environmental issues affecting specific sub-regions. The border-wide workgroups address binational and transboundary aspects of environmental health, emergency preparedness and response, and cooperative enforcement and compliance. Policy Forums focus on broad issues concerning air and water quality, and the effective management of hazardous and solid waste and toxic substances. In addition, task forces will be created, as needed, to implement projects at the local level consistent with the needs of the region and the goals of the program.

The Rio Grande/Río Bravo Basin Coalition

The Rio Grande/Río Bravo Basin Coalition is a multinational, multicultural organization with leadership from the U.S., Mexico, and the Pueblo Nation. Its purpose is to help local communities restore and sustain the environment, economies, and social well-being of the Rio Grande/Río Bravo Basin. The coalition has 50 partner organizations from around the watershed which share a commitment to the health and long-term sustainability of the Río Grande/Río Bravo Basin. The belief is that building coalitions across borders is the best way to solve international environmental problems.

The Coalition organizes the Día del Río citizen-led event. The event is both a call to action and a celebration of the basin's rich diversity, and it draws public attention to the critical state of the basin's rivers, groundwater, and wildlife. Activities focus on raising awareness and include public talks, tree planting, and river cleanups.

International Boundary and Water Commission

The International Boundary and Water Commission (IBWC) encourages and coordinates the establishment of cooperative relationships with federal, state, and local agencies, both in the U.S. and in Mexico, in carrying out activities along the border. The U.S. and the IBWC may undertake cooperative projects to implement existing treaties and other agreements between the two Governments. Projects may originate with the emergence of an environmental problem requiring the agreement and cooperation of the two Governments for a solution. Because of the international nature of the Rio Grande, the State of Texas has contracted with the U.S. Section of the IBWC to implement the Clean Rivers Program, including the *Friends of the Rio Grande* initiative, in its 1,254-mile international boundary section.

Federal Agencies

Environmental Protection Agency

EPA works to develop and enforce regulations that implement environmental laws enacted by Congress. EPA is responsible for researching and setting national standards for a variety of environmental programs, and delegates to states and tribes the responsibility for issuing permits and for monitoring and enforcing compliance. While EPA protects the nation's natural resources primarily through regulation, EPA has also developed a wide variety of funding, planning, and education programs that are effective in protecting environmental quality.

U.S. Geological Survey

The U.S. Geological Survey (USGS) has the principal responsibility within the Federal Government to provide the hydrologic information and understanding needed by others to achieve the best use and management of the Nation's water resources. Through the National Water Quality Assessment Program (NAWQA), USGS scientists collect and interpret data about water chemistry, hydrology, land use, stream habitat, and aquatic life. The NAWQA Program is a primary source for long-term, nationwide information on the quality of streams, groundwater, and aquatic ecosystems. This information supports national, regional, State, and local decision making and policy formation for water-quality management. The goals of NAWQA are to assess the status and trends of national water quality and to understand the factors that affect it.

National Oceanic and Atmospheric Administration

Programs work to protect, restore, and responsibly develop the nation's coastal communities and resources while ensuring their protection for future generations.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers is a worldwide organization that provides engineering services, environmental restoration, and construction support for a wide variety of civil and military projects. The Corps' primary civil mission is developing and managing the nation's water resources. The Corps develops projects to reduce flood damage; improves navigation channels and harbors; protects wetlands; and preserves, safeguards, and enhances the environment.

U.S. Coast Guard

The U.S. Coast Guard is a military, multi-mission, maritime service and one of the nations five Armed Services. Its mission is to protect the public, the environment, and U.S. economic interests – in the nations ports and waterways, along the coast, on international waters, or in any maritime region as required to support national security. The Coast Guard addresses the wide ranging problems associated with preventing, responding to, and paying for pollution associated with oil spills and leaks. It does so by creating a comprehensive programs that deal with prevention, response, liability, and compensation of spills from vessels and facilities in our navigable waters.

U.S. Department of Agriculture

The U.S. Department of Agriculture (USDA) is committed to helping America's farmers and ranchers. The USDA is the steward of the nation's 192 million acres of national forests and rangelands. It is the country's largest conservation agency, encouraging voluntary efforts to protect soil, water, and wildlife on the 70 percent of America's lands that are in private hands. USDA is a research leader in everything from human nutrition to new crop technologies that allow us to grow more food and fiber using less water and pesticides.

USDA-Natural Resource Conservation Service

The mission of the Natural Resources Conservation Service (NRCS) is to provide technical and financial assistance to landowners and operators on soil and water conservation matters. Work is directed through local soil and water conservation districts in Texas, according to the terms of memoranda of understanding with each district.

USDA-Farm Services Agency

The principal mission of the Farm Services Agency (FSA) includes stabilizing farm income, helping farmers conserve land and water resources, providing credit to new or disadvantaged farmers and ranchers, and helping farm operations recover from the effects of disaster. Many of the FSA operated programs are funded through the Commodity Credit Corporation (CCC), a government owned and operated corporation established in 1933.

USDA-Agricultural Research Service

The Agricultural Research Service (ARS) is the principal in-house research agency of the U.S. Department of Agriculture (USDA). ARS conducts research to develop and transfer solutions to agricultural problems of high national priority. Two of the twenty-two ARS National Programs, Water Quality and Management and Soil Resource Management, are strongly committed to applied nonpoint source pollution research as part of their mission to increase understanding and develop solutions to protect the Nation's soil and water resources. In Texas, ARS is conducting ongoing research on nonpoint source related issues such as: land application of municipal and agricultural wastes; improved management of soil, water, nutrients, and chemicals in agricultural production systems; and enhanced simulation tools for water quality, hydrology, and crop growth. ARS research, conducted by laboratories throughout the state, is often carried out in cooperation with universities, state research and extension centers, and private organizations.

USDA-Forest Service

Congress established the Forest Service in 1905 to provide quality water and timber for the Nation's benefit. Main activities include (1) protection and management of natural resources on National Forest System lands, (2) research on all aspects of forestry, rangeland management, and forest resource utilization (3) community assistance and cooperation with State and local governments, forest industries, and private landowners to help protect and manage Non-Federal forest and associated range and watershed lands to improve conditions in rural areas. The Forest Service is also the largest forestry research organization in the world, and provides technical and financial assistance to state and private forestry agencies.

State Agencies

Texas State Soil and Water Conservation Board

The Texas State Soil and Water Conservation Board (TSSWCB) is the lead agency in Texas for activity relating to abating agricultural and silvicultural nonpoint source pollution. As the lead agency, the TSSWCB is mandated to: 1) plan, implement, and manage programs and practices for abating agricultural and silvicultural nonpoint source pollution; 2) administer a Technical Assistance Program for Soil and Water Conservation Land Improvement Measures; and 3) administer a Cost-Share Assistance Program for Soil and Water Conservation Land Improvement Measures. The TSSWCB meets these mandates by working with local soil and water conservation districts to administer its TMDL Program, 319(h) Grant Program, Conservation Planning Programs (i.e. Water Quality Management Plan and Comprehensive Nutrient Management Plan Programs), NPS compliant resolution process, Poultry Initiative, and involvement in the implementation of the Coastal Management Plan.

Texas Commission on Environmental Quality

The Texas Commission on Environmental Quality (TCEQ) strives to protect the state's human and natural resources consistent with sustainable economic development. The TCEQ implements many sections of the Texas Water Code, federal Clean Water Act, and Safe Drinking Water Act. The TCEQ develops water quality requirements designed to protect attainable uses and to maintain the quality of waters in the state. The TCEQ has a number of programs that address various aspects of nonpoint source pollution management through planning, the setting of standards, data collection, assessment, targeting and prioritization, and implementation.

Texas Water Development Board

The Texas Water Development Board (TWDB) is responsible for long-term water planning and financing water-related development for the state. Its duties include the preparation and update of the State Water Plan, collection and maintenance of water data, and administration of various funds designed to help finance state and local water-related projects.

Texas Parks and Wildlife Department

The Texas Parks and Wildlife Department's (TPWD's) primary functions are to manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities.

To this end, TPWD operates and maintains a system of public lands, including state parks, historic sites, fish hatcheries and wildlife management areas; monitors conserves and enhances the quality of public and private lands, rivers, streams, lakes, coastal marshes, bays, beaches, and Gulf waters; manages and regulates fishing, hunting and boating activities; assists public and private entities in providing outdoor recreational opportunities; conducts education and outreach events and programs; and cooperates with other governmental entities in these areas. TPWD's efforts focus on programs that affect habitat, in the belief that preservation and creation of appropriate habitat will result in the protection of fish, wildlife, and recreation.

Texas Agricultural Experiment Station

The Texas Agricultural Experiment Station (TAES) is the official state agricultural research agency in Texas. It is administered by the Board of Regents of the Texas A&M University System. The TAES cooperates with other state and federal agencies and colleges and universities in planning and conducting agricultural research. Programs of the 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.

Texas Department of Agriculture

The Texas Department of Agriculture (TDA) is the State's lead regulatory agency 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. 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 TCEQ, the Structural Pest

Control Board, and the DSHS. TDA is also responsible for the enforcement of federal pesticide laws under a cooperative agreement with the EPA.

Texas Institute for Applied Environmental Research

The Texas Institute for Applied Environmental Research (TIAER) was established as part of the Texas A&M System in 1992. The first mandate in its enabling legislation is to conduct applied research on environmental issues that have public policy implications. The legislation also calls for TIAER to provide national leadership on emerging environmental policy and to provide a setting for environmental studies on the interface between government and the private sector. Establishing interdisciplinary programs or partnerships to develop and implement new policies, technologies, strategies, and relationships is another TIAER mandate.

The TIAER goal is to impact state and national environmental policy. A principal that is fundamental to this goal is that improvements in the environment are best accomplished not by simply conducting scientific research, but by using research results to formulate policy recommendations that will actually be implemented by government and other institutions. TIAER seeks to use cutting-edge strategies and technologies to assist developers and implementers of environmental policy. Partnerships with other universities and state agencies are integral aspects of Institute work. These partnerships build on the strengths of each entity to produce an effective, efficient program.

Texas Water Resources Institute

The Texas Water Resources Institute is a unit of the Texas Agricultural Experiment Station and Texas Cooperative Extension. It is part of a national network of institutes created by the Water Resources Research Act of 1964. The Institute is funded by the United States Geological Survey and is affiliated with the National Institutes for Water Research.

The Texas Water Resources Institute serves as a focal point for water-related research at Texas universities, encouraging discussion of statewide issues through meetings and multi-university studies. The Institute links academic expertise with state and federal agencies, strengthening water research and education. Additionally, the Institute provides leadership for water resources programs through grant administration, pre-award services, project management, communications, and facilitation of interagency collaboration.

Texas Forest Service

The Texas Forest Service (TFS), a member of the Texas A&M University System, provides statewide leadership and professional assistance to assure that the state's forest, tree, and related natural resources are wisely used, nurtured, protected, and perpetuated for the benefit of all Texans.

Texas Cooperative Extension

The Texas Cooperative Extension (TCE) is a partnership between the USDA, Texas A&M University, and County Commissioners Courts. The basic mission of the TCE is education and dissemination of information relating to agriculture, home economics/consumer sciences, community development, and 4-H/youth. County Extension Agents deliver most of the educational programs of the TCE. These county agents, supported by specialists based at College Station and 12 regional centers throughout Texas, provide technical information and respond to individual problems 1and 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.

Texas Department of Licensing and Regulation

The Texas Department of Licensing and Regulation (TDLR) is the primary state agency responsible for the oversight of businesses, industries, general trades, and occupations that are regulated by the state and assigned to the department by the legislature. TDLR ensures public safety and welfare in many diverse areas. Issuing licenses, conducting inspections, investigating complaints, issuing penalties, setting rules and standards, and holding hearings, names just a few of the agency's activities. The TDLR activities as they relate to occupational certifications ensures that environmental professionals operate in compliance with federal and state laws and regulations.

Texas General Land Office

The Texas General Land Office (GLO) is the state agency responsible for the management of state-owned public lands not specifically purchased by or deeded to other agencies. The GLO is a proprietary state agency. The GLO is also the state's lead agency for coordinating the Coastal Management Plan designed to help preserve public beach access, protect coastal wetlands and other coastal natural resources, and respond to beach erosion along the Texas coast.

Railroad Commission of Texas

The Railroad Commission of Texas (RRC) is the state agency with primary regulatory jurisdiction over the oil and natural gas industry, pipeline transporters, natural gas utilities, rail safety matters, and surface mining operations. The main functions of the RRC are to protect the environment, protect public safety, protect the correlative rights of mineral interest owners, prevent waste of natural resources, and assure fair and equitable utility rates in those industries over which it has been granted authority.

Texas Department of Transportation

The Texas Department of Transportation (TxDOT) is the lead state agency for construction and maintenance of state roads, which includes responsibility for the management of road and highway nonpoint sources of pollution. The goal of TxDOT as it relates to nonpoint source pollution, is to prevent the degradation of receiving waters due to storm water runoff from highway operations. TxDOT has developed a comprehensive storm water management program aimed at achieving this goal.

Texas Department of State Health Services

The Texas Department of State Health Services (DSHS) is the lead agency to protect, promote, and improve the health of the people of Texas. DSHS administers several programs that support public health and environmental programs. The Environmental Sciences Branch provides analytical chemistry laboratory support to the EPA Safe Drinking Water Program and analyzes fish and shellfish from Texas coastal waters, inland lakes, and rivers for organic chemicals and toxic metals. The Division for Regulatory Services-Seafood and Aquatic Life Group protects consumers of fish and shellfish from disease or other health hazards transmissible by these products produced in or imported into Texas. The Seafood and Aquatic Life Group also protects the recreational fishers from disease or contaminants found in fish and other aquatic species caught in Texas' lakes, rivers, bays or nearshore State waters.

Interagency Agreements

Maximizing the utilization of local, state and federal resources is essential if limited resources are to be effective. Texas has implemented a variety of mechanisms to ensure and improve coordination among and between Federal, State, and local officials for addressing water quality. A list of some of the agreements and strategic partnerships is provided below.

Table 4.1 Federal, State, and Local Agreements to Facilitate Cooperation on NPS Issues

Cooperative Entities	Type of Agreement	Purpose of Agreement
TCEQ and TSSWCB	Memorandum of Understanding	Facilitate cooperation between the two primary Texas NPS control agencies in achieving program goals.
TCEQ and TSSWCB	Memorandum of Agreement	Sets for the cooperating responsibility and authority regarding development of total maximum daily loads (TMDLs).
TSSWCB and Texas A&M University System	Memorandum of Understanding	Establishes commitments to work together to accomplish statewide NPS pollution reduction goals with the state's agricultural and silvicultural producers. TAES 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.
TCEQ and RRC	Memorandum of Understanding	Clarifies the division of jurisdiction between TCEQ and RRC with regards to wastes generated in connection with oil and gas exploration, development, and production activities.
TCEQ and GLO	Memorandum of Understanding	Sets forth the mutual coordination of program responsibility and procedural mechanisms for the Galveston Bay Estuary Program to address threats arising from pollution, development, and overuse, and enhancing ecosystems-based management of Galveston Bay.
TCEQ with other state agencies: TPWD, DSHS, TWDB, Tx A&M University System	Memorandum of Agreement	Establishes agreements with key state and federal partners to set priorities, achieve water quality goals, and plan and implement watershed projects to protect and restore NPS-impacted water bodies.
USDA-NRCS with local Soil and Water Conservation Districts	Memorandum of Agreement	Sets forth the cooperation for SWCDs to furnish technical assistance to farmers and ranchers in the preparation of soil and water conservation plans.
TCEQ and TWDB	Memorandum of Agreement	Sets forth the cooperation, responsibility and authority regarding the development of TMDLs.
TCEQ and TDA	Memorandum of Agreement	Sets forth the cooperation, responsibility and authority regarding the development of TMDLs.
TCEQ and TAES, TCE and TFS	Memorandum of Agreement	Sets forth the cooperation, responsibility and authority regarding the development of TMDLs.

TSSWCB and USDA-Forest Service	Memorandum of Understanding	Sets forth the responsibilities and activities to be performed by each agency in carrying out the State Water Quality Management Plan and Nonpoint Source Management Program as related to activities on National Forest System Lands.
TPWD and TxDOT	Memorandum of Understanding	Provides a formal mechanism by which the TPWD may review TxDOT transportation projects, including those that have the potential to affect natural resources and to promote the mutually beneficial sharing of information which will assist TxDOT in making environmentally sound decisions.
TCEQ and U. S. Coast Guard	Memorandum of Agreement	Outlines the responsibilities for the recovery of abandoned sealed containers on Texas beaches for pollution prevention and response.
GLO and U.S. Coast Guard	Memorandum of Agreement	Provides for agreement to cooperate and to coordinate efforts in implementing and exercising their respective statutory and regulatory duties related to pollution prevention and response.

Stakeholder Involvement

In order to achieve water quality goals, including those discussed in this Management Program, the State of Texas enlists the cooperation of affected entities, or stakeholders, to solicit input, assistance and cooperation in developing and implementing solutions. Within a particular watershed, stakeholders may include individuals and civic groups, farmers and ranchers, local industry, environmental organizations, wastewater dischargers, as well as local, state, and federal government entities.

Coordinated Monitoring

The development of the annual coordinated monitoring schedule is an exceptional example of stakeholder involvement. Monitoring priorities and issues are discussed among state, federal, regional, and local governmental entities as well as other interested parties and the public. The implementation of coordinated statewide monitoring is a priority of the TCEQ and the Clean Rivers Program (CRP) to minimize duplication of effort, improve spatial coverage of monitoring sites, and improve consistency of parametric coverages (parametric coverages typically include field measurements, flow measurements, routine water chemistry, and fecal coliform analysis).

At least one meeting is held in each major river basin, hosted by the CRP planning agency, during the spring of each year. The purpose of the meeting is to develop a coordinated basin-wide monitoring schedule. All water quality monitoring groups that collect Surface Water Quality Monitoring data and commit to comply with TCEQ requirements for collecting quality-assured data are invited to participate. New sites are added, existing sites may be relocated, and parametric coverages may be changed based on the discussions at the meetings.

The preliminary basin-wide monitoring schedules developed at the coordinated monitoring meetings are reviewed by the CRP planning agencies, CRP stakeholders, and TCEQ staff to ensure that proposed revisions to monitoring locations and parametric coverages are appropriate. After review, a statewide coordinated schedule is posted on the internet developed and maintained under contract by the Lower Colorado River Authority at: http://cms.lcra.org/

Stakeholder Groups

National Natural Resources Conservation Foundation

The National Natural Resources Conservation Foundation (NNRCF) promotes innovative solutions to natural resource problems and conducts research and educational activities to support conservation on private land. The NNRCF is a private, nonprofit corporation. The foundation builds partnerships among agencies and agricultural, public, and private constituencies interested in promoting voluntary conservation on private lands.

Texas Forestry Association

The Texas Forestry Association (TFA) is a tax-exempt, non-profit 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.

Clean Rivers Program Stakeholder Workgroup

The Stakeholder Workgroup meets annually to ensure the Clean Rivers Program is functioning in a manner that considers the needs of all stakeholders. Representatives from government, industry, business, agriculture, and environmental interest groups participate in the Workgroup. Surface water quality issues are discussed, and decisions are made through a consensus-based approach.

The Stakeholder Workgroup was originally formed solely as an advisory group for the Clean Rivers Program. However, in recent years the

Workgroup's scope and membership has been expanded to include input on the focus, goals, and functionality of the Nonpoint Source Management Program, the Total Maximum Daily Load Program, and the Surface Water Quality Monitoring Program. The group also works with the TCEQ on setting priorities for addressing water quality problems related to both point and nonpoint sources.

Clean Rivers Program Basin Steering Committees

CRP Basin Steering Committees meet at least annually in each of Texas' major river basins. The purpose of these meetings is for the CRP Planning Agency to present water quality issues for the basin and request input from the local citizens and stakeholders in identifying potential sources of pollution and setting local priorities. In addition, the meeting provides a way for state agency representatives to communicate statewide NPS goals to stakeholders at the local level. The CRP Planning Agency responsible for monitoring and assessing water quality for each basin plans and conducts the meeting. Basin Status Reports prepared by the CRP Planning Agencies outline recommended actions for nonpoint source pollution management and other water quality issues in each river basin.

Local Watershed Action Committees

Throughout the Total Maximum Daily Load (TMDL) development process, stakeholder work groups or existing community forums are used to obtain public input toward project design, sampling, load allocations, and options for implementation measures. After a TMDL has been established for a particular water body, the TCEQ develops an implementation plan with the participation of local stakeholders, describing the voluntary and regulatory measures needed to achieve reduction of the pollutants addressed in the TMDL.

NPS Stakeholders Forum

The TCEQ and the TSSWCB established a statewide stakeholder workgroup comprised of CRP Stakeholders and other state and local entities with an interest in NPS management. The NPS Stakeholders Forum provides TSSWCB and TCEQ an opportunity to seek input and feedback on the State's NPS management programs and activities. The NPS Stakeholders Forum meets at least annually. The TSSWCB and TCEQ NPS and CRP programs coordinate meetings of this group as needed. The meetings provide an opportunity for the NPS program to provide information about NPS management and the 319 program to state and local government entities for implementation of the goals and milestones of the NPS Management Program.

Texas Watershed Protection Committee

In 1997 the Texas Watershed Protection Committee (TWPC) was formed for the purpose of coordinating actions on numerous atrazine detects found in surface water bodies that were sources of public drinking water. The TWPC is informal in that its existence is not mandated by any state law or regulation; however, it meets an important need for coordinating responses to pesticide contamination of surface water. As well as coordinating general activities aimed at preventing contamination, the TWPC actively seeks and identifies opportunities to improve existing surface water quality programs and promotes coordination between agricultural and surface water related agencies. Response to pesticide contamination is coordinated through the TWPC. Information is provided to the TWPC upon detection of pesticide contamination in surface water for evaluation and recommendations. Response to pesticide contamination in surface water falls under the jurisdiction of a number of state agencies including the TSSWCB, TCEQ, and TDA.

Texas Groundwater Protection Committee

The Texas Groundwater Protection Committee (TGPC) was formally created by the 71st Legislature in 1989. The TGPC was created to bridge gaps among existing state water and waste regulatory programs in order to focus protection on groundwater resources and to optimize water quality protection by improving coordination among agencies involved in groundwater activities. Texas Water Code sections 26.401 through 26.407 established the TGPC and outlined its powers, duties, and responsibilities. The TGPC is responsible for preparing the *Texas Groundwater Protection Strategy*, which provides guidelines for the prevention of contamination and for the conservation of groundwater and that provides for the coordination of the groundwater protection activities of the agencies represented on the committee.

The state's groundwater protection policy was adopted by the Legislature as part of the Act that created the TGPC. The policy sets out non-degradation of the state's groundwater resources as the goal for all state programs. The state's groundwater protection policy recognizes:

- the variability of the state's aquifers in their potential for beneficial use and susceptibility to contamination,
- the importance of protecting and maintaining present and potentially usable groundwater supplies,
- the need for keeping present and potential groundwater supplies reasonably free of contaminants for the protection of the environment and public health and welfare, and
- the importance of existing and potential uses of groundwater supplies to the economic health of the state.

The TGPC actively attempts to identify opportunities to improve existing groundwater quality programs and promote coordination between agencies. The TGPC strives to identify areas where new or existing programs could be enhanced to provide additional needed protection.

Coastal Coordination Council

The Coastal Coordination Council (Council) administers the Coastal Management Program (CMP). The Commissioner of the General Land Office chairs the Council. Other members of the Council include the chair, or a member designated by the chair, of the following agencies' Commissions: the Texas Parks and Wildlife Department (TPWD); the Texas Commission on Environmental Quality; the Railroad Commission of Texas; the Texas Water Development Board; the Texas Transportation Commission; the State Soil and Water Conservation Board; the director of the Texas A&M University Sea Grant Program serving as a non-voting member; and four gubernatorial appointees. The appointees consist of a local elected official who resides in the coastal area, a business owner in the coastal area, a resident from the coastal area, and a representative of agriculture.

The Council is charged with adopting uniform goals and policies to guide decision-making by all entities regulating or managing natural resource use within the Texas coastal area. The Council reviews significant actions taken or authorized by state agencies and subdivisions that may adversely affect coastal natural resources to determine their consistency with the CMP goals and policies. In addition, the Council oversees the CMP Grants Program and the Small Business and Individual Permitting Assistance Program.

Texas Alliance of Groundwater Districts

The Texas Alliance of Groundwater Districts (TAGD), formerly the Texas Groundwater Conservation Districts Association, was formed on May 12, 1988, as a nonprofit §501©)(3) corporation. The TAGD was formed to further the purpose of groundwater conservation and protection activities. The TAGD provides a means of communication and exchange of information between individual districts regarding the day-to-day operation of local groundwater management. Members of TAGD are part of a network which provides valuable technical and operational experience. This often provides information that saves districts time and money. The TAGD maintains contact with members of the private sector and various elected, local, state, and federal officials, providing them with timely information on activities and issues relevant to groundwater management. Members of TAGD also serve on various local, state, and federal agency committees and subcommittees, providing input and information on behalf of the member district.

One of the primary intents of Chapter 36 of the Texas Water Code, the chapter empowering groundwater conservation districts, is for the districts to develop and carry out educational programs for their constituency. Many districts have developed educational programs directed toward water conservation, well-head protection and overall environmental awareness that has contributed to the mitigation of NPS pollution.

Soil and Water Conservation Districts

There are currently 217 soil and water conservation districts (SWCDs) organized across the state. Each district is an independent political subdivision of state government that is governed by five directors elected by landowners in the district. Local SWCDs provide assistance to agricultural landowners or operators.

Various federal, state, and local agencies provide assistance to SWCDs. The TSSWCB was designed to organize and serve as the state-level administrative agency for local SWCDs. Through Memoranda of Understanding with the USDA-NRCS, local SWCDs are able to furnish technical assistance to farmers and ranchers in the preparation of a complete soil and water conservation plan to meet each land units's specific capabilities and needs.

Senate Bill 503 of the 73rd Texas Legislature created the Water Quality Management Plan Program authorizing the TSSWCB, through local SWCDs to provide agricultural and silvicultural producers with an opportunity to comply with state water quality laws through traditional, voluntary, incentive-based programs. Landowners and operators may request the development of a site-specific water quality management plan through local SWCDs. Plans include appropriate land treatment practices, production practices, and management and technology measures to achieve a level of pollution prevention or abatement consistent with state water quality standards.

SWCDs work to bring about the widespread understanding of the needs of soil and water conservation. In addition, they work to activate the efforts of public and private organizations and agencies into a united front to combat soil and water erosion and to enhance water quality and quantity in the state. It is the purpose of SWCDs to instill in the minds of local people that it is their individual responsibility to do the job of soil and water conservation.

Importance of Local Participation

The 1987 amendment to the Clean Water Act was the first comprehensive attempt by the federal government to control nonpoint sources of pollution. Since that time, other state, federal and local programs have been created or expanded to protect water quality. Many local, regional, state, and federal agencies have specific responsibilities that are critical to the restoration of NPS impacted waterbodies. Organizations, especially at the watershed level, can provide information about local concerns and infrastructure, and can help to implement and build support for pollution control measures necessary to restore water quality.

The table below presents an overview of some of the programs involved in implementing the State's Nonpoint Source Management Program by achieving the milestones and goals defined in this document. For more information about these programs, see chapter 5 for a detailed discussion. These programs are implemented by the agencies described above.

Table 4.2 Federal, State, and Local Programs and Activities for Assessment, Implementation and Education within the Texas Nonpoint Source Pollution Management Program

Program	**Lead Agency**	**Program Type**	**Funding Source**
NPS Grant Program	TCEQ TSSWCB	Assessment Implementation Education	Federal
Clean Rivers Program (CRP)	TCEQ River Authorities Councils of Government	Assessment Education	Fees
TMDL Implementation Plans	TCEQ TSSWCB	Assessment Implementation Education	Federal State
Superfund Program	TCEQ	Implementation	Federal State
Brownfields Program	TCEQ EPA	Implementation	Federal State
Voluntary Cleanup Program	TCEQ	Implementation	State Fees
Corrective Action Program	TCEQ	Implementation	State
Leaking Petroleum Storage Tank Program	TCEQ	Implementation	Federal State
Floodplain Management	TCEQ	Implementation	State
Emergency Response Program	TCEQ RRC DSHS EPA	Implementation	State
Coastal Oil Spill Prevention and Response	GLO U. S. Coast Guard	Implementation	State
Kills and Spills Team	TPWD	Implementation	State

401/404 Water Quality Certification	Corps TCEQ RRC TPWD	Implementation	Federal State
Water Rights Permit Program	TCEQ	Implementation	State
Clean Marina Initiative	NOAA	Implementation Education	Federal
Clean Texas Marinas	TCEQ GLO	Implementation Education	Federal State
Small Spill Prevention Program	GLO	Implementation Education	State
Solid Waste Permitting Programs	TCEQ	Implementation	State
Beneficial Use Sludge Permitting Program	TCEQ	Implementation	State
Illegal Disposal Abatement Program	TCEQ	Implementation Education	State
Texas Environmental Enforcement Task Force	TCEQ TPWD GLO RRC Atty General's Office Governor's Office	Implementation Education	State
Citizen Complaints	TCEQ	Implementation	State
Citizen Environmental Watch	TCEQ	Implementation	State
Composting	TCEQ TSSWCB	Implementation Education	Federal State Local
Used Oil Recycling	TCEQ	Implementation	Fees
Household Hazardous Waste Management Program	TCEQ	Implementation Education	State
Tire Disposal Program	TCEQ	Implementation	Fees
City of San Antonio Waste Management Programs	City of San Antonio	Implementation Education	Local
City of Austin Biosolids Composting	City of Austin	Implementation	Local Fees
Municipal and Industrial Wastewater Permitting	TCEQ	Implementation	Fees
On-Site Sewage Facility Program	TCEQ Local Authorities	Implementation	Fees

Texas On-Site Wastewater Treatment Research Center	Established by the Legislature	Implementation Education	State
City of El Paso Reclaimed Water System	City of El Paso	Implementation	Federal State Local Fees
Brazos River Authority Technical Assistance Program	Brazos River Authority	Implementation	Local
State Storm Water Permitting Programs	TCEQ EPA	Implementation	State
Storm Water Management Guidelines	TxDOT	Implementation	State
Trinity River Corridor	City of Dallas	Implementation	Local
Dallas Floodway Extension	City of Dallas Corps of Engineers	Implementation	Local
San Antonio River Tunnel	City of San Antonio	Implementation	Local
Integrated Storm Water Management Program	North Central Texas Council of Govts.		Local
San Angelo Urban Nonpoint Source Abatement Program	City of San Angelo UCRA	Implementation Education	Federal Local
Groundwater Pesticide Management Plan	EPA	Implementation	Federal State
Pesticide Review Program	EPA	Implementation	Federal
Agricultural Pesticide Regulation	TDA EPA TCEQ DSHS	Implementation	State
Structural Pest Control Board	SPCB TDA EPA	Implementation	State
Agriculture Resource Protection Authority	ARPA TDA TSSWCB TAES DSHS TCEQ SPCB	Implementation	State
Texas Watershed Protection Committee	TWPC TCEQ TSSWCB TDA	Implementation Education	State
Agricultural Waste Pesticide Collection Program	TCEQ TCE	Implementation	State

Agricultural Waste Permitting	TCEQ TSSWCB USDA-NRCS	Implementation	Federal State
TSSWCB Water Quality Management Program	TSSWCB	Implementation Education	Federal State
Dairy Outreach Program	TCEQ	Implementation Education	Federal State
Texas Brush Control Program	TSSWCB	Implementation	State
Agricultural Loan Program	TWDB	Implementation	State
Private Lands Enhancement Program	TPWD	Implementation Education	State
Environmental Quality Incentives Program	USDA-NRCS	Implementation Education	Federal
Watershed Program	USDA-NRCS	Implementation	Federal
Conservation Technical Assistance Program	USDA-NRCS	Implementation	Federal
Conservation Reserve Program	Farm Services Agency	Implementation	Federal
Agricultural Research Service	USDA	Implementation	Federal
TX Institute for Applied Environmental Research	TIAER	Assessment Implementation	State
Texas Water Resource Institute	TWRI	Assessment Implementation	State
Creekside Conservation Program	LCRA	Implementation Education	Local
Resource Development Program	TFS	Implementation	State
Forest Stewardship Program	USDA Forest Service	Implementation	Federal
Forest Land Enhancement Program	USDA Forest Service	Implementation Education	Federal
Site Visit Program	TCEQ	Implementation	State
Small Towns Environmental Program	TCEQ	Implementation	State
Texas Country Cleanup Program	TCEQ TCE TDA	Implementation	State
Supplemental Environmental Projects	TCEQ	Implementation	Local
Clean Texas Program	TCEQ	Implementation Education	State
Texas Chemical Council	Trade Association	Implementation Education	Local

Underground Injection Control	TCEQ	Implementation	State
Source Water Assessment and Protection Program	TCEQ	Assessment Implementation	State
Texas Groundwater Protection Committee	TCEQ RRC DSHS TDA TSSWCB TAGD TAES BEG TDLR	Implementation	Federal State
Underground Storage Tank Installer Licensing	TCEQ	Implementation	State
Texas Department of Licensing and Regulation	TDLR	Implementation	State
Edwards Aquifer Protection Program	TCEQ	Implementation	Federal State
Oil and Gas Well Plugging Program	RRC	Implementation	Fees
Wetlands Reserve Program	NRCS	Implementation	State
Texas Wetlands Conservation Plan	TPWD	Implementation Education	State
Seagrass Conservation Plan	TPWD	Implementation Education	State
Coastal Management Plan	CCC- GLO	Implementation	Federal State
Wetland Conservation Plan for State-Owned Coastal Wetlands	TPWD GLO	Implementation Education	State
Texas Wetlands Conservation Plan	TPWD	Implementation	Federal
Local Governments Wetland Plan	GLO	Education Implementation	State
Wetlands Assistance for Landowners	TPWD	Education	State
Texas Coastal Management Program / Coordination Council	CMP-CCC	Implementation Education	Federal State
Galveston Bay Estuary Program	GBEP	Implementation Education	Federal State Local
Coastal Bend Bays & Estuaries Program	CBBEP	Implementation Education	Federal State Local

Coastal Habitat Restoration Program	TPWD	Implementation Education	State
BEACH Act	GLO	Assessment	Federal Local
Gulf of Mexico Community-Based Restoration Program	GCRP	Implementation	Federal State
Bilge Water Reclamation Program	GLO	Implementation Education	Federal State Local
Coastal Texas 2020	GLO	Implementation	Federal State Local
Adopt -A-Beach Program	GLO	Implementation Education	State Local
Border Pollution Prevention Initiative	TCEQ	Implementation Education	Federal State Local
Border Environment Infrastructure Fund	NADB	Implementation	Federal Local
International Boundary and Water Commission	IBWC	Assessment Implementation Education	Federal Local
Economically Distressed Area Program	TWDB	Implementation Education	Federal State Local
Colonias Initiatives Program	SOS	Implementation Education	State
Border Recycles Day	TCEQ	Implementation Education	State Local
Texas Watch Program	EPA TCEQ Texas State Univ.	Assessment Education	Federal State
Colorado River Watch Program	LCRA	Assessment Education	Federal Local
The Aquatic Experience	UCRA	Assessment Implementation Education	Federal Local
The City of Denton Watershed Protection Program	City of Denton	Assessment Education	Federal Local
Nonpoint Source Consumer Education	TCEQ	Education	Federal State
Storm Drain Stenciling	TCEQ	Education	State
Back Yard Composting and Xeriscaping	TCEQ	Education	Federal State

Teaching Environmental Sciences	TCEQ	Education	State
Environmental News You Can Use	TCEQ	Education	State
Publications and Videos	TCEQ TSSWCB	Education	Federal State
Environmental Hotlines	EPA TCEQ	Education	Federal State Local
Small Spill Prevention	GLO	Education	Fees
Agricultural Outreach Program	TCE	Education	Federal State
On-Site Wastewater Treatment Training Center	TAMU	Education	State Local
Don’t Mess With Texas	TxDOT	Education	State
Keep Texas Beautiful	TxDOT	Education	State
Texas Wildscapes Program	TPWD	Education	State
Edwards Aquifer Authority	Edwards Aquifer Authority	Education	Local
Barton Springs/Edwards Aquifer Conservation District	BSEACD	Education	Local
Grow Green and Earth Camp	City of Austin	Education	Local
WET in the City	City of Houston	Education	Local
City of Fort Worth Environmental Education	City of Fort Worth	Education	Local
City of San Antonio Curbside Recycling	City of San Antonio	Implementation Education	Local

CHAPTER 5 ASSESSMENT

In order to protect water quality, we must define and measure it, identify the types and sources of pollution, and implement plans to protect, maintain, and restore water quality. The state of Texas uses a dynamic, flexible cycle of activities to manage water quality. Steps in the cycle include:

- **Standards and Planning**: setting standards for surface water quality and revising or formulating monitoring plans;

- **Monitoring**: collecting data to monitor the condition of surface waters;
- **Assessment and Targeting**: assessing data to determine water quality status and to identify any impairments;
- **Developing Strategies**: for protecting, improving, or restoring water quality with pollutant source controls and practices; and
- **Implementing Pollution Controls**: for both point and non-point sources and evaluating progress, which may lead back to revising those plans or formulating new ones.

Implementing this cycle of activities involves coordination between many different entities and programs around the state of Texas. The development of implementation plans and the implementation of those plans will be discussed in Chapter 7.

Surface Water Assessment

Texas has a large number of water bodies. There are 11,247 streams and rivers large enough to be named, with a total combined length of 191,228 miles. However, only 40,194 miles of streams and rivers (21%) are considered perennial, meaning that they have sustained flow throughout the year. Texas also has 9,993 inland reservoirs and lakes 10 acres or larger in size that together cover approximately 1,994,600 acres. Of those, 211 are major reservoirs which are greater than 5,000 acre-feet each. Texas bays and estuaries cover approximately 2,393 square miles along a coastal shoreline that stretches 624 miles in length. The Gulf of Mexico, within Texas' jurisdiction covers approximately 3,879 square miles. In the conterminous United States, Texas ranks first in total square miles covered by fresh water and saltwater with 4,959.

The major surface waters of Texas have been divided into classified water segments. A single river may consist of several classified segments. The term segment refers to a defined, basic unit for assigning site-specific standards, and is intended to have relatively common biological, chemical, hydrological, and physical characteristics. Segments will also normally exhibit common reactions to external stresses such as discharges or pollutants. The establishment of segments facilitates planning activities, issuance of permits, and allocation of grant funds necessary to implement various sections of the federal Clean Water Act. Texas currently recognizes 225 stream segments, 100 reservoir segments, and 48 estuary segments. The Gulf of Mexico is treated as one segment. Texas surface water quality standards and the assessment of water quality are based on these classified segments.

Protecting Surface Water Quality

The TCEQ Water Quality Standards Team is responsible for establishing and revising standards to protect surface water quality. The Texas Surface Water Quality Standards (TSWQS), §30, Chapter 307 of the Texas Administrative Code, recognize the regional and geologic diversity of the state. Appropriate water uses are designated for each of the classified segments. Numerical and narrative criteria established in the TSWQS provide a basis for assessing water quality, evaluating use support, and managing point and nonpoint source loadings in Texas surface waters. The TSWQS are designed to:

- establish numerical and narrative criteria for water quality throughout the state;
- provide a basis on which TCEQ regulatory programs can establish reasonable methods to implement and attain the state's standards.

Water quality standards are protective; that is, if one or more water quality standard is not being met in a classified segment, there is some possibility that water quality may be inadequate to meet the designated uses. For example, a water body fails to meet the dissolved oxygen standard established to support aquatic life use, yet no fish kills are observed. However, a decline in the variety or number of aquatic species and an increased probability of fish kills may exist.

Uses

Four general categories of use are defined in the Texas Surface Water Quality Standards: aquatic life use, contact recreation, domestic water supply, and fish consumption.

Aquatic Life Use

The standards associated with this use are designed to protect plant and animal species that live in and around the water. They establish optimal conditions for the support of aquatic life and define indicators used to measure whether these conditions are met. Some pollutants or conditions that may jeopardize this use include low levels of dissolved oxygen, toxic substances such as metals or pesticides, or excess turbidity.

Contact Recreation

The standard associated with this use measures the level of certain bacteria in water to estimate the relative risk of swimming or other water sports involving direct contact with the water. It is possible to swim in water that does not meet this standard without becoming ill; however, the probability of becoming ill is higher than it would be if bacteria levels were lower.

Domestic Water Supply

Domestic water supply consists of two subcategories: Public Water Supply and Aquifer Protection.

<u>*Public Water Supply*</u>. Standards associated with this use indicate whether water from a lake or river is suitable for use as a source for a public water supply system. Source water is treated before it is delivered to the tap and must meet a separate set of standards established for treated drinking water. Indicators used to measure the safety or usability of surface water bodies as a source for drinking water include the presence or absence of substances such as metals or pesticides. Concentrations of salts, such as sulfate or chloride, are also measured, since treatment to remove high levels of salts from drinking water is expensive.

<u>*Aquifer Protection*</u>. Segments designated for aquifer protection are capable of recharging the Edwards Aquifer. The principal purpose of this use designation is to protect the quality of water infiltrating and recharging the aquifer. The designation for aquifer protection applies only to those designated portions of the segments that are on the recharge zone, transition zone, or contributing zone of the Edwards Aquifer.

Fish Consumption

The standards associated with this use are designed to protect the public from consuming fish or shellfish that may be contaminated by pollutants. The standards identify levels at which there is a significant risk that certain toxic substances dissolved in water may accumulate in the tissue of aquatic species. However, because pollutant concentrations in water do not always predict when toxic substances will accumulate in fish, the state also conducts tests on fish and shellfish tissue to determine if there is a risk to the public from consuming fish caught in state waters. The standards also specify bacterial levels in marine waters to assure that oysters or other shellfish that may accumulate bacteria from the water are safe for commercial harvest, sale, and consumption by the public.

Water Quality Indicators

Specific indicators of water quality such as bacteria, dissolved solids, and organics are also described in the standards. Several different parameters may be measured to determine whether a water body meets its designated uses. Some of the most common are listed here, with an explanation of why they are important to the health of a water body.

Fecal Coliform, E. Coli, and Enterococci Bacteria

These bacteria are measured to determine the relative risk of swimming or other water sports. These bacteria are found in the waste of warm-blooded animals. Their presence may indicate that pathogens also in these wastes may be reaching a body of water from sources, such as, inadequately treated sewage, improperly managed animal waste from livestock, pets in urban areas, or failing septic systems.

Dissolved Oxygen

The concentration of dissolved oxygen is a single, easy-to-measure characteristic of water that positively correlates with the abundance and diversity of aquatic life in a water body. A water body that can support diverse, abundant aquatic life is a good indication of high water quality. However, highly variable dissolved oxygen concentrations may indicate a related problem associated with an excess of nutrients in water. High concentrations of nutrients in water may stimulate excessive growth of vegetation which may result in very high dissolved oxygen concentrations during the day and very low dissolved oxygen concentrations at night. These conditions may have a negative impact on aquatic life use.

Dissolved Solids

High levels of dissolved solids, such as chloride and sulfate, can cause water to be unusable, or simply too costly to treat for the drinking water supply use. Changes in dissolved solids concentrations also adversely affect the water quality for aquatic life use.

Metals

Concentrations of metals can pose a threat to drinking water supplies and human health. Eating fish contaminated with metals can cause these toxic substances to accumulate in tissue, posing a risk to human health. Metals also pose a threat to livestock and aquatic life. Potentially dangerous levels of metals and other toxic substances are identified through chemical analysis of water, sediment, and fish tissue.

Organics

Toxic substances from pesticides and industrial chemicals, called organics, pose the same concerns as metals. Polychlorinated biphenyls (PCBs), for example, are industrial chemicals that are toxic and probably carcinogenic. Although banned in the United States in 1977, PCBs remain in the environment, and they accumulate in fish and human tissues when consumed. Potentially dangerous levels of toxic substances are identified through chemical analysis of water, sediment, and fish tissue.

Fish Consumption Advisories and Closures

The Texas Department of State Health Services (DSHS) conducts chemical testing of fish tissue to determine whether there is a risk to human health from consuming fish or shellfish caught in Texas streams, lakes, and bays. Fish seldom contain levels of contaminants high enough to cause an imminent threat to human health, even to someone who eats fish regularly. Risk increases for those persons who regularly consume larger fish and predatory fish from the same area of contaminated water over a long period of time. When a fish consumption advisory is issued, a person may legally take fish or shellfish from the water body under the advisory, but should limit how much fish he or she eats, and how often. When a fish consumption closure is issued, it is illegal to take fish from the water body.

Data Collection

Better understanding the relationship between land and water starts with monitoring the condition of water quality. The mission of the TCEQ Surface Water Quality Monitoring (SWQM) program is to characterize the water quality of the ambient surface waters of the state.

Monitoring activities can be grouped into five categories: routine monitoring, systematic monitoring, targeted monitoring, permit support monitoring and effectiveness monitoring:

Routine monitoring is designed to assess the status and trends of overall water quality throughout the state, and for each river basin. Data are collected using a monitoring network of key sites on the major water bodies in each basin on a regular basis. Monitoring sites may also include smaller water bodies to support characterization of ecoregions and/or basin-specific conditions.

Systematic monitoring focuses on evaluating subwatersheds and unclassified water bodies. Its purpose is to investigate and detect areas of concern, and identify issues that require further study. It also includes monitoring at sites to check the status of water bodies (identify improvements or concerns). This monitoring strategy rotates resources around the river basin to gather information on water bodies that would not normally be included in the routine monitoring program.

Targeted monitoring is conducted on water bodies where there is reason to believe there is a threat or a concern for water quality, to establish the extent and degree of an impairment, or to determine the best strategy for restoring water quality. Sometimes called special studies, targeted monitoring activities usually involve intensive periods of data collection at sites where routine or systematic monitoring identified impacts, concerns, or impaired uses.

Permit support monitoring is used to address specific areas where additional information is need to determine appropriate limits for wastewater discharges. This may include studies to gather site-specific information for use in developing permits.

Effectiveness monitoring is conducted to evaluate whether management practices, regulatory measures, and watershed improvement and restoration plans are producing the desired results.

Monitoring Coordination

The CRP plays a key role in the TCEQ's yearly integration of these various monitoring needs into a coordinated monitoring schedule for the entire state. The schedule shows all surface water monitoring being conducted by the TCEQ or under its contracts or cooperative agreements for each planning year.

Planning and development of the coordinated monitoring schedule takes place from January through May preceding the state fiscal year for which the plan is developed. To support coordinated monitoring, the TCEQ has developed guidance for selecting sites and for sampling methods for routine, systematic, and targeted monitoring. The coordinated monitoring schedule is hosted by the Lower Colorado River Authority, a CRP Planning Agency, on its Web site at *http://cms.lcra.org/*.

Texas Commission on Environmental Quality

Surface Water Quality Monitoring Program

The TCEQ's Surface Water Quality Monitoring (SWQM) Program is coordinated by the Surface Water Quality Monitoring Team and by staff in the TCEQ's 16 regional offices. Routine monitoring and special studies are conducted by SWQM personnel.

Finished drinking water data is collected by the TCEQ's Drinking Water Quality Program. Additional supporting information is provided by the Source Water Assessment and Protection Program (discussed in Chapt 5).

Clean Rivers Program

The CRP is a collaboration of 15 regional water agencies with the TCEQ. It is a unique, water quality monitoring, assessment, and public outreach program that is funded by state fees assessed on the number and size of wastewater treatment plants and surface water right permittees that reside within each river basin. The CRP provides the opportunity to approach water quality issues at the local level through coordinated efforts among diverse agencies, various programs, and the public.

Cost-effective watershed management decisions must be based on scientifically valid and complete assessments of water quality conditions and contributing causes of impact. Water bodies should be selected upon the importance of the resource, risk from pollution, and with input from the Steering Committees (discussed in Chapter 4). Monitoring activities include fixed monitoring, systematic monitoring, targeted monitoring, and special studies.

United States Geological Survey

The United States Geological Survey (USGS) also conducts a large amount of monitoring statewide and much of the data are utilized by the TCEQ. The USGS surface water collection network in Texas is primarily established to monitor stream flow continuously at many permanent sites. Field measurements, routine water chemistry, and metals in water are also collected at many of the fixed sites. Sites are chosen to represent a mix of natural and human factors that influence water quality. Chemical variables are then related by the USGS to hydrologic conditions to interpret water-resource conditions and meet water quality management needs. Estimation of point and nonpoint source loadings, stormwater management, and chemical-contaminant controls are some of those needs.

Other Sources

Additional data from other state and federal agencies, cities, and other monitoring groups can be assessed in the evaluation of water quality if the data meet clearly defined acceptance and time line criteria established by the TCEQ. Previous contributors of data of this type include the Texas Department of State Health Services (DSHS), Texas Parks and Wildlife Department (TPWD), Texas Institute for Applied Environmental Research (TIAER), and Texas Watch.

Assessing the Data

The current condition of Texas surface water resources and the effectiveness of protection and restoration activities are evaluated by assessing the available data. The physical, chemical, and biological characteristics of aquatic systems are assessed in relation to human health concerns, ecological conditions, and designated uses. Water quality data may be used to:

- characterize existing conditions,
- evaluate spatial and temporal trends,
- determine water quality standards compliance,
- identify emerging problems, and
- evaluate the effectiveness of water quality control programs.

Water Quality Inventory

The TCEQ evaluates the condition of the state's water bodies on a periodic basis as required by CWA§305(b). The results of this evaluation are contained within the *Texas Water Quality Inventory and 303(d) List* which is prepared by the TCEQ's SWQM team and submitted to the EPA for approval. One of five categories is assigned to each parameter and area of a water body, known as an assessment unit, to provide more information to the public, EPA, and agency staff about water quality status, management plans, and management activities. When an assessment unit has multiple parameters, the highest category is assigned to the assessment unit. When a water body has multiple assessment units, an overall category is assigned to the entire water body. The table below summarizes the categorization of water bodies in Texas. Categories four and five represent the list of impaired water bodies as required by CWA§303(d).

Table 5.1 Categories of the Texas Water Quality Inventory and 303(d) List

Category 1	Attaining the water quality standard and no use is threatened.
Category 2	Attaining some of the designated uses; no use is threatened; and insufficient or no data and information are available to determine if the remaining uses are attained or threatened.
Category 3	Insufficient or no data and information to determine if any designated use is attained.
Category 4	Standard is not supported or is threatened forone or more designated uses but does not require the development of a TMDL.
Category 4a	TMDL has been completed and approved by EPA.
Category 4b	Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future.
Category 4c	Nonsupport of the water quality standard is not caused by a pollutant.
Category 5	Category 5 is the 303(d) list. The water body does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants.
Category 5a	A TMDL is underway, scheduled, or will be scheduled.
Category 5b	A review of the water quality standards will be conducted before a TMDL is scheduled.
Category 5c	Additional data and information will be collected before a TMDL or review of the water quality standard is scheduled.

Nonpoint Source Assessment

The CWA §319(a) assessment focuses only on those waters which have been identified as being degraded, at least in part, by nonpoint source pollution. Texas' CWA §319(a) assessment of impaired waters is based on the Texas Water Quality Inventory and 303(d) List. In order to address the most current priorities for Texas and have a NPS program based on the most current information, the latest state approved Texas Water Quality Inventory and 303(d) List will serve as the state's 319(a) assessment.

NPS-degraded surface waters appearing in the report will be targeted by the state for additional NPS monitoring and restoration activities.

With regards to CWA §319(h) grant funding, priority for assessment dollars is given to those water bodies that fall under categories 5a, 5b, and 5c of the Texas Water Quality Inventory and 303(d) List. Assessment dollars may also be used to fund development of TMDL Implementation Plans or Pollution Reduction Strategies for water bodies in categories 4a, 4b, and 4c. These plans are discussed in Chapter 6.

Basin Status Reports

Each CRP partner agency collects information on potential sources of pollution throughout its planning area or river basin. This information is used to correlate water quality to the environmental factors that influence it, such as soils, climate, hydrology, wastewater treatment plans, urban runoff, and agricultural runoff. An annual basin status report, the Basin Highlights Report, is produced by each regional water agency, and provides an overview of water quality issues and the status of ongoing projects/tasks. A detailed and in-depth data analysis is provided for each basin in the Basin Summary Report once every five years. This report provides trend analysis, spatial analysis (correlating environmental factors to water quality), an explanation for why certain water quality issues exist, and recommendations for addressing persistent water quality problems. The CRP strives to report water quality data in a user-friendly format to inform the public. The information contained in these reports is utilized by the TCEQ in the development of the Texas Water Quality Inventory and 303(d) List, subsequent statewide rankings, and prioritization of management strategies.

Total Maximum Daily Loads (TMDLs)

A TMDL, or Total Maximum Daily Load, is a tool for achieving water quality standards and is based on the relationship between pollution sources and in-stream water quality conditions. TMDLs are developed to provide an analytical basis for planning and implementing pollution controls, land management practices, and restoration projects needed to protect water quality. The TMDL establishes the allowable loadings or other quantifiable parameters for a water body and thereby provides the basis to establish water quality-based controls. These controls provide the pollution reduction necessary for a water body to meet water quality standards.

CWA§303(d) and its implementing regulations (40 CFR §130.7) require states to identify waters that do not or will not meet applicable water quality standards after the application of technology-based or other required controls, and to establish TMDLs for pollutants that are causing non-attainment of water quality standards. For listed waters, States must develop TMDLs allowing for seasonal variations and an appropriate margin of safety. A TMDL is a quantitative assessment of water quality problems, contributing sources, and load reductions or control actions needed to restore and protect individual water bodies.

TMDLs address all significant stressors which cause water body use impairment, including: point sources (e.g., sewage treatment plant discharges), nonpoint sources (e.g., runoff from fields, streets, range, or forest land), and naturally occurring sources (e.g., runoff from undisturbed lands). A TMDL is the sum of the individual wasteload allocations for point sources, load allocations for nonpoint sources and natural background pollutants, and an appropriate margin of safety. TMDLs may address individual pollutants or groups of pollutants, as long as they clearly identify the links between the water body use impairment, the causes of the impairment, and the load reductions needed to remedy the impairment.

Public participation is an integral part of the TMDL process. Therefore, the TMDL process provides many opportunities for the public to participate. Listed below are a few of the ways the public can participate in the TMDL process:

- In most cases a watershed committee is established to provide local input on TMDL projects. The public is encouraged to work on these committees or attend these committee meetings.
- TMDL meetings are open to the public. Public notices are provided for these meetings. These meetings provide an opportunity to make comments and get answers to questions.
- The public is given a chance to review and provide comments on the development of the current CWA§303(d) list for the state.
- Before the state adopts a TMDL, a formal public comment period is provided in which the draft TMDL is made available, a public comment hearing is conducted, and responses to all comments are published.
- Resources are available to assist the public's participation in the TMDL process. The TCEQ website provides information about the TMDL program, the status of individual TMDL projects, and links to other TMDL-related websites. The TCEQ has also published printed materials such as Developing Total Maximum Daily Load Projects in Texas: A Guide for Lead Organizations, which provides valuable information on the TMDL process in Texas.

The development of TMDLs begins with the review of existing data and/or the collection of additional data related to water quality, point source discharge, precipitation, soils, geology, topography, and land use (construction, agriculture, mining, etc.) within the watershed. Next, models or other analytical methods are used to calculate pollutant loads and the water quality response of the receiving water. The appropriate analytical method/model is selected based on the pollutants of concern, the amount of data available, and the type of water body. If a computer model is selected, data collected from the watershed may be used to calibrate and verify the model so that the computed values match those of known field data. The model can then be used to develop different scenarios, by first determining the amount of specific pollutants each source contributes, then calculating the amount each pollutant needs to be reduced, and finally specifying how the reduced pollutant load would be allocated among the different sources. In some cases, TMDLs can be based on readily available information and studies using simple analytical efforts to provide a basis for stressor assessment and implementation planning. In other cases, more complex, data intensive computer simulations are required.

Upon completion of data collection and analyses, a TMDL report is developed adopted by the state after a thorough public review and comment period. The state-adopted TMDL is submitted to EPA for review and approval. The TMDL Report consists of six component parts, each of which is presented and discussed below.

Problem Statement: The TMDL report includes an indication whether the segment is on the latest CWA§303(d) list and its priority, applicable water quality standards are identified, the pollutant or stressor of concern is identified, and the beneficial use impairment of concern is described. Historical water quality data from the impaired water body and its contributing watershed is presented and assessed. The TMDL report describes the characteristics of the water body such as drainage area, length, flow rates, depth, etc. The watershed is described including characterization of soil types, land uses, population, wildlife resources, and topography. The TMDL report includes a general description of the location of the impaired water body including information about the river basin, ecoregion, and political jurisdictions in which it is located.

Endpoint Identification: Numeric water quality target(s) for the TMDL are identified in the TMDL report, and the basis for target(s) as interpretation of water quality standards is documented. These targets identify the specific instream (and potentially watershed) goals or endpoints for the TMDL which equate to attainment of the water quality standard. In some cases, multiple indicators and associated numeric target values may be needed to interpret an individual water quality standard. In addition, some TMDLs may incorporate multiple numeric targets to account for seasonal differences in acceptable pollutant levels in a particular water body. In many cases where applicable standards are expressed in numeric terms, it is appropriate to set the numeric target equal to the numeric water quality standard.

In situations where applicable water quality standards are expressed in narrative terms, it is necessary to develop a quantitative interpretation of narrative standards. Since a TMDL is an inherently quantitative analysis, it is necessary to determine appropriate quantitative indicators of the water quality problem of concern in order to calculate a TMDL. It is sometimes possible to supplement instream indicators and targets with watershed targets-- measures of conditions within the watershed which are directly associated with water bodies meeting their water quality standards for the pollutant(s) of concern.

Source Analysis: Point, nonpoint, and background sources of pollutants of concern are described in the TMDL report, including the magnitude and location of sources. The TMDL document demonstrates all sources have been considered. The TMDL document provides estimates of the amounts of pollutants entering the receiving water of concern or, in some cases, the amount of pollutant that is bioavailable based on historic loadings stored in the aquatic environment. These pollutant sources or causes of the problem are documented based on site-specific studies, literature reviews or other sources of information. Sources can be categorized in many ways, including but not limited to discharge source, land use category, ownership, pollutant production process (e.g. sedimentation processes), and/or tributary watershed areas. The source analysis discusses the data and methods used to estimate source contributions.

Linkage Between Pollutant Sources and Water Quality in the Receiving Water: The TMDL document describes the relationship between numeric target(s) and the identified pollutant sources, leading to an estimate of the total assimilative capacity (loading capacity) of the waterbody for the pollutant of concern. The loading capacity is the critical quantitative link between the applicable water quality standards (as interpreted through numeric targets) and the TMDL. Thus, a maximum allowable pollutant load is estimated to address the site-specific nature of the impairment. The loading capacity reflects the maximum amount of a pollutant that may be delivered to the water body and still achieve water quality standards. A number of different loading capacity approaches can be used as part of TMDLs.

The loading capacity section discusses the methods and data used to estimate loading capacity. A range of methods can be used from predictive water quality models to inferred linkages based on comparison of local reference conditions with existing conditions in the watershed of concern. In some cases, loading capacity may vary within the watershed of concern (e.g., toxics loading capacity may be higher in areas with high water mixing rates than in backwater areas with poor water exchange), and in different time periods (e.g. nutrient loading capacity may be lowest during high temperature summer low flow periods). The basis for spatial and temporal variations in loading capacity estimates is discussed.

Margin of Safety: A margin of safety is included in the TMDL report to account for uncertainty in the understanding of the relationship between pollutant discharges and water quality impacts. The TMDL document describes an explicit and/or implicit margin of safety for each pollutant. An explicit margin of safety can be provided by reserving (not allocating) portion of the loading capacity identified for the water body for the pollutant of concern. An implicit margin of safety can be provided by making and documenting conservative assumptions used in the TMDL analysis. The TMDL report provides an explanation of the basis for margin of safety which shows why it is adequate to account for uncertainty in the TMDL. Where an implicit margin of safety is provided, the report includes a discussion of sources of uncertainty in the analysis and how individual analytical assumptions or other provisions adequately account for these sources of uncertainty.

Load Allocations: The TMDL report identifies the total allowed pollutant amount and its components: appropriate wasteload allocations for point sources; load allocations for nonpoint sources; load allocation for an appropriate margin of safety; and, natural background. Allocation of allowable loads or load reductions among different sources of concern are determined. These allocations are usually expressed as wasteload allocations to point sources and load allocations to nonpoint sources. Allocations can be expessed in terms of mass loads or other appropriate measures. The TMDL equals the sum of allocations and cannot exceed the loading capacity. Load allocations for nonpoint sources are generally expressed as specific allocations for "gross allotments" to nonpoint source discharger categories. Separate nonpoint source allocations are established for background loadings. Allocations may be based on a variety of technical, economic, and political factors. The methodology used to set allocations is discussed.

Monitoring the Results

There are many different programs in place throughout the state that are responsible for conducting implementation activities. Upon implementing a best management practice (BMP) or other implementation activity it is necessary to determine the effectiveness of the activity. Data collected after implementation must be compared to data collected prior to implementation to determine effectiveness. These data may be historical, like that collected for a special study, or collected as part of the project tasks prior to implementation. In some cases, routine monitoring can be used to evaluate effectiveness. In other cases, it will be necessary to collect data in a specific project area to evaluate the effectiveness of the implementation activities. Certain types of BMPs or implementation activities will not show immediate results. Effectiveness and water quality improvements will be determined over time, and not immediately upon implementation. More about implementation activities will be discussed later in this document.

Groundwater Assessment

Groundwater supplies about 58% of all water used by Texans for domestic, municipal, industrial, and agricultural purposes. Approximately 36% of the water used for municipal supplies, and 75% of the water used for agricultural purposes is obtained from groundwater sources. This groundwater is produced from aquifers, which are underground layers of rock with water stored in pore spaces, cracks or voids. Major aquifers are defined as producing large quantities of water in a comparatively large area of the state, whereas minor aquifers produce significant quantities of water within smaller geographic areas or small quantities in large geographic areas. Minor aquifers are very important as they may constitute the only significant source of water supply in some regions of the state.

Nine major aquifers and twenty-one minor aquifers have been delineated within the state. These major and minor aquifers underlie approximately 76% of the state's surface area. Other undifferentiated, local aquifers may represent the only source of groundwater where major or minor aquifers are absent. These local aquifers, which provide groundwater that is used for all purposes, vary in extent from very small to several hundred square miles.

Measuring Groundwater Quality

The Texas Water Development Board (TWDB) is authorized by the Texas Water Code to conduct studies and map the state's water resources. The TWDB has identified the state's aquifers, and delineated the boundaries of major and minor aquifers based on yields and significance of aquifer production. These maps depict the extent of each aquifer, including where it is exposed at the surface, which is commonly where recharge occurs, as well as, the portion of the aquifer underground. For most aquifers, a Total Dissolved Solids (TDS) concentration of 3,000 milligrams per liter is used to mark the boundary of usable quality water when mapping aquifers. The boundary of the Edwards Aquifer, for mapping purposes, is defined by a TDS concentration of 1,000 milligrams per liter.

TDS are constituents in groundwater dissolved from the surrounding rock and are the basis for the Texas Groundwater Protection Committee's (TGPC) groundwater classification system.

Under this groundwater classification system, four classes are defined based on quality as determined by TDS concentration. Through classification, groundwater can be categorized, and protection or restoration decisions can be made according to the water quality present or potential use of the groundwater.

Table 5.2 TGPC Groundwater Classification System

CLASS	QUALITY*	EXAMPLES OF USE
Fresh	Zero to 1,000	Drinking and all other uses
Slightly Saline	More than 1,000 to 3,000	Drinking (if freshwater is unavailable), livestock watering, irrigation, industrial, mineral extraction, oil and gas production
Moderately Saline	More than 3,000 to 10,000	Potential/future drinking and limited livestock watering and irrigation (if fresh or slightly saline water is unavailable); industrial, mineral extraction, oil and gas production
Very Saline to Brine	More than 10,000	Mineral extraction, oil and gas production

*Concentration range of total dissolved solids in milligrams per liter.

The state has developed surface water quality standards applicable to certain water bodies that are protective of groundwater affected by surface water. For the recharge zone of the Edwards Aquifer, the state has developed water quality protection measures that specify groundwater recharge as a "designated use" in the state's surface water quality standards. The state has not developed standards for pollutant discharge to groundwater, although, the legislatively mandated (TWC §26.401) goal of non-degradation of use guides the priorities of groundwater programs. However, comparison of measured values for constituents of concern in major and minor aquifers with TDS concentration of 3000 mg/L, or less, against adopted Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCL's) provides an effective method of evaluating groundwater quality in aquifers for the intended use of drinking water.

Aquifer Vulnerability

Since groundwater contamination can remain latent for a lengthy period of time, and since groundwater is difficult to clean up once it has become impacted, the majority of Texas groundwater programs focus on prevention of contamination, rather than remediation. This is true of point-source regulatory and permitting programs, as well as NPS related programs like the Pesticides in Groundwater Program conducted under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) by TCEQ.

DRASTIC
D - **D**epth to water
R - annual **R**echarge
A - **A**quifer media
S - **S**oil media
T - **T**opography
I - vadose zone **I**mpact
C - hydraulic **C**onductivity

Previous NPS assessments have contained an aquifer vulnerability ranking system based on the average DRASTIC index for the aquifers of Texas. This ranking system is used (Appendix D), because it is a reasonable method of determining the relative vulnerability of aquifers to surface activities, and by extension, possible NPS contamination.

Data Collection

The TWDB has the responsibility for collecting and maintaining an inventory of ambient groundwater conditions throughout the state. The TGPC relies upon ambient monitoring data from the TWDB for state groundwater quality information. The TWDB performs ambient groundwater monitoring on water wells in a particular number of Texas aquifers each year, so that all major and minor aquifers of the state are monitored approximately every five years. The TWDB maintains a database of ambient groundwater monitoring data for the state from over 51,000 water wells and is supplemented by data from the United States Geological Survey (USGS), the Bureau of Economic Geology (BEG), and the TCEQ. Also, many of the groundwater conservation districts throughout the state have well-developed monitoring programs that are primarily intended to monitor the volume of water in an aquifer, but also collect groundwater quality information. Data are maintained by the groundwater conservation district, and generally reported to the TWDB for inclusion in their ambient groundwater database.

Assessing the Data

For the groundwater portion of the *Texas Water Quality Inventory and 303(d) List*, ambient groundwater quality data are drawn from the TWDB database. The number of wells reporting values for constituents of concern above the MCL, or between the Minimum Detection Level (MDL) and the MCL are determined, and these values are posted in a table for each aquifer, along with the total number of wells sampled in that aquifer.

The data are augmented by the data taken from the annual *Joint Groundwater Monitoring and Contamination Report* that lists groundwater contamination cases of the regulatory programs of the TCEQ, Railroad Commission of Texas (RRC) and groundwater conservation districts. TCEQ reports data for groundwater contamination related to industrial and hazardous waste sites, municipal solid waste sites, leaking underground and above ground storage tanks, public drinking water supplies, wastewater disposal facilities, and other occurrences of contamination that may not be directly linked to a specific source or program. The RRC collects and reports data regarding groundwater contamination that may be related to oil and gas well drilling and production activities, transmission (pipeline) spills, and surface mining operations. Groundwater conservation districts typically monitor only those groundwater contamination cases that are of specific interest to the individual district, or those that do not fall under the regulatory umbrella of other agencies.

In 1996, the Texas Groundwater Protection Committee (TGPC) began the groundwater quality assessment process, through a partnership of the

TCEQ and the TWD, two of its member agencies. Assessment of all thirty aquifers was completed in 2002. Each aquifer in the *2002 Water Quality Inventory and 303(d) List* is represented with a map showing the locations of water wells sampled and nitrate analyses exceeding EPA drinking water standards. Tables are included that show the parameters assessed against EPA drinking water standards, as well as, summaries of the sources and types of groundwater contamination at regulated facilities. This information is compiled from data contained in the *Joint Groundwater Monitoring and Contamination Report*.

Nitrate is readily soluble and mobile in water, and is considered one of the major human health concerns in drinking water. Coincidentally, nitrate concentration is an indicator of NPS pollution in groundwater, because it can move readily through the soil and vadose zone, entering aquifers by means of percolation. The vadose zone is the stratigraphic region between the soil surface and the water table, or the unsaturated zone. Nitrate in surface water indicates the potential for groundwater contamination.

Since no water quality standards have been designated for groundwater, an assessment standard of degradation or impairment with respect to use must be defined here. For the purposes of the NPS assessment, any measurements of groundwater quality taken from the aquifers listed in the *Texas Water Quality Inventory and 303d List* that exceed the Maximum Contaminant Levels (MCL) for nitrate in drinking water, are considered to be an indicator of either nonpoint source degradation or impairment, with respect to existing or potential use.

Constituents of concern that are above the Minimum Detection Level (MDL), but below the MCL, should be watched carefully over several report cycles. An increase in the number of detections of a constituent can signal a growing problem, even though the MCL has not been exceeded. Groundwater that indicates degradation with respect to existing or potential use will be targeted by the state for additional NPS monitoring and restoration activities.

The ranking for priority waterbodies that appear in Table B.2 are averaged and do not reflect the intrinsic vulnerability of outcrop areas and/or known areas where recharge is occurring. For this reason, spatial examination of contaminant distribution is vital to any true assessment of aquifer quality or vulnerability prediction.

Table B.2 ranks the Seymour, Edwards - Balcones Fault Zone in the San Antonio area, and Edwards - Balcones Fault Zone in the Austin area, as aquifers having "high" vulnerability rankings. The northern extent of the Ogallala, and Cenezoic Pecos Alluvium received "low" or low "medium" rankings, and the Hueco-Mesilla Bolsons rank "low" in the DRASTIC based aquifer vulnerability ranking scheme. The Joint Groundwater Monitoring and Contamination Reports document a number of significant impacts to the usable groundwater zone of the Bolsons, and related investigations indicate a high potential for NPS impacts.

Upon further examination of the data from the *Texas Water Quality Inventory and 303d List*, it becomes readily apparent that constituent values exceeding the MCL occur predominantly in the "outcrop" portions of any aquifer with "outcrop" (unconfined) and "downdip" (confined) areas, or in the completely unconfined aquifers like the Ogallala, Seymour, and Cenezoic Pecos Alluvium. These "outcrop" areas of aquifers are more vulnerable to NPS impacts.

A spatial context reveals that a disproportionate number of high nitrate values occur in the Rio Grande Valley area of the aquifer. Therefore, this portion of the Gulf Coast aquifer must be labeled as impacted by NPS pollution.

Sampling sites exceeding an MCL for a given constituent will also be targeted. These would include the Lipan, Seymour, Marathon, Bone Spring-Victorio Peak, Edwards-Trinity (High Plains), Blaine, Ogallala, and Cenezoic Pecos Alluvium aquifers.

Future water quality inventories will contain more specific groundwater quality assessments for aquifers. This will allow the focus to be more narrow in determination of potential NPS impacts. The values for nitrate and other constituents in all reports may be revisited in the case of a change in the MCL values, as occurred with the 2003 EPA arsenic evaluation.

Monitoring the Results

The Texas Groundwater Protection Committee (TGPC), through the *Texas Groundwater Protection Strategy*, has commissioned the development of a new statewide groundwater monitoring program that will better evaluate the effectiveness of regulatory programs in preventing impacts from both point sources and nonpoint sources. Future activities of the TPGC, and of its member agencies, may be guided by the results of the new monitoring program.

CHAPTER 6 IMPLEMENTATION

Nonpoint source pollution management makes use of both regulatory and non-regulatory programs. Regulatory programs establish rules for certain activities in order to prevent harm to the environment resulting from these activities. The rules often require notification and reporting to a regulatory authority when the activity is engaged in, and specific prior authorization for the activity, such as registration, permitting, or certification. Regulatory activities also include inspections to determine whether rules are being complied with, as well as pursuit of apparent violations through investigations, enforcement activities, and litigation.

Non-regulatory programs do not establish or enforce environmental protection rules. Non-regulatory programs are voluntary. Regulation of everyday practices which individuals can use to control some nonpoint sources of pollution is impractical. In these cases, Texas encourages voluntary compliance through education and outreach. In addition, the size and complexity of the problem, low public awareness, and the lack of rigorous scientific definition of NPS problems make regulation difficult. Without regulation, a coordinated effort from the highest levels of government down to the citizens must occur to have an impact and reduce nonpoint source pollution.

The Texas Commission on Environmental Quality (TCEQ) is designated by law as the lead state agency for water quality in Texas. The Texas State Soil and Water Conservation Board (TSSWCB) also plays an important role as the lead agency in the state for the management of agricultural and silvicultural (forestry) nonpoint source runoff. Local, regional, state, and federal agencies have specific responsibilities that are critical to the restoration and protection of polluted water bodies. Non-government organizations, especially at the watershed level, provide information about local concerns and infrastructure, and help build support for the kind of pollution controls necessary to restore water quality.

This chapter describes ongoing programs throughout the state which address NPS pollution. The programs are conducted by the agencies described in Chapter 4. This chapter is divided into the following types of NPS management issues:

- Surface Water Plans
- Groundwater Plans
- Remediation of Contaminated Sites
- Emergency Response and Disaster Recovery
- Hydromodification
- Marinas and Recreational Boating
- Solid and Hazardous Waste Management

- Wastewater Management
- Storm Water Management
- Pesticide Management
- Agricultural Management
- Silvicultural Management
- Pollution Prevention
- Protection for Drinking Water Sources
- Aquifer Protection
- Wetlands Protection
- Coastal Programs
- Border Programs

Surface Water Plans

An important tool in managing nonpoint source pollution is the development of implementation plans. Once the sources or causes of pollution have been identified through the development of TMDLs or special studies (described in Chapter 5), an implementation plan must be developed. Implementation plans describe the management measures necessary to achieve the pollutant reductions. Management measures incorporate both nonregulatory and regulatory mechanisms. These management measures may include permit effluent limits and recommendations, nonpoint source pollution management practices, stream standard revisions, special projects, pollution prevention, public education, and watershed-specific rule recommendations.

Implementation plans may include both control actions and management measures. Control actions are point source pollution reduction strategies like the construction of centralized wastewater treatment facilities. Management measures are nonpoint source pollution reduction strategies which are the focus of this document. The best management measures for each individual watershed are developed in cooperation with regional and local stakeholders.

There are two types of plans developed in the State of Texas, TMDL Implementation Plans and plans developed at the local level called Watershed Protection Plans.

Both types of implementation plans describe implementation activities, the schedule for implementing them, and the authority for the regulatory measures. It also provides reasonable assurance that the voluntary practices will be undertaken and identifies partners who may perform these tasks. For instance, the plan may identify funds needed to implement voluntary actions. The plan also includes the measurable results that will be achieved, along with a follow-up monitoring plan to determine its success. Interim results are evaluated to assess progress toward the goal of the plan.

Even after plans are fully implemented, it is difficult to accurately predict how long it will take for improvements to occur in the water body, or how much improvement will be seen. For this reason, there is a schedule for phasing in implementation activities, especially those that address nonpoint sources of pollution. Less expensive, time-tested activities are implemented first, and their affects are assessed. If the water quality goal of the plan is not yet achieved, then another round of activities is implemented. Through this adaptive management approach, the water body is continually reassessed, and adjustments are made in the implementation activities as needed to attain the water quality goal of the plan.

The following elements will be addressed in plans implemented through the CWA §319(h) Grant Program as required by EPA Guidance:

- a. An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the TMDL.
- b. An estimate of the load reductions expected for the management measures described in the implementation plan.
- c. A description of the NPS management measures that will need to be implemented to achieve the load reductions estimated in the implementation plan, and an identification of the critical areas in which those measures will be needed to implement the plan.
- d. An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement the plan.
- e. An information/education component that will be used to enhance public understanding of the project and encourage early and continued participation in selecting, designing, and implementing the NPS management measures that will be implemented.
- f. A schedule for implementing the NPS management measures identified in the plan.
- g. A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented.
- h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether the TMDL needs to be revised.

- i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established in the plan.

TMDL Implementation Plans

Chapter 5 explains how Total Maximum Daily Loads (TMDLs) serve as part of the assessment process to identify sources and quantities of pollutant loadings that are preventing a water body from meeting water quality standards. After a TMDL is completed, an implementation plan is developed that describes the management measures necessary to achieve the pollutant reductions identified in the TMDL. The ultimate goal of TMDL Implementation Plans is the attainment of the water quality standard, but additional, interim results may be evaluated to assess progress toward that goal as described above. The development of TMDL Implementation Plans and implementation of NPS management measures defined in these plans is a priority for CWA §319(h) funding (described in Chapter 2).

Watershed Protection Plans

Watershed Protection Plans, are also developed at the local level to address water quality issues. Watershed Protection Plans are often based on special studies conducted to gather more data in certain areas where problems are known to exist but more intense monitoring is necessary to determine the source of the problem.

Watershed Protection Plans are developed by river authorities, cities, or other local government entities to determine how to best solve the water quality problems of that area and to define the implementation activities needed to attain or maintain water quality standards. Priority for CWA §319(h) funding (described in Chapter 2) is provided to develop and implement these plans.

Water Quality Trading

The concept of water quality trading has often been discussed as a way to increase the efficiency of TMDL and Watershed Protection Plan implementation and/or provide more flexibility for sources required to achieve extreme load reductions. In the context of TMDL and Watershed Protection Plan implementation, “water quality trading” refers to theoretical trading of pollutant allocations among local or regional sources, and generally does not mean physical transfers of actual effluent discharge. Arranging pollutant trades amongst watershed sources typically would require that some entity tracks the trades and keeps the account balanced to remain within the planned load allocations. The accounting entity may also need to mediate legal agreements, or disagreements, between trading partners.

Action with regard to water quality trading studies or plans will depend largely on the initiative of others, and the TCEQ and TSSWCB cannot stipulate when or if such efforts will occur. However, the TCEQ and TSSWCB will attempt to cooperate with such efforts in a timely and helpful manner. The development of a water quality trading program is optional. Any such effort that uses CWA §319 grant funding will have the tracking/accounting assurance stipulated in the grant stipulations.

Groundwater Plans

The Texas Groundwater Protection Committee strives to improve or identify areas where new or existing programs could be enhanced to provide additional protection for groundwater resources. The committee actively seeks to improve existing groundwater programs and promotes coordination among agencies and Groundwater Conservation Districts.

Joint Groundwater Monitoring and Contamination Report

The TGPC uses many tools to verify pollutant and contamination sources and develop plans to address the sources. The *Joint Groundwater Monitoring and Contamination Report* is essential to this process. The report is a compilation of all known groundwater contamination cases in the state and their enforcement status. In general, once groundwater contamination has been confirmed through regulatory compliance monitoring, the case will follow a generic sequence of actions until the investigation concludes no further action is necessary. The sequence of actions to verify pollutant sources and develop plans based on this report generally consists of confirmation of the contamination, an investigation to study the extent, composition, and circumstances of the contamination, and the planning of corrective action measures based on the investigation.

Groundwater Protection Strategy

There are no specific programs that routinely examine the quality of water being consumed by Texans utilizing private/domestic wells, the segment of Texas' population most likely to be impacted by NPS pollution of groundwater. Surveys of the groundwater quality of private wells in Texas are rare; however, studies that have been conducted by various agencies have indicated that both man-made and naturally occurring contaminants - (eg fecal coliform, nitrate, radioactive nuclides, pesticides and pesticide degradation byproducts, arsenic, and other heavy metals) have been found in some domestic wells at levels that exceed health-based maximum contaminant levels (based upon a lifetime exposure to the constituent). The TGPC has prepared the new *Texas Groundwater Protection Strategy* (AS-188, February 2003) that details actions to be taken to remedy this situation and address other aspects of NPS pollution.

The state's groundwater protection efforts are implemented through three types of groundwater program activities: groundwater protection, groundwater remediation, and groundwater conservation.

Protection. Groundwater protection is the first programmatic component that defines the state's efforts. TWC§26.401 sets out nondegradation of the state's groundwater resources as the goal for all state programs and asserts that groundwater be kept reasonably free of contaminants that interfere with the present and potential uses of groundwater.

Remediation. The second programmatic component of the state's efforts is groundwater remediation. Once contamination has occurred, the goal of remediation programs is to restore the quality of groundwater if feasible. The remediation of groundwater contamination is accomplished through the implementation of corrective action plans developed as a result of the *Joint Groundwater Contamination Report*, monitoring of the effectiveness of corrective action measures, and ultimately, the completion of the corrective action measures.

Conservation. Another component of groundwater programs is conservation. Groundwater Conservation Districts are the state's preferred method of managing groundwater resources. Groundwater Conservation Districts have the authority to adopt and enforce rules, require well permits, monitor groundwater quality and quantity, and provide public education. These activities are useful in assisting with the implementation of the Districts' management plans described above.

Groundwater Conservation Districts

The legislature has stressed the importance and responsibility of groundwater conservation districts in developing and implementing comprehensive management plans to conserve and protect groundwater resources. Wastewater reuse, desalination, well spacing regulations, brush control, and other strategies are featured in the plans.

This chapter, and the following two chapters, represents the toolbox of programs in place throughout the state which attempt to achieve the goals defined in this management plan through implementation of the defined milestones. The implementation programs and measures described in the plan work together to manage nonpoint source pollution in the State of Texas and are often defined through planning to achieve specific water quality goals.

Remediation of Contaminated Sites

Environmental contamination can occur in many ways. Some examples include, unreported spills of hazardous materials, undetected leaks from pipes or other malfunctioning industrial equipment, improper disposal of byproducts of industrial processes, abandoned municipal solid waste landfills, and abandoned, inactive industrial sites. If not remedied, ground and surface water contamination may occur which can pose environmental and human health problems. Below is a discussion of several state programs in place which address remediation of contaminated sites.

Superfund Program

The state Superfund program's mission is to remediate abandoned or inactive sites within the state that pose an unacceptable risk to public health and safety or the environment, but which do not qualify for action under the federal Superfund program. The state Superfund program is administered by the TCEQ.

The TCEQ manages or provides management assistance to the U.S. Environmental Protection Agency (EPA) with regard to the Superfund remediation process, after the site is identified as being eligible for listing on either the state Superfund registry or the federal National Priorities List. The TCEQ ensures that all Superfund activities are completed in a timely and efficient manner, and in accordance with all applicable state and federal laws and rules.

Brownfields Program

In Texas, many former industrial properties lie dormant or underutilized due to liability associated with real or perceived contamination. These properties are broadly referred to as brownfields. The TCEQ, in close partnership with the EPA and other federal, state, and local agencies, facilitates cleanup, transferability, and revitalization of brownfields. This is accomplished through the development of regulatory, tax, and technical assistance tools. In addition, the TCEQ is available at no cost to local governments to provide technical advice, education, and project partnering for brownfields redevelopment projects.

Voluntary Cleanup Programs

The Texas Voluntary Cleanup Program (VCP) provides administrative, technical, and legal incentives to encourage the cleanup of contaminated sites in Texas. Non-responsible parties, including future lenders and landowners, receive protection from liability to the state of Texas for cleanup of sites under the VCP. Therefore, constraints for completing real estate transactions at those sites are eliminated. Also under the VCP, site cleanups follow a streamlined approach to reduce future human and environmental risk to safe levels. As a result, many unused or under used properties may be restored and become economically productive and beneficial to the community.

In addition, the RRC has a Voluntary Cleanup Program, which oversees the remediation of oil and gas related pollution and provides an incentive to remediate the pollution through a release of liability to the state in exchange for a successful cleanup. Applicants to the program may not have caused or contributed to the pollution.

Corrective Action Program

The mission of the industrial and hazardous waste corrective action program is to oversee the cleanup of sites with soil and groundwater contamination from industrial and municipal hazardous and industrial non-hazardous wastes. This program is administered by the TCEQ. The goal of this program is to assure that the public is not exposed to hazardous levels of chemicals by requiring mitigation, and the removal of contamination to levels protective of human health and the environment.

The RRC is responsible for plugging and cleanup of abandoned wells and sites. The RRC oversees cleanup by responsible parties of pollution associated with oil and gas activities under RRC jurisdiction. Funding for the RRC's program comes from regulatory fees, permit fees, and bond fees paid by the oil and gas industry. Cleanup and prioritization of sites is based on protection of public health, public safety, and the environment.

Leaking Petroleum Storage Tank Program

The TCEQ is responsible for administering the leaking petroleum storage tank (LPST) program. The program mission is to oversee the cleanup of spills from regulated storage tanks by recording and evaluating all reported incidents of releases of petroleum and other hazardous substances from underground and above-ground storage tanks. The program goal is to assure that the public is not exposed to hazardous levels of contamination by requiring the removal of contamination from LPSTs to levels protective of human health and the environment.

Any entity performing or coordinating regulated LPST corrective action services must be licensed by the TCEQ, as an LPST corrective action specialist. Any individual who supervises any corrective action required on a LPST site but is not a qualified professional engineer must be registered as an LPST corrective action project manager. Corrective action services include measures to determine and report the extent of a release in progress, attempts to halt and prevent future releases of regulated substances, cleanup of surface and subsurface contamination on site, site closures, post-remediation monitoring, or any other actions reasonably necessary to protect public health and preserve environmental safety.

Emergency Response and Disaster Recovery

Nonpoint source pollution can occur as a result of natural disasters or spills of hazardous materials. Emergency response to these incidents can reduce the amount of impact pollutants from these activities present to the environment.

Severe storms can cause loss of vegetation, severe erosion, and runoff of contaminants, all of which can impact water quality. Clean-up efforts following severe storms often create large quantities of waste materials, which place additional pressures on the environment.

Spills on land are considered an emergency, because chemicals or other hazardous materials can enter nearby water resources and pose a threat to the environment and public health. Transportation and storage of hazardous materials increases the risk of the occurrence of spills. Some of the programs in the state of Texas that are responsible for response to spills and recovery from natural and manmade disasters are discussed below.

Floodplain Management

Development in some Texas communities has raised the elevation of portions of the floodplain, increased drainage over impervious surfaces, channeled runoff away from new growth areas, and caused other physical changes to the environment. These changes can contribute to the severity of flooding events, and result in further damage to the environment.

The TCEQ serves as the state floodplain coordinator and implements the National Flood Insurance Program (NFIP) in Texas. As part of this program, the TCEQ provides guidance, support, and training to floodplain administrators to become participants in the NFIP. TCEQ staff visit communities throughout the state to provide planning, assistance, and information to community officials, and help coordinate disaster response to severe floods.

The Texas Water Code authorizes cities and counties in the state to adopt ordinances and court orders to create comprehensive floodplain management programs designed to protect public health, safety, and the general welfare of its citizens. To participate in the NFIP, a community must adopt and enforce a floodplain management ordinance which prevents new development from increasing the flood threat and protect new and existing buildings from anticipated flood events.

Local floodplain management programs are responsible for reviewing all construction plans and conducting inspections of approved projects to assure conformance with NFIP regulations. NFIP regulations ensure that construction methods and materials will minimize future flood damage and impacts to the environment from floods. Best management practices are required in floodplain areas to provide for water conveyance, and reduce runoff volumes associated with development. Examples of a few BMPs used include swales, detention and retention ponds, and infiltration basins.

Emergency Response Program

The TCEQ Emergency Response team is on call 24-hours a day, year-round for response to oil and hazardous substance spills, emergencies, and human-caused disasters. The TCEQ responds to incidents such as, midnight dumping of abandoned drums, the breakup of the space shuttle Columbia in the skies over central and east Texas, and natural disasters.

The TCEQ collaborates with the EPA, the Coast Guard, other state agencies, counties, cities, local hazardous material teams, fire departments, law enforcement, and corporate response units. TCEQ staff lead response efforts when appropriate and provide planning or support.

The TCEQ assesses health and environmental risks in conjunction with the Texas Department of State Health Services (DSHS), the Railroad Commission of Texas (RRC), the Texas Parks and Wildlife Department (TPWD), Texas General Land Office (GLO) or other experts as necessary. DSHS identifies communities where people may be exposed to hazardous substances in the environment, assess a site's hazards, and recommends actions that need to be taken to protect human health. The RRC is responsible for response and clean-up of inland oil and gas related spills. TPWD is responsible for assessing impacts of spills to fish and wildlife. GLO responds to coastal oil spills.

Some of the services the TCEQ offers in response to spills and other pollution related emergencies include:

- assisting water supply officials providing drinking water and making systems operational; evaluating water quality; assisting individuals in maintaining private water or sewer systems; and assessing damages to public drinking water systems;
- providing information and aid to the State Emergency Management Council on matters of flood-hazard areas, floodplain management, flood hydrology, engineering, dam safety, reservoir operation, water rights and uses, water quality, and hazardous waste management;
- making available the services of specialists (floodplain management, hydrology, meteorology, groundwater geology, water quality, dam safety, wastewater treatment, water rights and uses, solid waste management including hazardous waste and radioactive waste, and emergency response) that may be of assistance during a disaster;
- providing spill response maps, as well as maps relating to flood-hazard areas;

- providing TCEQ data, including data from neighboring states and Mexico, needed for dealing with a disaster that transcends the boundaries of Texas;
- providing support for post-emergency weather and damage assessment;
- providing technical assistance to local governments in the physical siting of disposal facilities for debris including municipal wastes whenever a disaster generates excessive amounts of waste;
- providing cleanup funding as appropriate from funds under the TCEQ's statutory authorities; and
- providing contracting resources for cleanups.

To the extent possible, TCEQ ensures that the individuals or entities responsible for spills bear the cost of clean-up activities. Violators who intentionally or knowingly allow an unauthorized discharge of pollutants that causes or threatens to cause water pollution may be prosecuted. Failure to report a spill is also cause for prosecution.

Coastal Oil Spill Prevention and Response

The Oil Spill Prevention and Response Act of 1991 (OSPRA) designated the GLO as the lead state agency for preventing and responding to oil spills in the marine environment. A two-cent-per-barrel fee on crude oil loaded or off-loaded in Texas supports funding for the GLO's response efforts. To ensure rapid response, field offices are located along the Texas coast. In preparation for spills, the program has pre-staged response equipment in sensitive and geographically advantageous locations. The GLO's Oil Spill Prevention and Response (OSPR) program functions include deploying state-owned response equipment, designating responsible parties, coordinating spill response strategies, investigating the spill causes, and conducting follow-ups to ensure that appropriate corrective actions are identified and implemented. The program maintains a substantial inventory of response equipment.

The OSPR program maintains an active outreach effort, visiting schools, associations, and interest groups. The outreach program emphasizes the environmental impacts of small, chronic spills. Pollution prevention methods are highlighted in every presentation. In addition, the OSPR sponsors the Clean Gulf Conference and Exhibition annually to bring experts from government and industry together to discuss the latest developments in oil spill technology and the issues facing both responders and industry.

The OSPR program has also completed construction of four bilge water reception facilities along the coast. The Oily Bilge Water Reception Facility Program deters disposal of bilge water containing oil directly into surface water by providing operators of pleasure and commercial boats

with disposal facilities. In addition, the GLO has increased its presence with additional boat and harbor patrols. The OSPR program maintains a comprehensive, unannounced oil spill drill and audit program designed to measure the readiness level of all sectors of the oil handling community: deep draft vessels, pipelines, and shore-based facilities.
The OSPR program is one of only a few state programs in the nation that funds oil spill prevention and response-related research. The Shoreline Environment Research Facility (SERF) enables oil spill researchers to conduct biological and chemical experiments in nine tanks that are capable of simulating a variety of coastal environments. The American Petroleum Institute has conducted two of the first "field conditions" dispersant experiments at the SERF facility, and works with program personnel to perfect response strategies for maritime applications.

The Texas Automated Buoy System (TABS) was developed to assist in predicting the movement of oil in offshore environments. Nine offshore buoys transmit real time ocean current data, which is then fed into computer trajectory models to produce a predicted pattern of oil movement.

To increase spill preparedness and streamline the OSPR program, the On-Line Vessel database was created to enable vessel operators to register response and preparedness information electronically, rather than submit hard copy plans.

The Texas Oil Spill Planning and Response Toolkit , produced by the OSPR program, with assistance from the Coast Guard, is the most comprehensive oil spill preparedness tool available. The toolkits are comprised of sensitivity maps, local knowledge guides, forms, and Area Contingency Plans for all of Texas. The program publishes the toolkit as both a downloadable program and CDRom. The toolkit is updated annually and is widely distributed free of charge throughout the Gulf Coast.

Kills and Spills Team

The Texas Parks and Wildlife Department (TPWD) has assembled a Kills and Spills Team (KAST) comprised of biologists and team members headquartered in and assigned to five regions across Texas. The KAST assumes four key responsibilities: 1) respond to fish and wildlife kills and pollution incidents, including oil and hazardous material spills;
2) minimize environmental degradation resulting from pollution incidents and fish and wildlife kills; 3) obtain compensation, repair, and restoration for environmental damage; and, 4) act as a technical resource with respect to relationships between water quality, habitat, and living organisms.

The majority of incidents the KAST team responds to are fish kills. Natural causes responsible for fish kills include extreme weather temperatures, bacteria and disease, and toxic algal blooms. The actions of humans can result in fish and wildlife kills through the introduction of toxic chemicals, pesticides, fertilizers, and contaminated storm water runoff. Low dissolved oxygen concentration is another cause of fish kills. Low dissolved oxygen concentrations may be natural or ma-induced. Low dissolved oxygen can result from large amounts of plant life depleting oxygen levels during the night. Other causes of low dissolved oxygen include hot, still days, dams, and dead end canals. A fish or wildlife kill is physical evidence that something is wrong. The sooner it is reported, the sooner it can be investigated and remedied.

A fish or wildlife kill is physical evidence that something is wrong. The sooner it is reported, the sooner it can be investigated and remedied. Immediately after a kill or spill is reported, an investigation begins to determine the source of a spill or the cause(s) of a kill. Though differences exist between investigating fish and wildlife kills and spills, the need for prompt response and accurate analysis applies in either case. Crucial details can be lost in a short amount of time. In addition, factors that may seem insignificant such as weather, vegetation, algal blooms, water chemistry, water flow, and pollution, can have serious impacts to an ecosystem when they change rapidly. Therefore, TPWD biologists must pay close attention to details, follow proper sampling procedures, and keep valid records. For large pollution events, TPWD biologists often work together with other state and local authorities.

Often in the case of a kill or spill, a responsible party is identified as having caused the incident. The responsible party may be asked to make restitution for the ecological damages. Restitution may consist of a monetary payment for the value of fish or wildlife killed, or may be some project that restores value to the ecosystem.

Hydromodification

Hydromodification is defined by EPA as the alteration of the hydrologic characteristics of surface waters. Hydromodification may cause degradation of water resources. Three general types of hydromodification contribute to nonpoint source pollution:

Channel modification. Channel modification describes river and stream channel engineering undertaken for the purpose of flood control, navigation, drainage improvement, and reduction of channel migration potential. Activities such as straightening, widening, deepening, or relocating existing stream channels fall into this category. This term also refers to the excavation of borrow pits, canals, underwater mining, or other practices that change the depth, width, or location of waterways or bay formations in coastal areas. Channelization and channel modification activities can diminish suitability of instream and streamside habitat for fish and wildlife. They can also 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. In addition, hardening of banks along waterways can increase the movement of NPS pollutants from the upper reaches of watersheds into downstream or coastal waters.

Dams. Dams are defined as constructed impoundments that are either (1) 25 feet or more in height and greater than 15 acre-feet in capacity, or (2) 6 feet or more in height and greater than 50 acre-feet in capacity. Dams can adversely impact the quality of the surface waters and habitat in the stream or river where they are located. A variety of impacts can result from the siting, construction, and operation of these facilities. Construction activities from dams can cause increased turbidity and sedimentation in the waterway resulting from vegetation removal, soil disturbance, and soil rutting. The operation of dams can also generate a variety of types of nonpoint source pollution in surface waters. Controlled releases can change the timing and quantity of freshwater inputs into coastal waters, reduce downstream flushing, and create sediment deposition downstream of the dam. Dam releases can result in erosion of the streambed and scouring of the channel below the dam. Finally, reservoir releases can alter water temperature and lower dissolved oxygen levels in downstream waterbodies.

Streambank erosion. Streambank erosion refers to the loss of land along streams and rivers. The force of water flowing in a river or stream causes erosion. Eroded material can be carried downstream and deposited in the channel bottom or in point bars located along bends in the waterway. These deposits can have adverse impacts on the creation and maintenance of riparian habitat. Excessively high sediment loads can smother submerged aquatic vegetation, cover shellfish beds and tidal flats, fill in riffle pools, and contribute to increased levels of turbidity and nutrients.

The State of Texas achieves protection of water resources from hydromodification activities through a mixture of management measures. Below are examples of some of the programs that implement these measures.

Clean Water Act §401/404 Water Quality Certification

CWA§401 provides for the protection of the state's surface water resources by ensuring that federal discharge permits are consistent with the Texas Surface Water Quality Standards. Under CWA§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 U.S., such as the discharge of dredge or fill material. CWA§401 is a cooperative federal/state program that 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.

Only those activities that require a federal permit are subject to state review for §401 certification. However, any federally authorized activity which may result in a discharge is subject to CWA§401 certification. An important type of permit subject to CWA§401 certification is the U.S. Army Corps of Engineers (Corps) CWA§404 permit for discharges into wetlands or other navigable waters.

Before issuing a federal permit in Texas, the permitting agency must receive, from TCEQ or RRC, 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 TCEQ 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 (RRC). The RRC certified permit activities include dredging an access channel to conduct drilling or production operations in a critical area; construction of a drilling pad or installation of a production platform in a critical area; or construction, operation, or maintenance of a crude oil or natural gas pipeline facility in waters of the state. The Texas Parks and Wildlife Department participates in the review of CWA§404 permits and CWA§401 wetland certifications to determine effects on fish and wildlife, and wetland habitats.

The CWA§401 certification program also plays an important role protecting coastal resources under the Texas Coastal Management Program (CMP). The CMP is designed to accomplish the goals set by the state legislature for coastal resource protection and to meet specific requirements for an approved plan under the federal Coastal Zone Management Act (CZMA). Certain activities, such as discharges authorized by CWA§404 permits, must be consistent with the state CMP when they occur within the coastal zone boundary. CWA§404 permits often involve impacts to coastal wetlands. Efforts to avoid and/or minimize adverse impacts to wetlands are taken to retain the important functions these water bodies provide for wildlife and aquatic habitat.

Water Rights Permit Review

Water flowing in Texas' creeks, rivers, and bays is public property; however, the State of Texas confers on individuals and organizations the right to pump water from a stream, creek, pond, or lake or to impound water in a lake or pond, under the authority of Chapter 11 of the Texas Water Code. With a few exceptions, surface waters may be used only with explicit permission of the state, granted in the form of water rights. Water rights projects have the potential to cause, amplify, or exacerbate nonpoint source problems through flow modification, dam construction, sediment load alteration, loss of wetlands, and removal of riparian vegetation.

Each application for a water rights permit is reviewed for administrative and technical requirements by the TCEQ to evaluate its impact on other water rights, bays and estuaries, conservation, water availability, public welfare, etc. TCEQ assesses the effects that the issuance of a water rights permit will have on existing instream uses including, water quality, fish and wildlife habitat, recreation, and freshwater inflows to bays and estuaries. In addition, Texas Parks and Wildlife Department reviews water rights applications, and is required by law to provide recommendations for permit conditions, mitigation, and schedules of flow or releases to protect fish and wildlife resources (Parks and Wildlife Code 12.024).

Factors that the TCEQ evaluates when performing an assessment of a water rights permit include the perennial nature of the stream, aquatic life use and biological integrity of the stream, water quality issues, presence of species of concern, and recreational uses. In addition to setting streamflow restrictions, mitigation may be recommended for altered, inundated, or destroyed terrestrial or riparian wetland habitats. The results of these assessments are incorporated into limitations and/or special conditions attached to water rights permits in order to protect the environmental integrity of the impacted stream reach.

Marinas and Recreational Boating

Marinas and boating activities can be sources of nonpoint source pollution. Texas has over 350 coastal and inland marinas statewide encompassing slips and storage for more than 57,000 boats. Marinas, if not sited and constructed properly, can destroy wetlands, aquatic habitat and submerged aquatic vegetation, and can also restrict or alter water flows. Improper siting and construction can also lead to decreased dissolved oxygen levels and increases in pollutant concentrations. Activities that occur at marinas can create sources of nonpoint pollution including petroleum hydrocarbons such as fuel and oil. These substances can enter surface water directly from spills during refueling, may be present in bilge discharge, or can be transported in storm water runoff from these facilities. Other potential pollutants include copper and tin which are used in antifoulants used to prevent fouling of the submerged portions of ships, and iron and chrome which are contained in boats themselves. These substances may enter the water during boat cleaning.

Recreational boating can also degrade water quality and destroy aquatic habitat. Sewage, waste from fish cleaning, and food waste discharged from boats, either accidental or intentional, can lower dissolved oxygen levels, increase nutrients and impact aquatic life. In addition, discharges of sewage can elevate fecal coliform bacteria to levels that are unsafe for swimming and fishing. Some of the programs in place to address the nonpoint source problems resulting from marinas and recreational boating activities are discussed below.

The Clean Marina Initiative

The Clean Marina Initiative is a voluntary, incentive-based program promoted by the National Oceanic and Atmospheric Administration

(NOAA) and others that encourages marina operators and recreational boaters to protect coastal water quality by engaging in environmentally sound operating and maintenance procedures. NOAA is jointly responsible for administering the Coastal Nonpoint Control Program with EPA, and plays an important role in protecting coastal waters from polluted runoff. The Coastal Nonpoint Program establishes a consistent set of management measures for all coastal states to use in controlling nonpoint source pollution. Management measures are designed to prevent or reduce runoff from a variety of sources, including marinas.

NOAA recognizes that the Clean Marina Initiative can serve a valuable role in protecting coastal waters from nonpoint source pollution and has promoted the program as a way for states to meet many of the marina management measure requirements under the Coastal Nonpoint Program. As a result, the Coastal Nonpoint Program has been responsible for driving the development of most of the state Clean Marina Programs existing today and developing a national interest in the initiative. NOAA continues to support the Clean Marina Initiative through targeted grant funding to states developing Clean Marina Programs.

The Clean Texas Marinas Program

The Clean Texas Marinas Program is a proactive partnership designed to encourage marinas, boatyards and boaters to use simple, innovative solutions to keep Texas coastal and inland water resources clean. The basic goal of the program is pollution prevention by increasing awareness of environmental laws, rules, and jurisdictions, and increasing the number of designated Texas Clean Marinas. To be designated as a Texas Clean Marina and be recognized for environmental stewardship, marina owners are asked to identify opportunities and implement best management practices to control pollution associated with:

- Vessel maintenance and repair
- Petroleum storage and transfer
- Sewage disposal
- Solid, liquid and hazardous wastes
- Stormwater runoff
- Facilities management

The program also offers information, guidance, and technical assistance to marina operators, local governments, and recreational boaters on best management practices (BMP's) that can be used to prevent or reduce pollution. The Clean Texas Marinas Program was developed by the Texas Sea Grant College Program in partnership with the GLO, TCEQ, Marina Association of Texas, the Marina Advisory Board, and others.

Solid and Hazardous Waste Management

Many county unincorporated areas in the state do not have organized waste collection services. Illegal dump sites are generally easily accessible to vehicles, somewhat hidden from view, and are perceived to be a no-man's land where dumping is permissible without costs. Approximately 70% of these sites are located in drainage swales or in creeks, resacas, or arroyos. Irrigation canals are also subjected to illegal dumping.

Environmental risks associated with illegal dumping and burning of solid waste include: surface and groundwater contamination; impact to wildlife and aquatic habitat; impact on endangered or threatened plants, animals, and species; and air pollution from open burning, especially in areas of concentrated population. Leachate from illegal dumping sites can contaminate water supplies, as can ash with concentrated contaminants created during illegal burning. Burn sites are often buried, creating potential for future water contamination.

Over one-fifth of the trash going to landfills in Texas is made up of yard trimming and vegetative food material. These materials can be used, instead of being wasted, as an organic, environmentally-friendly substitute for home chemical fertilizers. Practices by homeowners, such as the use of mulching lawnmowers and home composting, can reduce the amount of yard waste entering landfills. Manure from animal waste and sludge from human waste can also be used in this way. Private enterprise can make use of these materials to produce compost on the commercial level.

Another NPS contributor associated with waste management is the improper disposal of hazardous waste. Hazardous waste comes from industry, manufacturing, and households. Hazardous waste comes in many different shapes and forms. Chemical, medical, and furniture processing are some examples of processes that produce hazardous waste. Household products that contain corrosive, toxic, ignitable, or reactive ingredients such as paints, cleaners, oils, batteries, and pesticides are also hazardous wastes that contribute to NPS pollution. Oversided containers for household products can contribute to NPS due to overuse to get rid of the product, storage which can be unsafe, and improper disposal.

Hazardous and solid wastes, if not disposed of properly, can pollute the environment and pose a threat to human health. The State of Texas has several programs in place to address hazardous and solid waste management.

State Solid Waste Permitting Programs

With a few exceptions, the TCEQ uses permitting to regulate the storage, transport, processing, and disposal of solid waste in Texas to prevent nonpoint source releases to the environment. TCEQ rules require that solid waste be processed and disposed of only in authorized facilities.

The TCEQ randomly audits a portion of waste stream notifications in order to ensure proper classification and coding of waste in Texas. Hazardous waste is defined as any solid waste listed as hazardous or possesses one or more hazardous characteristics as defined in federal waste regulations. Industrial waste is waste that results from or is incidental to operations of industry, manufacturing, mining, or agriculture. Under the definition of a waste, certain materials recycled in certain ways are excluded from being considered waste while others are not.

Facilities that aggregate, process, and return to use source-separated, non-putrescible recyclable materials from the municipal solid waste stream are exempt from permitting or registration requirements. All other recycling facilities must be authorized by the TCEQ.

The TCEQ certifies Municipal Solid Waste (MSW) technicians. The operating permits of most MSW facilities, including landfills, transfer stations, processing facilities, and recycling and resource recovery facilities, require the presence of a certified MSW technician. The responsibilities of an MSW technician include the proper screening, handling, transportation, collection, storage, and disposal of municipal solid waste.

The Beneficial Use Sludge Permitting Program

Sewage sludge, also known as biosolids, must be properly processed, transported, and used or disposed of in order to prevent adverse environmental and public health impacts. Sludge is the material that remains after bacteria has digested the human waste from municipal water and wastewater treatment plants. Sludge can also originate from septic tanks, chemical toilets, grease and grit traps.

Because of the nutrient and soil-conditioning characteristics of most biosolids, local governments are encouraged to consider beneficial land application or composting of sludge. An activity to land-apply Class B biosolids for a beneficial use must be authorized by the TCEQ. An activity to land apply Class A biosolids (e.g. compost) for beneficial use does not require authorization by TCEQ. Beneficial use is defined as the land application of treated municipal sludge at or below the agronomic needs of a cover crop or the use of water treatment sludge as a soil amendment.

Because some municipal wastewater treatment plants also receive industrial wastewater, sewage sludge can contain pesticides and chemicals along with human waste. A permit is required for most activities that involve the processing, transportation, beneficial use, or disposal of sludge. If a sludge is not of domestic origin, it is regulated as either a municipal solid waste or an industrial solid waste.

The Illegal Disposal Abatement Program

To successfully address illegal dumping problems, communities must develop long-term comprehensive solutions. The TCEQ has developed a model approach for use in developing solutions for illegal dumping and other municipal solid waste problems. This model approach focuses on developing and maintaining a program that includes the following four components:

- Garbage collection services. Provide residents with convenient and affordable ways to dispose of their garbage, such as citizen collection stations for rural communities.
- Public awareness campaigns. Increase public awareness on the health and safety hazards of illegal dumping and available legal options for garbage disposal.
- Cleanup of existing dumps. Clean up illegal dump sites to discourage other dumpers, who are attracted to these existing sites, and to improve the community's awareness of the problem.
- Enforcement. Increase the cost of illegal dumping through increased enforcement and more severe punishments for offenders.

The TCEQ has an extensive outreach campaign to address the issue of illegal dumping. The TCEQ also provides funding to Councils of Government (COGs) through the Regional Solid Waste Grant program. Funds for the grant program are generated by state fees on Municipal Solid Waste (MSW) disposed of at landfills. The COGs use the funds to develop an inventory of closed MSW landfills; conduct regional coordination and planning activities; provide technical assistance and informational programs pertaining to solid waste management; serve as central point of contact for solid waste management outreach, education, and training programs; maintain a regional solid waste management plan; and administer pass-through grant programs to provide funding for regional and local MSW projects.

Texas Environmental Enforcement Task Force

Intentional damage to the environment is a serious threat to the public's health and safety. In many cases, offenders favor rural areas or low-income neighborhoods for environmental crimes such as illegal dumping. The most common environmental crimes involve the dumping of various pollutants like septic waste, household garbage, used motor oil, auto batteries and barrels of hazardous waste.

Texas is a national leader in the investigating and prosecuting of environmental crime. This distinction is a direct result of the formation of the Texas Environmental Enforcement Task Force. The task force's sole responsibility is to combat environmental crime, both directly and by informing and training Texas peace officers.

Each year TCEQ dedicates a week to educating Texas about environmental damage caused by dumping and other illegal pollution. Activities during the week include educational forums with community groups and law enforcement, a traveling exhibit on preventing environmental crime, police officer training, and a ceremony recognizing environmental crime fighters. Training sessions for police officers cover state and federal environmental statutes and emphasize the differences between criminal and civil cases. Primary instruction includes evidence collection and the use of scientific and technical expertise. Officers are led through re-enactments of illegal discharges and the execution of a search warrant.

The TCEQ heads up the Texas Environmental Enforcement Task Force with TPWD, Attorney General's Office, GLO, RRC, and the Governor's Office. While operating as a task force, these state agencies coordinate with various U.S. Attorney's Offices, the EPA, and the FBI. Task force membership has expanded to include a dozen more state, federal, and local entities. The task force meets bimonthly to review referrals for investigations. Tips come from many sources: employees at the offending company, business competitors, or task force members who come across leads. If the environmental task force adopts a case, each member agency appoints an investigator and the group consults with prosecutors to determine whether the case is better suited for state or federal courts. The participating agencies collaborate in conducting searches, taking and analyzing samples, and performing other functions necessary to support criminal investigations and prosecutions.

Citizen Complaints

Responding to complaints from the general public about alleged environmental violations is an important part of TCEQ's regional office responsibilities. Each complaint is assigned a priority status to ensure that staff respond to the most environmentally serious complaints first. TCEQ has established procedures by which staff will investigate complaints once the most appropriate course of action is determined. An investigation may take the form of an on-site inspection or sampling.

Complaints are categorized as follows:

- conditions relating to air quality such as odor, dust, and smoke
- conditions that create a potential to pollute the water or land
- alleged violations of TCEQ permits or rules
- smoking vehicles
- spills

- other environmental concerns

Matters not within TCEQ jurisdiction will be referred to the appropriate state agency. The TCEQ does not have the authority to regulate, enforce, or mediate private actions between citizens.

Citizen Environmental Watch

The Citizen Environmental Watch Program allows information gathered by private individuals to be developed as evidence of environmental violations. This program provides an opportunity for citizens to get involved with environmental protection.

The program is implemented by the TCEQ regional offices. Regional staff review the complainant's information—such as photos, videotapes, and water samples—and decide on the appropriate course of action. If necessary, an investigator will visit the site or facility in question. Individuals must be willing to disclose their identities and, in some cases, asked to testify. Strict agency procedures for gathering and preserving evidence must be followed. The TCEQ can pursue an enforcement action only if the evidence is admissible at a hearing, based on Texas rules of evidence. The agency will not consider information gathered illegally.

If a serious or unresolved violation is found, the TCEQ will initiate an enforcement action. Individuals providing evidence in an enforcement case will be notified of the results of the investigation and any follow-up enforcement actions.

Composting

Compost is produced by aerobic decomposition of organic matter. Compost feedstock may include, but is not limited to, leaves and yard trimmings, biosolids, food scraps, food-processing residuals, manure or other agricultural residuals, forest residues, bark, and paper. Composting benefits water quality by saving landfill capacity, reducing the use of chemical fertilizers, improving manure management which aids in the reduction of phosphorus and bacteria concentrations due to storm water runoff from dairy farms, and promoting establishing vegetation which helps reduce NPS pollution from rainfall runoff.

The TSSWCB and the TCEQ partnered to initiate an innovative solution to water quality problems in the North Bosque and Leon watersheds, the Composted Manure Incentive Program (CMIP). Storm water runoff containing manure from dairy farms is a significant source of phosphorous and bacteria in the two watersheds. Incentive payments, funded by CWA §319 funds, are given to governmental entities towards the purchase of eligible composted manure to be used in beneficial uses. The ultimate goal of the project is to ensure that markets are in place to support the continued export of manure from these two watersheds after rebate funds have been exhausted. The Texas Department of Transportation (TxDOT) uses the compost throughout the state to promote establishment and maintenance of roadside vegetation.

The TCEQ provides outreach and technical assistance in the use of compost throughout the state. The outreach program provides workshops, demonstrations, and technical assistance specifically addressing the benefits, opportunities, and incentives for using composted manure. The TCEQ has an expanded outreach program in the North Bosque and Leon watersheds that is conducted in conjunction with the CMIP.

The Texas Cooperative Extension also has an expanded education and marketing campaign for composted manure. This campaign effort has surveyed existing and potential markets for composted manure in the CMIP watersheds, organized a comprehensive education and marketing campaign focused on these markets, and begun field trials and demonstrations to document and publicize the effectiveness of the appropriate uses of composted manure in a wide array of landscaping, horticultural, and agricultural applications.

Used Oil Recycling

Texas law prohibits dumping used oil on land or into sewers or waterways. This includes the use of used oil as a dust suppressant. Texas has also banned used oil filters from being placed in or accepted for disposal in a landfill. TCEQ requires all transporters, handlers, and collection centers for used oil to register with the agency and report annual quantities of used oil handled. A facility which accepts used oil from household *do-it-yourselfers* may be exempted from the state fee on the sale of new automotive oil.

Oil and Gas Waste Management

The Railroad Commission of Texas (RRC) regulates activities and the wastes generated as a result of activities associated with the exploration, development, or production of oil or gas or geothermal resources, including transportation of crude oil or natural gas by pipeline. These wastes are termed “oil and gas wastes”, and include both hazardous and non-hazardous oil and gas wastes.

The RRC has responsibility for the prevention of pollution that might result from activities associated with exploration, development, and production of oil, gas, or geothermal resources of the State to prevent operations dangerous to life or property. The RRC uses rule-authorization and permitting to regulate the storage, transport, processing, and disposal of oil and gas wastes in Texas to prevent releases to the environment. RRC rules require that oil and gas wastes be processed and disposed of only in an authorized or permitted manner RRC’s environmental and safety programs cover drilling, operation, and plugging of wells;

separation and treatment of produced fluids in the field or at natural gas processing plants; storage of crude oil before it enters the refinery; underground storage of hydrocarbons in slat caverns or natural gas depleted reservoirs; transportation of crude oil or natural gas by pipeline; drilling, operation and plugging of brine wells; and storage, hauling, reclamation, or disposal of wastes generated by these activities.

The RRC's environmental and safety regulations for oil and gas wastes are administered through the Environmental Services, the Well Plugging, the Site Remediation and Special Response, and the Compliance programs. The Environmental Services program includes permitting programs for management of wastes and protection of the public from surface storage or disposal, disposal and enhanced recovery wells, underground hydrocarbon storage and brine mining. The Environmental Services program also coordinates with other state and federal agencies on environmental and safety matters. The Compliance program coordinates the activities of nine district offices in inspecting oil and gas operations and enforcing the RRC's environmental and safety rules. The Well Plugging and the Site Remediation and Special Response programs handle special Oil Filed Cleanup Fund (OFCUF). The OFCUF is supported by the oil and gas industry through various fees, taxes, and penalties. The Site Rememdiation and Special Response program also reviews operator cleanup activities and coordinates the RRC's response to large spills an other major events.

The TCEQ Household Hazardous Waste Management Program

TCEQ's Household Hazardous Waste (HHW) Management program primarily regulates HHW collections and programs. Technical and regulatory information is also provided to entities on setting up HHW collection programs as well as general information to citizens of Texas on HHW issues. Quarterly meetings of a HHW managers network are also coordinated.

Tire Disposal Program

Scrap tires must be managed to prevent fires and control disease vectors (mosquitos and rats). The toxic air pollutants from tire fires can become nonpoint source water pollutants through atmospheric deposition. Prior to Texas' scrap tire management program, large illegal tire dumps often appeared on the beds and banks of streams, damaging riparian habitat. The TCEQ regulates the collection, processing and recycling/disposal of over 20 million tires discarded each year in Texas. Anyone who stores more than 500 scrap tires must register with the TCEQ as a scrap tire storage site. Scrap tires must be hauled by a registered transporter to either a permitted landfill or an authorized scrap tire facility. All facilities must keep manifest records showing the disposition of scrap tires.

The City of San Antonio Waste Management Programs

The City of San Antonio's Household Hazardous Waste (HHW) Program operates a permanent HHW Drop-off Center (DoC). This service provides an environmentally safe means for citizens to dispose of items such as paint, pesticides, oil, anti-freeze, batteries and household cleansers. If thrown in the regular trash, these items could potentially harm the solid waste collectors and contaminate our environment. The program has developed an outreach campaign, "Take it to the Doc!", that urges the public to dispose of hazardous household waste properly by bringing it to the HHW DoC.

All collected HHW materials are handled and packaged for disposal by technically trained personnel. Following collection, the transport of all materials is performed by a licensed hazardous materials transporter. The method of disposal depends upon the type of material. Approximately 80% of all materials collected through the City of San Antonio HHW Program are recycled. Materials that cannot be recycled are disposed of by a licensed hazardous materials treatment, storage and disposal facility.

City of Austin Biosolids Composting

Another innovative strategy for wastewater management was developed by the City of Austin in the 1950's. Originally established as a series of stabilization ponds used to treat wastewater residuals from the city's wastewater plants, the Hornsby Bend Beneficial Reuse Program has become a nationally recognized, EPA award-winning sludge-recycling facility.

Situated on 700 acres of land along the Colorado River, about 10 miles east of downtown Austin, the facility is a national model for innovative approaches to solving environmental problems. Each year, thousands of tons of wastewater sludge is anaerobically digested and composted into an EPA-certified soil conditioner called "Dillo Dirt". Waste products (tree trimming and yard waste), which would ordinarily be disposed of in a landfill, are utilized as bulking agents, significantly reducing the cost of waste disposal for Austin residents. This popular product is distributed to various city departments for use in park facilities and to commercial vendors for sale.

Water separated from the sludge flows through a 250-acre facultative pond system. After polishing in a 4-acre greenhouse enclosed aquatic plant facility, the treated effluent is used to irrigate approximately 160 acres of a 220-acre on-site farm. Hay and other feed crops are harvested from this land by a contract farmer, and the city receives a portion of the profits. Some digested and dried sludge is also land applied to the on-site farm to improve soil conditions. Plans are underway for the program, regulated by the TCEQ, to be expanded to off-site agricultural locations.

Wastewater Management

Municipalities, industries, and agricultural operations can produce large volumes of wastewater. Unless proper disposal methods are used, wastewater can contaminate the state's surface and ground waters by contributing pathogens, organics, and metals to stormwater runoff.

Multiple segments around the state are not meeting water quality criteria and improperly treated on-site sewage (OSSF) effluent has been identified as a major nonpoint source contributor. Historically, individual OSSFs were found primarily in rural areas. However, rapidly increasing urban populations, combined with shifts in population from rural to urban areas, have led to pressure for widespread suburban development. One way to reduce the amount of NPS pollution resulting from on-site sewage effluent is to develop centralized wastewater collection and treatment facilities. These facilities are regulated in Texas by the TCEQ to ensure that the effluent they release into the waters of the state is treated to certain standards that minimize NPS pollution. This is an example of a point source solution to a nonpoint source problem.

Raw sewage and wastewater can increase levels of nutrients in water. Elevated nutrient concentrations encourage algal growth and decrease dissolved oxygen. Low dissolved oxygen endangers aquatic plants and animals. Following is a discussion of some of the programs in place to manage nonpoint source pollution from wastewater.

The On-Site Sewage Facility Program

About 50,000 on-site wastewater treatment systems are installed annually in Texas to treat wastewater from rural and suburban homes and small businesses. An on-site wastewater treatment system collects, treats and applies wastewater to soil. By definition, wastewater managed by an on-site system cannot leave the property where it is generated. Texas has approximately 4-5 million households relying upon on-site sewage facilities (OSSF) for wastewater disposal and the numbers are increasing each year.

The Texas legislature passed legislation to regulate on-site sewage facility systems statewide. The law established parameters for delegation of authority to regional and local governments-such as counties, cities, river authorities and special districts to implement and enforce on-site sewage regulations with approval and oversight by the TCEQ. The TCEQ sets minimum standards, local authorities can adopt more stringent rules if approved by the TCEQ.

The TCEQ provides technical assistance for designers and installers of OSSF systems by reviewing plans to ensure that new facilities are designed and constructed using best current technology. TCEQ staff conduct plan reviews, installation inspections, and follow up inspections to ensure that designated controls are used and compliance with regulations is achieved. These inspections also assist in pinpointing areas of concern. Existing, failing systems are generally identified by citizen complaints and required to be brought to current standards. TCEQ staff also provide oversight of delegated local authorities.

The TCEQ is also responsible for the certification of inspectors and installers of OSSFs. The responsibilities of a registered installer include the installation of treatment tanks and the installation or replacement of sewer lines or disposal components according to minimum state standards or the more stringent conditions in the authorized agent's order or ordinance. OSSFs must be constructed by licensed individuals who have been properly trained in appropriate installation procedures. Any individual who is compensated by another individual to construct, install, alter, or repair an on-site sewage facility must be licensed as an installer. Individuals who manage the on-site sewage program for an authorized agent must be licensed as a "designated representative." Designated representatives review planning materials, issue permits to construct, investigate and resolve complaints, initiate enforcement on violators, issue authorizations to operate, maintain records, and submit reports as required.

The Texas On-Site Wastewater Treatment Research Council

Meeting the research and technology transfer needs of individuals involved in wastewater treatment in Texas is the major goal of the Texas On-site Wastewater Treatment Research Council. The Council was established by the Legislature to fund research that demonstrates the feasibility of on-site treatment alternatives. The Council awards competitive grants to accredited colleges and universities in Texas, governmental entities, or other acceptable public or private entities. Research funded by the grant must be for improvement in the quality, and reduction in cost, of on-site wastewater treatment technologies provided to Texans. The Council also awards grants to enhance technology transfer regarding on-site wastewater treatment by using educational courses, seminars, symposia, publications, and other forms of information dissemination. To support the research program, a $10 fee is charged to all property owners in Texas who apply to construct OSSFs for treatment and disposal of wastewater.

The City of El Paso Reclaimed Water System

The City of El Paso Water Utilities (EPWU), one of the nation's most progressive water agencies, has been delivering reclaimed water since 1963. As a pioneer in water reclamation, EPWU has attained international recognition for its innovative and extensive use of recycled water. EPWU now operates the most extensive and advanced reclaimed water system in Texas for industrial use and landscape irrigation.

EPWU's philosophy is that water is too valuable to be used only once. Wastewater from within the EPWU collection area is collected and treated from one of four EPWU's Wastewater Reclamation Plants using advanced or tertiary treatment. The result is a high water quality that has earned the EPWU the reputation as operating the first wastewater treatment plant in the world to meet Drinking Water Standards for its reclaimed water. The other three plants meet the highest possible quality rating of Type I reclaimed water as described in state regulations monitored by the TCEQ. These facilities were constructed with funding from the U.S. Bureau of Reclamation grants, U.S. Economic Development Administration grants, Texas Water Development Board low interest loans, and City of El Paso Water and Sewer revenue bonds.

Reclaimed water use has been proven safe for the following types of applications throughout the U. S. and are approved for use by the TCEQ: city parks, school playgrounds and sports fields, landscape nurseries, sports complexes, golf courses, street median landscaping, construction projects, street sweeping, fire protection, residential and multi-family landscape, industrial cooling towers, and other industrial processes. The EPWU is also authorized to reinject wastewater treated to drinking water standards into the local aquifer.

The Brazos River Authority Technical Assistance Program

The Brazos River Authority (BRA) is committed to its mission of developing, managing, and protecting the water resources of the Brazos River Basin to meet the needs of Texas. The diversity that exists within the 42,000 square mile Brazos River Basin is extreme. Annual rainfall ranges from about 19 inches in West Texas to more that 56 inches along the gulf coast. Rapid and localized population growth, and ever changing land uses, presents the BRA with many challenges that must be planned for and addressed appropriately. To meet the needs of Texas, innovative measures are utilized to deal with issues such as moving water from areas with surplus water to areas with water deficits and removing constituents such as salt from both inland and gulf coast waters.

Beginning in the early 1970's, the BRA pioneered the development of regional wastewater treatment systems to reduce the amount of NPS pollution resulting from OSSFs. Today BRA operates 4 regional wastewater treatment plants, 8 municipal wastewater treatment plants, one regional composting operation, and 3 water treatment plants. Over the years, BRA has received numerous awards from the TCEQ and EPA, recognizing the excellence of their operations, maintenance, and design.

The BRA is a prominent and active partner in numerous water quality improvement projects and studies throughout the Brazos River Basin with a major emphasis on non-point source agricultural issues such as confined animal feeding operations (poultry and dairy) and crop production, and non-agricultural sources such as on-site sewage facilities. The BRA is committed to a positive and proactive approach to identify water quality problems and to follow through with appropriate restoration measures.

The BRA also offers programs such as the Technical Assistance Program to assist cities, water districts, and other entities with their particular water and wastewater treatment operations. These services include regulatory review, operations assistance, preventive maintenance, program preparation, laboratory testing, and industrial pretreatment. A key component of the industrial pretreatment program is to work with cooperating industries to reduce their pollutants before they enter the sewerage system, thereby reducing the potential to impact water quality.

Storm Water Management

Storm water pollution is a form of water pollution that originates from urban and rural landscapes. Everyday activities such as landscape maintenance, the operation of automobiles, and building construction can cause water pollution under certain circumstances. Pollution occurs when rainfall or infiltrating groundwater carry accumulated pollutants to receiving water bodies such as surface lakes, streams, and coastal waters or groundwater aquifers.

The fertilizers used to maintain urban landscapes can cause excessive growths of aquatic vegetation and can lead to unhealthy concentrations of nitrates in groundwater used as drinking water supply. Metals and organic compounds associated with the operation of automobiles can be toxic or carcinogenic to human health and wildlife. Air emissions that originate from a multitude of industrial, urban, and mobile sources are deposited onto the ground, with the potential to add pollutants to surface and ground water when rainfall runoff occurs. Sediments that erode from land areas disturbed by construction activities can impair aquatic wildlife habitats, shorten the design life of reservoirs, and act as a carrier for contaminants. In addition, increased impermeable surface due to urbanization can alter the quantity and quality of storm water runoff by facilitating the transportation of runoff and accumulated sediments from paved surfaces. The water-related impacts of construction and urbanization can include habitat alteration, higher peak flows and flooding, erosion, and increased pollutant loads such as sediment, metals, nutrients, and bacteria. The following is a discussion of some of the programs in place throughout the state to address NPS pollution resulting from storm water runoff.

State Storm Water Permitting Programs

The state of Texas assumed the authority to administer the National Pollutant Discharge Elimination System (NPDES) program in Texas on September 14, 1998. NPDES is a federal regulatory program to control discharges of pollutants to surface waters of the United States. The TCEQ's Texas Pollutant Discharge Elimination System (TPDES) program now has federal regulatory authority over discharges of pollutants to

Texas surface water, with the exception of discharges associated with oil, gas, and geothermal exploration and development activities, which are regulated by the Railroad Commission of Texas (RRC).

The urban storm water program administered through the TPDES program addresses small municipalities, growing urban fringe areas, and other urban development under the Phase II rules. If an urban area falls within the scope of the storm water program, a TPDES permit is required, a management plan for the reduction of the runoff impacts must be implemented locally, permit compliance must be evaluated, and maintenance of existing surface water quality must occur, consistent with the water quality standards. TPDES permits regulate storm water discharges from industrial activities, construction activities, and municipal separate storm sewer systems (MS4s) to Texas waters. The TCEQ issues and manages TPDES permits for storm water discharges from these activities and systems. Factors that EPA require states to consider in designating urban areas as so-called MS4s include discharges to sensitive waters, high growth areas or growth potential, contiguity to an existing urban area, significant contribution of pollutants to surface water, and ineffective protection of water quality by other state programs.

Texas Land Application Permits (referred to as no discharge permits) authorize individual facilities to manage storm water and/or wastewater through evaporation, subsurface disposal, or irrigation systems which prevent runoff and prevent accumulation of nutrients in the soil. The TCEQ has a general permit which provides authorization for qualifying manure composting facilities to dispose of storm water through irrigation and/or evaporation.

The RRC regulates discharges of waste from activities associated with the exploration, development, or production of oil, gas, or geothermal resources, including transportation of crude oil and natural gas by pipeline, and from solution brine mining activities (except solution mining activities conducted for the purpose of creating caverns in naturally-occurring salt formations for the storage of wastes regulated by the TCEQ). Discharges of waste regulated by the RRC into water in the state cannot cause a violation of the water quality standards. While water quality standards are established by the TCEQ, the RRC has the responsibility for enforcing any violations of such standards. In addition, the NPDES authority delegated to Texas by EPA does not include those discharges from activities under the RRC's jurisdiction; such a discharger must obtain authorization from both the RRC and the EPA.

Texas Department of Transportation Storm Water Management Guidelines

Involvement in construction and urbanization makes the Texas Department of Transportation (TxDOT) a key player in the control of storm water pollution. It is TxDOT's responsibility to be aware of the problem and to take measures to minimize and/or prevent storm water pollution. Therefore, it is the goal of TxDOT to prevent the degradation of receiving waters due to storm water runoff from highway operations. TxDOT is developing a comprehensive storm water management program aimed at achieving this goal.

TxDOT has published a document entitled, "Storm Water Management Guidelines for Construction Activities". Although other issues are mentioned such as project planning and maintenance, the focus of the document is to provide guidance on the use of storm water management measures during highway construction.

With this document, the user can develop a storm water management plan tailored to the needs of a particular project. In addition, the measures in this document will assist in meeting regulatory requirements where storm water is a concern. Although runoff control measures are required by law in some instances, these measures are applicable anywhere soil is disturbed and erosion and sedimentation are potential problems. The material in this manual is derived primarily from storm water guidance documents developed and adopted by the TCEQ.

The City of Dallas Trinity River Corridor Project

The Trinity River Corridor Project is made up of several distinct elements. The overall effort will include the building of levees, wetlands, a downtown lake, gateway parks, trails, equestrian centers, and an interpretive center. It will also involve the expansion and preservation of the Great Trinity Forest through the acquisition of 2,700 acres of land along the Trinity River.

One element of the Trinity River Corridor project is the construction of a flood control project along the Trinity River that will reduce the flooding risk for about 12,500 structures in Dallas. The Dallas Floodway Extension (DFE) will restore standard project flood (800-year) protection to the downtown Dallas vicinity and the densely populated areas along the southern Trinity River corridor.

A Chain of Wetlands will be constructed in conjunction with the DFE. The Chain of Wetlands extends about four miles in length and is comprised of seven wetland cells that produce 170 acres of water surface. About 100 acres of grasslands will fill in between and around the wetland cells. The wetlands will be fed by treated wastewater discharge. The Chain of Wetlands also offer a secondary route for flood waters of the Trinity River lowering the flood elevations and filtering flood waters of nutrients and sediments prior to discharge into the Trinity River. The design team for the Chain of Wetlands includes the Corps, EPA, U. S. Fish and Wildlife Service, City of Dallas staff, TPWD, and the Trinity River Corridor Citizens Committee.

The San Antonio River Tunnel

The San Antonio River Tunnel system was constructed to lower the risk of damage due to flooding and help reduce nonpoint source pollution in storm water runoff discharged into the San Antonio River. The system consists of 12 trash rakes cycled on a daily basis to prevent large bulky floatable debris from entering the tunnel system and eventually the San Antonio River. During a storm event, the trash rakes are run as needed to ensure operational efficiency of the system. Approximately 500 tons of floatable debris is removed annually, with three tons removed weekly and the remainder from storm events.

This facility also contains a re-circulation feature incorporating a Parkson screen that removes smaller debris prior to entering the San Antonio River. This re-circulation system helps maintain water quality in the famous downtown riverwalk during periods of low flow in the river. The tunnel is to remain full of water at all times allowing the re-circulation feature to ensure water quality is maintained in the tunnel itself so when initial flushing during a storm occurs, downstream water quality is not affected.

Integrated Storm Water Management Project

The North Central Texas Council of Governments (NCTCOG) organized the integrated Storm Water Management (ISWM) project in order to protect streams and rivers from nonpoint source pollution and heightened flooding risks due to urban development. The project will foster partnerships with state and federal agencies to meet regulatory requirements and provide guidelines for communities to establish a successful comprehensive storm water management program. The project provides an innovative site development approach for addressing both storm water quantity and quality. The ISWM project is intended to be an essential element for ongoing and future cooperative storm water initiatives in North Central Texas.

The NCTCOG is working with approximately 55 local governments in order to create sound storm water management guidance documents for the region through the ISWM project. The ISWM Design Manual for Development will outline the most current and applicable storm water management techniques and provide criteria and rationales for the selection of structural and nonstructural storm water quality and quantity BMPs.

The San Angelo Urban Nonpoint Source Abatement Program

The north fork of the Concho River winds through the City of San Angelo traversing residential, recreational, industrial, and commercial land use areas. This urban reach of the river has a long history of poor water quality and a record of frequent fish kills encompassing a period of at least thirty years. Several water quality studies conducted by private and public entities have confirmed that urban runoff and nonpoint source pollution have been the primary cause of poor water quality conditions.

Recognizing the desire of city residents and stakeholders to improve water quality in the North Concho, the Upper Colorado River Authority (UCRA) partnered with the City of San Angelo to appoint a Citizen's Advisory Group to develop a plan for eliminating the fish kills and addressing nonpoint source pollution impacting the river. The work of the committee culminated in a Master Plan for pollution abatement targeting seven urban subwatersheds. The worst watersheds for pollutant loadings were identified and a priority system established for construction of facilities that would lessen the load of organic material and nutrients entering the river.

The implementation plan includes construction of a gabion retention structure, stormwater control structures, and streambank stabilization. The plan is still in the process of being implemented. The best management practices that have been implemented have produced improvements in water quality expressed by the absence of fish kills following major storm events. The program also has involvement and support from local elected officials and the initiation of an extensive public outreach program, the Aquatic Experience, which is discussed in Chapter 7.

Pesticide Management

Texas Pesticide Laws define a pesticide as a substance or mixture of substances intended to prevent, destroy, repel, or mitigate any pest, or any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant. Pesticides enter water bodies through runoff from sites where there are applied such as farms, golf courses, parks, highway right-of-ways, and lawns and gardens; by leaching into groundwater; wastewater discharges; and atmospheric deposition. Pesticide contamination occurs as a result of improper or over use, spills, improper storage, and improper disposal. According to a USGS study of 48 drinking water reservoirs in Texas (September 2000), the pesticides most frequently detected in Texas drinking water reservoirs included atrazine, diazinon, metolachlor, and simazine. EPA has identified pesticide contamination as a nationwide problem in surface water and groundwater. In response, there has been a coordinated state effort to monitor pesticides and define roles and responsibilities in responding to the water quality effects of pesticide contamination.

In addressing pesticide contamination several major principles need to be taken into account. Agricultural pesticides are beneficial and important to the production of food and fiber, and are of significance to the state economy. However, the use of pesticides should not impair any use of waters of the state or cause a public health hazard. Drinking water supplies, both groundwater and surface water, should especially be protected. State and local government should be the first line of protection, their efforts being complemented by federal expertise and information. Efforts in Texas in addressing these issues include, for groundwater, the adoption of the *Groundwater Pesticide Management Plan* and, for surface water, the incorporation into this document, of a similar elaboration of management measures. These surface water pesticide management measures were primarily developed under the guidance of the Texas Watershed Protection Committee.

Groundwater Pesticide Management Plan

Considerable progress has been made in the prevention of groundwater contamination from pesticides by laying out specific management measures in *The State Management Plan for Prevention of Pesticide Contamination of Groundwater* – usually referred to as the *Groundwater Pesticide Management Plan* or *PMP*. This plan was published in January 2001 after several years of development under the guidance of the Texas Groundwater Protection Committee. A similar elaboration of management measures has been developed, by an interagency group, for the prevention of pesticide contamination of surface water. Many of the measures for preventing pesticide contamination of groundwater and surface water are the same, however, there are important differences.

Surface Water Pesticide Management

The goal of surface water pesticide management is to provide a mechanism for the protection of surface water from pesticide contamination similar to that provided to groundwater under the *PMP*. The goal of surface water pesticide management is to protect and maintain the existing quality of surface water and to prevent the degradation of state surface water resources. This goal subscribes to unimpaired use of surface water, allowing for the normal use of pesticides without impairing surface water quality or posing a public health hazard. All used and potentially usable surface waters are subject to the same protection afforded by the antidegradation policy goal. This level of surface water protection complements the protection of groundwater influenced or hydrologically connected to surface water.

Pesticide contamination of surface water is detected through the state's assessment process as described in Chapter 5. Public water supplies are regularly monitored by the Public Drinking Water Section of the TCEQ. NPS pollution resulting from pesticides is managed through prevention and response to contamination. The Texas Watershed Protection Committee (defined in Chapter 4) coordinates these activities.

Prevention and Mitigation

The Texas Watershed Protection Committee recommends and coordinates a five tiered approach for prevention of pesticide contamination.

- **General Education:** General information is shared statewide to raise awareness of the potential for pesticide contamination. Brochures, displays, and slide presentations are the tools used to raise awareness. These materials are created and distributed throughout the state by the cooperating agencies of the Texas Watershed Protection Committee (TWPC).

- **Education Focused on Affected Water Bodies:** Educational efforts will be expanded in areas where a surface drinking water source is identified as affected by specific pesticides. This effort will be applied even though monitoring has not shown contamination beyond the Maximum Contaminant Level (MCL). Dissemination of information will be through public presentations, articles in newsletters, and advertisement of available educational literature.

- **Education and Application of Best Management Practices (BMPs) in Areas with Lower Levels of Pesticides:** Where monitoring has revealed contamination of surface water used as a drinking water source, but at concentrations lower than the pesticide MCL or Health Advisory Level (HAL), a voluntary BMP program will be encouraged. Furthermore, cooperating agencies may take additional action through their standard education programs.

- **Education and Application of BMP's in Areas with Greater Levels of Pesticides:** In a surface water body used as a drinking water source, where monitoring has revealed a nonpoint source contamination by a pesticide at levels greater than the MCL or HAL, a voluntary education and BMP program will be initiated. If there is no evidence of sufficient improvement, use restrictions will be implemented.
- **Pesticide Use Restrictions:** If all previous levels of preventive measures fail, the final recourse will be use restriction of the pesticide in the water body which is contaminated. Such actions will be implemented by the TDA after consultation with the other involved agencies through the TWPC. Users will be notified of the restricted use status of the pesticide in their area.

Response to Contamination

The response to contamination of surface water by pesticides falls under the jurisdiction of a number of agencies. Pesticide runoff is typically treated as an agricultural nonpoint source pollution therefore, the

TSSWCB plays a key role in response. The TCEQ Source Water Assessment and Protection (SWAP) program provides response assistance when the water body is a drinking water supply. The Texas Department of Agriculture (TDA), the lead regulatory agency for agricultural pesticides, provides expertise on pesticide regulation and education. When pesticide contamination results in a surface water body not meeting standards the response is addressed through the TMDL process as described in Chapter 5. When the pesticide contamination does not result in a standards violation response occurs through the preventive actions described above and, if the local entity responsible for the affected water body chooses to participate, through the TCEQ's SWAP program described below. The TWPC coordinates all responses to pesticide contamination to ensure that the responsible agencies or programs are notified and take appropriate action.

Implementation Under Source Water Assessment Program

Under the Source Water Assessment Program (SWAP) all surface waters that contribute to public drinking water supplies are investigated for potential contamination. Investigations proceed in the following stages:

- Identification of areas that supply public drinking water
- Delineation of the boundaries of the assessment areas needed to protect the water supplies
- Inventorying of potential sources of contamination within the assessment areas
- Informing the public of the results
- Implementation of a source water protection program (see page 113)

Pesticide Review Program

The EPA reviews and registers pesticides to ensure they meet current scientific and regulatory standards. Through this process consideration is made for human health and ecological effects of pesticides. The EPA issues risk management decisions based on the reviews that may result in registration eligibility, risk reduction measures, or elimination of uses. Risk factors that are analyzed include risks to workers, risks associated with residential uses, and risks affecting drinking water. Measures used to address risks include requiring intensive monitoring programs, prohibition of use in specified geographic areas or watersheds, education programs to ensure proper use and mitigation requirements. The State of Texas has developed programs to enforce and ensure compliance with this EPA program at the state level.

Agricultural Pesticide Regulation

The Texas Department of Agriculture (TDA) is the State's lead regulatory agency 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. TDA is responsible for licensing all agricultural pesticide applicators and labeling, storage, sales, usage, and disposal of all pesticides. TDA also cooperates with other state agencies that have statutory pesticide responsibilities, such as the TCEQ, the Structural Pest Control Board, and the DSHS. 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 all pesticides are used safely and according to instructions. The Texas Pesticide Control Act requires that pesticides be stored 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 also directs that pesticide containers 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 is also responsible 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. The Texas Cooperative Extension is responsible for training in relation to the state pesticide applicator certification program.

The Structural Pest Control Board

The Structural Pest Control Board (SPCB) is authorized to promulgate rules and regulations governing the methods and practices pertaining to structural pest control to prevent adverse effects on human health and the environment. SPCB has established regulations which authorize it to enforce label instructions approved by EPA and TDA regarding application and disposal of pesticides in the urban environment. Many label instructions contain information relating to proper application and disposal of pesticides to prevent surface water contamination.

In addition, the SPCB licenses businesses, certified commercial applicators, certified noncommercial applicators, technicians, technician apprentices, non-commercial applicator apprentices, and management technicians in the structural pest control industry. The SPCB also has the authority to take action against any licensee for engaging in practices that could be detrimental to public health, safety, or the environment. The

SPCB also has the authority to perform inspections to monitor pesticide use and investigate complaints regarding label violations.

Agriculture Resource Protection Authority

The Agriculture Resource Protection Authority (ARPA) is the coordinating body for TDA, TSSWCB, TAES, DSHS, TCEQ, and SPCB with respect to their policies and programs for management, regulation, and control of pesticides. In addition, ARPA helps to avoid overlapping responsibilities of the state agencies, facilitates all the involved agencies participation in the regulation of pesticides, and helps demarcate the various areas of responsibility of the participating agencies.

ARPA may cooperate with and advise the member agencies or any other state agency that may be concerned with the regulation of pesticides and review any rule relating to pesticides that is proposed by any of its member agencies, except rules under Chapter 125 of the Texas Agriculture Code. ARPA can inform and advise the governor on matters involving pesticides, prepare and recommend to the governor and to the legislature any legislation that ARPA considers proper for the management and control of pesticides, and make annual reports to the governor and the appropriate legislative oversight committees.

The Agricultural Waste Pesticide Collection Program

The TCEQ, partners with Texas Cooperative Extension (TCE) and Texas Department of Agriculture (TDA), to organize regional waste pesticide collections held statewide. The free collections provide agricultural producers and other Texans with an opportunity to dispose of pesticides and other household hazardous wastes at no expense and with no questions asked. In addition, mercury fever thermometers are accepted and replaced at no charge with mercury-free thermometers. The program is strictly voluntary. Participants are asked to answer several survey questions. The survey responses are evaluated to determine program effectiveness.

Agricultural Management

Texas has the largest number of farms and the most land in agricultural production in the United States. According to the 1997 Ag Census, 77% of the land area of Texas was in agricultural production. Of this, there are 26,762,000 acres of cropland, 15,807,000 acres of pastureland, and 95,323,000 acres of rangeland. In addition, there are almost 400 cattle feedlots, over 1200 dairies, approximately 100 hog operations, and over 1300 poultry operations in Texas.

Agricultural activities are a potential source of nonpoint source pollution. Possible nonpoint source pollutants associated with agricultural activities include nutrients, pesticides, organic matter, sediment and bacteria. These pollutants may be transported to surface waters through runoff or eroded soil particles. Pesticides and nutrients may also leach into groundwater or be transported through avenues such as abandoned and improperly constructed wells or through naturally occurring hydrologic connections. Below is a discussion of some programs in place to address nonpoint source pollution resulting from agricultural activities.

Agricultural Waste Permitting

Animal feeding operations, such as feedlots, dairies, and poultry operations, can be a source of pollutant discharges following rainfall events. An animal feeding operation is required to apply for a wastewater permit if it exceeds a given number of animals. These concentrated animal feeding operations (CAFOs) are prohibited from directly discharging into surface waters except under catastrophic rainfall or a chronic rainfall event.

Animal Feeding Operations (AFOs), which have fewer animals than CAFOs, do not require written authorization. AFOs are under the purvue of the Texas State Soil and Water Conservation Board (TSSWCB) and must meet the same technical requirements as a CAFO. All poultry operations must obtain a TSSWCB-certified water quality management plan (WQMP). However, by April 13, 2006, dry litter poultry operations meeting certain size requirements must obtain written authorization. AFOs and CAFOs may receive technical assistance from the TSSWCB and the U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS).

The TCEQ Agriculture Permitting Program reviews technical designs of CAFOs for new facilities, facilities being modified or increased, and for facilities renewing their authorization. The designs are reviewed for selection, implementation, and use of environmentally sound BMPs to collect, store and utilize waste and wastewater and to control air emissions and odor in a manner to conform with good agricultural management practices. Waste and wastewater must be properly land-applied for beneficial use on agricultural land at agronomic rates.

A Pollution Prevention Plan (PPP) must be prepared for every CAFO facility in the State. The PPP must be prepared in accordance with good engineering practices and include measures necessary to limit the discharge of pollutants to waters in the state. The PPP must describe practices which are to be used to assure compliance with the CAFO rules. Specific components of a PPP include a site plan indicating all animal confinement areas, waste treatment/retention facilities, waste/wastewater application areas, management of waste/wastewater application areas at agronomic rates, as well as an identification of potential pollutant sources used, stored, or disposed of at the facility. Any recharge zone/features must be located, evaluated and protected. Procedures for monitoring discharges and sampling of land application areas are included in the PPP.

Also, descriptions of all other protective measures or BMPs used to control potential pollutant sources must be included in the PPP.

TSSWCB Water Quality Management Plan Program

Texas Agriculture Code, §201.026 makes the TSSWCB responsible for planning, implementing, and managing programs and practices for abating agricultural and silvicultural nonpoint source pollution. This is primarily accomplished through the TSSWCB Water Quality Management Plan Program, which was established in 1993 by the Texas Legislature when it passed Senate Bill 503. Senate Bill 503 authorized the TSSWCB to assist agricultural and silvicultural producers in meeting the state's water quality goals and standards through this voluntary, incentive-based program.

Through this program, agricultural and silvicultural producers develop and implement site specific water quality management plans (WQMPs) in cooperation with local Soil and Water Conservation Districts (SWCDs). The WQMPs include appropriate land treatment practices, production practices, management measures, technologies or combinations thereof, and an implementation schedule.

Local SWCDs provide technical assistance to develop the plan through agreements with United States Department of Agriculture Natural Resources Conservation Service (USDA-NRCS) or the TSSWCB. After being approved by the district, the developed plan requires TSSWCB certification. Certified water quality management plans ensure farming or ranching operations are carried out in a manner consistent with state water quality goals. The state legislature provides funding through the TSSWCB for the implementation of WQMPs.

The Dairy Outreach Program

Some areas of the state have been identified as having water quality problems and concerns resulting from point and NPS pollution as a result of animal feeding operations. These areas are involved in the TCEQ's Dairy Outreach Program and include Erath, Bosque, Hamilton, Comanche, Johnson, Hopkins, Wood, and Rains counties. The TCEQ, TCE, and TSSWCB conduct various NPS related activities in the Dairy Outreach Program Areas (DOPA):

- Presentations to producer groups on water quality protection and the NPS program
- Review of permit applications for dairies, feedlots, and poultry facilities
- Information on CAFOs rules
- Education and training to producers on NPS issues such as land application of manure

Owners/operators of CAFOs located in the Dairy Outreach Program Areas, and operating under the state's CAFO rules, must complete an initial eight-hour course and subsequent eight hours every two years of continuing education in animal waste management. Similarly, employees of any CAFO responsible for work activities relating to compliance must be regularly trained or informed of information pertinent to the proper operation and maintenance of the facility and waste disposal. Employees at all levels of responsibility shall be informed of the general components and goals of the PPP. Training topics include land application of waste, proper operation and maintenance, good housekeeping and material management practices, recordkeeping requirements, and spill response and cleanup.

The Texas Brush Control Program

The TSSWCB also achieves nonpoint source abatement through the implementation of the Texas Brush Control Program. The Texas Brush Control Program was created to enhance the State's water resources through selective control of brush species. This program is a voluntary program in which landowners may contract with the state for cost-share assistance. Local SWCDs assist landowners with development of resource management plans addressing brush control, soil erosion, water quality, wildlife habitat and other natural resource issues.

The Agricultural Loan Program

The Texas Water Development Board (TWDB) provides grants and loans for agricultural water conservation equipment and practices which promote, demonstrate, or evaluate more efficient use of irrigation in agriculture. Grants are available to political subdivisions and state agencies. Loans are also available to political subdivisions and individuals through political subdivisions or a linked deposit program. The use of more efficient practices can reduce agricultural NPS loadings in surface and groundwater.

The Private Lands Enhancement Program

Through the Private Lands Enhancement Program, the Texas Parks and Wildlife Department (TPWD) provides technical assistance to persons who desire to include wildlife management considerations in present or future land use practices. On request, a TPWD biologist will meet with the land manager and conduct an inspection of the property. The land manager will be asked to define the various needs and uses of the property and to establish an objective for wildlife considerations. The biologist will provide recommendations which may include a written management plan. Field biologists work with individual landowners on request to develop land management plans which use environmentally and economically sound land use practices. Implementation of the management plan is completely voluntary. Practices include grazing rotation and management for increased grass cover. Filter strips in riparian areas are established. Upland erosion controls and establishment of vegetative cover reduce runoff and allow filtration. Strip removal practices for cedar are used to decrease loss of subsurface water to cedar. These practices combined lead to improved infiltration, increased water retention, and in some instances the rejuvenation of natural springs.

The Environmental Quality Incentives Program

Resources available to address issues related to nonpoint sources from privately owned agricultural land were significantly enhanced by the passage and implementation of the 2002 Federal Farm Bill. The Environmental Quality Incentives Program (EQIP) in the Conservation Title of the 2002 Farm Bill is a voluntary conservation program that promotes agricultural production and environmental quality as compatible goals. Through EQIP, farmers and ranchers may receive financial and technical assistance to install or implement structural and management conservation practices on eligible agricultural land. EQIP is administered by the USDA-NRCS, but the priorities for allocation and distribution of funds are established with input from a State Technical Committee that is composed of representatives from federal and state resource agencies and organizations that are associated with agriculture. The TSSWCB and TCEQ are represented on this committee. In Texas, financial assistance funds will be used to address both the local high priority practices identified by the Local Work Groups that are chaired by soil and water conservation districts and the statewide resource concerns identified by the State Technical Committee. The State Technical Committee and Local Work Groups recommend the practices eligible for cost share and the cost share rates that will be paid. Eligible persons may select to apply in the county-based program recommended by the Local Work Group or in one of the Statewide Resource Concerns recommended by the State Technical Committee. Landowners and operators will choose the practices and evaluation systems that best fit their needs.

The availability of EQIP, active participation in the State Technical Committee, Local Work Groups, and accommodation of recommendations from the State Technical Committee by the State Conservationist have provided opportunities to focus resources on problem areas that were previously difficult or impossible to address. The voluntary nature of the program has enabled the state technical committee and the USDA-NRCS to establish state level resource concerns. By bringing this program down to the state level they are able to provide a portion of funds as incentive payments to producers that implement structural and management practices to address specific environmental problems. Before, EQIP funding assistance for individual land owners and agricultural producers was unavailable or very difficult to obtain. Through the State Technical Committee, the USDA-NRCS has actively pursued information on areas of the state where changes or adjustments in practices by individual land owners would be needed to contribute to the alleviation of identified environmental problems. This has enhanced the opportunities for regulatory agencies to use a combination of regulatory and voluntary practices to address specific problem areas impacted by nonpoint sources or a combination of point sources and nonpoint sources.

The Watershed Program

The purpose of the Watershed Program, administered by the USDA-NRCS, is to assist Federal, State, local agencies, local government sponsors, tribal governments, and program participants to protect and restore watersheds from damage caused by erosion, floodwater, and sediment; to conserve and develop water and land resources; and solve natural resource and related economic problems on a watershed basis. The program provides technical and financial assistance to local citizens or project sponsors, builds partnerships, and requires local and state funding contribution.

Resource concerns addressed by the program include watershed protection; flood prevention; erosion and sediment control; water supply; water quality; opportunities for water conservation; wetland and water storage capacity; agricultural drought problems; rural development; municipal and industrial water needs; upstream flood damages; water needs for fish, wildlife, and forest-based industries; fish and wildlife habitat enhancement; wetland creation and restoration; and public recreation in watersheds of 250,000 or fewer acres.

Plans or surveys including watershed plans, river basin surveys and studies, flood hazard analyses, and flood plain management assistance are developed to identify solutions that use conservation practice and nonstructural measures to solve resource problems. If approved, technical and financial assistance is provided for installation of improvement measures specified in the plans.

Conservation Technical Assistance Program

The Conservation Technical Assistance program, administered by the USDA-NRCS, provides voluntary conservation technical assistance to land-users, communities, units of state and local government, and other Federal agencies in planning and implementing conservation practices that address natural resource issues. The program encourages and assists citizens to voluntarily conserve, improve and sustain natural resources.

Conservation Reserve Program

The principal mission of the Farm Services Agency (FSA) is designed to stabilize farm income, assist farmers with conservation of land and water resources, provide credit to new or disadvantaged farmers and ranchers, and help farm operations recover from the effects of disaster. Many of the

FSA operated programs are funded through the Commodity Credit Corporation (CCC), a government owned and operated corporation established to stabilize, support, and protect farm income and prices. The Conservation Reserve Program is a voluntary program administered by the FSA that offers annual rental payments, incentive payments, annual maintenance payments for certain activities, and cost-share assistance to establish approved cover on eligible cropland. The program encourages farmers to plant long-term resource-conserving cover to improve soil, water, and wildlife resources. The CCC makes available cost-share assistance in an amount equal to not more than 50% of the participant's costs in establishing approved practices. Contract duration is between 10 and 15 years. The NRCS, Cooperative State Research and Education Extension Service, state forestry agencies, and local soil and water conservation districts provide technical support for this program.

USDA-Agricultural Research Service

The Agricultural Research Service (ARS) is the principal in-house research agency of the USDA. ARS conducts research to develop and transfer solutions to agricultural problems of high national priority. The mission of the ARS is to increase understanding and develop solutions to protect the Nations's soil and water resources. Two of the twenty-two ARS National Programs, Water Quality Management and Soil Resource Management, are strongly committed to applied nonpoint source pollution research. In Texas, ARS is conducting ongoing research on NPS related issues such as: land application of municipal and agricultural wastes; improved management of soil, water, nutrients, and chemicals in agricultural production systems; and enhanced simulation tools for water quality, hydrology, and crop growth. ARS research, conducted by laboratories throughout the state, is often carried out in cooperation with universities, state research and extension centers, and private organizations.

The Texas Institute for Applied Environmental Research

The Texas Institute for Applied Environmental Research (TIAER) was established as part of the Texas A&M System to conduct applied research on environmental issues that have public policy implications. TIAER is also responsible for providing national leadership on emerging environmental policy and to provide a setting for environmental studies on the interface between government and the private sector. Establishing interdisciplinary programs or partnerships to develop and implement new policies, technologies, strategies, and relationships is another responsibility of TIAER. Partnerships with other universities and state agencies build on the strengths of each entity to produce an effective, efficient program.

The TIAER goal is to impact state and national environmental policy. A fundamental principal to this goal is improvements in the environment are best accomplished by conducting scientific research and using research results to formulate policy recommendations that will actually be implemented by government and other institutions. TIAER seeks to use cutting-edge strategies and technologies to assist developers and implementers of environmental policy.

TIAER staff performs ambient monitoring and analyzes data to assess nonpoint source impacts to receiving waters and improvements to receiving water from best management practice implementation. TIAER also works to refine and apply computer models to simulate and evaluate nonpoint source management practices.

The Texas Water Resources Institute

The Texas Water Resources Institute is a unit of the Texas Agricultural Experiment Station and Texas Cooperative Extension. It is part of a national network of institutes created by the Water Resources Research Act of 1964. The Institute is funded by the United States Geological Survey and is affiliated with the National Institutes for Water Research.

The Texas Water Resources Institute serves as a focal point for water-related research at Texas universities, encouraging discussion of statewide issues through meetings and multi-university studies. The Institute links academic expertise with state and federal agencies, strengthening water research and education. Additionally, the Institute provides leadership for water resource programs through grant administration, pre-award services, project management, communication, and facilitation of interagency collaboration.

The Lower Colorado River Authority - Creekside Conservation Program

The Lower Colorado River Authority (LCRA) is dedicated to land stewardship through several innovative conservation programs. The LCRA has joined with numerous partners throughout the state to promote land conservation and preserve wildlife habitat in Central and South Texas.

As farmers and ranchers lose topsoil to erosion, land productivity decreases. Thousands of acres of valuable soil are washed into tributaries and lakes every year. This sediment can build up to create flood management problems, threaten aquatic habitats, and reduce groundwater recharge. Waterways also suffer from excessive sedimentation and nonpoint source pollution.

Since 1990, LCRA's Creekside Conservation Program has worked with landowners and state and federal agencies to reduce sedimentation and agricultural nonpoint source pollution on privately owned land in eleven counties. The LCRA strongly emphasizes brush management to improve vegetative cover that reduces erosion, increases land productivity, filters groundwater, and enhances wildlife habitat. In recent decades, the spread of invasive brush species, particularly cedar and mesquite, over Central Texas rangelands has choked out native grasses and plants that benefit water quality and quantity.

Local Soil and Water Conservation Districts (SWCDs) help landowners with project planning in the Colorado River basin. The local office of the USDA-NRCS selects potential sites and qualified landowners to participate in the Creekside Conservation Program. Local SWCDs approve the projects and submit them to LCRA for final approval. Upon completion of the project, the landowner is reimbursed for up to half of the cost of the conservation project. The NRCS and LCRA staff monitor success of each project on an annual basis.

Silvicultural Management

Texas has more than 23 million acres of forested land. Half of this area, roughly 11.8 million acres, is considered commercial timberland. Most streams that originate or flow through these timberlands are sources of water supply, prime recreation, and other high quality uses. Because of this, forest management programs have been developed to implement adequate measures to protect water quality. Below is a discussion of some of the programs in place to address the nonpoint source problems resulting from silvicultural activities.

The Texas Forest Service Resource Development Program

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

The Forest Stewardship Program

The Forest Stewardship Program (FSP), a USDA Forest Service program, provides technical assistance, through State forestry agency partners, to nonindustrial private forest (NIPF) owners. The program encourages and enables active long-term forest management. A primary focus of the program is the development of comprehensive, multi-resource management plans that provide landowners with the information they need to manage their forests.

The Forest Land Enhancement Program

The Forest Land Enhancement Program (FLEP), administered by the USDA Forest Service, is a voluntary program that provides technical, educational, and cost-share assistance to non-industrial private forest (NIPF) landowners. Eligible landowners must have an approved Forest Stewardship Plan.

Pollution Prevention

The key to controlling nonpoint source pollution is often prevention. Preventing contaminants from reaching water in the first place mitigates environmental risks from pollution and eliminates the need for expensive clean-up programs. Community, business, and citizen involvement are integral to successful pollution prevention. There are many simple day to day activities citizens can do to prevent pollution. Educating citizens about what those activities are and implementing prevention programs can be accomplished on a larger scale by federal, state, or local government programs. Following is a discussion of several programs that work with citizens, businesses, and industry to encourage voluntary implementation of pollution prevention activities.

The Site Visit Program

The TCEQ offers free, confidential on-site environmental compliance assessments (site visits) to local government facilities and independently owned and operated businesses with 100 or fewer total employees. After a site visit, the facility operator receives a report from the consultant outlining environmental compliance deficiencies and a copy of the consultant's compliance checklist. The consultant will provide specific recommendations on how the facility can achieve full compliance and possibly reduce regulatory burden.

The Small Towns Environment Program

The Texas Small Towns Environment Project (STEP) was designed to assist small towns, unincorporated communities, subdivisions, colonias, or clusters of homes with urgent drinking and wastewater problems. The TCEQ provides technical assistance and support to community leaders and residents who are willing to solve problems through self-help. Texas STEP agents work collaboratively with community residents to pull together local resources to initiate a drinking water and/or wastewater project. The Texas STEP is a partnership between the TCEQ, Texas Department of Housing and Community Affairs, the DSHS, TWDB, and GLO with support from the national Small Towns Environment Program of the Rensselaerville Institute.

The Texas Country Cleanup Program

The TCEQ, in cooperation with TCE and TDA, conducts free, one-day collections at 30-40 locations across the state annually for citizens in rural and agricultural communities to bring materials for recycling or disposal. Texas Country Cleanups offer residents recycling opportunities for materials specific to rural and agricultural materials. The materials accepted in these collections include triple-rinsed empty pesticide containers, used motor oil, used oil filters, and lead-acid batteries.

Supplemental Environmental Projects

Supplemental Environmental Projects (SEPs) prevent or reduce pollution, enhance the quality of the environment, and increase environmental public awareness. The SEP program, administered by the TCEQ, provides the opportunity for the respondent in an enforcement action to negotiate an agreement to perform an SEP in return for a reduction in administrative penalties. Potential SEPs include cleanup of abandoned illegal dump sites; community household hazardous waste collections; purchase of Water Wise kits for local schools; and on-site pollution prevention projects that exceed regulatory requirements.

The Clean Texas Program

The Clean Texas Program is a voluntary environmental leadership program to protect the state's air, water, and land. The program offers benefits and incentives to members who commit to improving the environment and sustaining a quality of life for future generations. The Clean Texas Program is open to industries, businesses, cities, counties, schools, universities, military bases, nonprofit groups, and other organizations. Clean Texas Program "partners" make commitments to measurable environmental improvement goals, internal environmental programs, and community environmental outreach programs or projects. Clean Texas Program "leaders" make these same commitments and in addition, pledge to implement a system to assure compliance and continuous improvement (environmental management system, strategic plan, business plan), a community communication program, and a system to review and measure the environmental impact of products, processes, and community services (product stewardship program).

Oil and Gas Waste Minimization Program

The Oil and Gas Waste Minimization Program, administered by the Railroad Commission of Texas (RRC), offers assistance to oil and gas operators interested in minimizing wastes through source reduction and recycling of oil and gas wastes. The RRC's program includes several products and services, including a manual, workshops, technology transfer, waste minimization planning software, a newsletter, and on-site assistance.

Texas Chemical Council

The Texas Chemical Council (TCC) is a statewide trade association of chemical manufacturing facilities in Texas. The TCC represents the Texas chemical industry in environmental protection, health and safety issues, tort reform, and energy policy. As a partner in the TCEQ Clean Texas program, the Texas Chemical Council (TCC) encourages all its member companies to participate as program members, committed to fulfilling the requirements of membership. The TCC and its member companies strive to conserve natural resources, cultivate environmentally responsible business activities, foster product stewardship, and handle waste responsibly. The TCC supports other environmental goals such as recycling and the protection of vital habitats, wetlands, and endangered species.

Protection for Drinking Water Sources

Many Texans get their drinking water from large scale municipal water systems that rely on surface water resources, such as rivers, lakes, and reservoirs. Others depend on private sources, such as wells and aquifers. Contamination can occur in surface or groundwater supplies from wastewater discharges, urban and agricultural runoff, leaking underground storage tanks, improperly maintained on-site sewage facilities, waste sites, abandoned wells, and deposition of airborne pollutants. The State of Texas pays special attention to protecting surface and ground water supplies that serve as a source of drinking water. Protecting drinking water at the source makes good public health, economic, and environmental sense. Below is a discussion of the state programs that focus on the protection of drinking water sources.

Underground Injection Control

Underground Injection Control (UIC) involves the protection of underground sources of drinking water (USDW) through the regulatory oversight of injection wells. Given the broadest interpretation for statutes covering Underground Injection Control (UIC), any water could be determined to be fresh water provided it has beneficial use. The UIC program interprets "fresh water" as water with 10,000 mg/l or less Total Dissolved Solids (TDS), with the understanding that the broader statutory definition may be strictly applied whenever necessary to protect water containing greater than 10,000 mg/l TDS (30 TAC §331.2).

The TCEQ's authorized UIC program has elected to not specifically designate or geographically delineate aquifers as underground sources of drinking water. Any aquifer or portion thereof that fits the definition is considered an underground source of drinking water (USDW), even if not affirmatively identified as such by the agency.

Injection wells are divided by class; specifically, Class I through Class V. In Texas, regulatory responsibility for the subsurface injection of fluids and waste lies with either the Railroad Commission of Texas (RRC) or the TCEQ, depending mainly on the class of injection well, the intended use of the well, or in the case of Class III wells, the mineral to be mined.

- Class I - hazardous wastes injected beneath the lowermost formation containing an USDW. All Class I wells are regulated by the TCEQ through injection well permits.
- Class II - "oil and gas waste", including salt water. All Class II wells are regulated by the RRC through injection well permits.
- Class III - extraction of minerals, exclusive of oil and natural gas (uranium, sodium sulfate (potash), brine and sulfur. Brine injection wells are regulated by the RRC through permits, all other Class III injection wells under TCEQ.
- Class IV -hazardous wastes into or above a formation which contains an USDW within one-quarter mile of the wellbore. Class IV injection wells are generally prohibited by the TCEQ rules (30 TAC §331.6).
- Class V - Miscellaneous injection wells that are not Class I, II, III, or IV wells, or single family residential cesspools or septic system disposal wells. Wells used for in-situ combustion of fossil fuels and geothermal wells are under the jurisdiction of the RRC. Aquifer storage and recovery wells, subsidence control wells, salt water intrusion barrier wells; air conditioning return flow wells; drainage wells; some septic system wells; cesspools; dry wells used to inject nonhazardous wastes other than domestic sewage into the unsaturated zone; and sand backfill wells used to reclaim some mines are under the jurisdiction of TCEQ.

For those facilities which handle hazardous waste, surface facilities are permitted separately by the TCEQ, under the authority of the Texas Solid Waste Disposal Act (Health and Safety Code, Chapter 361), and/or the federally delegated Resource Conservation and Recovery Act (RCRA) program. Strict application review procedures, and following monitoring and inspection programs by both the TCEQ and the Railroad Commission of Texas help prevent non-point source contamination of usable groundwater by salt water and non-hazardous wastes.

The Source Water Assessment and Protection Program

The TCEQ Source Water Assessment and Protection (SWAP) program was created in 1996 by the Safe Drinking Water Act. SWAP combines source water assessment (SWA) and source water protection (SWP).

Source Water Assessments

The Source Water Assessment (SWA) assesses a Public Water Supply system's susceptibility to 227 potential drinking water contaminants. Specific elements scrutinized include location, intrinsic characteristics, contaminant occurrence, point and nonpoint source pollution, and construction. These elements are compared with several hundred thousand database records to produce a technically defensible assessment product. The goal of the SWA component leads to local Source Water Protection (SWP) implementation.

A source water assessment report has been provided to each of 6,000 public water systems (PWS) and is intended to lead to the implementation of source water protection projects and BMP implementation. The source water assessments are used by the TCEQ SWAP program to drive the prioritization and implementation of Source Water Protection (SWP) activities, and the recommended best management practices (BMPs) aimed at minimizing or eliminating the affects of NPS contaminants.

Source Water Protection

Source Water Protection (SWP) is a voluntary, pollution prevention program implemented at the local level. All public water supply systems are eligible to participate in the program. The TCEQ provides technical assistance and guidance to local Public Water Supply systems that implement recommended BMPs. The TCEQ coordinates BMP recommendations or implementation with other agencies/organizations with expertise and/or jurisdiction. These BMPs include signs to increase public awareness, educational programs, site-specific protection plans, and local ordinances. The TCEQ recommends communities participating in the program voluntarily implement BMPs based on results of potential contaminant source inventories. Most SWP participants have implemented programs by working cooperatively with community members and through public education programs. Costs associated with implementing a SWP program are much lower than cleaning up a contaminated water source. Implementation costs are eligible for funding through the Texas Water Development Board’s Drinking Water State Revolving Fund loan program.

For over fifteen years, TCEQ has used funds from the NPS Program to fund source water protection activities. Additionally, information developed for the NPS Program serves as valuable information and data about land-based contamination sources which provide valuable input into the source water assessment process. An example of this coordination is the Regional Aquifer Protection Programs (i.e., Edwards Aquifer) which has provided a wealth of data for TCEQ’s assessment and protection activities.

The hallmark of Source Water Protection is to identify a PWS’s water source, sensitive contributing areas, possible sources of contamination

(PSOCs), and recommend BMPs to eliminate or minimize the threat of contamination. These recommendations often advocate the involvement of other agencies/organizations having relevant expertise and/or jurisdiction to provide increased public awareness, educational programs, site-specific protection plans (i.e. TMDL-IPs, WPPs), and local ordinances.

Most SWP participants have implemented their programs by working cooperatively with community members and providing public education. The costs for implementing a SWP program are minimal and dramatically less than remediating contaminated drinking water.

Aquifer Protection

In addition to programs already identified in this document, multiple agencies have responsibilities related to protecting the groundwater in the state from impacts from NPS pollution. Groundwater is water that occurs beneath the land surface in porous or fractured rock and sediments. Groundwater is a major source of the water used by Texans for domestic, municipal, industrial, and agricultural purposes.

Vulnerability of an aquifer to contamination has two components: the environmental pathway that a contaminant would take to reach the groundwater, and the source and type of contaminants that result from activities conducted above the aquifer. Aquifer vulnerability is related to the physical, hydrological and biological characteristics of the soil, the unsaturated (non-water producing) upper portion of the aquifer and the water-bearing portion. Characteristics such as permeability and processes such as natural attenuation affect the movement and alteration of contaminants. These characteristics vary greatly among aquifers in Texas, such that aquifers have different vulnerabilities to contamination. Different parts of the same aquifer may have different vulnerabilities. The potential for impact on an aquifer is dependent on what activities are occurring above an aquifer or in its recharge zone.

Groundwater contamination occurs principally in heavily populated areas of the state, such as Houston, Dallas, Fort Worth, San Antonio, and El Paso. Petroleum storage tank facilities are the largest category of contamination sources, but other regulated surface activities have resulted in contamination as well. The following is a discussion of some of the programs in place to protect the aquifers of the state.

The Texas Groundwater Protection Committee

The Texas Groundwater Protection Committee (TGPC) is an interagency committee that was created by the Texas Legislature in 1989 to bridge the gap between state groundwater programs and optimize groundwater quality protection by improving coordination among agencies involved in groundwater protection activities. The TCEQ is designated as the lead agency for the committee and provides administrative support for its activities.

The TCEQ partners with the Railroad Commission of Texas (RRC), Texas Department of State Health Services (DSHS), Texas Department of Agriculture (TDA), TSSWCB, Texas Alliance of Groundwater Districts (TAGD), Texas Agricultural Experiment Station (TAES), Bureau of Economic Geology (BEG), and the Texas Department of Licensing and Regulation (TDLR). The committee works to effectively manage and protect Texas groundwater. The TGPC works on special issues through subcommittees composed of committee members and the general public.

The Nonpoint Source Subcommittee is an important mechanism for the TGPC to implement and evaluate NPS activities. Recognizing the dangers to human health and groundwater quality that abandoned water wells pose, for example, the TGPC initiated efforts to develop educational materials to promote low-cost, landowner-initiated closure (capping or plugging) of abandoned water wells through the Abandoned Water Well Closure Task Force, a sub-group of the Non-Point Source Subcommittee.

The Agricultural Chemicals Subcommittee is another group within TGPC that is concerned with NPS impacts resulting from the legal use of chemicals to control insect and animal pests and unwanted vegetation. The Agchem Subcommittee has produced the Texas State Management Plan for Prevention of Pesticide Contamination of Groundwater, (TCEQ, 2001, SFR-070/01), which describes the general policies and regulatory approaches the State will use in order to protect groundwater resources from risk of contamination by pesticides. The document describes a generic coordinating mechanism among all responsible and participating agencies during the implementation of the plan, and provides for specific responses when they are deemed necessary.

Underground Storage Tank Installer Licensing Program

Any entity who engages in the business of underground storage tank installation, repair, or removal in Texas, must be registered with the TCEQ as an Underground Storage Tank (UST) contractor. Individuals who supervise the installation, repair, or removal of an underground storage tank must be licensed by the TCEQ as a Type "A" UST installer on-site supervisor, and any individual who supervises the permanent removal of a UST system must be licensed as a Type "B" UST remover on-site supervisor.

Texas Department of Licensing and Regulation

The Texas Department of Licensing and Regulation (TDLR) is charged to protect ground water quality through the licensing of well drillers and assuring well construction standards are enforced. A Water Well Driller is defined as any individual who drills, bores, cores, or constructs a water well. A driller may include an owner, operator, contractor, or drilling supervisor. The program has a mandatory apprenticeship which requires all applicants to have at least two years of drilling experience before taking the licensing exam. TDLR has the power to suspend or revoke licenses and set administrative penalties for incompetence or violations of any section of Texas Occupation Code Chapters 1901 and 1902 or any rule.

The Texas Legislature expanded the Water Well Driller functions to include pump installers that repair wells after they have been drilled. Pump Installers install and repair well pumps and equipment, locate and survey abandoned wells, and repair existing wells. Regulation of this function provides a mechanism to ensure that surface casing is completed on wells that were drilled before the rules on surface casing existed to prevent contamination of drinking water sources by improperly sealed wells.

Numerous state and local programs have identified abandoned water wells as having a significant, or potentially significant, negative impact on groundwater quality in the state. Abandoned water wells exist in every county and impact all of the state's aquifers. It is conservatively estimated that 150,000 of the wells drilled since 1965 are abandoned or deteriorated. Abandoned water wells not only serve as conduits or channels for contamination to reach groundwater, but large diameter wells can also be a hazard to human and animal life. In addition, uncapped, non-cemented, deteriorated or uncased wells completed in more than one water-bearing zone may allow poorer-quality water from one zone to co-mingle and impact the other(s). Abandoned municipal, industrial, irrigation wells and abandoned rig-supply, domestic or livestock wells, and unplugged test-holes also pose threats to groundwater quality.

State law requires landowners, who possess an abandoned or deteriorated well, to have the well plugged or capped under TDLR standards. The landowner is liable for any water contamination or injury due to such wells. The Abandoned Well Notification and Compliance Program, administered by the TDLR, compiles, identifies, and processes abandoned water well notification and enforcement cases. The TDLR can assess administrative and civil penalties against persons who do not comply with the provisions. Some groundwater conservation districts are implementing well-capping and plugging programs of their own.

Additionally, the Water Well Driller/Pump Installer Program provides advisories to water well drillers for areas with contaminant plumes or undesirable water quality. These advisories help water well drillers avoid impacting usable groundwater by unknowingly drilling through contaminated zones in the areas specified. Drillers are advised to case off and pressure grout those zones to prevent contaminant migration - another form of NPS pollution.

Edwards Aquifer Protection Program

The State of Texas contains only one designated sole-source aquifer, the Edwards Aquifer found in the central and south central portion of the state. The Edwards Aquifer is an arcuate band of limestone and associated formations that stretch from Bell County through Williamson, Travis, Hays, Comal, Bexar, Medina and Uvalde counties, finally terminating in Kinney County. All of these counties, except Bell, are subject to TCEQ rules promulgated to protect the quality of groundwater within the aquifer.

The rules are the basis of the Edwards Aquifer Protection Program, administered by TCEQ's Field Operations Division staff in the Austin and San Antonio Regional Offices. The program requires anyone who plans to build on the recharge, transition, or contributing zones of the Edwards Aquifer, to first have an application, including construction plans, approved by the TCEQ. Staff in the regional offices review these plans. After a plan is approved, the site is monitored for compliance.

The rules are intended to mitigate NPS and point source impacts from regulated development over the recharge zone, transition zone and contributing zone of the Edwards aquifer, and, depending on location and type of development, may require any or all of the following:

- A water pollution abatement plan (WPAP) for any regulated activity proposed on the Edwards Aquifer recharge zone. This includes any construction-related activity on the recharge zone, such as, but not limited to, the construction of buildings, utility stations, roads, highways, railroads; clearing, excavation, or any other activities that alter or disturb the topographic, geologic, or existing recharge characteristics of a site; or any other activities which may pose a potential for contaminating the Edwards Aquifer and hydrologically connected surface streams.
- An organized sewage collection system (SCS) plan for any public or private sewerage system for the collection and conveyance of sewage to a treatment and disposal system that is regulated pursuant to rules of the commission and provisions of Chapter 26 of the Texas Water Code. A system includes lift stations, force mains, gravity lines, and all appurtenances necessary for conveying wastewater from a generating facility to a treatment plant.
- An underground storage tank (UST) facility plan for the installation or replacement of underground storage tanks or piping on either the recharge or transition zones of the Edwards Aquifer. In particular, storage tank (aboveground or underground) facilities that will store 500 gallons or more of static hydrocarbons or hazardous substances are regulated.

- An aboveground storage tank (AST) facility plan for the installation of permanent aboveground storage tanks at a facility that will have a total capacity of 500 gallons or more on either the recharge or transition zones of the Edwards Aquifer. In particular, ASTs that will store static hydrocarbons or hazardous substances are regulated.

Environmental Permitting Programs

The TCEQ, RRC, DSHS, and other regulatory agencies are responsible for permitting various activities ranging from application of pesticides to wastewater discharge. All of these permitting programs contain some form of NPS pollution prevention requirements, whether in the form of BMPs or through monitoring.

TCEQ's Wastewater Permitting program, for example, routinely issues "no discharge" permits for facilities disposing of treated wastewater effluent via irrigation or evaporation. The effluent disposal sites must meet certain criteria to insure that groundwater and surface water are not impacted by percolation of contaminants or runoff from application areas. Permits require facilities to monitor groundwater quality, sample soils for nutrient and salt loading, and provide information on the uptake of contaminants by cover crops in order to prevent contamination. Similar requirements are made for sites handling or disposing of post-treatment wastewater sludge, wastes from permitted confined animal feeding operations and wastes from drinking water treatment facilities.

TCEQ permits for industrial and hazardous waste generators and management units, and municipal solid waste disposal facilities contain provisions designed to protect groundwater and surface water from the effects of small levels of contaminants that may escape from a facility. This provisions include pond linings, numerous monitoring points, filter strip areas, leak detection systems for production piping and other measures.

The RRC establishes oil and gas well construction and plugging standards, and requires a letter from TCEQ that establishes the location of the base of usable quality groundwater. Wells must be constructed and plugged in such a manner that the usable quality groundwater is protected from contaminants that may migrate during the life of the well. In addition, RRC authorizations by rule and permits for storage, management and disposal of oil and gas waste, include requirements for pit liners, sampling and monitoring, and runoff control.

Texas Department of State Health Services (DSHS), Bureau of Radiation Control (BRC) regulates radioactive materials, including uranium recovery and radioactive waste disposal. The BRC monitors groundwater for radionuclides on a routine basis at several facilities. Additionally, BRC regulates receipt, possession, storage, use and treatment of NORM (Naturally Occurring Radioactive Materials).

The Railroad Commission of Texas—Oil and Gas Well Plugging Program

The RRC has long been active in regulating the exploration, development and production of oil and gas in Texas, which includes protecting the environment and maintaining public safety. The RRC began regulating oil and gas exploration and production operations in 1919 and over time has adopted increasingly stringent plugging standards and procedures. Statutes to prevent pollution from unplugged wells have also been modified over the years to increase RRC authority in this area.

The RRC has utilized the Oil Field Clean Up (OFCU) Fund to plug over 15,000 wells, however, thousands of additional abandoned wells remain. To ensure effective and efficient use of the OFCU Fund, the RRC has implemented a well plugging priority system to plug the wells that pose the greatest risk to the environment. The OFCU Fund is supported entirely by fees, penalties, and other payments collected from the oil and gas industry. The RRC has also been working with the TCEQ to utilize Clean Water Act CWA§319(h) grant funding to reduce chloride and total dissolved solids levels in several watersheds.

Wetlands Protection

Wetlands are generally considered as a transition zone between land and water where the soil is occasionally or permanently saturated with water. Wetlands are populated with plants that are specially adapted to grow in standing water or saturated soils. There are many different types of wetlands, including marshes, bogs, swamps, mangroves, prairie playas, and bottomland hardwood forests. Wetlands may not always appear to be wet. Many wetlands dry out for extended periods of time. Other wetlands may appear dry on the surface but are saturated with water beneath the surface.

Saltwater wetlands fringe estuaries; freshwater wetlands border streams, rivers, and reservoirs or occur in isolation. Generally, wetlands improve water quality, provide critical habitat for a wide variety of fish and wildlife, provide storage for flood waters, and stabilize shorelines. Wetlands filter nutrient and sediment from water before it enters adjacent water bodies and underlying groundwater aquifers.

Wetlands can be physically destroyed by filling or dewatering. Wetlands can also be damaged by the same pollutants that degrade other water bodies, such as nutrients, toxic substances, and oxygen demanding wastes. Below is a discussion of some of the programs in place to protect this precious resource.

The Wetlands Reserve Program

The Natural Resource Conservation Service (NRCS) administers the Wetlands Reserve Program (WRP). The Wetlands Reserve Program is a voluntary program that provides technical and financial assistance to eligible landowners to address wetland, wildlife habitat, soil, water, and related natural resource concerns on private land in an environmentally beneficial and cost effective manner. The program provides an opportunity for landowners to receive financial incentives to enhance wetlands in exchange for retiring marginal land from agriculture.

The Texas Wetlands Conservation Plan

Ninety-seven percent of Texas' land is privately owned and managed. Management decisions on these lands are made by private landholders. Economics often dictate what these management strategies will be. The Texas Wetlands Conservation Plan focuses on providing private landowners with information to assist them in making informed, economically beneficial management decisions, which will protect wetland functions and maximize the benefits that wetlands provide. Development of the Wetlands Conservation Plan was coordinated by the Texas Parks and Wildlife Department (TPWD) and is intended as a guide for wetlands conservation efforts throughout the state.

The Texas Wetlands Conservation Plan, initiated in 1988 and last updated in 1997, focuses on non-regulatory, voluntary approaches to conserving Texas' wetlands. It has three major goals: to enhance the landowner's ability to use existing incentive programs and other land use options through outreach and technical assistance; to develop and encourage land management options that provide an economic incentive for conserving existing or restoring former wetlands; and to coordinate regional wetlands conservation efforts.

Wetland issues addressed in the Plan fall into five general categories: education; economic incentives; statewide and regional conservation; assessment and evaluation; and coordination and funding. The Plan, in addition to providing general information and goals, highlights many specific recommendations to enhance wetlands conservation in Texas. To date, a shortage of funding has slowed implementation of recommendations identified in the Plan.

Wetlands Planning Efforts in Texas

Wetlands planning in Texas has been influenced by opportunities and requirements initiated at the national, state, and local levels. Many public and private sector organizations and individuals in Texas are involved in wetlands conservation and regulation. Each organization has a unique focus, which may include regulation, technical assistance to landowners, funding or land restoration sites. Alone, individual entities are often ill-equipped to meet wetlands conservation opportunities and challenges. However, together they form a web of conservation opportunities. Several planning efforts are working at the state level to address different aspects of wetlands management and planning.

Seagrass Conservation Plan

The Seagrass Conservation Plan was developed to address seagrass problems in Texas over the next ten years. The TCEQ, GLO, and TPWD endorsed conservation goals for the Seagrass Plan, which include defining seagrass research needs, addressing management concerns, and expanding environmental awareness in citizens through education.

Conservation Plan for State-Owned Coastal Wetlands

The State Wetlands Conservation Plan for State-Owned Coastal Wetlands provides protection through specific actions for state-owned coastal wetlands. The TPWD and the GLO, with assistance from other agencies, are jointly developing this legislatively required plan. Eighteen specific items/actions must be included in the plan. Some of these actions include a goal of no overall net loss of state-owned wetlands, wetland mitigation policies, a requirement for freshwater inflows to estuaries, a navigational dredging and disposal plan, education and research regarding boating in wetlands, the reduction of nonpoint source pollution, improved coordination among federal and state agencies, and a plan to acquire coastal wetlands.

Local Government Wetlands Plan

The Local Government Wetlands Plan is a demonstration project that will incorporate the tools contained in Texas Coastal Wetlands: A Handbook for Local Governments. The GLO will form a partnership with a local government to develop a local wetlands plan.

Wetlands Assistance for Landowners

In 1995, a "Wetlands Assistance Guide for Landowners" was published which describes the programs, regulations and conservation options that affect landowners in Texas. The Landowner's Guide summarizes existing state, federal and private programs which provide financial and technical assistance for wetlands protection. Other topics discussed include an assessment of landowner options for wetlands protection, a summary of existing state and federal regulations affecting wetlands, a list of contacts, and a description of the roles of state and federal agencies which are involved in wetlands regulation and management.

Coastal Programs

High freshwater inflows tend to frequently flush the estuaries of the upper coast. Lower coast estuaries have low freshwater inflows and high residence times for natural and man-made pollutant inputs. Pollutants from both local and distant sources tend to accumulate in estuaries. Most pollutants that enter streams and rivers eventually migrate toward the coast. As rivers approach the coast, their mouths broaden and stream velocity decreases. The reduction in stream velocity and fluctuation of tides from the Gulf reduce flushing and entrap nutrients and pollutants at the head of estuarine waters. This natural trapping process establishes the basis for highly productive estuarine ecosystems, but also makes estuaries vulnerable to excessive pollutant loading. Thick clay soils, which persist throughout the coast except for areas directly adjacent to large rivers, prevent the exchange of surface and groundwater.

Rural and agricultural lands comprise almost half of the total land use/land cover within the coastal management area. 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.

> Estuaries are coastal waters where inflowing stream or river water mixes with, and measurably dilutes, sea water. In Texas, estuaries are the lower tidal portions of rivers and streams that directly enter the Gulf of Mexico or its bay systems. Estuaries serve as important nurseries for many commercial fish and shellfish populations, including shrimp, oysters, crabs, and scallops.

The Texas coast houses half the nation's petrochemical industry and more than a quarter of its refining capacity. 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.

The steady growth of industry, 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 coastal areas of Texas have to deal with the same nonpoint source pollution issues as the rest of the state, in addition to beach erosion, salinity, and protection of important coastal estuarine and wetland habitats. The following programs are specific to nonpoint source management along the Texas Coast.

The Texas Coastal Management Program/Coastal Coordination Council

The Texas Coastal Management Program (CMP) was created to coordinate state, local, and federal programs for the management of Texas coastal resources. The program brings in federal Coastal Zone Management Act (CZMA) funds to Texas state and local entities to implement projects and program activities for a wide variety of purposes. The Coastal Coordination Council (CCC) administers the CMP and is chaired by the Commissioner of the GLO. It is comprised of the chair or appointed representatives from the TPWD, the TCEQ, the TWDB, TxDOT, a member of the State Soil and Water Conservation Board, a member of the RRC, the director of the Texas A&M University Sea Grant Program and four gubernatorial appointees. These members are selected to provide fair representation for all aspects concerning coastal issues.

The Council is charged with adopting uniform goals and policies to guide decision-making by all entities regulating or managing natural resource use within the Texas coastal area. The Council reviews significant actions taken or authorized by state agencies and subdivisions that may adversely affect coastal natural resources to determine their consistency with the CMP goals and policies. In addition, the Council oversees the CMP Grants Program and the Small Business and Individual Permitting Assistance Program.

The Coastal Zone Act Reauthorization Amendments (CZARA), §6217, requires each state with an approved coastal zone management program to develop a federally approvable program to control coastal nonpoint source pollution. The Texas CCC appointed a Coastal Nonpoint Source Pollution Control Program workgroup to develop this document.

On April 7, 2003, the National Oceanic and Atmospheric Administration (NOAA) recommended conditional approval of the Texas Coastal Nonpoint Source Pollution Control Program. The document discusses 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 which address pollution sources and meet the federal requirements; information on additional management measures, technical assistance, and public participation; and program monitoring and evaluation.

Coastal Nonpoint Source Program

The Coastal NPS Program for Texas has been under development since 1997. To facilitate the development of the NPS Program, the Coastal Coordination Council established a subcommittee comprised of staff from the General Land Office, Texas Commission on Environmental Quality, Texas Railroad Commission, Texas Department of Transportation, Texas Parks and Wildlife Department, Texas State Soil and Water Conservation Board, and a public member from the Council. This subcommittee has addressed comments submitted by the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA) regarding Texas' Coastal NPS Program, reviewed and recommended proposed NPS pollution control projects, and researched possible options to enhance the program.

In December 1998, Texas submitted its Coastal NPS Program to NOAA and EPA. After two and a half years of discussion between Texas and the federal agencies, NOAA and EPA published in the Federal Register, in late September 2001, their intent to approve the Texas Coastal NPS Program with certain conditions. NOAA and EPA identified six areas that Texas must strengthen or correct prior to receiving full approval of the Coastal NPS Program. (Table 6.1)

The second notice to conditionally approve Texas' Coastal NPS Program was posted in the Federal Register on April 7, 2003. The Final Conditional Approval Letter was received on July 9, 2003. Texas was given five years to meet the remaining conditions.

Texas continues to seek full approval by addressing the remaining conditions in the Final Conditional Approval Letter. The Texas Coastal Coordinating Council is preparing responses to EPA and NOAA to address these conditions and will continue to negotiate with EPA and NOAA for full approval. Texas anticipates full approval of the Texas Coastal NPS Management Program by July 9, 2008, and full implementation of this program by July 9, 2018.

Table 6.1. Texas Coastal NPS Management Program. Remaining Conditions and Anticipated Year of Condition Resolution

EPA/NOAA Condition	Projected Approval Year			
	2005	2006	2007	2008
New Development and Existing Development		X		
Site Development		X		
Watershed Protection		X		
New and Operating Onsite Disposal Systems				X
Roads, Highways, and Bridges				X
Hydromodification		X		

The National Estuary Program

The National Estuary Program (NEP) was established under §320 of the Clean Water Act to "identify nationally significant estuaries which 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 developed a Comprehensive Conservation and Management Plan (CCMP) which recommends priority actions and implementation schedules to address impacts observed in the estuary. The CCMP development is a concensus-based process involving a partnership across federal, state, and local levels. With the completion of the CCMPs, each National Estuary Program 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; and 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. The GBEP partners 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 stormwater 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 to conduct voluntary inspections and provide information assistance to reduce bacterial pollution caused by malfunctioning septic systems.

Coastal Bend Bays & Estuaries Program

The TCEQ and EPA helped establish the Coastal Bend Bays & Estuaries Program (CBBEP) to develop and implement a plan to protect and restore the bays and estuaries of the Texas Coastal Bend. The CBBEP has developed a Comprehensive Conservation and Management Plan to deal with a wide array of problems ranging from public health and education, freshwater flow, and loss of natural habitats. The CBBEP has implemented the following actions to protect bays and estuaries from nonpoint source pollution:

- A regional handbook of urban nonpoint source pollution BMPs for voluntary use by local governments seeking to implement nonpoint source pollution programs.
- Compliance assistance to small business and industries in the region which are subject to NPDES permit program or have nonpoint source controls needs.
- Assistance to local governments to implement on-site sewage facility programs.
- Coordinate and implement agricultural water quality management programs necessary to meet water quality standards.

Coastal Habitat Restoration

Texas Parks and Wildlife Department has an active program to restore wetlands along the Texas Coast. These marsh creation projects establish intertidal marsh with emergent plants along bay shorelines that are suffering from severe erosion. These created marshes buffer shorelines from erosion and remove both sediments flowing into the bays and sediments that have been re-suspended by storms. These wetlands also help remove nutrients from stormwater runoff. These newly created and restored marshes provide habitat for a wide variety of ecologically and economically important marine life. Typically these restoration projects involve multiple local, state, and federal partners. Citizens also assist by replanting the marshes. Including citizens increases awareness of the value of these marshes.

The BEACH Act

In October 2000, the U.S. Congress passed the Beaches Environmental Assessment and Coastal Health Act of 2000 (BEACH Act) to protect the public health at our nation's beaches. The BEACH Act requires that states, in cooperation with the EPA, develop and implement a program to monitor coastal recreation waters adjacent to beaches that are used by the

public, and to notify the public if water quality standards for pathogens and pathogen indicators are exceeded.

The BEACH Act requires the state to identify all factors used to evaluate and rank beaches; identify coastal recreation waters in the state; identify bathing beaches adjacent to coastal recreational waters; develop a sampling, monitoring, and notification program; develop a method for issuing beach advisories and/or closings; and develop a method to notify the public. In July 2001, the Governor's office appointed the GLO as the lead state agency to implement the BEACH Act based upon the current Beach Watch Program.

The Texas Beach Watch Program gives Texans baseline data on the health of gulf waters, making sure that beaches are safe for swimmers, surfers, sailors and boaters. The Beach Watch Program involves county and city governments, universities, and organizations representing beach goers. Contractors test specified sites for Enterococcus bacteria and issue public advisories if water samples exceed the criteria recommended by the EPA.

The Gulf of Mexico Community-Based Restoration Program

The Gulf of Mexico Community-Based Restoration Program (GCRP) Partnership invites proposals for its citizen-driven habitat restoration projects. The partnership funds on-the-ground activities to restore marine, estuarine and riparian habitats. This grant program seeks to restore and protect the health and productivity of the Gulf of Mexico in ways consistent with the economic well being of the region. Projects must be within the designated priority area, the Lower Laguna Madre, Texas Coastal Bend and Bays, and Galveston Bay.

The GCRP is a multi-year, regional partnership between the Gulf Ecological Management Sites (GEMS) Program and the NOAA Community-Based Restoration Program. The purpose of this partnership was designed to strengthen the conservation efforts of the GEMS Program by supporting on-the-ground habitat restoration benefitting living marine resources and fostering local stewardship of ecologically significant areas across the Gulf of Mexico.

The Bilge Water Reclamation Program

The GLO initiated the Bilge Water Reclamation Program as an innovative response to the large number of spills from commercial and recreational vessels along the Texas coast. Facilities operating under the program collect and process bilge water that is often contaminated by petroleum hydrocarbons from local commercial fishing vessels. The facilities provide vessels with an environmentally responsible way to dispose of bilge water. There is no charge to use the facility, and the used oil collected is recycled by a local company. The cooperative development of the Bilge Water Reclamation Program, by the GLO and its partners, has proven to have a positive impact on water quality along the Texas coast.

Coastal Texas 2020

Coastal Texas 2020 is a long-term, statewide initiative to unite local, state, and federal efforts to promote the environmental and economic health of the Texas coast. One goal of Coastal Texas 2020 is to increase the state's share of federal funding to fight rapid coastal erosion. Coastal Texas 2020 is designed to implement the vision of a comprehensive approach to coastal issues that mixes local, state, and federal funds with money from the private sector, while combining regulatory changes with market-based solutions.

The Adopt-A-Beach Program

The Texas Adopt-A-Beach Program, sponsored by the GLO, is dedicated to preserving and protecting Texas beaches by raising public awareness; educating citizens about the source of debris; and generating public support for state, national, and international action to clean up coastal waters. Since the first Adopt-A-Beach Cleanup in 1986, more than 300,000 volunteers have come to the Texas coast to haul off tons of trash. At each cleanup site, volunteers record data about the trash to learn more about the cause of marine debris. This data has been instrumental in the passage of international treaties and laws aimed at reducing the amount of offshore dumping. The program's success is due to the generous efforts of dedicated volunteer county coordinators, coastal community leaders, sponsors, and citizens. Strong support from the private sector helps carry the anti-litter message to Texans all across the state.

Border Programs

Urban populations are growing rapidly in the border region, exceeding growth throughout the rest of the state and much of the nation. The McAllen-Edinburg-Mission area is the fourth-fastest growing metropolitan statistical area in the U.S. On the Mexican side of the border, population is rising even more quickly, expanding by almost 50 percent in the past ten years. With this boom has come both an increased demand for water supplies and a strain on communities' water, wastewater, and waste management infrastructure.

The region's economy depends on agriculture, ranching, oil and gas production, trade and commerce, industry, and tourism. Agriculture is particularly important in the Lower Rio Grande Valley, where the lack of an adequate supply of high quality water is threatening the livelihood of farmers. Per capita income is lower in the border region than other parts of Texas as a whole. Lower income results in fewer tax dollars for local governments to meet existing needs, to keep up with rapid growth, or to plan for the future. Communities are challenged to do more with less. One of the greatest threats to water quality is the lack of sufficient water and wastewater infrastructure to keep pace with border growth. A lack of adequate service increases the likelihood that raw sewage or poorly treated water can enter the river, elevating bacteria levels and the risk of contracting water-borne diseases like hepatitis A. Raw sewage, wastewater, and agricultural activity can also increase levels of nutrients in the river. Elevated nutrient concentrations encourage algal growth and decrease dissolved oxygen. Low dissolved oxygen endangers aquatic plants and animals.

In addition to the need for adequate infrastructure, water quantity problems also affect water quality in the Rio Grande. The less water available, the more concentrated pollutants can become in the river, and the less suitable the water becomes for municipal and agricultural use.

Groundwater throughout the border region is most threatened by increasingly high salt content. Overuse of a groundwater resource depletes water and increases movement of brackish water that requires more extensive treatment to meet drinking water standards. Other causes of high salinity include leaching of salts left in the soil by previous irrigation and seepage of oil-field brines into the ground. Pesticide residues can also travel into an aquifer with irrigation runoff or seepage into the soil.

Border growth also impedes communities' ability to manage the disposal of solid and hazardous wastes. Limited disposal options leads to an increase in illegal dumping. Improper disposal of used tires is a major concern in the region. Hazardous waste transportation is also a concern in border port-of entry cities , where chemical spills pose a potential threat to public health and water supplies. The following is a discussion of some of the programs in place to deal with the issue of water quality in the border region.

The TCEQ Border Pollution Prevention Initiative

The Mexican government's in-bound maquiladora ("maquila") or twin plant program allows foreign companies to establish manufacturing and production facilities in Mexico and ship raw materials and components to those facilities under no or low tariffs. The Maquilas have affected Texas' border environment in a number of ways. One of the most significant environmental impacts is the strain placed on the ability to manage additional wastewater, solid waste, and hazardous waste disposal needs. Since its inception in 1994, the TCEQ Border Pollution Prevention Initiative has worked with maquilas, local, state, and federal governments, and universities to reduce pollution along the border. The program has assisted Mexican federal and border-state governments, universities, and other institutions in developing pollution prevention and waste minimization capability. Pollution prevention capability has been furthered by facility site assistance visits, training events, partnerships with universities in Mexico, and border roundtables.

The Border Environment Infrastructure Fund

The North American Development Bank established the Border Environment Infrastructure Fund (BEIF) in an effort to make projects affordable, especially for the smallest and poorest communities. The purpose of the BEIF is to make environmental infrastructure projects affordable for communities throughout the U. S.-Mexico border region by combining grant funds with loans or guaranties for projects that would otherwise be financially unfeasible. A primary objective of the BEIF assists communities in transition from highly subsidized projects to self-sustaining projects supported locally by user fees and other revenue. As a result, to access BEIF funds, project sponsors must demonstrate local "buy in" with the commitment of current revenues, capital reserves, and/or debt at the municipal or utility level.

The International Boundary and Water Commission

The mission of the International Boundary and Water Commission (IBWC) is to apply the rights and obligations which the Governments of the United States and Mexico assume under the numerous boundary and water treaties and related agreements. The United States and Mexican sections of the IBWC, USIBWC and MxIBWC, have recently been taking a proactive approach in support of its obligations. For example, the USIBWC holds public meetings along the border to provide information to the local communities on issues such as water quality, ongoing projects, and illegal dumping, and solicits the input of the citizens in addressing these issues. Several of the main goals of the IBWC as they relate to nonpoint source pollution include finding solutions to border sanitation, and working to address other border water quality problems. In order to obtain these goals, the USIBWC has implemented the following objectives:

- promote successful resolution of a broad range of trans-boundary environmental issues
- investigate and report on the most feasible measures for solving border sanitation problems

- conduct various planning and environmental studies for groundwater and border sanitation (water quality) programs

One of the key projects for dealing with border sanitation is the construction of an international wastewater treatment plant in the City of Nuevo Laredo. The Nuevo Laredo International Wastewater Treatment Plant (NLIWTP) provides a high level of treatment for millions of gallons of sewage each day originating from the City of Nuevo Laredo. The NLIWTP directly impacts the water quality of the Rio Grande and reduces the health risk to residents on both sides of the river. As the project continues, the USIBWC is working with the MxIBWC and Nuevo Laredo's Comision Municipal de Agua Potable y Alcantarillado (COMAPA) on long-term planning for further improvements to the water and wastewater infrastructure in Nuevo Laredo with funds provided by the EPA.

The USIBWC also conducts water quality monitoring in support of its mission to address border sanitation problems along the border. USIBWC field offices located throughout the border provide local support for this mission. In 1998, because of the international nature of the Rio Grande, the State of Texas contracted with the USIBWC to implement the Clean Rivers Program (CRP) for the Rio Grande in its 1,254-mile international boundary section. This agreement has led to a more coordinated effort between federal, state, and local agencies in addressing the water quality of the Rio Grande.

The Economically Distressed Areas Program

The Economically Distressed Areas Program (EDAP), administered by the Texas Water Development Board, provides financial assistance in the form of a grant, a loan, or a combination grant/loan to bring water and wastewater services to economically distressed areas, where present water and wastewater facilities are inadequate to meet the needs of residents. To be eligible for the program, projects must be located in economically distressed areas within affected counties and/or be located next to an international border. The EDAP will fund construction, acquisition, or improvements to water supply and wastewater collection and treatment works, including all necessary engineering work. The program also includes measures to prevent future substandard development.

The Colonias Initiatives Program

The Colonias Initiatives Program is administered by the Texas Secretary of State's Office. One of the greatest concerns regarding the colonias is the lack of wastewater infrastructure, potable water, and the potentially serious consequences for public health and its effect on quality of life. The Colonia Incentives Program was initiated to advance efforts to get colonia residents' homes connected to water and wastewater services in a more expeditious manner.

Border Recycles Day

Border Recycles Day involves a variety of environmental events in communities and schools as part of the statewide Texas Recycles Day (and National America Recycles Day) on November 15th. The first Border Recycles Day was celebrated in November 1998. Events initially were staged in Texas border cities by the TCEQ, but local communities have since taken ownership and created their own initiatives. Now Border Recycles Day has been formally incorporated in the State-to-State Strategic Environmental Plans that the TCEQ has developed with counterpart agencies in the neighboring states of Chihuahua, New Mexico, Coahuila, Nuevo Leon, and Tamaulipas. As a result, some Texas border communities host sister-city events with their Mexican counterparts.

Friends of the Rio Grande

One of the goals of the USIBWC Clean Rivers Program (CRP) is to promote environmental awareness through public education and outreach. TCEQ and the USIBWC CRP have teamed together to form an initiative called Friends of the Rio Grande. The goals of this initiative are to increase public outreach programs throughout the border region, implement a volunteer monitoring program in cooperation with Texas Watch, promote environmental clean ups in the basin, and to provide recognition of outstanding efforts in environmental activities to encourage greater participation in environmental awareness.

CHAPTER 7 EDUCATIONAL PROGRAMS

The active participation and cooperation of all Texans is necessary to safeguard Texas' natural resources. Everyone who lives or works in a watershed can potentially contribute to nonpoint source problems. Public education and awareness is essential to involving citizens in learning about their environment and taking appropriate actions to prevent pollution. Implementation programs typically include an education component to enhance public understanding and encourage participation. In addition, a number of state, regional, and local agencies and organizations have developed stand alone programs to educate and inform the public on environmental issues which promote stewardship and protection of natural resources.

Education Through Assessment

One of the most effective ways citizens can learn about water quality and the problems associated with nonpoint source pollution is by conducting assessment activities. Learning about watersheds and how water quality is assessed leads to an understanding of city planning, waste treatment, land use and its effects on water quality, and environmental practices that lessen the impacts of urban growth, development, and agricultural practices on water quality. Volunteer monitoring and assessment programs that make data readily available and easy to understand gives citizens a sense of ownership and responsibility for their watersheds. Below is a discussion of some of the volunteer monitoring and assessment programs in place throughout the state that address nonpoint source pollution.

Texas Watch Volunteer Environmental Monitoring & Education Program

The Texas Watch Program serves as a valuable resource for educating the public about water quality issues and fostering citizen participation in monitoring and protecting water quality. The Texas Watch Program is administered through a cooperative partnership between Texas State University, the TCEQ, and the EPA. The Texas Watch Program supports NPS and other environmental education and volunteer monitoring activities throughout the state. Texas Watch provides assistance to participating partners by promoting and maintaining environmental education activities, such as:

- statewide/regional meetings and workshops
- a centralized volunteer water quality database
- a comprehensive Web site
- quarterly newsletters
- a toll free information line

- NPS and environmental education materials
- certified monitoring training protocols and materials

The Texas Watch Program, through its varied outreach activities, encourages individuals to adopt activities and behaviors which contribute to the improvement of water quality and prevention of NPS pollution. The Texas Watch Program trains and certifies students, volunteers, and other partners to collect quality assured data that can contribute to environmental decision making. Volunteers monitor a wide variety of habitats from rivers, creeks, ponds, and lakes to bays, bayous, and estuaries. In addition, Texas Watch forms watershed-based partnership networks to help citizens identify and address local water quality issues and concerns. The Texas Watch Partners Program solicits public and private entities to help train, equip, manage, and offer general support to the growing number of volunteer monitors across the state. This program is establishing strong ties between citizens, industries, river authorities, councils of governments, water districts, cities, local, state, and federal agencies, students at all grade levels, and private foundations.

The Lower Colorado River Authority— Colorado River Watch Program

The Lower Colorado River Authority (LCRA) is a participating Texas Watch partner. Protecting water quality in the lakes and rivers is a vital part of the LCRA's mission. In 1988, a handful of Austin citizens, teachers, and students began sampling water along a tributary of the Colorado River. Within two years, their program had expanded to about twenty sites along the Colorado. In 1992, the LCRA began to manage the Colorado River Watch Network program, and helped expand monitoring sites along the river from Brownwood to the Gulf of Mexico. The success of the program has earned grants from the National Science Foundation and the EPA. The Colorado River Watch Network has been honored by the EPA, the State of Texas, the City of Austin, and many other organizations.

LCRA ensures that Network monitors are well-trained. Certified monitors must complete a 10-hour training process provided by LCRA. Instructors show volunteers how to use the testing equipment and monitors their practice of new data collection skills in the river. Volunteers then visit their designated testing site along with the instructor to test for several water quality indicators.

Every year to coincide with Earth Day, the Colorado River Watch Network joins with other volunteer monitors to test rivers, creeks, and coastal waters along the Colorado River watershed. Hundreds of volunteers participate in 20 counties along the Upper and Lower Colorado River Basin. This one-day monitoring event provides LCRA with a snapshot of the water quality along the river. The Network continues to support environmental stewardship of dedicated teachers, students, and other citizens who perform volunteer monitoring throughout the river basin.

The Aquatic Experience

Public education and outreach has been an integral part of the Upper Colorado River Authority's (UCRA) efforts to educate the public about NPS and urban runoff abatement. The UCRA has developed an on-going program, "The Aquatic Experience" that offers assistance to area public schools by providing opportunities for teachers and students to be exposed to every aspect of the aquatic environment. All topics involve "hands on" activities to promote general water education and emphasize local water quality issues.

Curriculum and workshops have been developed focusing on volunteer water quality monitoring, water conservation, aquatic life, and brush control. Assistance is provided to individuals or groups of students wishing to plan and implement long range investigations, research, studies, or water pollution abatement projects. "Aquatic Experience" activities take place primarily at the UCRA offices and the adjacent North Concho River; alternative locations, such as classrooms, or school sponsored events are also utilized.

Future plans for the program include development of an on-site educational facility along the North Concho River for hands-on experiences that will allow for the collection and identification of aquatic organisms, identification of aquatic plants, and demonstration of an aquatic environment. The site will contain a native and invasive plant identification plot that will demonstrate both proper and improper conservation practices of area water resources. The site will also contain numerous BMPs located on existing stormwater outlets to the river.

The City of Denton Watershed Protection Program

The City of Denton Watershed Protection Program was initiated as part of a plan to reduce the overall pollutants within the surface waters of Denton and to ensure compliance with the National Pollution Discharge Elimination System Storm Water Phase II rule. The Watershed Protection Program monitors water quality around the city and the results are made available to the public. The City of Denton received initial funding from the EPA Environmental Monitoring for Public Access and Community Tracking (EMPACT) grant to get the program started. Through the grant, physical and chemical water quality data is measured and the results are telemetered to the University of North Texas for additional analysis. Information on water quality, including realtime water quality data, is compiled and displayed in an easily understood format and made available to the public via the internet. The Watershed Protection Program has used EMPACT data and additional watershed monitoring data to establish a preliminary baseline for the condition of the city's surface water resources. This preliminary baseline data will be used to evaluate future changes in water quality.

Education Through Implementation

Everyday activities that go on in a watershed have a direct impact on the quality of water in the watershed. By learning how everyday activities affect water quality, Texans can change habits to protect water resources. The voluntary and preventive efforts of citizens, businesses, service organizations, and other groups are an essential part of the effort to address NPS pollution. The key to successful NPS management is making citizens aware of the existing voluntary and preventive efforts available to the public. The following is a discussion of the education programs in place to make citizens aware of the activities and practices that contribute to NPS pollution and their role in NPS management.

Nonpoint Source Consumer Education

The TCEQ has developed a variety of educational outreach materials to increase general awareness of nonpoint source (NPS) water pollution and stimulate actions which can be undertaken by citizens to reduce NPS pollution. Outreach materials developed under this program target primarily urban nonpoint issues such as pet waste, yard care, household hazardous waste, and used motor oil. Campaign materials include radio and television public service announcements, pet waste posters, bilingual NPS bookmarks and door hangers, NPS fact sheets, and a Clean Water for Texas brochure. Many of the materials can be downloaded and adapted by organizations for local use.

Storm Drain Marking

Many Texas communities are working to reduce nonpoint source pollution by labeling storm drain inlets with messages warning citizens not to dump polluting materials. TCEQ has developed a how-to guide for communities interested in starting a storm drain marking program to reduce nonpoint source pollution. The manual covers a range of methods for labeling storm drain inlets and offers examples of programs operating in selected Texas cities. The purpose of the manual is to give cities and community groups the tools to launch a successful citizen-education effort to reduce dumping and protect local water supplies. To order this manual (GI-212), send your request to educate@tceq.state.tx.us or call 512/239-0028.

Back Yard Composting and Xeriscaping

Backyard mulching, composting, and xeriscaping not only reduce waste, but also benefit yards and the environment by producing healthier soil and reducing water and fertilizer demands. Other benefits include reduced erosion, run-off, and pollution. The TCEQ has developed a program to help citizens and communities (through a network of regional and local coordinators) teach their residents practical waste reduction and pollution prevention through environmentally responsible yard care practices, including grass-cycling, composting, xeriscaping, and integrated pest management. TCEQ staff provides training programs, technical assistance, literature, audiovisual resources, and networking opportunities that promote voluntary diversion of yard trimmings, food scraps, clean wood material, unrecyclable paper, and other easily composted materials from landfills.

Teaching Environmental Sciences

TCEQ's Teaching Environmental Sciences (TES) is a graduate credit course developed through local resources. Since 1994, TCEQ and its collaborators have presented classes at local colleges and universities throughout Texas. Each summer, the TCEQ sponsors this program for 200-400 teachers who will use information learned in the course to instruct K-12 students on the importance of air, water, and waste issues and their impact on communities. Each course is led by a professor of science or education and is tailored to the region in which it is offered. Typically, much of the forty hours of instruction is spent outside the classroom, as teachers take tours and perform field tasks, such as water sampling and analysis. Teachers visit local industries, environmentally sensitive sites, water and wastewater plants, air monitoring stations, landfills, and/or recycling centers. They also hear from representatives of regulatory agencies, businesses, and community organizations.

Several teacher workshops are held each summer for teachers interested in conservation and natural resource issues. The workshops are held in various parts of the state in cooperation with the TSSWCB. The Texas Environmental Education Advisory Committee of the Texas Education Agency approves the content of the TSSWCB sponsored workshops. As an approved Environmental Education Professional Development Provider, teachers are able to get credit hours toward their required continuing education units, while experiencing nature and the outdoors.

Environmental News You Can Use

The TCEQ offers subscribers a free service called Environmental News You Can Use. This monthly newsletter highlights information on a particular theme to be used to educate customers, suppliers, employees, or students about why and how they can improve the environment. To subscribe, send your name, mailing address, and e-mail address to educate@tceq.state.tx.us or call 512/239-3150.

Publications and Videos

The TCEQ has many publications available to provide assistance on everything from pollution prevention to regulatory guidance. Each year over 30,000 books, posters, and teacher guides are ordered for school classrooms. Among the items most in demand are posters and coloring books. In addition to publications, almost a dozen videos are available on school recycling, waste reduction and management, and pollution prevention. The agency's publications and videos have caught the attention of educators and environmental agencies outside of Texas.

The Association of Texas Soil and Water Conservation Districts has established and updates a conservation related video library that is maintained by the TSSWCB staff on their behalf for the benefit of local districts and educators. Currently, there are over 180 conservation-related videos in the library available to districts and teachers at no charge. Videos can be ordered through local soil and water conservation districts or the TSSWCB.

Environmental Information Line

The 1-800-CLEANUP information line is a partnership with the private sector, the EPA, and other states to provide citizens an environmental information system that can be customized for each community. The system provides a single source of community-specific environmental and recycling information. Texans can call the hotline or go to www.1800clenup.org and enter their five-digit ZIP code to find information on local recycling, household hazardous waste collections, and environmental events.

Small Spill Prevention Program

The GLO's small spill prevention program works with marinas and other interested parties to educate the public on ways to properly dispose of oil and reduce small spills. Small amounts of petroleum products may not kill fish and other marine organisms, but they can affect the vision, sense of smell, growth, and reproductive ability of marine wildlife. While small petroleum spills may impact marine wildlife, multiple small spills have the potential to impact entire water bodies. The Small Spill Prevention Program is an effective way to educate the public about ways to reduce spills and protect our marine resources.

The Texas Cooperative Extension Agricultural Outreach Program

The Texas Cooperative Extension (TCE) is a partnership between the USDA, Texas A&M University, and County Commissioners Courts. The basic mission of the TCE is education and dissemination of information relating to agriculture, home economics/consumer sciences, community development, and 4-H/youth. County Extension Agents deliver most of the educational programs of the TCE. These county agents, supported by specialists based at Texas A&M University in College Station and 12 regional centers throughout Texas, provide technical information, 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.

The TCE has the organizational framework and outreach capabilities to help implement the informational and educational programs essential to any voluntary pollution abatement effort. The TSSWCB works with the TCE to develop educational programs concerning agricultural nonpoint source pollution.

The Texas A & M University On-Site Wastewater Treatment Training Center

The On-Site Wastewater Treatment Training Center was established in 1997 to provide an educational mechanism for training inspectors, installers, site evaluators, home owners, elected officials, and others involved in the on-site wastewater treatment industry. The Texas Agricultural Extension Service, Texas On-Site Wastewater Association, Texas Engineering Extension Service, Texas Agricultural Experiment Station, Texas Commission on Environmental Quality, local installers and businesses, Texas On-Site Wastewater Treatment Research Council, and Hidalgo County Health Department played vital roles in the planning and construction of the South Texas International On-Site Wastewater Treatment Training Center. Texas currently has three training centers. The Training Centers demonstrate treatment units and land application systems for management of wastewater. The Cooperators believe that training centers meet the need for hands-on training concerning on-site wastewater treatment systems.

There are five types of wastewater processing techniques taught and demonstrated at the Training Center. These concepts include septic tanks, anaerobic treatment, sand filters, trickling filters and constructed wetlands. These techniques are described later in this document as examples of best management practices.

Don't Mess With Texas

The Texas Department of Transportation (TxDOT) maintains more acres of right-of-way than any other state department of transportation in the U.S. After years of collecting an increasing amount of trash from state highways, the agency realized that a public service campaign was needed to educate Texans about litter prevention. Two of the main components in the campaign include the Adopt-a-Highway (AAH) program and the Don't Mess with Texas (DMWT) program.

The AAH program is implemented statewide to teach Texans about litter prevention by allowing citizens to pick up litter along Texas highways. The program encourages litter pick-up by establishing sections of the highway to be adopted by individuals or groups for clean-up. Upon adopting a section of the highway, a sign will be posted along the highway naming the individual or group who has adopted the section of the highway. The program concept has been adopted by 47 other states and several foreign countries.

In 1986, TxDOT secured a local, award-winning, advertising agency to develop a litter prevention campaign to encourage motorists to stop littering. Better known as "Don't Mess with Texas" (DMWT), this program was the first of its kind in the world. Research was completed to determine what groups were contributing the most litter. This group became the target of the litter prevention campaign. The target audience was men under the age of 35 who predominantly drove pickup trucks. Television and radio public service announcements featuring these targeted Texans were created. Research allows the program to reinvent itself periodically based upon changes in the target audience. The DMWT Partners program was established to allow entities to donate in-kind goods and services to the campaign.

Keep Texas Beautiful

The vision of the Keep Texas Beautiful (KTB) organization was designed to make Texas the most beautiful state in the nation. KTB seeks to achieve this goal through partnerships involving government, business, civic groups and volunteers to address litter prevention, solid waste management, recycling, composting, beautification, and general community improvement. KTB programs empower Texans through education to take responsibility for enhancing their community's environment.

Any Texas community can become a Keep Texas Beautiful Affiliate. Affiliates receive a variety of services to improve their effectiveness in mobilizing grassroots volunteers to beautify their communities. KTB has established an annual certification and recognition program for communities with ongoing programs for litter prevention, beautification, community improvement, and the minimization of solid waste.

Keep Texas Beautiful sponsors and coordinates many of its education and cleanup programs in cooperation with state agencies including the TxDOT and the TCEQ. Keep Texas Beautiful (KTB) is currently under contract with the TCEQ to operate the River and Lakes Cleanup Program. Each year, KTB helps sponsor dozens of cleanups across the state in partnership with local governments, concerned citizens, community and nonprofit groups, schools, scout troops, businesses and companies. Volunteers pick up litter and debris along the shores and banks of Texas lakes and rivers.

In return, participants receive, free of charge: trash bags, posters, T-shirts, press releases, and volunteer incentives.

KTB has also taken a leadership role on the issue of illegal dumping and litter law reinforcement by offering seminars and conferences, and forming a statewide task force to share information, discuss the issue, and develop solutions.

The Texas Wildscapes Program

The Texas Wildscapes Program emphasizes providing the basics for good habitat: food, water, and cover. With approximately 95% of Texas land use practices in the hands of private landowners, the importance of education toward a common bond is evident. The Wildscapes Program provides educational materials for the Texas urban residential landowner to promote a better-educated population which is more supportive of wildlife and conservation issues. The Texas Wildscapes Program can also be applied to community, rural, and corporate properties. The program introduces the concept of habitat, and provides information to the public regarding wildlife needs and the importance of landscaping with native plants. The program also promotes minimizing the use of pesticides and fertilizers, xeriscaping, mulching, composting, and watering practices to conserve water.

The Edwards Aquifer Authority

The Edwards Aquifer Authority, a member of the Texas Alliance of Groundwater Districts, is a regulatory agency charged with preserving and protecting the Edwards Aquifer in an eight-county region including all of Uvalde, Medina and Bexar counties, plus portions of Atascosa, Caldwell, Guadalupe, Comal and Hays counties. The Authority was created by the Texas Legislature in 1993 with the passage of the Edwards Aquifer Authority Act to preserve and protect this unique groundwater resource. The Act created a 17-member board of directors which sets policy to manage, conserve, preserve, and protect the aquifer; works to increase the recharge; and prevent waste or pollution of the aquifer. The Act also established the South Central Texas Water Advisory Committee made up of representatives from downstream counties to interact with the Authority when issues related to downstream water rights are discussed.

The goals of the Edwards Aquifer Authority are designed to fully implement the requirements of the Edwards Aquifer Authority Act; develop an effective, comprehensive management plan based on sound, consensus-based scientific research and technical data; maintain continuous spring flow; protect and ensure the quality of ground to surface water in the Authority's jurisdiction; forge solutions that ensure public trust; promote healthy economies in all parts of the region; research and develop additional sources of water; and provide strong, professional management for the Authority.

The Barton Springs/Edwards Aquifer Conservation District

The Barton Springs/Edwards Aquifer Conservation District (BSEACD) is an underground water conservation district created for the purpose of conserving, protecting and recharging the underground water bearing formations within the District, and for the prevention of waste and pollution of such underground water, particularly the waters in the formations known as the Edwards Limestone and Associated Formations in Northern Hays and Southern Travis Counties. The BSEACD, a member of the Texas Alliance of Groundwater Districts, initiates and administers clean up events within its district.

The BSEACD Staff contact local schools, scouting troops, neighborhood groups, and place ads in local papers to request volunteers for the event. Creek clean ups are typically held on a Saturday morning in the fall or spring when temperatures are comfortable. Volunteers meet to share safety information, distribute bags and gloves, and pair off in groups of two or three people to pick-up trash. Large items such as old tires, lumber, metal signs, fencing, and appliances are collected by adult volunteers and BSEACD staff for special pick-up and disposal.

Since many caves and sinkholes are located in rural areas which do not have trash collection, they become the target of illegal dumping. Cave cleanups are less frequent and require a special team of volunteers depending on the type of cave. Removal of debris from caves is labor and time intensive. Hoisting systems are used to remove debris from the cave. Final phases of cave cleanup include removal of sediment laden with broken glass and leached chemicals from debris.

In addition to cleanup events, the BSEACD administers the Aquifer Watch Program. The Aquifer Watch Program links junior high/middle school students with a well near their school which is appropriate for water quality sampling. Students visit their "adopted well" four times during the school year. Prior to the well visit, a staff member visits the class to provide hands-on demonstrations and training the various pieces of equipment. During the well visit, District staff accompanies the group and assists with measurements of the aquifer level, water sampling, and on-site chemical analysis using titrators and spectrophotometers. Students test their groundwater samples for temperature, pH, conductivity, alkalinity, chlorides and nitrates. In addition to time spent in the field collecting water samples and measuring water levels, District staff works with the teachers and students to help them learn more about their "adopted" well.

The City of Austin's "Grow Green" and "Earth Camp"

Recognizing that one of the most effective ways to protect water quality is through pollution prevention, the City of Austin sponsors a variety of educational programs designed to encourage environmentally responsible behavior. One of the most comprehensive programs is "Grow Green" which is a partnership between the City of Austin, the Texas Cooperative Extension (TCE), and local nurseries. This program is a model for how local government can work with the horticulture industry to protect water quality.

The concepts developed under this program are a result of sound science and research. The program stresses planting native and adapted plants which require little water and few pesticides to survive in Texas. One strategy, stressed by the City of Austin, includes reducing the use of turf grass. Turf grass can be a high maintenance yard material, often requiring fertilizing, disease control, and supplemental watering. Consideration of options such as increased native and adapted plant beds or mulched or native areas to reduce the need for additional chemicals, watering, and mowing is emphasized.

The program recommends such practices as having soil tested to ensure that only nutrients missing are added, leaving grass clippings on the lawn instead of bagging them to reduce the need for fertilizer, using organic fertilizers, and minimizing the use of pesticides and other chemical treatments. The "Grow Green Plant Guide" was created to help residents select beautiful native plants which are drought tolerant and resistant to pests and diseases. In doing so, it is easier to adhere to the principles outlined in the Grow Green Program.

Now in its ninth year, Earth Camp is the City of Austin's four-day, outdoor, watershed education program for fifth-grade elementary school students. The primary focus for Earth Camp Austin is educating students about the many things necessary to the preservation of water quality in Austin watersheds. The lessons entail study of the geography and natural history of Austin's watersheds, water quality, wildlife in our watersheds, hydrology and geology of the Barton Springs/Edwards Aquifer, green gardening, and other related topics. The approach is based on field trips with hands-on scientific investigations. Participating students are expected to do some homework that includes family involvement and group work.

The camp runs during the school year, from September through June. Participating teachers attend training, teach the Earth Camp curriculum before the students attend camp, and manage and assist the students during camp. The City of Austin provides the environmental expertise, teacher training, field trips, tours, lessons, and equipment.

The City of Houston's WET in the City Program

Water Education for Teachers (WET), is a nationally recognized training for urban educators that includes an interdisciplinary activity and curriculum guide for kindergarten through 12th grades. The program helps students learn about their local environment and how to conserve precious natural resources.

Students, educators, and administrators in Team WET Schools make a commitment to increase environmental education and stewardship in their community. Each school's Team WET Coordinator receives technical assistance from the City of Houston Water Conservation staff and a Team WET Kit that includes a water test kit, guides for planning water festivals, instructions for conducting water quality audits, and other materials for successful student and community projects. First through 8th grade students create their own water conservation messages to help educate their peers and increase public awareness of conservation issues with the "Design-a-T-Shirt Contest".

Every year, the Mayor of Houston declares the month of May "Water Conservation Awareness Month". The two-day event features conservation skits, a conservation scavenger hunt, and booths sponsored by environmental organizations, city, and county departments. Public Works Engineering also conducts an annual program called "Water Wise and Energy Efficient." This two-week education/retrofit program focuses on water and energy conservation.

In addition to the education and outreach activities, Public Works Engineering also targets water use customers by distributing more than 20,000 "water saver" kits to citizens to help them reduce their water consumption and water bills. The kits contain a displacement bag (½ gallon) for the toilet tank, dye tablets to test for leaks, a "tankee clipper", a flow restrictor, and an instruction sheet.

The City of Houston actively participates in other special events such as National Drinking Water Week, Earth Day events, Bay Day, Home & Garden Shows, school health fairs, and other environmentally focused festivals and community events in order to implement a comprehensive water conservation program for residents of all ages.

The City of Fort Worth Environmental Education Programs

The City of Fort Worth's Environmental Management Department has established a Public Education division that offers adult information presentations, student programs, publications, and special events about environmental concerns in Fort Worth. Program components include composting, environmentally friendly lawn care practices, storm water and wastewater instruction curriculum, and waste reduction through recycling demonstrations.

The Department of Environmental Management has also launched a pilot Environmental Mapping Education web site for the Fort Worth ISD. The web site incorporates environmental science with the digital mapping of Geographic Information Systems. Students can log onto the site and work through online mapping, water quality, air quality, and spill response lessons. Students interactively map local area rivers, streets, parks, and watersheds. Each lesson poses a problem, and explains a step-by-step mapping process to find a solution.

The City of San Antonio's Curbside Recycling Program

The City of San Antonio's recycling program is the largest curbside recycling program in the State of Texas. In 1995, the program was initiated in a quadrant of the city and full implementation citywide was completed in three years. The program created "Binny" the Recycling Bin as their mascot and an advertising mechanism for the public. The program's ultimate success is a result of public and private cooperation.

The program provides service once a week, and recyclables are collected using an 18-gallon green recycling bin which the City has distributed to all residents at no cost. The recyclables are collected curbside for ease of collection. The City accepts newspaper, glass jars and bottles, aluminum cans, plastic household jars and bottles, aerosol cans, and steel and tin household containers.

CHAPTER 8 BEST MANAGEMENT PRACTICES

Nonpoint source management programs in Texas make use of a wide variety of Best Management Practices (BMPs). This section provides an overview of the primary BMPs in use or identified for use in Texas. This is not a complete listing of all acceptable BMPs for nonpoint source pollution control programs and projects in Texas. Whether or not projects receive funding under CWA §319(h), the use and demonstration of innovative practices not listed here are acceptable and valuable, particularly where their effectiveness can be evaluated and monitored.

Definition of Best Management Practices

Best Management Practices (BMPs) are those practices determined to be the most efficient, practical, and cost-effective measures identified to guide a particular activity or to address a particular problem. Nonpoint Source BMPs are specific practices or activities used to reduce or control impacts to water bodies from nonpoint sources, most commonly by reducing the loading of pollutants from such sources into storm water and waterways. Programs that implement these BMPs are addressed in Chapter 5.

There are many NPS BMPs in use in Texas. "Best" is relative to the particular needs or purposes and the specific site characteristics to be addressed.

Since most BMPs address specific management needs and site characteristics, it is helpful to identify and classify BMPs according to where they are most effective. The next section categorizes BMPs according to their use in managing the various parts of the NPS pollution pathway. The final section addresses which BMPs best address different activities and disturbances which are sources of NPS pollution.

A separate document, the BMP Finder (www.tceq.state.tx.us/compliance/monitoring/stakeholders/nps-stakeholders.html) provides a more comprehensive description and discussion of important Texas NPS BMPs and guidance on their use. The BMP Finder is extensively cross-referenced to help in identifying and comparing BMPs which are closely related and to sort out the many different names and variations in BMPs which are currently in use.

Categories of Nonpoint Source Pollution Management

The management of nonpoint source pollution involves a strategic combination of practices designed to prevent and intercept the entry of nonpoint source pollutants into Texas waters along the entire storm water pathway. Most BMPs address one specific stage of this pathway, although they may be applied in different situations and to different sources.

- Preventive practices: preventing or reducing the contact of pollutants with storm water
- Cleanup practices: recapturing pollutants that have spilled onto or contaminated a location
- Erosion control practices: protecting material at the soil surface from entering storm water runoff
- Sediment control practices: preventing materials already suspended in storm water from leaving a site
- Runoff control practices: reducing the volume, velocity, and/or erosive force of storm water runoff flow
- Channel protection practices: preventing erosion of channels, stream banks, and streambeds
- Habitat restoration practices: restoring natural communities that minimize erosion and remove water pollutants, especially along a waterway and its riparian zone
- In-stream remediation practices: removing nonpoint source pollutants or restoring water quality characteristics in a waterway
- Other BMPs, such as public education, for example, may address two or more of these stages in the storm water pathway simultaneously.

For optimum effectiveness, NPS programs should attempt to coordinate all BMPs in a watershed. BMPs can either complement each other – erosion control on a site typically increases the effectiveness and reduces the size and maintenance requirements of the site's sediment controls – or undermine each other – armoring a straight stretch of channel or stream banks may increase flow velocity and channel erosion downstream. In general, controlling NPS pollutants through prevention where possible is most cost effective. Control of these pollutants generally becomes more difficult and expensive the farther they travel down the storm water pathway.

The first table below presents selected Texas BMPs in each of these categories along the storm water pathway.

Table 8.1 Best Management Practices by Category

Management Category and Description	Typical BMP Examples
Preventive BMPs Preventive BMPs, sometimes called source controls, are management techniques or designs that prevent or reduce the exposure of substances to precipitation, storm water, or surface waters. All policies and practices that prevent the release of materials to the open air, soil, or water are preventive BMPs. Such practices and safeguards comprise a large part of the rules, guidelines, and permit requirements for facility management and for the storage, transport, processing, and disposal of wastes and hazardous materials administered by TCEQ and other regulatory agencies.	Planning, policy, and regulatory activities Using alternate, less polluting materials Housekeeping to contain and cover materials and wastes, or keep them indoors Minimize the extent and duration of land disturbance activities Well plugging Recycling and composting, including rainwater harvesting Household Hazardous Waste and similar collections
Cleanup BMPs Cleanup BMPs remove or remediate nonpoint source pollutants which have contaminated a specific area. In most cases of significant contamination, the selection and implementation of these BMPs is governed specifically under agency rules. Other cleanup BMPs, such as cleanup of litter or illegally disposed materials, are more discretionary.	Spill response Contaminated site cleanup Trash-litter cleanup Increased-efficiency street sweeping
Erosion Control BMPs Erosion control BMPs maintain the integrity of the land surface to prevent material at the surface from entering storm water or surface water.	Mulches and blankets Vegetation preservation and establishment Riprap on temporary traffic areas
Sediment Control BMPs For material that escapes erosion control BMPs and enters storm water runoff, the next line of defense is sediment control. Sediment control BMPs detain runoff before it leaves a site to filter out and/or precipitate suspended particles, including soluble pollutants which may be attached to solid particles.	Inlet protection Extended detention basins Vegetated filter strips Sediment trap/stone outlet Filter berms and silt fences Sand filter systems Constructed or restored wetlands
Run-on and Runoff Control BMPs Runoff control BMPs reduce the volume, velocity, and erosive force of storm water through diversion, infiltration or absorption of storm water into the surface or through physical impediments which slow the flow of storm water.	Level spreaders Interceptor swales Diversion dikes to exclude storm water from off-site

Channel, Stream Bank, and Streambed Protection BMPs These BMPs protect the integrity of stream beds and stream banks to prevent erosion and loss. Stream banks can be protected or restored either by increasing resistance of the bank to erosion or by decreasing the energy of the water at the point of contact with the bank, for example by deflecting or interrupting flows	Prevention of disturbance by exclusion of livestock, off-road vehicles, etc. Channel shaping to reduce velocity and erosive force Gabions or riprap lining of channels Reinforcing or armoring exposed surfaces Stream bank vegetation
Habitat Restoration BMPs These are a special subset of biological erosion control and stream protection BMPs. They establish or protect the natural communities which most effectively protect waterways and riparian areas from erosion..	Reestablish hydrology of wetlands and riparian areas Restoration of wetland native plant communities
In-Stream and Lake Remediation BMPs Once nonpoint source pollutants have affected a water body, another set of BMPs may reduce or reverse these effects.	Mechanical aeration to restore dissolved oxygen Chemical treatments – e.g. pH adjustment
Other BMPs	Public education

Categories of Nonpoint Sources and Associated Pollutants

Best Management Practices can be classified not only by management category but also by the primary nonpoint sources of pollution and the types of pollutant loadings and other impacts that each of these sources tends to cause. Many BMPs are used to address a broad range of NPS sources, particularly the erosion and sediment control BMPs.

Major Sources

- Agriculture
- Silviculture (Forestry)
- Urban storm water
- Construction (including road construction)

Special Sources

- Atmospheric deposition
- Boats and marinas
- Septic and other on-site wastewater systems
- Mining and petroleum production
- Industrial sites
- Roads
- Spill containment and contaminant remediation

- Hydromodification and stream bank protection
- Habitat degradation
- Wildlife
- In-stream remediation
- Underground storage tanks

Table 8.2 Best Management Practices by Source

Sources and Activities	Pollutants and Other Impacts	BMP Examples
Agriculture Tilling, cultivation, harvesting, and other soil surface exposure and disturbances; chemical applications	Sediment from exposed soil; nutrients from fertilizers; chemicals from pesticides, streamflow and temperature increases caused by vegetation removal	Animal Mortality Facility, Alley Cropping, Brush Management, Closure of Waste, Impoundments, Composting Facility, Conservation Crop Rotation, Constructed Wetland, Contour Buffer Strips, Cover Crop, Cross Wind Stripcropping, Diversion Dam, Dike, Filter Strip, Firebreak, Grade Stabilization Structure, Grassed Waterway, Irrigation Land Leveling, Manure Transfer, Nutrient Management, Pest Management, Pond Sealing or Lining - Bentonite Treatment, Prescribed Grazing, Residue Management - No Till/strip till, Riparian Forest Buffer, Sediment Basin, Surface Roughening, Terrace, Use Exclusion, Waste Utilization, Water and Sediment Control Basin, Well Decommissioning
Silviculture/Forestry Road construction and use, timber harvesting, mechanical equipment operation, prescribed burning, site preparation, fertilizer and pesticide application	Sediment; nutrients from forest fertilizer application; chemicals from pesticide application; temperature changes resulting from riparian vegetation removal and sediment additions; and streamflow increases caused by vegetation removal.	Broad-Based Dips; Cross-Road Drainage Culverts; Haul Roads; Log Sets, Field Chipping Sets and Portable Mill Locations; Revegetation of Disturbed Areas; Rolling Dips; Skid Trails; Stream Crossings; Streamside Management Zones (SMZ); Salvage & Sanitation in SMZs; Water Bars; Wing Ditch

Sources and Activities	Pollutants and Other Impacts	BMP Examples
Urban and Industrial Industrial, commercial, and residential activities; lawn and landscape management; pets and wildlife; pavement and other impervious covering of the soil; vehicular traffic; production and use of synthetic chemicals; improper disposal of wastes	Sediment from disturbed land; nutrients and pesticides from lawn and landscape management; pathogens and nutrients from pet and wildlife waste; oil and grease; petroleum hydrocarbons	Clean-Up; Composting; Animal Waste Collection; Curb Elimination; Debris Removal; Exposure Reduction; Landscaping And Lawn Maintenance Controls; Minimization Of Pollutants, Parking Lot/Street Cleaning Operations, Road Salt Controls, Streambank Stabilization, Land Use Management Practices, Buffers, Easements, Solid Waste Collection Facilities, Extended Detention Basin, Infiltration Device, Oil and Grease Trap Device, Porous Pavement, Sand Filter, Rain Garden, Vegetative Practices, Filter Strip, Grassed Swale, Wetland, Wet Retention Pond

Sources and Activities	Pollutants and Other Impacts	BMP Examples
Construction Removal of the soil's protective cover; unpaved traffic surfaces; earthmoving; open stockpiling of erodible materials;	Sediment from bare soil and stockpiles; nutrients from temporary and permanent vegetation establishment; streamflow increases caused by vegetation removal and impervious ground coverings; waste chemicals and debris from painting and other construction wastes;	MINIMIZE EXTENT &DURATION OF DISTURBANCE SURFACE STABILIZATION Mulching, Preserving Natural Vegetation, Recontouring, Permanent Seeding, Riprap, Sodding, Surface Roughening, Temporary Gravel Construction Access, Temporary Seeding, Topsoiling, Erosion Control Compost, Erosion Control Blanket Runoff Diversion RUNOFF CONVEYANCE MEASURES Grass-Lined Channel or Swale, Hardened Channel, Interceptor Swale, Temporary Slope Drain, Paved Flume, Runoff Diversion Dike OUTLET PROTECTION Level Spreader, Outlet Stabilization Structure SEDIMENT TRAPS AND BARRIERS Block and Gravel Drop Inlet Protection, Excavated Drop Inlet Protection, Fabric Storm Drain Inlet Protection, Sediment Basin, Rock Dam, Sediment Fence/Straw Bale Barrier, Sediment Trap, Sand Filter System, Sod Drop Inlet Protection, Vegetated Filter Strip, Filter Berm (rock, sandbag, compost, mulch), Filter Sock (compost or mulch), Brush Barrier, Wetlands, Wet Basin, Extended Detention Basin STREAM PROTECTION Streambank Stabilization, Streambed Stabilization, Temporary Stream Crossing

Sources and Activities	Pollutants and Other Impacts	BMP Examples
Atmospheric deposition Metals from volcanic activity, forest fires, windblown dust, vegetation, sea spray, the smelting of ores, and stack and fugitive dust (dust that escapes emission controls). Nitrogen from microbial decomposition, combustion of fossil fuels, fertilizer and explosives factories, and volatilization of applied ammonia-based fertilizers	Windblown pollutants of greatest concern include metals, such as mercury, and nitrogen.	Pollution prevention and emissions control measures to reduce the exposure and release of pollutants to the air; also, erosion and sediment control BMPs reduce the entry of soil-bound pollutants, including those from atmospheric deposition, into storm water.
Boats and marinas Discharge of sewage, fish cleanings, and food waste from recreational boats; bilge from boat ballast; paints, pesticide, and wood preservatives; chemicals used to deter metal corrosion; biocidal antifouling agents; boat and marina construction; boat hull bottom painting and scrapings; boat operation and dredging activities; refueling activities and bilge or fuel discharges	BOD (biological oxygen demand) and SOD (sediment oxygen demand); nutrients; pathogens; metals; arsenic from paint pigment, pesticide, and wood preservatives; zinc from anodes used to deter metal corrosion; copper and tin; copper and other metals. Both copper and tin (as butyltin) have been found at toxic concentrations in marina waters nationwide, deriving from boat hull bottom paints and scrapings; turbidity; petroleum hydrocarbons; oil and grease	No-Wake Zones, Protected Shallow Water Habitats, Proper Storage and Handling of Materials, No-Discharge Zones, Pumpout Facilities (Fixed-Point, Portable, and Dedicated Slipside Systems), Boat Repair and Maintenance Restrictions, Solid Waste Collection Facilities, Fish Cleaning Facilities/Controls
Septic and other on-site wastewater systems Discharges, seepage, or other releases from failing or improperly installed on-site wastewater treatment systems	Nitrogen, phosphorus, organic matter, toxic chemicals, and bacterial and viral pathogens	Chemical Additive Restrictions, Elimination of Garbage Disposals, Inspection and Maintenance, Phosphorus Detergent Restrictions, Denitrification Systems, Floating Aquatic Plant (Aquaculture) Systems, Upgrade or Replacement of Failing Systems, Alternating Bed System, Mound (Fill) System, Pressure Distribution (Low Pressure Pipe) System, Point-of-Sale Inspections, Inspection and Permitting of Installed Systems, Local Ordinances
Mining and petroleum production	Salt, sediment, petroleum hydrocarbons	Well and Testhole Inspection; Plugging Wells and Testholes

Sources and Activities	Pollutants and Other Impacts	BMP Examples
Spill containment and contaminant remediation Spills, leaks, or other releases of chemicals and other pollutants	Petroleum hydrocarbons and other toxic chemicals	HHW and Empty Pesticide Container Collection, Storm Drain Stenciling, Spill Cleanup, Slurry Walls, Grouting, Geomembranes, Hydrodynamic Control, Surface Seals, Surface Drainage, Excavation, Soil Venting, In-Situ Treatment of Contaminants
Stream bed and stream bank protection Increased stream flow and erosive force can damage and erode stream channels	Sediment, organic matter, nutrients	No-Wake Zones, Livestock Exclusion, Stream Bank Setbacks, Blankets and Mattresses, Branch Packs, Composite Revetment, Gabions, Live Fascines (Wattling Bundles), Live Staking, Tree Revetment, Vegetative Cover, Live Cribwall, Check Dam, Deflectors, Grade Stabilization Structure, Low-Head Dam (Weir)
Underground storage tanks Spills, leaks, and other releases	Petroleum hydrocarbons and related chemicals	Slurry Walls, Grouting, Geomembranes, Surface Seals, Surface Drainage, Hydrodynamic Control, Pumping, Interceptor Systems, Soil Venting, Excavation, Biological Degradation, Chemical Degradation, Inspection

APPENDIX A
CERTIFICATION OF AUTHORITY

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Protecting Texas by Reducing and Preventing Pollution

GENERAL COUNSEL'S CERTIFICATION

The State of Texas, through the Texas Commission on Environmental Quality (commission or TCEQ), is currently in the process of seeking full approval for its *Texas Nonpoint Source Pollution Assessment Report and Management Program* ("NPS Program"). The Environmental Protection Agency (EPA) has given full technical approval to the NPS program.

In accordance with Section 319(b)(2)(D) of the Clean Water Act, each management program proposed for implementation must include:

> A certification of the attorney general of the State or States (or the chief attorney of any State water pollution control agency which has independent legal counsel) that the laws of the State or States, as the case may be, provide adequate authority to implement such management program or, if there is not such adequate authority, a list of such additional authorities as will be necessary to implement such management program .

Following a review of the referenced 2005 NPS Program, the General Counsel certifies, under Section 319(b)(2)(D) of the Clean Water Act, that the laws of the State of Texas provide adequate authority to implement the NPS Program, as more specifically described below.

Relevant Legal Authority

The TCEQ is the state agency given primary responsibility for implementing the constitution and laws of the state relating to the conservation of natural resources and protection of the environment.[1] Specifically, the commission has general jurisdiction over the state's water quality program, including:

- the issuance of permits;
- the enforcement of water quality rules, standards, orders and permits; and
- water quality planning.[2]

[1] Texas Water Code (TWC) §5.012.

[2] TWC §5.013.

The commission also has the power to perform any acts whether specifically authorized by the Texas Water Code (TWC) or other law or implied by the TWC, necessary and convenient to the exercise to the exercise of its jurisdiction and powers.[3] The commission is also authorized to adopt rules necessary to carry out its duties and powers.[4]

Chapter 26 of the TWC provides that the commission shall establish the level of quality to be maintained in, and shall control the quality of, the water in the state.[5] Waste discharges or impending waste discharges covered by the provisions of Chapter 26 are subject to reasonable rules or orders adopted or issued by the commission in the public interest. The commission has also been given the powers and duties specifically prescribed by Chapter 26 and all other powers necessary or convenient to carry out those statutory responsibilities.

Section 26.012 requires the executive director to prepare and develop a general, comprehensive plan for the control of water quality in the state, which shall be used as a flexible guide by the commission. Additionally, § 26.017 requires the commission to:

- encourage voluntary cooperation by the people, cities, industries, associations, agricultural interests, and representatives of other interests in preserving the greatest possible utility of water in the State;

- encourage the formation and organization of cooperative groups, associations, cities, industries, and other water users for the purpose of providing a medium to discuss and formulate plans for attainment of water quality control;

- establish policies and procedures for securing close cooperation among state agencies that have water quality control functions; and

- cooperate with the governments of the United States and other states and with official or unofficial agencies and organizations with respect to water quality control matters.

Section 26.023 of the TWC provides that the commission is the sole and exclusive authority for setting water quality standards, and must set water quality standards for the water in the state by rule, and may amend the standards from time to time. The standards must be based on all quality assured data obtained by the commission, including local watershed and river basin database. The commission may also issue permits and amendments to permits for the discharge of waste or pollutants into or adjacent to water in the state and may refuse to issue a permit when issuance would violate the provisions of any state or federal law or rule or

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[3] TWC §5.102.

[4] TWC §5.103.

[5] TWC §26.011.

regulations.[6] The commission must also consider the compliance history of an applicant and its operator in considering issuance, amendment or renewal of a permit to discharge effluent.[7]

The commission may prescribe reasonable requirements for a person making discharges of any waste or of any pollutant to monitor and report on his activities concerning collection, treatment, and disposal of the waste or pollutant.[8] The executive director has the responsibility for establishing a water quality sampling and monitoring program for the state. All other state agencies engaged in water quality or water pollution control activities are statutorily required to coordinate those activities with the commission.[9] Additionally, the commission and employees or agents of the commission are authorized to enter any public or private property at any reasonable time for the purpose of inspecting and investigating conditions relating to the quality of water in the state.[10]

Local governments may also inspect the public water in its area and may execute cooperative agreements with the commission to provide for the performance of water quality management, inspection, and enforcement functions and for the transfer of money or property from any party to the agreement to another party for the purpose of water quality management, inspection, enforcement, technical aid and education, and the construction, ownership, purchase, maintenance, and operation of disposal systems.[11] Municipalities may also establish a water pollution control and abatement program for the city to include services and functions which, in the judgement of the city or as may be reasonably required by the commission, will provide effective water pollution control and abatement for the city.[12] Municipal water pollution control and abatement programs must be submitted to the commission for review and approval.[13] Further, the commission shall hold annual hearings in counties that include particularly sensitive areas, such as the Edwards Aquifer, to receive evidence on actions the commission should take to protect the aquifer from pollution.[14] To further this goal, the commission has adopted rules in 30 Texas Administrative Code (TAC) Chapter 213 which regulate development activities over the Edwards Aquifer.

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[6] TWC § 26.027.

[7] TWC § 26.0281.

[8] TWC § 26.042.

[9] TWC §26.127.

[10] TWC §26.014.

[11] TWC § 26.171 and § 26.175.

[12] TWC § 26.177.

[13] *Id*.

[14] TWC § 26.046.

The commission also has broad authority over the location, design, construction, installation, and proper functioning of on-site sewage disposal systems[15] and has adopted corresponding rules in 30 TAC Chapter 285 to encourage the use of economically feasible alternative techniques and technologies.

Chapter 7 of the TWC establishes the enforcement authority of the commission. The commission may initiate an action to enforce provisions of the TWC, THSC within the jurisdiction of the commission and rules, orders, permits, or other decisions of the commission.[16] The commission must report at least once a month at a meeting of the commission on enforcement actions taken by the commission or others and the resolution of those actions.[17] The commission may assess an administrative penalty against a person for violations with a maximum amount of $10,000 a day for each violation.[18] Persons charged with a penalty have the option of paying it in full, paying the penalty, paying an installment, paying or not paying in full and filing a petition for judicial review.[19] If a person fails to comply with that section, then the commission or executive director may refer the matter to the attorney general for enforcement.[20]

Texas Department of Transportation

The Texas Department of Transportation (TxDOT) is the primary agency in the State responsible for highway, road, and bridge construction. As described in the 2005 NPS Program, TxDOT's approach in addressing nonpoint source pollution is to limit impacts to receiving waters through implementation of highway design specifications. TxDOT has been conferred broad authority by the legislature.[21] TxDOT and TCEQ have entered into Memoranda of Understanding which has been adopted by reference in 30 TAC § 7.119 with regard to the assessment of water quality impacts resulting from certain transportation projects.

Texas Railroad Commission

The Texas Railroad Commission (TRRC) is solely responsible for the control and disposition of waste and the abatement and prevention of surface and subsurface water pollution resulting from activities associated with the exploration, development, and production of oil and gas or geothermal resources, including:

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[15] Texas Health and Safety Code (THSC) § 366.011.

[16] TWC §7.002.

[17] TWC § 7.003.

[18] TWC §7.051 and §7.052.

[19] TWC § 7.061.

[20] TWC § 7.066.

[21] Texas Transportation Code, Chapter 201.

- activities associated with the drilling of injection water source wells which penetrate the base of useable quality water;

- activities associated with the drilling of cathodic protection holes associated with the cathodic protection of wells and pipelines subject to the jurisdiction of the Railroad Commission of Texas;

- activities associated with gasoline plants, natural gas or natural gas liquids processing plants, pressure maintenance plants, or repressurizing plants;

- activities associated with any underground natural gas storage facility,

- activities associated with any underground hydrocarbon storage facility; and

- activities associated with the storage, handling, reclamation, gathering, transportation, or distribution of oil or gas before refining.[22]

To prevent pollution of streams and public bodies of surface water of the State, the Railroad Commission is must adopt and enforce rules in accordance with Texas Natural Resource Code § 91.101 relating to the drilling of exploratory wells and oil and gas wells. Additionally, TCEQ and TRRC have entered a Memorandum of Understanding adopted by reference in 30 TAC § 7.117 concerning cooperation and the division of jurisdiction between the agencies regarding wastes that result from, or are related to, activities associated with the exploration, development, and production of oil, gas, or geothermal resources, and the refining of oil.

Texas Parks and Wildlife Department
The Texas Parks and Wildlife Department is authorized to regulate the use of department lands for oil, gas, and other mineral recovery and associated activities as the department considers reasonable and necessary to protect the surface estate. The Texas Parks and Wildlife is authorized by TWC § 26.129 to enforce the provisions of the Texas Water Code to the extent that any violation affects aquatic life and wildlife.

Wetlands
The United States Army Corps of Engineers (Corps) is the principle authority for all dredging operations affecting bays and estuaries of Texas. While EPA has designated the Corps as the implementing agency under Section 404 of the CWA, the TCEQ is responsible for completing Section 401 Water Quality Certifications. The commission has enacted regulations in 30 TAC Chapter 279 establishing procedures and criteria for applying for, processing, and reviewing state certifications under CWA, §401, for activities under the jurisdiction of the agency for the purpose maintaining the chemical, physical, and biological integrity of the state's waters consistent with the Texas Water Code and the federal CWA. It is the policy of the commission to achieve no overall net loss of the existing wetlands resource base with respect wetlands functions and values in the State of Texas.
Spill Response

[22] TWC § 26.131.

The *Texas Oil and Hazardous Substances Spill Prevention and Control Act* provides that it is the policy of the State to prevent the spill or discharge of hazardous substances into waters in the State and to cause the removal of any such spills and discharges without undue delay.[23] In accordance with the Act, the commission is the lead agency in spill response matters and shall conduct spill response for the state, and shall otherwise administer the provisions of the Act. The commission has also been designated by the Governor as the state's lead agency for Superfund activities and as the state's representative to the federal Regional Response Team in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act*, 42U.S.C. §§ 9601- 9675; the *Water Pollution Prevention and Control Act,* 33 U.S.C. §§ 12511387; and the *National Oil and Hazardous Substances Pollution Contingency Plan,* 40 CFR Part 300. Under the authority of the *Solid Waste Disposal Act,* the commission has broad removal authorities with respect to the cleanup of a release or threatened release of hazardous substances at a facility on the State registry. [24]

Funding Mechanisms

The executive director, with the approval of the commission, may execute agreements with the United States Environmental Protection Agency or any other federal agency that administers programs providing federal cooperation, assistance, grants, or loans for research, development, investigation, training, planning, studies, programming, and construction related to methods, procedures, and facilities for the collection, treatment, and disposal of waste and other water quality control activities. The commission is authorized to accept federal funds for these purposes and for other purposes consistent with the objectives of Chapter 26 of the TWC and may use the funds as prescribed by law or as provided by agreement.

Derek Seal

Derek Seal
General Counsel
Texas Commission on Environmental Quality

[23]TWC Chapter 26, Subchapter G.

[24]THSC Chapter 361.

ATTORNEY GENERAL OF TEXAS
GREG ABBOTT

May 2, 2005

Mr. Rex Isom, Executive Director
Texas State Soil and Water Conservation Board
P.O. Box 658
Temple, Texas 76503

Re: Statewide Agriculture/Silvicultural Nonpoint Source Management Program

Dear Mr. Isom:

I have reviewed the above management program document provided to me by TSSWCB staff. I have also reviewed Chapters 201 and 203 of the Texas Agricultural Code ("Code").

As you know, TSSWCB's statutory authority is contained in Chapters 201 and 203 of the Code. Section 201.026 of the Code gives the Board specific authority to "plan, implement, and manage programs and practices for abating agricultural and silvicultural nonpoint source pollution." Texas law therefore provides adequate authority for TSSWCB to promulgate and implement the Statewide Agriculture/Silvicultural Nonpoint Source Management Program set forth in the draft document provided to me by TSSWCB staff.

Please let me know if I can assist you further.

Sincerely,

Geo. Noelke

George Noelke
Assistant Attorney General
Administrative Law Division

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Appendix B
Priority Water Bodies

The following lists of priority water bodies are based on the Texas Water Quality Inventory and 303(d) List. In addition, the list includes some unimpaired water bodies targeted for pollution prevention efforts such as development of Watershed Protection Plans. The water bodies provided in these lists represent the state's priorities for CWA §319(h) funding for both implementation and assessment activities as defined. However, funding is not limited to these water bodies. These lists are subject to change and will be revised as needed.

Surface Water

Table B.1 Priority Water Bodies - Surface Water

Segment Number	Segment Name	Parameter of Concern	Assessment or Implementation
0101A	*Dixon Creek*	*bacteria*	*Assessment*
0102	*Lake Meredith*	*mercury in walleye*	*Assessment*
0199A	*Palo Duro Reservoir*	*depressed dissolved oxygen*	*Assessment*
0201A	*Mud Creek*	*bacteria*	*Assessment*
0202D	*Pine Creek*	*bacteria*	*Assessment*
0203A	*Big Mineral Creek*	*bacteria*	*Assessment*
0207A	*Buck Creek*	*bacteria*	*Assessment*
0211	*Little Wichita River*	*dissolved oxygen*	*Assessment*
0211	*Little Wichita River*	*total dissolved solids*	*Assessment*
0212	*Lake Arrowhead*	*See Segment 0211*	*Assessment*
0213	*Lake Kickapoo*	*See Segment 0211*	*Assessment*
0214A	*Beaver Creek*	*depressed dissolved oxygen*	*Assessment*
0218	*Wichita/North Fork Wichita River*	*selenium (chronic) in water*	*Assessment*
0218A	*Middle Fork Wichita River*	*selenium (chronic) in water*	*Assessment*
0299A	*Sweetwater Creek*	*bacteria*	*Assessment*
0302	*Wright Patman Lake*	*high pH*	*Assessment*
0302	*Wright Patman Lake*	*depressed dissolved oxygen*	*Assessment*
0302	*Wright Patman Lake*	*high pH*	*Assessment*
0306	*Upper South Sulphur River*	*bacteria*	*Assessment*
0306	*Upper South Sulphur River*	*high pH*	*Assessment*
0306	*Upper South Sulphur River*	*depressed dissolved oxygen*	*Assessment*
0307	*Cooper Lake*	*high pH*	*Assessment*
0307	*Cooper Lake*	*depressed dissolved oxygen*	*Assessment*
0401	*Caddo Lake*	*low pH*	*Assessment*
0401	*Caddo Lake*	*mercury in largemouth bass and freshwater drum*	*Assessment*
0401	*Caddo Lake*	*depressed dissolved oxygen*	*Assessment*
0401A	*Harrison Bayou*	*depressed dissolved oxygen*	*Assessment*
0402	*Big Cypress Creek below Lake O' the Pines*	*mercury in fish tissue*	*Assessment*
0402	*Big Cypress Creek below Lake O' the Pines*	*depressed dissolved oxygen*	*Assessment*
0402	*Big Cypress Creek below Lake O' the Pines*	*low pH*	*Assessment*

0402A	*Black Cypress Bayou*	*depressed dissolved oxygen*	*Assessment*
0402A	*Black Cypress Bayou*	*mercury in fish tissue*	*Assessment*
0402D	*Lake Daingerfield*	*mercury in fish tissue*	*Assessment*
0403	*Lake O' the Pines*	*depressed dissolved oxygen*	*Assessment*
0404	*Big Cypress Creek below Lake Bob Sandlin*	*bacteria*	*Assessment*
0404B	*Tankersley Creek*	*bacteria*	*Assessment*
0404D	*Welsh Reservoir*	*selenium*	*Assessment*
0407	*James' Bayou*	*depressed dissolved oxygen*	*Assessment*
0409	*Little Cypress Bayou (Creek)*	*depressed dissolved oxygen*	*Assessment*
0502A	*Nichols Creek*	*bacteria*	*Assessment*
0502A	*Nichols Creek*	*depressed dissolved oxygen*	*Assessment*
0502A	*Nichols Creek*	*chronic toxicity in water*	*Assessment*
0504	*Toledo Bend Reservoir*	*depressed dissolved oxygen*	*Assessment*
0504	*Toledo Bend Reservoir*	*mercury in largemouth bass and freshwater drum*	*Assessment*
0504C	*Palo Gaucho Bayou*	*chronic toxicity in water*	*Assessment*
0505	*Sabine River above Toledo Bend Reservoir*	*bacteria*	*Assessment*
0505B	*Grace Creek*	*depressed dissolved oxygen*	*Assessment*
0505B	*Grace Creek*	*bacteria*	*Assessment*
0505D	*Rabbit Creek*	*bacteria*	*Assessment*
0505E	*Brandy Branch Reservoir*	*selenium*	*Implementation Assessment*
0505F	*Martin Creek Reservoir*	*selenium*	*Implementation Assessment*
0505G	*Wards Creek*	*depressed dissolved oxygen*	*Assessment*
0506	*Sabine River below Lake Tawakoni*	*bacteria*	*Assessment*
0507	*Lake Tawakoni*	*depressed dissolved oxygen*	*Assessment*
0507A	*Cowleech Fork Sabine River*	*bacteria*	*Assessment*
0507B	*Long Branch*	*bacteria*	*Assessment*
0508	*Adams Bayou Tidal*	*bacteria*	*Assessment*
0508	*Adams Bayou Tidal*	*depressed dissolved oxygen*	*Assessment*
0508A	*Adams Bayou above Tidal*	*bacteria*	*Assessment*
0508B	*Gum Gully*	*depressed dissolved oxygen*	*Assessment*
0508B	*Gum Gully*	*bacteria*	*Assessment*
0508C	*Hudson Gully*	*bacteria*	*Assessment*
0508C	*Hudson Gully*	*depressed dissolved oxygen*	*Assessment*
0511	*Cow Bayou Tidal*	*bacteria*	*Assessment*
0511A	*Cow Bayou above Tidal*	*depressed dissolved oxygen*	*Assessment*
0511B	*Coon Bayou*	*depressed dissolved oxygen*	*Assessment*
0511B	*Coon Bayou*	*bacteria*	*Assessment*
0511C	*Cole Creek*	*bacteria*	*Assessment*
0511C	*Cole Creek*	*depressed dissolved oxygen*	*Assessment*
0511E	*Terry Gully*	*bacteria*	*Assessment*
0512A	*Running Creek*	*bacteria*	*Assessment*
0512B	*Elm Creek*	*bacteria*	*Assessment*
0603	*B. A. Steinhagen Lake*	*mercury in white and hybrid white/striped bass*	*Assessment*
0603A	*Sandy Creek*	*bacteria*	*Assessment*
0604	*Neches River below Lake Palestine*	*lead (chronic) in water*	*Assessment*
0604A	*Cedar Creek*	*bacteria*	*Assessment*

0604B	*Hurricane Creek*	*bacteria*	*Assessment*
0605A	*Kickapoo Creek*	*bacteria*	*Assessment*
0606	*Neches River above Lake Palestine*	*low pH*	*Assessment*
0606	*Neches River above Lake Palestine*	*zinc (acute) in water*	*Assessment*
0606	*Neches River above Lake Palestine*	*zinc (chronic) in water*	*Assessment*
0606A	*Prairie Creek*	*bacteria*	*Assessment*
0607A	*Boggy Creek*	*depressed dissolved oxygen*	*Assessment*
0607B	*Little Pine Island Bayou*	*depressed dissolved oxygen*	*Assessment*
0608A	*Beech Creek*	*depressed dissolved oxygen*	*Assessment*
0608B	*Big Sandy Creek*	*bacteria*	*Assessment*
0608C	*Cypress Creek*	*depressed dissolved oxygen*	*Assessment*
0608F	*Turkey Creek*	*bacteria*	*Assessment*
0608G	*Lake Kimball*	*mercury in fish tissue*	*Assessment*
0610	*Sam Rayburn Reservoir*	*mercury in largemouth bass and freshwater drum*	*Assessment*
0610	*Sam Rayburn Reservoir*	*depressed dissolved oxygen*	*Assessment*
0610A	*Ayish Bayou*	*bacteria*	*Assessment*
0611	*Angelina River above Sam Rayburn Reservoir*	*bacteria*	*Assessment*
0611A	*East Fork Angelina River*	*bacteria*	*Assessment*
0611A	*East Fork Angelina River*	*lead (chronic) in water*	*Assessment*
0611A	*East Fork Angelina River*	*lead in water*	*Assessment*
0611B	*La Nana Bayou*	*bacteria*	*Assessment*
0611C	*Mud Creek*	*bacteria*	*Assessment*
0612B	*Waffelow Creek*	*bacteria*	*Assessment*
0615	*Angelina River/Sam Rayburn Reservoir*	*mercury in largemouth bass and freshwater drum*	*Assessment*
0615	*Angelina River/Sam Rayburn Reservoir*	*impaired fish community*	*Assessment*
0615	*Angelina River/Sam Rayburn Reservoir*	*depressed dissolved oxygen*	*Assessment*
0701	*Taylor Bayou above Tidal*	*depressed dissolved oxygen*	*Assessment*
0702A	*Alligator Bayou*	*ambient toxicity in water*	*Assessment*
0702A	*Alligator Bayou*	*ambient toxicity in sediment*	*Assessment*
0702A	*Alligator Bayou*	*impaired fish community*	*Assessment*
0704	*Hillebrandt Bayou*	*depressed dissolved oxygen*	*Assessment*
0803	*Lake Livingston*	*depressed dissolved oxygen*	*Assessment*
0803	*Lake Livingston*	*high pH*	*Assessment*
0805	*Upper Trinity River*	*chlordane in tissue*	*Implementation*
0805	*Upper Trinity River*	*bacteria*	*Assessment*
0805	*Upper Trinity River*	*PCBs in fish tissue*	*Assessment*
0806	*West Fork Trinity River below Lake Worth*	*bacteria*	*Assessment*
0806	*West Fork Trinity River below Lake Worth*	*PCBs in fish tissue*	*Assessment*
0806	*West Fork Trinity below Lake Worth*	*chlordane in tissue*	*Implementation*
0806A	*Fosdic Lake*	*chlordane in tissue*	*Implementation*
0806A	*Fosdic Lake*	*DDE in tissue*	*Implementation*
0806A	*Fosdic Lake*	*dieldrin in tissue*	*Implementation*
0806A	*Fosdic Lake*	*PCBs in tissue*	*Implementation*

0806B	*Echo Lake*	*PCBs in tissue*	*Implementation*
0820C	*Muddy Creek*	*bacteria*	*Assessment*
0823	*Lewisville Lake City of Denton*	*dissolved oxygen*	*Implementation Assessment*
0823A	*Little Elm Creek*	*bacteria*	*Assessment*
0824	*Elm Fork Trinity River above Ray Roberts Lake*	*bacteria*	*Assessment*
0829	*Clear Fork Trinity River below Benbrook Lake*	*PCBs in fish tissue*	*Assessment*
0829	*Clear Fork Trinity below Benbrook Lake*	*chlordane in tissue*	*Implementation*
0829A	*Lake Como*	*chlordane in tissue*	*Implementation*
0829A	*Lake Como*	*DDE in tissue*	*Implementation*
0829A	*Lake Como*	*dieldrin in tissue*	*Implementation*
0829A	*Lake Como*	*PCBs in tissue*	*Implementation*
0841	*Lower West Fork Trinity River*	*PCBs in fish tissue*	*Assessment*
0841	*Lower West Fork Trinity River*	*bacteria*	*Assessment*
0841	*Lower West Fork Trinity*	*chlordane in tissue*	*Implementation*
0841A	*Mountain Creek Lake*	*chlordane in tissue*	*Implementation*
0841A	*Mountain Creek Lake*	*DDD in tissue*	*Implementation*
0841A	*Mountain Creek Lake*	*DDE in tissue*	*Implementation*
0841A	*Mountain Creek Lake*	*DDT in tissue*	*Implementation*
0841A	*Mountain Creek Lake*	*dieldrin in tissue*	*Implementation*
0841A	*Mountain Creek Lake*	*heptachlor epoxide in fish tissue*	*Implementation*
0841A	*Mountain Creek Lake*	*PCBs in tissue*	*Implementation*
1001	*Houston Ship Channel*	*nickel*	*Implementation Assessment*
1005	*Houston Ship Channel / San Jacinto River Tidal*	*nickel*	*Implementation*
1005	*Houston Ship Channel/ San Jacinto River Tidal*	*dioxin in catfish and crab tissue*	*Assessment*
1006	*Houston Ship Channel Tidal*	*nickel*	*Implementation*
1006	*Houston Ship Channel Tidal*	*PCBs in fish tissue*	*Assessment*
1006	*Houston Ship Channel Tidal*	*dioxin in catfish and crab tissue*	*Assessment*
1006	*Houston Ship Channel Tidal*	*pesticides in fish tissue*	*Assessment*
1006	*Houston Ship Channel Tidal*	*temperature*	*Assessment*
1006	*Houston Ship Channel Tidal*	*chronic toxicity in sediment*	*Assessment*
1006D	*Halls Bayou below US 59*	*bacteria*	*Assessment*
1006E	*Halls Bayou above US 59*	*bacteria*	*Assessment*
1006F	*Big Gulch above Tidal*	*bacteria*	*Assessment*
1006H	*Spring Gully above Tidal*	*bacteria*	*Assessment*
1006I	*Unnamed Tributary of Halls Bayou*	*bacteria*	*Assessment*
1006J	*Unnamed Tributary of Halls Bayou*	*bacteria*	*Assessment*
1007	*Houston Ship Channel/Buffalo Bayou Tidal*	*nickel*	*Implementation Assessment*
1007	*Houston Ship Channel/Buffalo Bayou Tidal*	*PCBs in fish tissue*	*Assessment*
1007	*Houston Ship Channel/Buffalo Bayou Tidal*	*pesticides in fish tissue*	*Assessment*
1007	*Houston Ship Channel/Buffalo Bayou Tidal*	*acute toxicity in sediment*	*Assessment*

1007	*Houston Ship Channel/Buffalo Bayou Tidal*	*dioxin in catfish and crab tissue*	*Assessment*
1007B	*Brays Bayou above Tidal*	*bacteria*	*Assessment*
1007C	*Keegans Bayou above Tidal*	*bacteria*	*Assessment*
1007D	*Sims Bayou above Tidal*	*bacteria*	*Assessment*
1007E	*Willow Waterhole Bayou above Tidal*	*bacteria*	*Assessment*
1007F	*Berry Bayou above Tidal*	*bacteria*	*Assessment*
1007G	*Kuhlman Gully above Tidal*	*bacteria*	*Assessment*
1007H	*Pine Gully above Tidal*	*depressed dissolved oxygen*	*Assessment*
1007H	*Pine Gully above Tidal*	*bacteria*	*Assessment*
1007I	*Plum Creek above Tidal*	*depressed dissolved oxygen*	*Assessment*
1007I	*Plum Creek above Tidal*	*bacteria*	*Assessment*
1007K	*Country Club Bayou above Tidal*	*depressed dissolved oxygen*	*Assessment*
1007K	*Country Club Bayou above Tidal*	*bacteria*	*Assessment*
1007L	*Unnamed Non-Tidal Tributary of Brays Bayou*	*bacteria*	*Assessment*
1007M	*Unnamed Non-Tidal Tributary of Hunting Bayou*	*bacteria*	*Assessment*
1007N	*Unnamed Non-Tidal Tributary of Sims Bayou*	*bacteria*	*Assessment*
1007O	*Unnamed Non-Tidal Tributary of Buffalo Bayou*	*bacteria*	*Assessment*
1007O	*Unnamed Non-Tidal Tributary of Buffalo Bayou*	*depressed dissolved oxygen*	*Assessment*
1007P	*Brays Bayou above Tidal*	*bacteria*	*Assessment*
1007Q	*Sims Bayou above Tidal*	*depressed dissolved oxygen*	*Assessment*
1007Q	*Sims Bayou above Tidal*	*bacteria*	*Assessment*
1007R	*Hunting Bayou above Tidal*	*bacteria*	*Assessment*
1007R	*Hunting Bayou above Tidal*	*depressed dissolved oxygen*	*Assessment*
1008	*Spring Creek*	*bacteria*	*Assessment*
1009	*Cypress Creek*	*bacteria*	*Assessment*
1013	*Buffalo Bayou Tidal*	*bacteria*	*Assessment*
1013	*Buffalo Bayou Tidal*	*nickel*	*Assessment Implementation*
1013A	*Little White Oak Bayou*	*depressed dissolved oxygen*	*Assessment*
1013A	*Little White Oak Bayou*	*bacteria*	*Assessment*
1013C	*Unnamed Non-Tidal Tributary of Buffalo Bayou Tidal*	*bacteria*	*Assessment*
1014	*Buffalo Bayou above Tidal*	*bacteria*	*Assessment*
1014	*Buffalo Bayou above Tidal*	*nickel*	*Assessment Implementation*
1014H	*South Mayde Creek*	*bacteria*	*Assessment*
1014K	*Turkey Creek*	*bacteria*	*Assessment*
1014M	*Neimans Bayou*	*bacteria*	*Assessment*
1014M	*Neimans Bayou*	*depressed dissolved oxygen*	*Assessment*
1014N	*Rummel Creek*	*bacteria*	*Assessment*
1014O	*Spring Branch*	*bacteria*	*Assessment*
1016	*Greens Bayou above Tidal*	*bacteria*	*Assessment*
1016	*Greens Bayou above Tidal*	*nickel*	*Assessment Implementation*
1016A	*Garners Bayou*	*bacteria*	*Assessment*

1016B	*Unnamed Tributary of Greens Bayou*	*bacteria*	*Assessment*
1016C	*Unnamed Tributary of Greens Bayou*	*bacteria*	*Assessment*
1016D	*Unnamed Tributary of Greens Bayou*	*bacteria*	*Assessment*
1016D	*Unnamed Tributary of Greens Bayou*	*depressed dissolved oxygen*	*Assessment*
1017	*Whiteoak Bayou above Tidal*	*nickel*	*Assessment Implementation*
1017	*Whiteoak Bayou above Tidal*	*bacteria*	*Assessment*
1017A	*Brickhouse Gully/Bayou*	*bacteria*	*Assessment*
1017B	*Cole Creek*	*bacteria*	*Assessment*
1017D	*Unnamed Tributary of White Oak Bayou*	*depressed dissolved oxygen*	*Assessment*
1017D	*Unnamed Tributary of White Oak Bayou*	*bacteria*	*Assessment*
1017E	*Unnamed Tributary of White Oak Bayou*	*bacteria*	*Assessment*
1101	*Clear Creek Tidal*	*chlordane in tissue*	*Implementation*
1101	*Clear Creek Tidal*	*bacteria*	*Implementation*
1101	*Clear Creek Tidal*	*dichloroethane in fish and crab tissue*	*Implementation*
1101	*Clear Creek Tidal*	*trichloroethane in tissue*	*Implementation*
1101B	*Chigger Creek*	*bacteria*	*Implementation*
1102	*Clear Creek above Tidal*	*chlordane in tissue*	*Implementation*
1102	*Clear Creek above Tidal*	*dichloroethane in fish and crab tissue*	*Implementation*
1102	*Clear Creek above Tidal*	*bacteria*	*Implementation*
1102	*Clear Creek above Tidal*	*trichloroethane in tissue*	*Implementation*
1102A	*Cowart Creek*	*bacteria*	*Assessment*
1102B	*Mary's Creek/ North Fork Mary's Creek*	*bacteria*	*Assessment*
1103	*Dickinson Bayou Tidal*	*bacteria*	*Assessment*
1103	*Dickinson Bayou Tidal*	*depressed dissolved oxygen*	*Assessment*
1103A	*Bensons Bayou*	*bacteria*	*Assessment*
1103B	*Bordens Gully*	*bacteria*	*Assessment*
1103C	*Geisler Bayou*	*bacteria*	*Assessment*
1103D	*Gum Bayou*	*bacteria*	*Assessment*
1104	*Dickinson Bayou local Initiative Watershed Plan*	*bacteria*	*Assessment*
1113	*Armand Bayou above Tidal*	*dissolved oxygen*	*Implementation Assessment*
1113A	*Armand Bayou above Tidal*	*bacteria*	*Assessment*
1202H	*Allen's Creek*	*bacteria*	*Assessment*
1202J	*Big Creek*	*bacteria*	*Assessment*
1205	*Lake Granbury*	*bacteria*	*Implementation Assessment*
1209	*Navasota River below Lake Limestone*	*bacteria*	*Assessment*
1209C	*Carters Creek*	*bacteria*	*Assessment*
1209G	*Cedar Creek*	*bacteria*	*Assessment*
1209I	*Gibbons Creek*	*bacteria*	*Assessment*
1209I	*Gibbons Creek*	*depressed dissolved oxygen*	*Assessment*
1209J	*Shepherd Creek*	*bacteria*	*Assessment*
1209K	*Steele Creek*	*bacteria*	*Assessment*
1210A	*Navasota River above*	*bacteria*	*Assessment*

	Lake Mexia		
1211A	Davidson Creek	bacteria	Assessment
1212	Somerville Lake	low and high pH	Assessment
1212B	East Yegua Creek	bacteria	Assessment
1214	Colorado River	choloride	Assessment
1214	Colorado River	sulfate	Assessment
1214	Colorado River	total dissolved solids	Assessment
1217	Lampasas River above Stillhouse Hollow Lake	bacteria	Assessment
1217A	Rocky Creek	depressed dissolved oxygen	Assessment
1218	Nolan Creek/ South Nolan Creek	bacteria	Assessment
1221	Leon River Below Proctor Lake	bacteria	Assessment
1222	Proctor Lake	depressed dissolved oxygen	Assessment
1222A	Duncan Creek	bacteria	Assessment
1226	North Bosque River	orthophosphorus	Implementation
1226B	Green Creek	bacteria	Assessment
1226E	Indian Creek	bacteria	Assessment
1226F	Sims Creek	bacteria	Assessment
1227	Nolan River	bacteria	Assessment
1242	Brazos River above Navasota River	bacteria	Assessment
1242D	Thompson Creek	bacteria	Assessment
1242D	Thompson Creek	depressed dissolved oxygen	Assessment
1242I	Campbells Creek	bacteria	Assessment
1242K	Mud Creek	bacteria	Assessment
1242L	Pin Oak Creek	bacteria	Assessment
1242M	Spring Creek	bacteria	Assessment
1242N	Tehuacana Creek	bacteria	Assessment
1242P	Big Creek	bacteria	Assessment
1243	Salado Creek	depressed dissolved oxygen	Assessment
1245	Upper Oyster Creek	depressed dissolved oxygen	Assessment
1245	Upper Oyster Creek	bacteria	Assessment
1246E	Wasp Creek	bacteria	Assessment
1247	Lake Granger Watershed Plan	sediment	Assessment Implementation
1247A	Willis Creek	bacteria	Assessment
1248	San Gabriel/North Fork San Gabriel River	total dissolved solids	Assessment
1254	Aquilla Reservoir	atrazine in finished drinking water	Assessment
1254	Aquilla Reservoir	atrazine in finished drinking water	Implementation
1255	Upper North BosqueRiver	orthophosphorus	Implementation
1255A	Goose Branch	bacteria	Assessment
1255B	North Fork Upper North Bosque River	bacteria	Assessment
1255C	Scarborough Creek	bacteria	Assessment
1255D	South Fork North Bosque River	bacteria	Assessment
1255E	Unnamed tributary of Goose Branch	bacteria	Assessment
1255F	Unnamed tributary of Scarborough Creek	bacteria	Assessment
1255G	Woodhollow Branch	bacteria	Assessment
1302	San Bernard River above Tidal	bacteria	Assessment
1305	Caney Creek above Tidal	bacteria	Assessment

1403	Lake Austin	dissolved oxygen	Implementation
1403A	Bull Creek	impaired macrobenthos community	Assessment
1403J	Spicewood Tributary to Shoal Creek	bacteria	Assessment
1403K	Taylor Slough South	bacteria	Assessment
1411	E.V. Spence Reservoir	sulfate	Implementation
1411	E.V. Spence Reservoir	total dissolved solids	Implementation
1411	E.V. Spence Reservoir	total dissolved solids	Assessment
1420	Pecan Bayou above Lake Brownwood	depressed dissolved oxygen	Assessment
1421	Concho River	impaired macrobenthos community	Implementation Assessment
1422	Lake Nasworthy	See Segments 1421 & 1425	Implementation Assessment
1423	Twin Buttes Reservoir	See Segments 1421 & 1425	Implementation Assessment
1424	Middle Concho/South Concho River	See Segments 1421 & 1425	Implementation Assessment
1425	O.C. Fisher Lake	total dissolved solids	Implementation Assessment
1425	O.C. Fisher Lake	chloride	Implementation Assessment
1426	Colorado River below E. V. Spence Reservoir	chloride	Assessment
1426	Colorado River below E. V. Spence Reservoir	total dissolved solids	Assessment
1427	Onion Creek	depressed dissolved oxygen	Assessment
1427A	Slaughter Creek	impaired macrobenthos community	Assessment
1428C	Gilleland Creek	bacteria	Implementation
1429B	Eanes Creek	bacteria	Assessment
1429C	Waller Creek	impaired macrobenthos community	Assessment
1604	Lake Texana	depressed dissolved oxygen	Assessment
1801	Guadalupe River Tidal	depressed dissolved oxygen	Assessment
1803A	Elm Creek	bacteria	Assessment
1803B	Sandies Creek	bacteria	Assessment
1803C	Peach Creek	bacteria	Assessment
1806	Guadalupe River above Canyon Lake	bacteria	Assessment
1806A	Camp MeetingCreek	depressed dissolved oxygen	Assessment
1901	Lower San Antonio River	bacteria	Assessment
1906	Lower Leon Creek	bacteria	Assessment
1906	Lower Leon Creek	depressed dissolved oxygen	Assessment
1908	Upper Cibolo Creek	depressed dissolved oxygen	Assessment
1910	Salado Creek	dissolved oxygen	Implementation
1910	Salado Creek	bacteria	Assessment
1910	Salado Creek	depressed dissolved oxygen	Assessment
1910A	Walzem Creek	bacteria	Assessment
1911	Upper San Antonio River	bacteria	Implementation Assessment
1913	Mid Cibolo Creek	depressed dissolved oxygen	Assessment
2104	Nueces River above Frio River	depressed dissolved oxygen	Assessment
2107	Atascosa River	bacteria	Assessment
2110	Lower Sabinal River	nitrate+nitrite nitrogen	Assessment
2113	Upper Frio River	depressed dissolved oxygen	Assessment

2116	*Choke Canyon Reservoir*	*total dissolved solids*	*Assessment*
2116	*Choke Canyon Reservoir*	*bacteria*	*Assessment*
2117	*Frio River above Choke Canyon Reservoir*	*bacteria*	*Assessment*
2117	*Frio River Above Choke Canyon Reservoir*	*depressed dissolved oxygen*	*Assessment*
2201	*Arroyo Colorado Tidal*	*depressed dissolved oxygen*	*Implementation Assessment*
2201	*Arroyo Colorado Tidal*	*ambient toxicity in sediment*	*Assessment*
2202	*Arroyo Colorado above Tidal*	*organic compounds in fish tissue*	*Assessment*
2202	*Arroyo Colorado above Tidal*	*chlordane in tissue*	*Implementation*
2201	*Arroyo Colorado*	*depressed dissolved oxygen*	*Implementation Assessment*
2202	*Arroyo Colorado above Tidal*	*DDE in tissue*	*Implementation*
2202	*Arroyo Colorado above Tidal*	*other organic compounds in tissue*	*Implementation*
2202	*Arroyo Colorado above Tidal*	*toxaphene in tissue*	*Implementation*
2202A	*Donna Reservoir*	*PCBs in tissue*	*Implementation*
2304	*Rio Grande below Amistad Reservoir*	*ambient toxicity in water*	*Assessment*
2306	*Rio Grande above Amistad Reservoir*	*ambient toxicity in water*	*Assessment*
2306	*Rio Grande above Amistad Reservoir*	*bacteria*	*Assessment*
2307	*Rio Grande below Riverside Diversion Dam*	*bacteria*	*Assessment*
2310	*Lower Pecos River*	*chloride*	*Implementation Assessment*
2310	*Lower Pecos River*	*sulfate*	*Implementation Assessment*
2310	*Lower Pecos River*	*total dissolved solids*	*Implementation Assessment*
2311	*Upper Pecos River*	*See Segment 2310*	*Implementation Assessment*
2314	*Rio Grande above International Dam*	*bacteria*	*Assessment*
2421	*Upper Galveston Bay*	*bacteria (oyster waters)*	*Assessment*
2421	*Upper Galveston Bay*	*dioxin in catfish and crab tissue*	*Assessment*
2422	*Trinity Bay*	*bacteria (oyster waters)*	*Assessment*
2423	*East Bay*	*bacteria (oyster waters)*	*Assessment*
2424	*West Bay*	*bacteria (oyster waters)*	*Assessment*
2424A	*Highland Bayou*	*bacteria*	*Assessment*
2424A	*Highland Bayou*	*depressed dissolved oxygen*	*Assessment*
2424C	*Marchand Bayou*	*depressed dissolved oxygen*	*Assessment*
2424C	*Marchand Bayou*	*bacteria*	*Assessment*
2425	*Robinson Bayou*	*bacteria*	*Implementation*
2425B	*Jarbo Bayou*	*bacteria*	*Assessment*
2425C	*Robinson Bayou*	*bacteria*	*Assessment*
2426	*Tabbs Bay*	*nickel*	*Implementation Assessment*
2426	*Tabbs Bay*	*bacteria*	*Assessment*
2426	*Tabbs Bay*	*dioxin*	*Assessment*
2427	*San Jacinto Bay*	*dioxin*	*Assessment*
2428	*Black Duck Bay*	*dioxin*	*Assessment*
2428	*Black Duck Bay*	*nickel*	*Assessment Implementation*

2429	*Scott Bay*	*bacteria*	*Assessment*
2429	*Scott Bay*	*dioxin*	*Assessment*
2429	*Scott Bay*	*nickel*	*Assessment Implementation*
2430	*Burnett Bay*	*dioxin*	*Assessment*
2430	*Burnett Bay*	*nickel*	*Assessment Implementation*
2432	*Chocolate Bay*	*bacteria (oyster waters)*	*Assessment*
2436	*Barbours Cut*	*dioxin*	*Assessment*
2436	*Barbours Cut*	*nickel*	*Assessment Implementation*
3438	*Bayport Channel*	*dioxin*	*Assessment*
2439	*Lower Galveston Bay*	*bacteria (oyster waters)*	*Assessment*
2441	*East Matagorda Bay*	*bacteria (oyster waters)*	*Assessment*
2442	*Cedar Lakes*	*bacteria (oyster waters)*	*Assessment*
2451	*Matagorda Bay/Powderhorn Lake*	*bacteria (oyster waters)*	*Assessment*
2451	*Matagorda Bay/Powderhorn Lake*	*depressed dissolved oxygen*	*Assessment*
2452	*Tres Palacios Bay/Turtle Bay*	*bacteria (oyster waters)*	*Assessment*
2452	*Tres Palacios Bay/Turtle Bay*	*depressed dissolved oxygen*	*Assessment*
2453	*Lavaca Bay/Chocolate Bay*	*depressed dissolved oxygen*	*Assessment*
2453	*Lavaca Bay/Chocolate Bay*	*mercury in water*	*Assessment*
2453	*Lavaca Bay/Chocolate Bay*	*bacteria (oyster waters)*	*Assessment*
2453	*Lavaca Bay/Chocolate Bay*	*mercury in fish and crab tissue*	*Assessment*
2456	*Carancahua Bay*	*high pH*	*Assessment*
2456	*Carancahua Bay*	*depressed dissolved oxygen*	*Assessment*
2456	*Carancahua Bay*	*bacteria (oyster waters)*	*Assessment*
2462	*San Antonio Bay/Hynes Bay/Guadalupe Bay*	*bacteria (oyster waters)*	*Assessment*
2472	*Copano Bay/Port Bay/Mission Bay*	*bacteria (oyster waters)*	*Assessment*
2482	*Nueces Bay*	*zinc in oyster tissue*	*Assessment*
2482	*Nueces Bay*	*selenium*	*Assessment*
2483A	*Oso Creek*	*depressed dissolved oxygen*	*Assessment*
2485	*Oso Bay*	*depressed dissolved oxygen*	*Implementation Assessment*
2491	*Laguna Madre*	*depressed dissolved oxygen*	*Assessment*
2501	*Gulf of Mexico*	*mercury in king mackerel > 43 inches*	*Assessment*
2501	*Gulf of Mexico*	*depressed dissolved oxygen*	*Assessment*

Groundwater

Table B.2 Priority Water Bodies - Groundwater

Aquifer	*Region*	*Constituent(s) of Concern*	*Implementation or Assessment?*
Edward (BFZ)	*Central Texas*	*Vulnerability*	*Implementation Assessment*
Cenezoic Pecos Alluvium	*West Texas*	*Nitrate, Chloride, Sulfate, and TDS*	*Assessment*
Edwards Trinity (Plateau)	*Terrell, Reagan, and Crockett Counties*	*Nitrate*	*Assessment*
Ogallala	*Southern High Plains, Panhandle*	*Nitrate*	*Assessment*
Gulf Coast	*Rio Grande Valley*	*Nitrate, Iron, TDS*	*Assessment*
Seymour	*North Central*	*Nitrate, Vulnerability*	*Assessment*
Blaine	*North Central*	*Nitrate, Chloride, Iron, Sulfate, TDS*	*Assessment*
Lipan	*Concho, Runnels, Tom Green, and Coke Counties*	*Nitrate, Chloride, TDS*	*Assessment*
Bone Spring-Victorio Peak	*Far West Texas*	*Nitrate, Chloride, Fluoride, Sulfate, TDS*	*Assessment*
Trinity	*Central Texas North - Outcrop Area Only*	*Nitrate*	*Assessment*
Dockum	*Panhandle, West Texas - Outcrop Area Only*	*Nitrate*	*Assessment*
Edwards-Trinity (High Plains)	*Southern High Plains*	*Nitrate*	*Assessment*
Marathon	*Big Bend Area*	*Nitrate*	*Assessment*
Capitan Reef	*West Texas*	*Chloride, Dissolved Solids, Radioactivity*	*Assessment*
Hickory	*Llano Uplift*	*Radioactivity*	*Assessment*
Hueco - Mesilla	*Far West Texas*	*Sulfate*	*Assessment*
Brazos River Alluvium	*Southeast Texas*	*Iron, Manganese*	*Assessment*
Rustler	*Culberson, Reeves Counties*	*Iron, Sulfate, TDS, Radioactivity*	*Assessment*

APPENDIX C
OVERVIEW OF CURRENT PRIORITY WATERSHEDS, MILESTONES, AND ESTIMATED TIMELINES

Priority Water Body Summary

The Milestone Summary Table presents an overview of estimated completion times for milestones on Texas' priority waterbodies. The individual tables for priority waterbodies, which follow the Milestone Summary Table, provide similar information but in greater detail.

Milestones:

A. ***Stakeholder Group*** *-Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.*

B. ***Data Review*** *-Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.*

C. ***Targeted Assessment*** *-Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.*

D. ***Modeling*** *-Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.*

E. ***Action Plan*** *-Develop a detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.*

F. ***Implementation*** *-Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.*

Table C.1. Milestone Summary Table

Waterbody	2005	2006	2007	2008	2009	2010
Assessing AquaticLife Use in Tidal Streams	*Targeted Assessment*	*Modeling*	*Action Plan*			
Aquilla Reservoir	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Armand Bayou Local Initiative Watershed Plan	*Implementation*	*Implementation*	*Implementation*	*Action Plan* *Implementation*	*Implementation*	*Implementation*
Arroyo Colorado-D.O.	*Implementation*	*Action Plan* *Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Arroyo Colorado Legacy Pollutants	*Implementation*	*Targeted Assessment* *Implementation*	*Implementation*	*Implementation*	*Targeted Assessment* *Implementation*	*Implementation*
Brandy Branch Reservoir	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Buck Creek	*Implementation*	*Targeted Assessment* *Implementation*	*Action Plan* *Implementation*	*Implementation*	*Implementation*	*Implementation*
Buffalo and White Oak Bayous	*Data Review* *Targeted Assessment*	*Action Plan*	*Action Plan* *Implementation*	*Implementation*	*Implementation*	*Implementation*
Cedar Lake	*Implementation*	*Stakeholder Group* *Targeted Assessment* *Modeling*	*Implementation*	*Action Plan* *Implementation*	*Implementation*	*Implementation*
City of Denton Watershed Plan (Hickory Creek)	*Stakeholder Group* *Data Review*	*Targeted Assessment* *Implementation*	*Action Plan* *Implementation*	*Implementation*	*Implementation*	*Implementation*

Waterbody	2005	2006	2007	2008	2009	2010
Clear Creek Legacy and VOC Pollutants	*Targeted Assessment*	*Targeted Assessment*	*Targeted Assessment*	*Targeted Assessment*	*Targeted Assessment*	*Targeted Assessment*
	Implementation	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Clear Creek Watershed	*Implementation*	*Implementation*	*Implementation*	*Targeted Assessment*	*Implementation*	*Implementation*
				Implementation		
Clear Fork of the Trinity		*Action Plan*				
Coastal Bend Bays Plan	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Colorado and San Gabriel Rivers, Brushy and Petronilla Creeks	*Modeling*	*Implementation*	*Action Plan*	*Implementation*	*Implementation*	*Implementation*
	Implementation		*Implementation*			
Concho River Basin	*Stakeholder Group*	*Targeted Assessment*	*Action Plan*	*Implementation*	*Implementation*	*Implementation*
	Data Review	*Implementation*	*Implementation*			
Copano Bay Oysters	*Implementation*	*Stakeholder Group*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
		Modeling				
		Action Plan				
		Implementation				
Dallas Legacy Pollutants	*Targeted Assessment*	*Targeted Assessment*	*Targeted Assessment*	*Targeted Assessment*	*Targeted Assessment*	*Targeted Assessment*
	Implementation	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Dickinson Bayou	*Modeling*	*Action Plan*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
		Implementation				

Waterbody	2005	2006	2007	2008	2009	2010
E.V. Spence	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Fort Worth Legacy Pollutants	*Targeted Assessment*	*Targeted Assessment*	*Targeted Assessment*	*Targeted Assessment*	*Targeted Assessment*	*Targeted Assessment*
	Implementation	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Galveston Bay Plan	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Gilliand Creek	*Implementation*	*Stakeholder Group*	*Action Plan*	*Implementation*	*Implementation*	*Implementation*
		Modeling	*Implementation*			
		Implementation				
Guadalupe above Canyon	*Implementation*	*Stakeholder Group*	*Action Plan*	*Implementation*	*Implementation*	*Implementation*
		Modeling	*Implementation*			
		Implementation				
Gulf Coast Oyster Waters	*Action Plan*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
	Implementation					
Houston Ship Channel Dioxin Study	*Modeling*	*Modeling*	*Action Plan*	*Action Plan*	*Implementation*	*Implementation*
	Implementation	*Implementation*	*Implementation*	*Implementation*		
Houston Ship Channel Nickel Study	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Lake Austin	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Lake Granbury	*Stakeholder Group*	*Targeted Assessment*	*Action Plan*	*Implementation*	*Implementation*	*Implementation*
	Data Review	*Implementation*	*Implementation*			

Waterbody	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Lake Granger Watershed Plan	*Stakeholder Group* *Implementation*	*Stakeholder Group* *Implementation*	*Targeted Assessment* *Implementation*	*Action Plan* *Implementation*	*Implementation*	*Implementation*
Lake 'O the Pines	*Action Plan* *Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Lavaca and Chocolate Bays	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Little Wichita	*Stakeholder Group* *Data Review*	*Targeted Assessment* *Implementation*	*Action Plan* *Implementation*	*Implementation*	*Implementation*	*Implementation*
Martin Creek Reservoir	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Matagorda Bay / Tres Palacios Bay	*Implementation*	*Stakeholder Group* *Modeling* *Implementation*	*Action Plan* *Implementation*	*Implementation*	*Implementation*	*Implementation*
Middle Brazos River Basin	*Modeling* *Action Plan*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
North Bosque River	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*
Nueces Bay Zinc Project	*Implementation*	*Action Plan* *Implementation*	*Action Plan* *Implementation*	*Implementation*	*Implementation*	*Implementation*
Orange County	*Modeling* *Implementation*	*Action Plan* *Implementation*	*Implementation*	*Implementation*	*Implementation*	*Implementation*

Waterbody	2005	2006	2007	2008	2009	2010
Oso Bay	Targeted Assessment Modeling	Modeling Action Plan	Action Plan Implementation	Implementation	Implementation	Implementation
Oso Creek and Oso Bay	Implementation	Stakeholder Group Data Review Targeted Assessment Modeling	Action Plan Implementation	Implementation	Implementation	Implementation
Pecos Watershed Plan	Stakeholder Group Data Review	Targeted Assessment Implementation	Action Plan Implementation	Implementation	Implementation	Implementation
Sabinal River	Implementation	Stakeholder Group Targeted Assessment Modeling	Implementation	Action Plan Implementation	Implementation	Implementation
Salado Creek	Implementation	Implementation	Implementation	Implementation	Implementation	Implementation
San Antonio River Authority	Stakeholder Group Data Review	Targeted Assessment Implementation	Action Plan Implementation	Implementation	Implementation	Implementation
San Antonio River Basin, Leon River, and Peach Creek	Modeling Implementation	Modeling Implementation	Action Plan Implementation	Implementation	Implementation	Implementation
South Central Texas	Modeling Action Plan	Implementation	Implementation	Implementation	Implementation	Implementation

<table>
<tr><th>Waterbody</th><th>2005</th><th>2006</th><th>2007</th><th>2008</th><th>2009</th><th>2010</th></tr>
<tr><td rowspan="5">Tarrant Regional Water District Watershed Plans</td><td>Stakeholder Group</td><td>Targeted Assessment</td><td>Targeted Assessment</td><td>Targeted Assessment</td><td>Targeted Assessment</td><td>Targeted Assessment</td></tr>
<tr><td>Data Review</td><td rowspan="4">Implementation</td><td>Action Plan</td><td rowspan="4">Implementation</td><td rowspan="4">Implementation</td><td rowspan="4">Implementation</td></tr>
<tr><td>Targeted Assessment</td><td rowspan="3">Implementation</td></tr>
<tr><td>Modeling</td></tr>
<tr><td>Implementation</td></tr>
<tr><td rowspan="2">Trinity River</td><td rowspan="2">Implementation</td><td>Stakeholder Group</td><td>Action Plan</td><td rowspan="2">Implementation</td><td rowspan="2">Implementation</td><td rowspan="2">Implementation</td></tr>
<tr><td>Modeling</td><td>Implementation</td></tr>
<tr><td rowspan="2">Upper Oyster Creek</td><td>Targeted Assessment</td><td>Targeted Assessment</td><td>Action Plan</td><td rowspan="2">Implementation</td><td rowspan="2">Implementation</td><td rowspan="2">Implementation</td></tr>
<tr><td>Modeling</td><td>Modeling</td><td>Implementation</td></tr>
<tr><td>Welsh Reservoir</td><td></td><td>Implementation</td><td>Implementation</td><td>Implementation</td><td>Implementation</td><td>Implementation</td></tr>
</table>

Table C.2. Individual Priority Waterbody Tables

Armand Bayou Local Initiative Watershed Plan*-dissolved oxygen*
Segment 1113

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	***(1997)***						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	***(1997)***						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	***(1999)-no aquatic life impairment found***						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.					*projected completion*		
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

Assessing Aquatic Life Use in Tidal Streams *-dissolved oxygen*
Segments 0511, 1501, 2453A

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.							
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2004)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.		*X*					
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.			*UAA to be developed*				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.							
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.			*X*	*X*	*X*	*X*	*X*

***Aquilla Reservoir** -Atrazine*
Segment 1254

Milestones	completed	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(1998)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(1998)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2000)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*omitted*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	*TMDL - (2002)*						
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*WQS met - routine monitoring continues*	*X*	*X*	*X*	*X*	*X*	*X*

***Arroyo Colorado** -dissolved oxygen*
Segment 2201

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(1998)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(1998)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2000)*	*X*	*X*	*X*			
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*Standards unattainable*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				*X*			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(2000)*	*X*	*X*	*X*	*X*	*X*	*X*

Arroyo Colorado Legacy Pollutants *-DDE, DDT, DDD, Dieldrin, Endrin, Lindane, Hexachlorobenzene, Heptachlor, Heptachlor Epoxide, Chlordane, Toxaphene, PCBs*
Segments 2201, 2202, 2202A

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(1998)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(1998)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(1999)*		*tissue samples*			*tissue samples*	
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*(1999)*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	*TMDL - (2001) revised-2003*						
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(1998)*	*X*	*X*	*X*	*X*	*X*	*X*

***Brandy Branch Reservoir** -selenium*
Segment 0505E

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2001)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2001)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*advisory rescinded (2004)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.		*proposed delisting*					
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

***Buck Creek** -bacteria*
Segments 0207A

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	***(2003)***						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality	***(2003)***						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.			***X***				
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				***X***			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		***X***	***X***	***X***	***X***	***X***	***X***

***Buffalo and Whiteoak Bayous** -bacteria*
Segments 1013, 1014, 1017

Milestones	**completed**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2000)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2001)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.		*X*					
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.		*X*					
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.			*TMDL*	*IP*			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.				*X*	*X*	*X*	*X*

***Cedar Lake**- bacteria*
Segments 2442

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.			***X***				
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.							
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.			***X***				
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.			***X***				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.					***X***		
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		***X***	***X***	***X***	***X***	***X***	***X***

City of Denton Watershed Plan (Hickory Creek) *-bacteria*
Segment 0823

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.		*X*					
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.		*projected completion*					
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.			*projected completion*				
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				*projected completion*			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

Clear Creek Legacy and VOC Pollutants *-chlordane, trichloroethane, dichloroethane*
Segments 1101, 1102

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(1998) Technical Advisory Committee for VOCs*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2000)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2001)*	*tissue samples 2000-2005*	*con'td. sampling*	*X*	*X*	*X*	*X*
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*omitted*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	*TMDL - 2001* *IP- 2003*	*poss. revision if samples show no decline*					
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(2001)*	*X*	*X*	*X*	*X*	*X*	*X*

Clear Creek Watershed - *total dissolved solids, bacteria*
Segment 1101, 1101B, 1102, 1102A, 1102B, 2425

Milestones	*completed*	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*2003*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.							
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.					*X*		
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.							
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.			*X*	*X*	*X*	*X*	*X*

Clear Fork of the Trinity River *-dissolved oxygen*
Segments 0831, 0833

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2000)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2000)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2001)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*omitted*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	*UAA being developed*						
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.							

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	***(1998)***						
*Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality**.***	***(1998)***						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	***Ongoing***						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	***(1998)***						
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	***(1998)***	*X*	*X*	*X*	*X*	*X*	*X*

Colorado and San Gabriel Rivers, Brushy and Petronilla Creeks *-chloride, sulfate, total dissolved solids (TDS)*
Segments1214, 1244, 1426, 2204

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2002)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2003)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2004)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.		*X*					
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				*X*			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(2002)*	*X*	*X*	*X*	*X*	*X*	*X*

Concho River Basin*- impaired macrobenthos community, chloride, total dissolved solids*
Segments 1421, 1422, 1423, 1424, 1425

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.		*X*					
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.		*projected completion*					
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.			*projected completion*				
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				*projected completion*			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

***Copano Bay Oysters** - bacteria*
Segments 2472

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.			***X***				
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.							
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.							
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.			***X***				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.			***X***				
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		***X***	***X***	***X***	***X***	***X***	***X***

***Dallas Legacy Pollutants** - chlordane, DDT, DDD, DDE, Dieldrin, Heptachlor Epoxide, PCBs*
Segments 805, 841, 841A

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2000)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2000)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2000)*	*tissue samples 2000-2005*	*con't. sampling*	*X*	*X*	*X*	*X*
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*omitted*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	*TMDL - (2001)*	*poss. revision if samples show no decline*					
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(2001)*	*X*	*X*	*X*	*X*	*X*	*X*

***Dickinson Bayou** -dissolved oxygen*
Segment 1103

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2000)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2001)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2004)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*(2004)*	*new model*					
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.			*X*				
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.			*X*	*X*	*X*	*X*	*X*

***E.V. Spence** -sulfate, total dissolved solids*
Segment 1411

Milestones	**completed**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(1999)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(1998)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2000)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*omitted*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	*TMDL - (2003)*						
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(2001)*	*X*	*X*	*X*	*X*	*X*	*X*

Ft. Worth Legacy Pollutants *-chlordane, DDE, Dieldrin, PCBs*
Segments 806, 806A, 806B, 829, 829A

Milestones	**completed**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*omitted*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2000)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2000)*	*tissue samples 2000-2005*	*con'td sampling*	*X*	*X*	*X*	*X*
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*omitted*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	*(2001)*	*poss. revision if samples show no decline*					
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(2001)*	*X*	*X*	*X*	*X*	*X*	*X*

***Galveston Bay Plan**- bacteria*
Segment

Milestones	*completed*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(1994)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(1994)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*Ongoing*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	*(1994)*						
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(1994)*	*X*	*X*	*X*	*X*	*X*	*X*

Gilleland Creek *- bacteria*
Segment 1428C

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.			***X***				
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.							
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.							
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.			***X***				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				***X***			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		***X***	***X***	***X***	***X***	***X***	***X***

***Guadalupe above Canyon** - bacteria*
Segment 1806

Milestones	*completed*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.			***X***				
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.							
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.							
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.			***X***				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				***X***			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		***X***	***X***	***X***	***X***	***X***	***X***

Gulf Coast Oyster Waters *-bacteria*
Segments 2421, 2422, 2423, 2424, 2432, 2439, 2441, 2442, 2451, 2452, 2453, 2456, 2462, 2472

Milestones	**completed**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2001)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2002)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2002)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*(2003)*	*BST to be completed*					
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.		*X*	*X*				
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

Houston Ship Channel *-dioxin*
Segments 0901,1001, 1005, 1006, 1007, 2421, 2426, 2427, 2428, 2429, 2430, 2436, 2438

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2000)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2001)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.		*X*					
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.		*X*	*X*				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				*TMDL*	*IP*		
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

***Houston Ship Channel** -nickel*
Segments 1001, 1005, 1006, 1007, 1013, 1014, 1016, 1017, 2426, 2427, 2428, 2429, 2430, 2436

Milestones	*completed*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	***(1999)***						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	***(1990)***						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	***(1998)***						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	***(1998)***						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	***(2001) TMDL*** ***(2003) IP***						
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		***X***	***X***	***X***	***X***	***X***	***X***

***Lake Austin**-dissolved oxygen*
Segment 1403

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(1999)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(1999)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2000)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*omitted*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	*EPA recommend-ation to delist (2001)*						
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(2001)*	*X*	*X*	*X*	*X*	*X*	*X*

***Lake Granbury**- bacteria*
Segments 1205

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.		*X*					
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.			*projected completion*				
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.				*projected completion*			
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.					*projected completion*		
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

***Lake Granger Watershed Plan**-sediment*
Segments 1247

Milestones	*completed*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.		*X*					
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.			*projected completion*				
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.				*projected completion*			
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.					*projected completion*		
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

***Lake O'the Pines** -dissolved oxygen*
Segment 0403

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(1998)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(1999)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2002)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*(2003)*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.		*X*					
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(1999)*	*X*	*X*	*X*	*X*	*X*	*X*

***Lavaca and Chocolate Bays** -mercury and dissolved oxygen*
Segment 2453

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2001)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2002)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2003)- indicated TMDL not necessary*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*omitted*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.		*proposed delisting*					
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(2001)*	*X*	*X*	*X*	*X*	*X*	*X*

Little Wichita*- dissolved oxygen, total dissolved solids*
Segments 0211, 0212

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.		*X*					
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.		*projected completion*					
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.			*projected completion*				
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				*projected completion*			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

Martin Creek Reservoir *-selenium*
Segment 0505F

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2001)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2001)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*advisory rescinded (2004)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.		*proposed delisting*					
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

Matagorda Bay / Tres Palacios Bay *- dissolved oxygen*
Segments 2451, 2452, 2456, 2483A

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.			***X***				
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.							
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.							
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.			***X***				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				***X***			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		***X***	***X***	***X***	***X***	***X***	***X***

***Middle Brazos River Basin** -dissolved oxygen*
Segments 1217A, 1243

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*omitted*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2001)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2004)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.		*X*					
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.		*X*	*X*				
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(1999)*	*X*	*X*	*X*	*X*	*X*	*X*

***North Bosque River** -nutrients*
Segments 1226, 1255

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(1995)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(1996)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2000)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*(2000)*			*X*			
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	*(2001)*						
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(2002)*	*X*	*X*	*X*	*X*	*X*	*X*

Nueces Bay Zinc Project *-selenium, zinc*
Segment 2482

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2001)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2002)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2003)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.	*(2004)*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.			*TMDL*	*IP*			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(2002)*	*X*	*X*	*X*	*X*	*X*	*X*

Orange County *-bacteria, dissolved oxygen, pH*
Segment 0511, 0511A

Milestones	*completed*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2002)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2002)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2004)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.		*X*					
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.			*X*				
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(2003)*	*X*	*X*	*X*	*X*	*X*	*X*

Oso Bay *-dissolved oxygen*
Segments 2485, 2491

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2000)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2000)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.		*X*					
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.		*X*	*X*				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.			*X*	*X*			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*(1999)*	*X*	*X*	*X*	*X*	*X*	*X*

Oso Creek, Oso Bay - *Bacteria*
Segment 2485, 2485A

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.			***X***				
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.			***X***				
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.			***X***				
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.			***X***				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				***X***			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		***X***	***X***	***X***	***X***	***X***	***X***

Pecos Watershed Plan*- chloride, sulfate, and total dissolved solids*
Segments 2310, 2311

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.		*X*					
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.		*projected completion*					
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.			*projected completion*				
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				*projected completion*			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

***Sabinal River** - nitrate-nitrite*
Segment 2110

Milestones	*completed*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.			***X***				
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.							
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.			***X***				
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.			***X***				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.					***X***		
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		***X***	***X***	***X***	***X***	***X***	***X***

***Salado Creek** -dissolved oxygen*
Segment 1910

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(1998)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(1998)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2000)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation	*(2001)*						
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.	*TMDL - (2002)*						
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.	*IP was determined unnecessary*	*X*	*X*	*X*	*X*	*X*	*X*

***San Antonio River Authority**- bacteria*
Segment 1911

Milestones	***completed***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.		*X*					
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.		*projected completion*					
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.			*projected completion*				
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.							
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				*projected completion*			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

***San Antonio River Basin, Leon River, and Peach Creek** -bacteria*
Segments 1221, 1803C, 1901, 1910, 1910A, 1911

Milestones	**completed**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2003)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2001)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2004)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.		*X*	*X*				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				*X*			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

***South Central Texas** -bacteria, dissolved oxygen*
Segment 1427, 1806A, 1803A, 1803B, 2107, 2104, 2113, 1906, 1913, 1908

Milestones	*completed*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2002)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2001)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*(2004)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.		*X*					
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.		*X*					
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

Tarrant Regional Water District Watershed Plans

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.		*X*					
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.		*X*					
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.		*X*	*X*	*X*	*X*	*X*	*X*
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.		*X*					
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				*projected completion*			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		*X*	*X*	*X*	*X*	*X*	*X*

***Trinity River** -bacteria*
Segments 0805

Milestones	completed	2005	2006	2007	2008	2009	2010
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.			***X***				
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.							
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.							
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.			***X***				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				***X***			
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.		***X***	***X***	***X***	***X***	***X***	***X***

***Upper Oyster Creek** -dissolved oxygen, bacteria*
Segment 1245

Milestones	***completed***	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.	*(2001)*						
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.	*(2002)*						
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.		*X*	*X*				
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.		*X*	*X*				
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.				*X*	*X*		
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.				*X*	*X*	*X*	*X*

Welsh Reservoir *- selenium*
Segment 404D

Milestones	**completed**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Employ or develop a Local Watershed Committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.							
Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.							
Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.	*advisory rescinded (2004)*						
Develop and apply model(s) to determine numerical load allocations. Recommend control strategies for implementation.		*proposed delisting*					
Develop A detailed action plan (TMDL, IP, or WPP) which establishes overall goals and objectives, load allocations, strategy for load allocation, timetable for implementation, and a list of expected results.							
Implement voluntary and regulatory actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness.			*X*	*X*	*X*	*X*	*X*

APPENDIX D AQUIFER VULNERABILITY RANKING SYSTEM

DRASTIC: A Standardized System for Evaluating Groundwater Pollution Potential Using Hydrogeologic Settings (EPA/600/2-87/035 June 1987).

DRASTIC is an acronym composed of letters for each of the measurable parameters for which data are generally available from a variety of reference sources, including the Texas Water Development Board, Natural Resource Conservation Service, Bureau of Economic Geology, USGS and others. These parameters are called DRASTIC factors, and include:

*D - **D**epth to water*
*R - net **R**echarge*
*A - **A**quifer media*
*S - **S**oil media*
*T - **T**opography*
*I - **I**mpact of the vadose zone media*
*C - hydraulic **C**onductivity of the aquifer*

In the DRASTIC methodology, each of these factors has a "range" and associated "rating" - for example, Depth to water has the following ranges and ratings:

Range	Rating
0-5 feet	10
5-15 feet	9
15-30 feet	7
30-50 feet	5
50-75 feet	3
75-100 feet	2
100+ feet	1

As is evident, the "rating" has a higher numeric value for a shallower depth to water.

Net Recharge has a "range" based on inches of infiltration.

Aquifer media has a "range" based on rock type, as is Impact of vadose zone material. Soil media is similarly based on soil type.

Topography's range is based on percent slope.
The range for hydraulic Conductivity is based on gallons per day per square foot.

The "ratings" are then multiplied by an assigned "weight" for each of the factors - for Depth to water, the assigned "weight" is 5. For Topography, the assigned "weight" is 1. These "weights" are for a pollution potential from general, industrial, and municipal sources. The factors receive a different set of assigned "weights" for pollution potential from agricultural sources. Factor "weights" may also be based on the best professional judgement of a geo-scientist doing the analysis.

Factor "ratings", multiplied by their assigned "weights", are then added together to yield a DRASTIC index, a numerical indicator of an aquifer's relative susceptibility to impacts from surface activities in a given location. More information may be obtained from the publication referenced at the top of this section.

Table D.1 Aquifer Vulnerability Ranking

Major Aquifers	***Average Drastic Index***	***Vulnerability Rank ****
Seymour	*144*	*High*
Edwards (Balcones Fault Zone - San Antonio)	*135*	*High*
Edwards (Balcones Fault Zone - Austin)	*126*	*High*
Carrizo-Wilcox	*117*	*Medium*
Edwards-Trinity (Plateau)	*107*	*Medium*
Ogallala (South)	*99*	*Medium*
Gulf Coast	*95*	*Medium*
Trinity	*95*	*Medium*
Cenzoic Pecos Alluvium	*95*	*Medium*
Ogallala (North)	*87*	*Low*
Hueco-Mesilla Bolson	*84*	*Low*
Minor Aquifers	***Average Drastic Index***	***Vulnerability Rank ****
Brazos River Alluvium	*144*	*High*
Ellenberger-San Saba	*126*	*High*
Marble Falls	*126*	*High*
Hickory	*114*	*Medium*
Nacatoch	*111*	*Medium*
Blossom	*109*	*Medium*
Queen City	*108*	*Medium*
Lipan	*108*	*Medium*
Rustler	*106*	*Medium*
Blaine	*102*	*Medium*

Minor Aquifers	*Average Drastic Index*	*Vulnerability Rank **
Bone Springs-Victorio Peak	*100*	*Medium*
Capitan Reef Complex	*98*	*Medium*
Sparta	*98*	*Medium*
Marathon	*96*	*Medium*
West Texas Bolsons	*90*	*Low*
Edwards-Trinity (High Plains)	*83*	*Low*
Rita Blanca	*83*	*Low*
Woodbine	*82*	*Low*
Igneous	*79*	*Low*
Dockum	*78*	*Low*
Yegua-Jackson	*Not Available*	*Not Available*

APPENDIX E THE HISTORY OF NONPOINT SOURCE MANAGEMENT

The need to protect the environment from nonpoint source pollution has resulted in the creation of a number of pollution control laws, regulations, and programs over the past 30 years. The implementation of these programs takes place at all levels - federal, state, and local. This Appendix presents a historical overview of some of the major legislation and programs that have been implemented to address nonpoint source pollution.

Clean Water Act of 1972

The Clean Water Act (CWA) of 1972 forms the basis for water quality protection for surface water as well as groundwater. It was enacted as a series of amendments to the Federal Water Pollution Control Act of 1948. The 1972 Act was prompted by the worsening state of America's rivers and several high-profile oil spills. The stated objective of the Clean Water Act is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The Act instituted a national program for cleaning up the nation's waters and required state programs be put in place to achieve the water quality goals. The statute employed a variety of regulatory and nonregulatory tools to reduce pollutant discharges into waterways, finance municipal wastewater treatment, and manage polluted runoff.

Congress did not directly regulate nonpoint source pollution in the original 1972 Act. Instead, early efforts at nonpoint source management were relegated to state and local governments through general area-wide waste management planning conducted under §208 of the CWA. Under the 208 program, state governors designated local management authorities for areas with waste treatment problems. These local authorities, in turn, engaged in comprehensive area-wide waste treatment planning. The Plans were primarily devoted to treatment works, but were also to take account of various nonpoint sources of pollution, including agricultural, silvicultural, mine-related, and construction related sources. §208 provided cost share funds to those areas of States which had approved waste management plans.

In the late 1970's, initial Water Quality Management Plans for Texas were prepared by the Texas Department of Water Resources (now the TCEQ) under the provisions of §208. These plans contained an assessment of NPS pollution conditions in each of the classified waters in Texas. Based primarily on these assessments, some fifteen individual NPS-related studies were conducted over a period of three years.

During the development of these initial Plans, two executive orders were issued to delineate the responsibilities of the two principle agencies involved with nonpoint source controls in the State of Texas. In 1979, the Texas Department of Water Resources was designated the State agency responsible for coordinating §208 planning, while the Texas State Soil and Water Conservation Board (TSSWCB) was designated as the planning agency responsible for identifying management strategies for agricultural and silvicultural nonpoint sources of pollution.

National Urban Runoff Program

For many years following the passage of the CWA, EPA and the states focused pollution control efforts mainly on regulating discharges from traditional "point source" facilities, such as municipal sewage plants and industrial facilities. These dischargers were considered the primary contributors to poor water quality conditions. However, as better point source control measures were developed, it became evident that more diffuse sources of water pollution were also contributing to water quality problems.

The National Urban Runoff Program (NURP) was developed by EPA in 1978 as a five-year program to obtain data on control of urban runoff quality and its impact on receiving waters. Between 1978 and 1983, NURP conducted studies that evaluated outfalls in 28 communities across the United States. These studies confirmed that contaminants contained in urban and suburban runoff, such as sediments, phosphorus, nitrates, coliform bacteria, as well as lead, and other heavy metals, impaired water quality in streams, lakes, wetlands, and estuaries. The data also showed that runoff from urban and industrial areas contained significant quantities of the same types of regulated pollutants that are found in wastewater and industrial discharges.

National Pollutant Discharge Elimination System

To address the problem of stormwater runoff, Congress amended the Clean Water Act in 1987 to include urban stormwater discharges as a "point source," requiring the EPA to develop permit requirements for urban stormwater discharges even though the actual source of the pollution is from nonpoint sources. The National Pollutant Discharge Elimination System (NPDES) law was promulgated as a two-phase program. Phase One, implemented in 1990, addressed construction, industrial, and municipal discharges in cities with populations over 100,000. Phase Two for all municipalities under 100,000 became effective in 2003. The TCEQ assumed delegation of the Federal NPDES program (now known as TPDES) in September 1998.

Rural Clean Water Program

In 1980, Congress established an experimental program to address agricultural nonpoint source pollution. The experiment was called the Rural Clean Water Program (RCWP). The RCWP combined land treatment and water quality monitoring to document the effectiveness of NPS pollution control measures.

Twenty-one experimental RCWP projects were selected throughout the country, representing a wide range of pollution problems and impaired water uses. Each of the projects involved the implementation of best management practices (BMPs) to reduce NPS pollution and water quality monitoring to evaluate the effects of the land treatment. BMP installation was targeted to land areas or sources of NPS pollutants identified as having significant impacts on the impaired or threatened water resource. Cost-share funds and technical assistance were offered to producers as incentives for *using or installing BMPs. The RCWP was administered by the U.S. Department of Agriculture in consultation with the U.S. Environmental Protection Agency.*

The RCWP projects made significant contributions to the body of knowledge about NPS pollution, NPS pollution control technology, agricultural NPS pollution monitoring design and data interpretation, and the effectiveness of voluntary cost-share programs designed to assist producers in reducing agricultural NPS pollution. The RCWP program was phased out by 1990.

The 1987 Clean Water Act Amendment: Nonpoint Source Management

In 1987 Congress amended the 1972 Clean Water Act by adding §319. This amendment was the first concerted effort by the federal government to address pollution from nonpoint sources. §319 established a national policy requiring states to develop and implement programs for the control of nonpoint source pollution. The new §319 created a two step process for nonpoint source management. States first had to submit to EPA a report that identifies waters within the state that, without additional action to control nonpoint sources of water pollution, cannot reasonably be expected to attain or maintain applicable water quality standards or the goals and requirements of the Clean Water Act. States then had to submit a nonpoint source management program to the EPA for approval. In addition, §319 provided for continuing federal monitoring of state nonpoint source progress through annual reports to EPA, and EPA's annual reports to Congress.

Initially, the Texas Water Commission (predecessor to TCEQ) was given the authority to administer the §319 Nonpoint Source program for the State of Texas, and used its authority to provide federal funds to a small number of planning agencies and river authorities across the state. In response to the 1987 Amendment, the Commission completed its initial NPS Pollution Assessment Report and Management program in 1989, and prepared the first program update in 1991.

As part of the public participation process, the Texas Water Commission convened a 27 member panel representing industry, agriculture, environmental groups, and government from diverse areas of the state to recommend a program to reduce nonpoint source pollution in Texas. The group's initial meeting was held on March 30, 1989. The committee established three specialized subcommittees–Education, Monitoring & Database, and Best Management Practices –reflecting the major emphases and worked 16 months to produce a set of fourteen recommendations. The recommendations ranged from development of a BMP technical manual to enforcement activities and public education. The Funding Subcommittee recommended funding requirements of $3.6 million to implement the program and recommended the Commission seek to implement the entire recommendation package. Specific methods for funding were not identified in order to allow the Commissioners flexibility in identifying funding sources. All fourteen recommendations were adopted by the TWC.

In 1993, the Texas Legislature authorized the Texas State Soil and Water Conservation Board to implement voluntary programs to assist agricultural and silivicultural *producers to meet the state's water quality goals and standards. As a result of TSSWCB's new authority, the EPA began to award half of the annual Texas §319(h) grant allotment directly to the TSSWCB, with the other half awarded to the Texas Natural Resource Conservation Commission (renamed the Texas Commission on Environmental Quality in 2002.) The TSSWCB and TCEQ coordinate the §319 program for the State of Texas according to the terms of a Memorandum of Agreement executed in 1993 between the two agencies.*

In 1996, the State of Texas initiated preparation of the second update to the State's Nonpoint Source Management Program which was approved by EPA in February 2000. The document was a collaborative effort between the TCEQ and the TSSWCB and was designed to complement the TMDL process underway in Texas.

Recent grant guidelines under §319 reflect the growing recognition that strategies built on specific watershed conditions are more effective at controlling nonpoint source than approaches based on jurisdictional roles of municipalities, counties, and states. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality goals will become an integral part of future nonpoint source management under the §319 PROGRAM.

CLEAN WATER ACTION PLAN

A major enhancement to the §319 grant program came about in 1998 through the EPA's and USDA's Clean Water Action Plan (CWAP). In his 1998 State of the Union Address, President Bill Clinton announced a new Clean Water Initiative to speed the restoration of the nation's waterways. This new initiative aimed to achieve clean water by strengthening public health protections, targeting community-based watershed protection efforts at high priority areas, and providing communities with new resources to control polluted runoff.

The CWAP emphasized four tools in achieving water quality: (1) a watershed approach to water pollution; (2) stronger federal and state water quality standards; (3) better natural resource stewardship for cropland, pasture, rangeland, and forests; and (4) better information for citizens and government officials. All of these tools affect nonpoint source pollution control and incorporate federal and state or local measures. In conjunction with the plan, the CWAP initiative was budgeted additional funds by Congress for water pollution control. §319 nonpoint source control programs received $200 million of additional funding, known as incremental funding, and NOAA received a new allocation to control polluted runoff and toxic contaminants. Since award of the first incremental funds in 1999, Congress has budgeted both base and incremental grant funding to EPA and the States for control of nonpoint source pollution.

Total Maximum Daily Load Program

The 1972 Clean Water Act did provide another mechanism for addressing nonpoint source pollution through §303. This Section required states to set ambient water quality standards for all water bodies within the state and identify the beneficial uses of each water body. In 1985 and 1992, EPA issued rules for implementing §303(d) under which States were required to identify those waters not meeting water quality standards; prioritize those waters; and set Total Maximum Daily Loads, or TMDLs, of pollutants for each such waterbody in order of priority. The TMDL process was designed to address load allocations for nonpoint sources as well as point sources. In addition, the rule required States TMDLs to restore those impaired waters but did not provide for actual implementation of the TMDLs.

In the 1970's and 1980's, EPA and the States focused on bringing point sources of pollution into compliance with NPDES requirements. Setting TMDLs for both point and nonpoint source pollution was viewed as an expensive and complicated process. The lack of widespread TMDL development was perceived by many groups around the country as a source of contention. As a result, a string of court cases filed in the early to mid-1990's, under the citizen suit provision of the CWA, forced EPA and the states to stop avoiding TMDL implementation.

Although the State of Texas was not involved in litigation, the TCEQ committed itself in 1998 to developing TMDLs for all impaired waterbodies within 10 years of their first placement on the state's 303(d) list. The 76th (1999) and 77th (2001) Texas Legislatures appropriated funds to the TCEQ and the TSSWCB to support the development of TMDLs. Texas has already completed a number of TMDLs for nonpoint source affected waterbodies and submitted them to the EPA. Currently, the TCEQ and TSSWCB operate under the 1992 EPA TMDL guidelines. Control of nonpoint sources remains voluntary through the implementation of best management practices.

National Estuary Program

In response to pollution in coastal waters, Congress established the National Estuary Program (NEP) under §320 of the Clean Water Act of 1987. The mission of the NEP is to protect and restore the health of estuaries while supporting economic and recreational activities. Under the Act, the administrator of the EPA was given authorization to convene management conferences to develop Comprehensive Conservation and Management Plans (CCMPs) for estuaries of national significance that are threatened by pollution, development, or overuse. Two Texas estuaries were named Estuaries of National Significance under §320 and were accepted into the National Estuary Program: Galveston Bay in July 1988, and Corpus Christi Bay in October 1992.

Both Texas estuaries have been impacted by nonpoint source pollution. The Coastal Bend Bays & Estuaries Program (CBBEP), established in 1994, submitted a CCMP in 1998. Contaminated stormwater flowing into the bay has been identified as a primary water quality concern. With funds from federal, state, and local governments, private *industry and foundation grants, the CBBEP has provided funding for nonpoint source control projects in the coastal bend region. The Galveston Bay Estuary Program (GBEP), established in 1989, drafted and adopted a CCMP in April 1995 to improve water quality and enhance living resources in Galveston Bay. Water and sediments in tributaries and near-shore areas of Galveston Bay have been degraded by contaminated runoff from nonpoint sources, primarily from urbanized areas. During the 1995 Texas legislative session, funds were approved for the GBEP to proceed with Plan implementation.*

In 1999, the Texas Legislature passed the Texas Estuaries Act (HB 2561), which recognized the economic and environmental value of publicly held resources in Texas estuaries. The Act identified the TCEQ as the lead management agency and directs other state agencies to work together.

Other Federal Programs

The Clean Water Act, which recently celebrated its 30th anniversary, has been credited with significant water quality improvements to surface water. Under the CWA, municipal and industrial wastewater facilities have been built or upgraded and industrial point source discharges have been regulated and controlled. Despite this progress, many waterbodies remain impaired from nonpoint sources. Congress has not significantly amended the Clean Water Act's nonpoint source provisions since 1987, however, the CWA is not the only vehicle through which Congress has extended federal control over nonpoint source pollution.

Coastal Zone Nonpoint Source Management

In 1972 Congress passed the Federal Coastal Zone Management Act (CZMA) in response to reports on coastal pollution and erosion. With this Act, the federal government established a program to encourage coastal states and territories to develop land-use plans that would protect coastal resources, including wetlands, dunes, and barrier islands. The CZMA provided funding to states to develop programs to define and regulate permissible land and water uses within this zone.

The Coastal Zone Management Reauthorization Amendments of 1990 (CZARA) created the Coastal Nonpoint Source Program under §6217. As a prerequisite for receiving continued CZMA funding, CZARA required the 29 coastal states, with federally approved coastal zone management plans, to develop and submit coastal nonpoint source pollution control programs for approval by the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA). States were required to issue management measures for certain categories of runoff and erosion, and to evaluate nonpoint sources and identify coastal areas that would be negatively affected by specified land uses. In 1991, EPA proposed guidance on management measures for five major categories of nonpoint sources. In 1992, EPA provided updated guidance for an agricultural management measure for erosion and sediment control and confined animal facility management, and a management measure for urban runoff in developing areas. The Coastal Nonpoint Source Program also *established shared responsibility for managing coastal waters between state Coastal Zone Management programs and state agencies responsible for overseeing implementation of §319 programs.*

In 1991, the Texas Legislature directed the General Land Office to head up a Coastal Coordination Council, which developed a Coastal Zone Management Plan in response to the requirements of the CZARA. The Plan, which became effective in 1995, sets policies, standards and regulations affecting private and public property in all counties contiguous to the Texas coastline. Activities such as development permits, fill-and-dredge operations, siting of oil and gas waste-disposal pits, agricultural activities, and highway construction are addressed in the plan. The Texas Coastal Management Program was approved by the National Oceanic and Atmospheric Administration (NOAA) on January 10, 1997.

As a requirement for federal approval of its coastal management program, Texas was required to develop and implement a program to specifically address coastal nonpoint source pollution. The purpose of the Coastal NPS Program is to identify sources of coastal NPS pollution and develop recommendations for its prevention.

The Coastal NPS Program for Texas has been under development since 1997. To facilitate the development of the NPS Program, the Coastal Coordination Council established a work group comprised of staff from the General Land Office, Texas Commission on Environmental Quality, Texas Railroad Commission, Texas Department of Transportation, Texas Parks and Wildlife Department, Texas State Soil and Water Conservation Board, and a public member from the Council. This work group has addressed comments submitted by the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA) regarding Texas' Coastal NPS Program, reviewed and recommended proposed NPS pollution control projects, and researched possible options to enhance the program.

In December 1998, Texas submitted its Coastal NPS Program to NOAA and EPA. After two and a half years of discussion between Texas and the federal agencies, NOAA and EPA published in the Federal Register, in late September 2001, their intent to approve the Texas Coastal NPS Program with certain conditions. NOAA and EPA identified six areas (encompassing 18 of the 52 required management measures) that Texas must strengthen or correct prior to receiving full approval of the Coastal NPS Program. These areas are:

- *development and site development*
- *watershed protection and existing development*
- *construction site chemical control*
- *new and operating onsite disposal systems*
- *roads, highways, and bridges; and*
- *hydromodification*

On December 24, 2002, NOAA and EPA emailed a memo concerning policy clarification on the overlap of §6217 Coastal NPS Programs with Phase I and Phase II

Storm Water Regulations. This memo clarifies which activities are no longer subject to the requirements of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) Coastal NPS Control Program.

The second notice to conditionally approve Texas' Coastal NPS Program was posted in the Federal Register on April 7, 2003. The Final Conditional Approval Letter was received on July 9, 2003. Texas was given five years to meet the remaining conditions. The Coastal NPS Program coordinates with 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 NPS Program.

Safe Drinking Water Act: Source Water Protection

The Safe Drinking Water Act (SDWA), promulgated by Congress in 1974, established a Federal program to monitor and increase the safety of the nation's drinking water supply. The SDWA authorized the EPA to set and implement health-based standards to protect against both naturally occurring and man-made contaminants in drinking water. The 1986 Amendment to the SDWA included a provision for States to establish wellhead protection (WHP) areas to protect groundwater from all sources of contamination including nonpoint sources. Texas was the first state in the nation to implement a wellhead protection project, having adopted a voluntary approach. The 1996 Amendment to the SDWA expanded the WHP program to strengthen protection for all sources of drinking water including surface water.

Intermodal Surface Transportation Efficiency Act

Another major piece of legislation passed in 1991 was the Intermodal Surface Transportation Efficiency Act (ISTEA) designed to expand and improve the quality and condition of the nation's highway and transportation system. This Act contained provision for the planning and developing of highway systems and a host of transportation enhancement activities including the mitigation of water pollution due to highway runoff. ISTEA established a block grant program in which States could use a portion of their federal highway funding allotment for runoff pollution control devices and other best management practices to reduce the amount of polluted runoff that reaches lakes and rivers. ISTEA also required that Departments of Transportation develop national erosion control guidelines for states to follow when carrying out federal-aid construction projects. Federal Highway Administration guidelines for erosion and sediment control in coastal areas must be consistent with both CZARA Guidance and the state 319 program.

The Food Security Act of 1985

Since 1985, farm bills have recognized the environmental problems caused by or associated with agricultural nonpoint source pollution. Congress passed the federal Food Security Act in 1985 to help prevent erosion of cropland and, incidentally, to control sediment runoff from farms. Conservation compliance provisions of the act required farmers who farm highly erodible land to have a conservation plan developed by 1990 and installed by 1995 to be eligible to participate in federal farm programs.

The Act also established the Conservation Reserve Program (CRP) to provide financial incentives to farmers who take highly erodible cropland and other environmentally fragile land out of production.

Federal Agriculture Improvement and Reform Act of 1996

In 1996 Congress reauthorized the Farm Bill (the Federal Agriculture Improvement and Reform Act) which refunded and restructured the Conservation Reserve Program and made changes to the program including the addition of environmental criteria in recognition that agriculture is a major cause of nonpoint source pollution. The programs of the Farm Bill are administered by the USDA - Natural Resource Conservation Service (NRCS).

The 1996 Bill also created the Environment Quality Incentives Program (EQIP) which offered financial, educational, and technical assistance to encourage persons involved in agricultural or livestock production to adopt conservation practices to protect water quality.

Farm Security and Rural Investment Act of 2002

The Farm Security and Rural Investment Act of 2002, authorized or reauthorized a number of conservation programs, including the Resource Conservation and Development Program. The legislation simplified existing programs and created new ones to address high-priority environmental and production goals. The new Farm Bill authorized an 80 percent increase in funding above levels previously available for USDA programs designed to protect and conserve natural resources. The 2002 Farm Bill also enhanced coordination between the EPA and the USDA by integrating funding and resources to minimize potential duplication of effort.

State of Texas Nonpoint Source Control Programs

In addition to the CWA §319 grant program and other federally funded programs, the State of Texas has managed nonpoint source water pollution through a combination of programs and regulations at the regional and local level.

General Discharge Prohibition

The Texas Water Code provides that, except as authorized, no person may "discharge sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state," discharge other waste which in itself or in conjunction with any other discharge or activity causes pollution of any water of the state, or commit any other act which causes pollution of any water of the state. Exempted from this prohibition are: discharges authorized by permit, discharges in compliance with a certified water quality management plan as provided under the state agriculture code, and activities under the jurisdiction of the Parks and Wildlife Department, the General Land Office or the Railroad Commission of Texas. The TCEQ enforces these provisions.

Texas Local Government Code

Texas law also puts authority to regulate land uses at the regional, county, and municipal level. Texas' local government code includes provisions allowing a home-rule municipality to prohibit the pollution of streams, drains, and tributaries that "may constitute the source of the water supply of any municipality." The law more broadly states that a home-rule municipality may provide protection for and police any watershed. A municipality may exercise other provisions inside or outside the municipality's boundaries.

Municipal Pollution Abatement Plans

The TCEQ's regulatory approach to urban nonpoint source management is found in the Texas Water Code, §26.177, which defines the water pollution control duties of cities in Texas. The statute was originally passed by the legislature in 1967 and was amended in 1971, 1977, 1987 and 1997. Under this section, cities having a population of 10,000 or more inhabitants are required to establish a water pollution control and abatement plan when the Clean Rivers Basin assessments or other TCEQ assessments identify water pollution impacts arising within the respective city and not associated with permitted point sources. These plans are to be submitted to the TCEQ for review and approval to address pollution attributable to non-permitted sources, to implement measures to control and abate water pollution within the city's jurisdiction. The statute allows for TCEQ to establish criteria for water pollution control and abatement programs and allows the agency to assess fees to cover the costs to administer the program. The following requirements are specified for water pollution control and abatement: 1) Inventory, monitor, and obtain compliance for waste discharges; and 2) provide for "reasonable and realistic planning plans for controlling..." nonpoint source pollution. Rules implementing §26.177 of the Texas Water Code were developed in 1998 and were adopted by the TCEQ in 1999.

Livestock and Poultry Production Operations

In 1987, the Texas Water Commission (now the TCEQ) adopted rules regulating animal feeding operations (AFOs) that can contribute to nonpoint source pollution. AFOs over a certain size, known as concentrated animal feeding operations (CAFOs), are required to obtain a NPDES permit. State regulations prohibit these facilities from discharging wastewater or animal waste directly into streams and rivers or allowing the waste to run off the site, where it could contaminate surface water or groundwater. The permit requires the operator to develop a pollution prevention plan that addresses water and air pollution as well as the land application of wastes and wastewater.

Recent rule changes for CAFOs have established stricter permit requirements in certain watersheds where water quality problems have been attributed to livestock operations. The TCEQ adopted rules on March 6, 2002, to implement the requirements of House Bill 2912, of the 77th Texas Legislature regarding permitting requirements for CAFOs located in major sole-source impairment zones and the protection of sole-source drinking water supplies. The EPA adopted changes to the federal CAFO regulations *and effluent guidelines that became effective on April 13, 2003, changing the requirements to operate CAFOs under the Clean Water Act. Specifically, the new federal regulations changed which animal feeding operations were defined as CAFOs and what management practices are required for those operations. The effluent guidelines changed the design standards for new source swine, veal, and poultry operations and added a requirement for nutrient management plans (NMPs). These new changes meant that under the state's NPDES MOA with EPA, all state CAFO rules must also meet federal requirements. On February 25, 2004, the TCEQ approved rules that incorporate changes necessary to support the recommendations of the Implementation Plan for the Total Maximum Daily Load evaluations for Segments 1226 and 1255 of the Bosque River.*

Edwards Aquifer Protection Program

Development activities in various portions of the Edwards Aquifer have been regulated since 1970 when the Texas Water Quality Board (a predecessor agency to the TCEQ) issued an order designed to protect the quality of water entering the Edwards Aquifer recharge zone. Sources of pollution such as underground storage tanks, above ground storage tanks, and sewer lines were regulated. The first Texas counties affected were Kinney, Uvalde, Medina, Bexar, Comal, and Hays. Upon petition by local government, construction activities in portions of Williamson County became regulated in 1986. In 1990, construction activities in portions of Travis county were also regulated.

The TCEQ's Edwards Aquifer Protection Program rules regulate certain activities having the potential to adversely affect the water quality of the Edwards Aquifer and hydrologically-connected surface water in order to protect existing and potential beneficial uses of groundwater. The rules require that developers obtain a letter of approval before beginning construction activity and require that developers implement both temporary and permanent best management practices during and after construction.

In 1999, Edwards rules were extended to cover the contributing zone to the recharge area. Other changes included a design performance standard for permanent best management practices. The standard applies to water quality systems used for stormwater treatment. Examples include sand filtration basins, extended detention basins, and retention ponds with irrigation systems. The rules also require engineers to certify the construction of the systems. There is also a mechanism in the rules to ensure maintenance of these systems. Regulated activities are those that have the potential for polluting surface streams that will cross the recharge zone. This includes large construction projects and installation of petroleum storage tanks.

On-Site Sewage Facilities

Prior to the late 1960's, the regulation of on-site sewage facilities (OSSF) in Texas was administered primarily by municipal governments through local building inspection and plumbing inspection programs. There was no inspection of installation outside of municipal jurisdiction. In the late 1960's, the Texas Legislature adopted legislation *which empowered other local governmental entities (e.g., counties, river authorities, Municipal Utility Districts, etc.) to adopt OSSF control orders subject to approval by the Texas Water Quality Board (now TCEQ). These approved orders gave local governments authority to permit systems, conduct inspections, collect fees, and investigate complaints.*

Soil Conservation Laws and Programs

Early attempts at soil conservation legislation in Texas began during the "Dust Bowl" days of the 1930's when the problems of wind and water erosion began to get public attention. Legislation authorizing the establishment of Wind Erosion Conservation Districts was enacted by the 44th legislature in 1935. This law provided for the creation of districts to conserve the soil by prevention of unnecessary erosion caused by winds, and reclamation of lands that were depreciated or denuded of soil by wind. The TSSWCB, created in 1939, was charged with the responsibility of organizing soil conservation districts throughout the state. In 1941, the 47th Legislature passed House Bill 444 which is the basic conservation law under which the Texas State Soil and Water Conservation Board and the Soil and Water Conservation Districts operate today.

The TSSWCB is charged with the responsibility of administering and coordinating the state's soil and water conservation laws and programs with the State's 217 soil and water conservation districts. Through various educational and financial programs, the districts provide assistance to farmers and ranchers to encourage the wise and productive use of the state's soil and water resources. After passage of the 1972 Clean Water Act, the soil and water conservation district directors in Texas asked the TSSWCB to seek an appropriate role for them in nonpoint source planning and management. This request led to the passage of Senate Bill 229 passed during the 69th Texas Legislature. This legislation added §201.026 to the Texas Agricultural Code to give the TSSWCB responsibility to plan implement and manage programs and practices for abating agricultural and silvicultural nonpoint source pollution.

Water Quality Management Plans

In 1993, the Texas Legislature took another major step toward controlling water pollution from agricultural and silvicultural nonpoint sources when it passed Senate Bill 503. SB 503 authorized the TSSWCB to assist agricultural and silvicultural producers in meeting the state's water quality goals and standards through a voluntary, incentive-based program. The Bill transferred much of the responsibility for regulating non-permitted, smaller animal feeding operations from the TCEQ to the TSSWCB. The move was designed to change the state's oversight of these operations from a traditional regulatory role to a technical assistance role.

SB503 provided for the development and certification of water quality management plans (WQMPs). These plans are site specific plans for agricultural or silvicultural lands which include appropriate land treatment practices, production practices, management measures, technologies, or combinations thereof. A water quality *management plan is a site-specific document indicating when, where, and how to implement conservation practices following standards in the USDA Natural Resource Conservation Service Field Office Technical Guide. These plans are tailored to each landowner's conservation needs and management goals while ensuring adherence to state water quality laws.*

SB 503 legislation also set up a complaint resolution process and provided for a cost share assistance to help pay for some of the costs of installing water quality management practices. The provisions of the legislation are administered by the TSSWCB through and in cooperation with local soil and water conservation districts. The passage of Senate Bill 1339 during the 77th Session of the Texas Legislature expanded the water quality management program to include poultry facilities.

Although authorized by SB 503, the TSSWCB has yet to develop a certified water quality management program for silvicultural activities.

APPENDIX F CLEAN WATER ACT, §319

[§319 added by PL 100-4]

(a) State Assessment Reports. --

(1) Contents. -- The Governor of each State shall, after notice and opportunity for public comment, prepare and submit to the Administrator for approval, a report which:

(A) identifies those navigable waters within the State which, without additional action to control nonpoint sources of pollution, cannot reasonably be expected to attain or maintain applicable water quality standards or the goals and requirements of this Act;

(B) identifies those categories and subcategories of nonpoint source or, where appropriate, particular nonpoint sources which add significant pollution to each portion of the navigable waters identified under subparagraph (A) in amounts which contribute to such portion not meeting such water quality standards or such goals and requirements;

(C) describes the process, including intergovernmental coordination and public participation, for identifying best management practices and measures to control each category and subcategory of nonpoint sources and, where appropriate, particular nonpoint sources identified under subparagraph (B) and to reduce, to the maximum extent practicable, the level of pollution resulting from such category, subcategory, or source; and

(D) identifies and describes State and local programs for controlling pollution added from nonpoint sources to, and improving the quality of, each such portion of the navigable waters, including but not limited to those programs which are receiving Federal assistance under subsections (h) and (I).

(2) Information Used in Preparation. -- In developing the report required by this section, the State (A) may rely upon information developed pursuant to 208, §303(e), §304(F),§305(B), AND §314, and other information as appropriate, and (B) may utilize appropriate elements of the waste treatment management plans developed pursuant to §208(b) AND §303, to the extent such elements are consistent with and fulfill the requirements of this section.

(b) State Management Programs. --

(1) In General. -- The Governor of each State, for that State or in combination with adjacent States, shall, after notice and opportunity for public comment,

prepare and submit to the Administrator for approval a management program which such State proposes to implement in the first four fiscal years beginning after the date of submission of such management program for controlling pollution added from nonpoint sources to the navigable waters within the State and improving the quality of such waters.

(2) Specific Contents. -- Each management program proposed for implementation under this subsection shall include each of the following:

(A) An identification of the best management practices and measures which will be undertaken to reduce pollutant loadings resulting from each category, subcategory, or particular nonpoint source designated under paragraph (1)(B), taking into account the impact of the practice on ground water quality.

(B) An identification of programs (including, as appropriate, nonregulatory or regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer, and demonstration projects) to achieve implementation of the best management practices by the categories, subcategories, and particular nonpoint source designated under subparagraph (A).

(C) A schedule containing annual milestones for (I) utilization of the program implementation methods identified in subparagraph (B), and (ii) implementation of the best management practices identified in subparagraph (A) by the categories, subcategories, or particular nonpoint sources designated under paragraph (1)(B). Such schedule shall provide for utilization of the best management practices at the earliest practicable date.

(D) A certification of the attorney general of the State or States (or the chief attorney of any State water pollution control agency which has independent legal counsel) that the laws of the State or States, as the case may be, provide adequate authority to implement such management program or, if there is not such adequate authority, a list of such additional authorities as will be necessary to implement such management program. A schedule and commitment by the State or States to seek such additional authorities as expeditiously as practicable.

(E) Sources of Federal and other assistance and funding (other than assistance provided under subsections (h) and (I)) which will be available in each of such fiscal years for supporting implementation of such practices and measures and the purposes for which such assistance will be used in each of such fiscal years.

(F) An identification of Federal financial assistance programs and Federal development projects for which the State will review individual assistance applications or development projects for their effect on water quality

pursuant to the procedures set forth in Executive Order 12372 as in effect on September 17, 1983, to determine whether such assistance applications or development projects would be consistent with the program prepared under this subsection; for the purposes of this subparagraph, identification shall not be limited to the assistance programs or development projects subject to Executive Order 12372 but may include any programs listed in the most recent Catalog of Federal Domestic Assistance which may have an effect on the purposes and objectives of the State's nonpoint source pollution management program.

(3) Utilization of Local and Private Experts. -- In development developing and implementing a management program under this subsection, a State shall, to the maximum extent practicable, involve local public and private agencies and organizations which have expertise in control of nonpoint sources of pollution.

(4) Development on Watershed Basis. -- A State shall, to the maximum extent practicable, develop and implement a management program under this subsection on a watershed-by-watershed basis within such State.

(c) Administrative Provisions. --

(1) Cooperation Requirement. -- Any report required by subsection (a) and any management program and report required by subsection (b) shall be developed in cooperation with local, substate regional, and interstate entities which are actively planning for the implementation of nonpoint source pollution controls and have either been certified by the Administrator in accordance with §208, have worked jointly with the State on water quality management planning under §205(j), or have been designated by the State legislative body or Governor as water quality management planning agencies for their geographic areas.

(2) Time Period for Submission of Reports and Management Programs. -- Each report and management program shall be submitted to the Administrator during the 18-month period beginning on the date of the enactment of this section.

(d) Approval or Disapproval of Reports and Management Programs. --

(1) Deadline. -- Subject to paragraph (2), not later than 180 days after the date of submission to the Administrator of any report or management program under this section (other than subsections (h), (I), and (k)), the Administrator shall either approve or disapprove such report or management program, as the case may be. The Administrator may approve a portion of a management program under this subsection. If the Administrator does not disapprove a report, management program, or portion of a management program in such 180-day period, such report, management program, or portion shall be deemed approved for purposes of this section.

(2) Procedure for Disapproval. -- If, after notice and opportunity for public comment and consultation with appropriate Federal and State agencies and other interested persons, the Administrator determines that –

(A) the proposed management program or any portion thereof does not meet the requirements of subsection (b)(2) of this section or is not likely to satisfy, in whole or in part, the goals and requirements of the Act;

(B) adequate authority does not exist, or adequate resources are not available, to implement such program or portion;

(C) the schedule for implementing such program or portion is not sufficiently expeditious; or

(D) the practices and measures proposed in such program or portion are not adequate to reduce the level of pollution in navigable waters in the State resulting from nonpoint sources and to improve the quality of navigable waters in the State; the Administrator shall within 6 months of receipt of the proposed program notify the State of any revisions or modifications necessary to obtain approval. The State shall thereupon have an additional 3 months to submit its revised management program and the Administrator shall approve or disapprove such revised program within three months of receipt.

(3) Failure of State to Submit Report. -- If a Governor of State does not submit the report required by subsection (a) within the period specified by subsection (c)(2), the Administrator shall, within 30 months after the date of the enactment of this section, prepare a report for such State which makes the identifications required by paragraphs (1)(A) and (1)(B) of subsection (a). Upon completion of the requirement of the preceding sentence and after notice and opportunity for comment, the Administrator shall report to Congress on his actions pursuant to this section.

(e) Local Management Programs; Technical Assistance. -- If a State fails to submit a management program under subsection (b) or the Administrator does not approve such a management program, a local public agency or organization which has expertise in, and authority to, control water pollution, resulting from nonpoint sources in any area of such State which the Administrator determines is of sufficient geographic size may, with approval of such State, request the Administrator to provide, and the Administrator shall provide, technical assistance to such agency or organization in developing for such area a management program which is described in subsection (b) and can be approved pursuant to subsection (d). After development of such management program, such agency or organization shall submit such management program to the Administrator for approval. If the Administrator approves such management program, such agency or organization shall be eligible to receive financial assistance under subsection (h) for implementation of such management program as if such agency or organization were a State for which a report submitted

under subsection (a) and a management program submitted under subsection (b) were approved under this section. Such financial assistance shall be subject to the same terms and conditions as assistance provided to a State under subsection (h).

(f) Technical Assistance for States. -- Upon request of a State, the Administrator may provide technical assistance to such State in developing a management program approved under subsection (b) for those portions of the navigable waters requested by such State.

(g) Interstate Management Conference. --

(1) Convening of Conference; Notification; Purpose. -- If any portion of the navigable waters in any State which is implementing a management program approved under this section is not meeting applicable water quality standards or the goals and requirements of the Act as a result, in whole or in part, of pollution from nonpoint sources in another State, such State may petition the Administrator to convene, and the Administrator shall convene, a management conference of all States which contribute significant pollution resulting from nonpoint sources to such portion. If, on the basis of information available, the Administrator determines that a State is not meeting applicable water quality standards or the goals and requirements of this Act as a result, in whole or in part, of significant pollution from nonpoint sources in another State, the administrator shall notify such State. The Administrator may convene a management conference under this paragraph not later than 180 days after giving such notification, whether or not the State which is not meeting such standards requests such conference. The purpose of such conference shall be to develop an agreement among such States to reduce the level of pollution in such portion resulting from nonpoint sources and to improve the water quality of such portion. Nothing in such agreement shall supersede or abrogate rights to quantities of water which have been established by interstate water compacts, Supreme Court decrees, or State water laws. This subsection shall not apply to any pollution which is subject to the Colorado River Basin Salinity control Act. The requirement that the Administrator convene a management conference shall not be subject to the provisions of §505 of this Act.

(2) State Management Program Requirement. -- To the extent that the States reach agreement through such conference, the management programs of the States which are parties to such agreements and which contribute significant pollution to the navigable water or portions thereof not meeting applicable water quality standards or goals and requirements of the Act will be revised to reflect such agreement. Such a management program shall be consistent with Federal and State law.

(h) Grant Program. --

(1) Grants for Implementation of Management Programs. -- Upon application of a State for which a report submitted under subsection (a) and a management

program submitted under subsection (b) is approved under this section, the Administrator shall make grants, subject to such terms and conditions as the Administrator considers appropriate, under this subsection to such State for the purpose of assisting the State in implementing such management program. Funds reserved pursuant to §205(j)(5) of this Act may be used to develop and implement such management program.

(2) Applications. -- An application for a grant under this subsection in any fiscal year shall be in such form and shall contain such other information as the Administrator may require, including an identification and description of the best management practices and measures which the State proposes to assist, encourage, or require in such year with the Federal assistance to be provided under the grant.

(3) Federal Share. -- The Federal share of the cost of each management program implemented with Federal assistance under this subsection in any fiscal year shall not exceed 60 percent of the cost incurred by the State in implementing such management program and shall be made on condition that the non-Federal share is provided from non-Federal sources.

(4) Limitation on Grant Amounts. -- Notwithstanding any other provision of this subsection, not more than 15 percent of the amount appropriated to carry out this subsection may be used to make grants to any one State, including any grants to any local public agency or organization with authority to control pollution from nonpoint sources in any area of such State.

(5) Priority for Effective Mechanisms. -- For each fiscal year beginning after September 30, 1987, the Administrator may give priority in making grants under this subsection, and shall give consideration in determining the Federal share of any such grant, to States which have implemented or are proposing to implement management programs which will --

> *(A) control particularly difficult or serious nonpoint source pollution problems, including, but not limited to, problems resulting from mining activities;*
>
> *(B) implement innovative methods or practices for controlling nonpoint sources of pollution, including regulatory programs where the Administrator deems appropriate;*
>
> *(C) control interstate nonpoint source pollution problems; or*
>
> *(D) carry out ground water quality protection activities which the Administrator determines are part of a comprehensive nonpoint source pollution control program, including research, planning, ground water assessments, demonstration programs, enforcement, technical assistance, education, and training to protect ground water quality from nonpoint sources of pollution.*

(6) Availability for Obligation. -- The funds granted to each State pursuant to this subsection in a fiscal year shall remain available for obligation by such State for the fiscal year for which appropriated. The amount of any such funds not obligated by the end of such fiscal year shall be available to the Administrator for granting to other States under this subsection in the next fiscal year.

(7) Limitation on Use of Funds. -- States may use funds from grants made pursuant to this section for financial assistance to persons only to the extent that such assistance is related to the costs of demonstration projects.

(8) Satisfactory Progress. -- No grant may be made under this subsection in any fiscal year to a State which in the preceding fiscal year received a grant under this subsection unless the Administrator determines that such State made satisfactory progress in such preceding fiscal year in meeting the schedule specified by such State under subsection (b)(2).

(9) Maintenance of Effort. -- No grant may be made to a State under this subsection in any fiscal year unless such State enters into such agreements with the Administrator as the Administrator may require to ensure that such State will maintain its aggregate expenditures from all other sources for programs for controlling pollution added to the navigable waters in such State from nonpoint sources and improving the quality of such waters at or above the average level of such expenditures in its two fiscal years preceding the date of enactment of this subsection.

(10) Request for Information. -- The Administrator may request such information, data, and reports as he considers necessary to make the determination of continuing eligibility for grants under this section.

(11) Reporting and Other Requirements. -- Each State shall report to the Administrator on an annual basis concerning (a) its progress in meeting the schedule of milestones submitted pursuant to subsection (b)(2)(c) of this section, and (B) to the extent that appropriate information is available, reductions in nonpoint source pollutant loading and improvements in water quality for those navigable waters or watersheds within the State which were identified pursuant to subsection (a)(1)(a) of this section resulting from implementation of the management program.

(12) Limitation on Administrative Costs. -- For purposes of this subsection, administrative costs in the form of salaries, overhead, or indirect costs for services provided and charged against activities and programs carried out with a grant under this subsection shall not exceed in any fiscal year 10 percent of the amount of the grant in such year, except that costs of implementing enforcement and regulatory activities, education, training, technical assistance, demonstration projects, and technology transfer programs shall not be subject to this limitation.

(I) Grants for Protecting Groundwater Quality. --

(1) Eligible Applicants and Activities. -- Upon application of a State for which a report submitted under subsection (a) and a plan submitted under subsection (b) is approved under this section, the Administrator shall make grants under this subsection to such State for the purpose of assisting such State in carrying out groundwater quality protection activities which the Administrator determines will advance the State toward implementation of a comprehensive nonpoint source pollution control program. Such activities shall include, but not be limited to, research planning, groundwater assessments, demonstration programs, enforcement, technical assistance, education and training to protect the quality of groundwater and to prevent contamination of groundwater from nonpoint sources of pollution.

(2) Applications. -- An application for a grant under this subsection shall be in such form and shall contain such information as the Administrator may require.

(3) Federal Share; Maximum Amount. -- The Federal share of the cost of assisting a State in carrying out groundwater protection activities in any fiscal year under this subsection shall be 50 percent of the costs incurred by the State in carrying out such activities, except that the maximum amount of Federal assistance which any State may receive under this subsection in any fiscal year shall not exceed $150,000.

(4) Report. -- The Administrator shall include in each report transmitted under subsection (m) a report on the activities and programs implemented under this subsection during the preceding fiscal year.

(j) Authorization of Appropriations. -- There is authorized to be appropriated to carry out subsections (h) and (I) not to exceed $70,000,000 for fiscal year 1988, $100,000,000 per fiscal year for each of fiscal years 1989 and 1990, and $130,000,000 for fiscal year 1991; except that for each of such fiscal years not to exceed $7,500,000 may be made available to carry out subsection (I). Sums appropriated pursuant to this subsection shall remain available until expended.
(k) Consistency of Other Programs and Projects With Management Programs. -- The Administrator shall transmit to the Office of Management and Budget and the appropriate Federal departments and agencies a list of those assistance programs and development projects identified by each State under subsection (b)(2)(F) for which individual assistance applications and projects will be reviewed pursuant to the procedures set forth in Executive Order 12372 as in effect on September 17, 1983, the concerns of the State regarding the consistency of such applications or projects with the State nonpoint source pollution management program.

(l) Collection of Information. -- The Administrator shall collect and make available, through publications and other appropriate means, information pertaining to management practices and implementation methods, including, but not limited to, (1)

information concerning the costs and relative efficiencies of best management practices for reducing nonpoint source pollution; and (2) available data concerning the relationship between water quality and implementation of various management practices to control nonpoint sources of pollution.

(m) Reports of Administrator. --

(1) Annual Reports. -- Not later than January 1, 1988, and each January 1 thereafter, the Administrator shall transmit to the Committee on Public Works and Transportation of the House of Representatives and the Committee on Environment and Public Works of the Senate, a report for the preceding fiscal year on the activities and programs implemented under this section and the progress made in reducing pollution in the navigable waters resulting from nonpoint sources and improving the quality of such waters.

(2) Final Report. -- Not later than January 1, 1990, the Administrator shall transmit to Congress a final report on the activities carried out under this section. Such report, at a minimum, shall –

(A) describe the management programs being implemented by the States by types and amount of affected navigable waters, categories and subcategories of nonpoint sources, and types of best management practices being implemented;

(B) describe the experiences of the States in adhering to schedules and implementing best management practices;

(C) describe the amount and purpose of grants awarded pursuant to subsections (h) and (I) of this section;

(D) identify, to the extent that information is available, the progress made in reducing pollutant loads and improving water quality in the navigable waters;

(E) indicate what further actions need to be taken to attain and maintain in those navigable waters (I) applicable water quality standards; and (ii) the goals and requirements of this Act;

(F) include recommendations of the Administrator concerning future programs (including enforcement programs) for controlling pollution from nonpoint sources; and

(G) identify the activities and programs of departments, agencies, and instrumentalities of the United States which are inconsistent with the management programs submitted by the States and recommend modifications so that such activities and programs are consistent with and assist the States in implementation of such management programs.

(n) Set Aside for Administrative Personnel. -- Not less than 5 percent of the funds appropriated pursuant to subsection (j) for any fiscal year shall be available to the Administrator to maintain personnel levels at the Environmental Protection Agency at levels which are adequate to carry out this section in such year.

APPENDIX G FEDERAL CONSISTENCY

§319(b)(2)(F) calls for each State Management Program to contain an identification of federal financial assistance programs and federal development projects for which the state will review individual assistance applications or development projects for their effect on water quality, to determine whether such activities would be consistent with the State Management Program. The Texas Review and Comment System (TRACS) will be utilized to fulfill this requirement. Consistency review of urban, non-agricultural, non-silvicultural programs is the responsibility of the TCEQ. Consistency of agricultural and silvicultural programs is reviewed by the TSSWCB.

TCEQ Review of Federal Assistance Programs

This list of Federal Assistance programs was developed from the 2004 Catalog of Federal Domestic Assistance for potential use by the TCEQ in the development and administration of its NPS Management Program. Some of these programs may be reviewed by the TCEQ for consistency with its NPS Management Program. Any federal programs which the State identifies as inconsistent with its management program will be brought to the attention of the EPA. No inconsistent programs have been identified at this time.

Department of Commerce

Economic Development Administration

11.300 Economic Development - Grants for Public Works and Economic Development Facilities
11.302 Economic Development - Support for Planning Organizations
11.303 Economic Development - Technical Assistance
11.307 Economic Adjustment Assistance

National Oceanic and Atmospheric Administration

11.405 Anadromous Fish Conservation Act Program
11.407 Interjurisdictional Fisheries Act of 1986
11.415 Fisheries Finance Program
11.417 Sea Grant Support
11.419 Coastal Zone Management Administration Awards
11.420 Coastal Zone Management Estuarine Research Reserve
11.426 Financial Assistance for National Centers for Coastal Ocean Science
11.427 Fisheries Development and Utilization Research and Development Grants and Cooperative Agreements Program
11.429 Marine Sanctuary Program
11.441 Regional Fishery Management Councils

Department of Defense

Department of the Army, Office of the Chief of Engineers

12.100 Aquatic Plant Control
12.101 Beach Erosion Control Projects
12.104 Flood Plain Management Services
12.105 Protection of Essential Highways, Highway Bridge Approaches and Public Works
12.106 Flood Control Projects
12.107 Navigation Projects
12.108 Snagging and Clearing for Flood Control
12.109 Protection, Clearing and Straightening Channels
12.110 Planning Assistance to States
12.114 Collaborative Research and Development

Office of the Assistant Secretary (Economic Security)

12.612 Community Base Reuse Plans
12.613 Growth Management Planning Assistance

Department of Housing and Urban Development

Housing

14.112 Mortgage Insurance for Construction or Substantial Rehabilitation of Condominium Projects
14.117 Mortgage Insurance - Homes
14.126 Mortgage Insurance - Cooperative Projects
14.127 Mortgage Insurance - Manufactured Home Parks

Community Planning and Development

14.218 Community Development Block Grants/Entitlement Grants
14.219 Community Development Block Grants/Small Cities Program

Public and Indian Housing

14.862 Indian Community Development Block Grant Program

Department of the Interior

Bureau of Land Management

15.214 Non-sale Disposals of Mineral Material
15.225 Recreation Resource Management

Office of Surface Mining Reclamation and Enforcement

15.250 Regulation of Surface Coal Mining and Surface Effects of Underground Coal Mining
15.252 Abandoned Mine Land Reclamation (AMLR) Program

Fish and Wildlife Service

15.605 Sport Fish Restoration
15.611 Wildlife Restoration
15.614 Coastal Wetlands Planning, Protection and Restoration Act
15.615 Cooperative Endangered Species Conservation Fund

Geological Survey

15.805 Assistance to State Water Resources Research Institutes
15.808 U. S. Geological Survey - Research and Data Acquisition

National Park Service

15.916 Outdoor Recreation - Acquisition, Development and Planning
15.919 Urban Park and Recreation Recovery Program

Department of Transportation

Federal Aviation Administration

20.106 Airport Improvement Program

Federal Highway Administration

20.205 Highway Planning and Construction
20.219 Recreational Trails Program

Federal Railroad Administration

20.312 High Speed Ground Transportation - Next Generation High Speed Rail Program

Federal Transit Administration

20.500 Federal Transit Capital Investment Grants
20.507 Federal Transit Formula Grants
20.509 Formula Grants for Other Than Urbanized Areas

Maritime Administration

20.801 Development and Promotion of Ports and Intermodal Transportation
20.812 Construction Reserve Fund

General Services Administration

39.002 Disposal of Federal Surplus Real Property

Small Business Administration

59.012 Small Business Loans

Environmental Protection Agency

Office of Air and Radiation

66.001 Air Pollution Control Program Support

Office of Water

66.419 Water Pollution Control - State and Interstate Program Support
66.424 Surveys, Studies, Demonstrations and Special Purpose - §1442 of the Safe Drinking Water Act
66.433 State Underground Water Source Protection
66.439 Targeted Watershed Initiative
66.454 Water Quality Management Planning
66.456 National Estuary Program
66.458 Capitalization Grants for Clean Water State Revolving Funds
66.460 Nonpoint Source Implementation Grants
66.461 Wetland Program Development Grants
66.463 Water Quality Cooperative Agreements
66.468 Capitalization Grants for Drinking Water State Revolving Funds
66.472 Beach Monitoring and Notification Program Implementation Grants
66.474 Water Protection Grants to the States
66.475 Gulf of Mexico Program
66.476 Vulnerability Assessments and Related Security Improvements at Large Drinking Water Utilities
66.477 Vulnerability Assessments and Related Security Improvements at Large Privately-Owned Community Drinking Water Utilities
66.478 Water Security Training and Technical Assistance Grant Program

Offices of Air and Radiation; Water; Environmental Justice; Environmental Information; Enforcement and Compliance Assurance; Pesticides, Prevention and Toxic Substances; and Solid Waste and Emergency Response

66.500 Environmental Protection - Consolidated Research
66.600 Environmental Protection Consolidated Grants Program Support

66.605 Performance Partnership Grants

Office of Enforcement and Compliance Assurance

66.700 Consolidated Pesticide Enforcement Cooperative Agreements

Office of Prevention, Pesticides and Toxic Substances

66.708 Pollution Prevention Grants Program

Office of Solid Waste and Emergency Response

66.805 Leaking Underground Storage Tank Trust Fund Program

Office of Research and Development

66.807 Superfund Innovative Technology Evaluation Program

Office of Environmental Education

66.951 Environmental Education Grants

Department of Energy

Civilian Radioactive Waste Management

81.065 Nuclear Waste Disposal Siting

Office of Environmental Management

81.104 Office of Technology Development and Deployment for Environmental Management

TCEQ Review of Federal Development Projects

The following is a list of the types of plans and development projects that are initiated and managed by Federal agencies which may have an impact on the State's nonpoint source management program. Not all of the activities listed below will be eligible for §319 federal consistency reviews pursuant to Executive Order 12372.

USDA, Forest Service

Forest Plans
Resource Area Analyses
Integrated Resource Management Plans
Timber Activities/Sales
Range Activities/Game Range Analysis
Chemicals/Herbicides
Area Analysis/Cumulative Impacts Analysis
Recreation Development
Transportation Plans

Soil and Water Management
Water Uses and Development
Soil and Water Improvement Projects
Public Water Supply Watershed Management
Hydrologic Modification
Wetlands Protection
"Every Species Counts" - recovery of threatened/endangered flora, fauna, fish, wildlife, invertebrates, plants
Watershed, Fish, Wildlife, Air and Rare Plants Program
Riparian Management and Restoration and Wetlands Habitats Programs
Minerals Exploration and Development
Fuels Management
Applications for Permits to Drill
Oil and Gas Leasing/Reclamation Plans
Hydropower Licensing Activity in Coordination with Federal Energy Regulatory Commission (FERC)/Special Use Permitting
ORV (Off-road Vehicles) Activities
Forest Fire Protection
Soil and Water Monitoring Program
Allotment Management Planning and Administration
Road Construction and Maintenance
Municipal Watershed Management Program
Floodplain Modifications

USDA, Natural Resources Conservation Service/Farm Service Agency

Small Watershed Program

Department of the Interior, Bureau of Land Management

Watershed Projects
Mineral Exploration and Development
Coal, Oil and Gas Leasing
Coal Reclamation
Road Restoration, Upgrades and Closures
Timber Activities
Rangeland Management Program
Chemical Pest Control/Pesticide Use Report
"Bring Back the Natives" - Conservation of Native Fishes
Area Analysis/Cumulative Impacts
Resource Management Plans
Wetlands Protection
Riparian Management Areas and Riparian Reserves
Hydrologic Units Mapping
Transportation Plans
Areas of Critical Environmental Concern (ACEC) Plans

Department of the Interior, Bureau of Reclamation

National Desalination Clearinghouse
Fisheries Applications Research
Flood Hydrology
Geotechnical Engineering
Hydroelectric Research
National Irrigation Water Quality Program (NIWQP)
Remote Sensing and GIS
Resource Management and Planning
River Systems and Meteorology
Sedimentation and River Hydraulics
Stream Corridor Restoration
Water Conservation Field Services Program
Water Operations - Upper and Lower Colorado River Regions

Department of the Interior, Fish and Wildlife Service

Management of National Wildlife Conservation - Refuges and Proposed Acquisitions

Department of the Interior, Surface Mining

Regulation of active mines and reclamation of abandoned mines
Abandoned Mine Lands (AML) Program

Department of Defense, Defense Installations

Land Management Plans
Location, design and acquisition of new or expanded defense installations

Department of Defense, Corps of Engineers

Dredging
Channel Improvement
Breakwaters
Harbors and navigation channels
Erosion control structures
Shoreline Protection - Beach Replenishment
Regulation/Permitting - including wetlands
Dams or flood control works
Ice management practices
Land acquisition for spoil disposal or other purposes
Selection of open water disposal sites

Department of Transportation, Federal Aviation Administration

Location, design, construction, maintenance and demolition of Federal aids to air navigation

Department of Transportation, U.S. Coast Guard

Location, design, construction, or enlargement of Coast Guard stations, bases, and lighthouses
Location, placement, or removal of navigation devices which are not part of the routine operations under the Aids to Navigation Program
Expansion, abandonment, designation of anchorages, lighting areas, or shipping lanes and ice management practices and activities

General Services Administration

Acquisition, location, and design of proposed Federal government property or buildings, whether leased or owned by the Federal government

APPENDIX H FUNDING

Funding sources available to support programs related to nonpoint source pollution include:

Federal

- *CWA §104(b)(3)*
- *CWA §106 Funds*
- *CWA §319(h) Grant Funds*
- *CWA §604(b) Funds*
- *FIFRA Funds*
- *Safe Drinking Water Act Grant Funds*
- *Solid Waste Disposal Act, §8001*
- *Superfund*
- *Non-game and Endangered Species Fund*

STATE

- *STATE GENERAL REVENUE FUNDS*
- *WATER QUALITY PERMIT FEES*
- *WATER RIGHTS PERMIT FEES*
- *STATE REVOLVING FUND*
- *TEXAS WATER DEVELOPMENT BOARD LOAN PROGRAMS AND DEVELOPMENT FUNDS*
- *GENERAL LAND OFFICE OIL SPILL FUND*
- *OSSF PERMIT AND LICENSE FEES*
- *FUND 0270, SOLID WASTE TIPPING FEES*
- *FUND 5500, STATE HAZARDOUS AND SOLID WASTE REMEDIATION FEES*
- *SOLID WASTE FUND*
- *FUND 4680, TEXAS IRRIGATORS FUND*
- *FUND 0790, WATER WELL DRILLERS*
- *TEXAS CONSERVATION FUND*
- *WILDSCAPES FEES AND POSTER AND STAMP SALES*
- *RIVER AUTHORITY FUNDS*

SPECIFIC FUNDING FOR TCEQ PROGRAMS

The Nonpoint Source Program Team is funded by Clean Water Act §319(h) and by State General Revenue Funds.

The Clean Rivers Program is supported by the water quality fees from wastewater discharge permits and water rights permits. Federal funding for Water Quality Management Plans is provided by EPA through a 1% reserve of annual allocated funds to the Texas Water Development Board for State Revolving Fund (SRF) loans. Of this amount, 40% is passed through to the seven designated area regional planning agencies.

Standards development and implementation and wetlands certification are funded by §106 of the Clean Water Act and by State General Revenue Funds.

The ongoing activities of the Surface Water Quality Monitoring Team are funded by §106 and State General Revenue Funds.

Water Quality Modeling is funded by Clean Water Act 604(b) funds and State General Revenue.

State General Revenue Funds, FEMA, and Clean Water Act §319(h) funds support the Resource Protection Team, Interstate Compacts Team, and Water Rights Permit Team (Water Rights Permitting and Availability Section) activities.

The Texas Watch Program (volunteer monitoring) is currently funded by Clean Water Act §319(h).

The Groundwater Planning and Assessment Team is funded from §106 ground water funds, FIFRA funds, and State General Revenue Funds.

The Galveston Bay Estuary Program is a continuation of the National Estuary Program receiving funding under §320 fo the Clean Water Act, State General Revenue Funds, Clean Water Act §104(b)(3) funds, and limited contributions from local governments.

Funding for the Coastal Bend Bays and Estuaries Program comes from Clean Water Act Sections 104(b)(3) and 320 funds and State General Revenue Funds.

Funding for the Source Water Assessment and Protection Program is from the Drinking Water State Revolving Fund. This fund was established under §1452 by Congress to achieve or maintain compliance with Safe Drinking Water Act requirements.

Funding for the Small Towns Environmental Program comes from two self-help funds: one administered by the Office of Rural Community Affairs, and one from the Texas Water Development Board.

Funding for the On-Site Sewage Facilities program comes from the Clean Water Act §319 portion of the Performance Partnership Grant awarded by EPA. However, legislation has also provided for the following methods of funding for continued program operations:

- *Fees may be collected for all OSSF permits issued by TCEQ. The fees collected by the authorized agents are not controlled by the TCEQ and vary between entities.*
- *OSSF installers are required to pay a fee to obtain a license, and a yearly renewal fee to maintain the license.*

Clean Texas- Cleaner World funds come from Fund 0270, solid waste tipping fees, and CWA Sections 319(h) and 106 grants.

Texas Country Cleanups and the Lake and River Cleanup are funded from the Solid Waste Fund. Fund 5500, from hazardous waste generation fees, provides funds for the Agricultural Waste Pesticide Program and the Household Hazardous Waste Program.

The Used Oil and Used Oil Filter Recycling Program is funded by revenues in the Used Oil Recycling Fund.

Funding for the Emergency Response Program, the Superfund Site Discovery and Assessment Team, and the Natural Resource Damage Assessment Team comes from Fund 5500, State Hazardous and the Solid Waste Remediation Fee Fund.

The Illegal Disposal Program is funded under the Solid Waste Disposal Act, §8001, and with State General Revenue Funds.

Occupational Certification Program funding comes from the following areas:
- *Landscape Irrigation: Fund 4680*
- *On-site Sewage Facility Installation: General Revenue Fund 0010*
- *Water Well Drilling: Fund 0790*
- *Water Pump Installation: Fund 0790*

Funding for the Edwards Aquifer Program comes from State funds supplemented by 319 grant funding.

Funding Sources for Agricultural & Silvicultural Nonpoint Source Pollution Abatement

In Texas, planning, implementing, and managing programs and practices for the abatement of agricultural and silvicultural nonpoint source pollution is the responsibility of the Texas State Soil and Water Conservation Board. However, other organizations and their programs play major roles. Because nonpoint source control is costly, efforts in Texas tend to rely on cooperation and coordination to make use of existing resources where possible.

Nonpoint source management programs utilize existing information, education, and demonstration capabilities to educate and inform farmers, ranchers, and other producers of the potential for nonpoint source pollution to occur as a result of *agricultural or silvicultural activities. Technical assistance programs, both state and federal, are used to assist in the implementation of best management practices contained in nonpoint source management programs. Cost-share incentive programs are utilized where applicable and available to provide incentives for installation of best management practices. Research organizations are relied upon to provide needed research to advance the effectiveness of nonpoint source management programs and keep pace with advances in agricultural and silvicultural production methods. Loan programs, where applicable, help producers implement best management practices. Where necessary and desirable, new and innovative solutions are sought to address problems that cannot be handled by existing programs.*

Below is a brief description of the major funding sources used in Texas to address agricultural and silvicultural nonpoint source pollution:

- *Water Quality Management Plan Program - Cost-share assistance for water quality benefits is available through the TSSWCB Water Quality Management Plan Program (a.k.a. Senate Bill 503 Program).*
- *Nonpoint Source Implementation Grants (319 Program) - The 319 program administered by the TSSWCB provides funding to implement projects to abate agricultural and silvicultural nonpoint source pollution.*
- *Watershed Protection and Flood Prevention Program - Projects eligible for funding through this NRCS administered program include watershed protection, flood prevention, erosion and sediment control, water supply, water quality, fish and wildlife habitat enhancement wetlands creation and restoration, and public recreation in watersheds of 250,000 or fewer acres.*
- *Wetlands Reserve Program (WRP) - WRP is a voluntary program administered by NRCS that provides technical and financial assistance to eligible landowners to enhance degraded wetlands in exchange for retiring marginal land from agriculture.*
- *Environmental Quality Incentives Program (EQIP) - EQIP is a voluntary conservation program administered by NRCS that provides farmers and ranchers with financial and technical assistance to install or implement structural and management conservation practices to address local natural resource concerns on eligible agricultural land.*
- *Agricultural Loan Program (Farm Loan Program) - FSA makes direct and guaranteed farm ownership and operating loans to farmers and ranchers who are temporarily unable to obtain private, commercial credit for land purchases, livestock, equipment, feed, seed and supplies.*
- *Conservation Reserve Program (CRP) - CRP is a voluntary conservation program administered by FSA, with NRCS providing technical assistance, that provides technical and financial assistance to eligible farmers and ranchers to address soil, water, and related*

resource concerns through conversion of sensitive acreage to vegetative cover in return for annual rental payments.

- *Creekside Conservation Program - A partnership between Lower Colorado River Authority, NRCS and local SWCDs to provide technical and financial assistance to reduce sedimentation and nonpoint source pollution on privately owned land in 11 counties in the Colorado River Basin.*
- *Forest Land Enhancement Program (FLEP) - FLEP, administered by the Texas Forest Service, provides financial, technical, educational and related assistance to private landowners in actively managing their land.*
- *Coastal Zone Management Administration/Implementation Awards - Funds are available to support NPS projects in the coastal management zone and to implement agricultural and silvicultural management measures in the Texas Coastal Nonpoint Pollution Control Plan.*
- *Clean Water State Revolving Funds - This program, administered by the TWDB, provides incorporated political subdivisions (Cities, Towns) with the authority to own and operate a wastewater system. It also provides incorporated political subdivisions, unincorporated political subdivisions (Counties, River Authorities, Water Supply Districts, Independent School Districts), and private individuals or non-profit entities (for nonpoint source pollution control loans only) loans for the financing, planning, design and construction of projects for wastewater treatment facilities, reuse and recycle facilities, collection systems, storm water pollution controls, and implementation of nonpoint source pollution controls.*

APPENDIX I SUMMARY OF PUBLIC RESPONSES

A public notice of final review was posted in the Texas Register on July 15, 2005 for a 30 day period, which ended on August 14, 2005. No comments were received during this public final review period.

APPENDIX J ACRONYMS AND ABBREVIATIONS

AAH	*Adopt-a-Highway*
AFOs	*animal feeding operations*
ASDWA	*Association of State Drinking Water Administrators*
ASIWPCA	*Association for State and Interstate Water Pollution Control Administrators*
AST	*aboveground storage tank*
AWWA	*American Water Works Association*
BEG	*Bureau of Economic Geology*
BEIF	*Border Environment Infrastructure Fund*
BMPs	*best management practices*
BRC	*Bureau of Radiation Control*
BSEACD	*Barton Springs/Edwards Aquifer Conservation District*
CAFOs	*concentrated animal feeding operations*
CBBEP	*Coastal Bend Bays & Estuaries Program*
CCC	*Commodity Credit Corporation*
CCC	*Coastal Coordination Council*
CCMP	*Comprehensive Conservation and Management Plan*
CFR	*Code of Federal Regulations*
COGs	*Councils of Government*
COMAPA	*Comision Municipal de Agua Potable y Alcantarillado*
CMP	*Coastal Management Program*
CRP	*Clean Rivers Program*
CSG	*Council of State Governments*
CWA	*Clean Water Act*
CWSRF	*Clean Water State Revolving Fund*
CZMA	*Coastal Zone Management Act*
DFE	*Dallas Floodway Extension*
DSHS	*Texas Department of State Health Services*
DMWT	*Don't Mess with Texas*
DoC	*Drop-off Center*
DOPA	*Dairy Outreach Program Areas*
EDAP	*Economically Distressed Areas Program*
EMPACT	*Environmental Monitoring for Public Access and Community Tracking*
EPWU	*City of El Paso Water Utilities*
EQIP	*Environmental Quality Incentives Program*
FIFRA	*Federal Insecticide, Fungicide and Rodenticide Act*
FLEP	*Forest Land Enhancement Program*
GBEP	*Galveston Bay Estuary Program*
GCRP	*Gulf of Mexico Community-Based Restoration Program*
GLO	*Texas General Land Office*
GPC	*Texas Groundwater Protection Committee*
GWPC	*Ground Water Protection Council*
HHW	*household hazardous waste*
IBWC	*International Boundary Water Commission*

ISD	*independent school district*
iSWM	*integrated Storm Water Management*
KAST	*Kills and Spills Team*
KTB	*Keep Texas Beautiful*
LCRA	*Lower Colorado River Authority*
LPST	*leaking petroleum storage tank*
MCL's	*maximum contaminant levels*
MDL	*minimum detection level*
MSW	*municipal solid waste*
MxIBWC	*Mexico International Boundary Water Commission*
NADB	*North American Development Bank*
NAFTA	*North American Free Trade Agreement*
NAWQA	*National Water Quality Assessment Program*
NCTCOG	*North Central Texas Council of Governments*
NFIP	*National Flood Insurance Program*
NIPF	*nonindustrial private forest*
NLIWTP	*Nuevo Laredo International Wastewater Treatment Plant*
NNRCF	*National Natural Resources Conservation Foundation*
NOAA	*National Oceanic and Atmospheric Administration*
NPDES	*National Pollutant Discharge Elimination System*
NPS	*nonpoint source pollution*
NRCS	*Natural Resources Conservation Service*
OAG	*Texas Office of Attorney General*
OFCU	*Oil Field Clean Up*
OSPR	*Oil Spill Prevention and Response*
OSPRA	*Oil Spill Prevention and Response Act of 1991*
OSSF	*on-site sewage facilities*
PCBs	*polychlorinated biphenyls*
PMP	*Pesticide Management Plan*
PWE	*Public Works and Engineering*
RG/RBBC	*Rio Grande/Rio Bravo Basin Coalition*
RCRA	*Resource Conservation and Recovery Act*
RRC	*Railroad Commission of Texas*
SDWA	*Safe Drinking Water Act*
SEP	*supplemental environmental project*
SPCB	*Structural Pest Control Board*
SWA	*source water assessment*
SWCDs	*Soil and Water Conservation Districts*
SWP	*source water protection*
TAES	*Texas Agricultural Experiment Station*
TAGD	*Texas Alliance of Groundwater Districts*
TCC	*Texas Chemical Council*
TCE	*Texas Cooperative Extension*
TCEQ	*Texas Commission on Environmental Quality*
TDA	*Texas Department of Agriculture*
TDLR	*Texas Department of Licensing and Regulation*

TDS	*Total dissolved solids*
TES	*Teaching Environmental Sciences*
TFA	*Texas Forestry Association*
TFS	*Texas Forest Service*
TGPC	*Texas Groundwater Protection Committee*
TIAER	*Texas Institute for Applied Environmental Research*
TMDL	*Total Maximum Daily Load*
TPDES	*Texas Pollutant Discharge Elimination System*
TPWD	*Texas Parks and Wildlife Department*
TSSWCB	*Texas State Soil and Water Conservation Board*
TSWQS	*Texas Surface Water Quality Standards*
TWC	*Texas Water Code*
TWDB	*Texas Water Development Board*
TWPC	*Texas Watershed Protection Committee*
TxDOT	*Texas Department of Transportation*
UCRA	*Upper Colorado River Authority*
UIC	*underground injection control*
USDW	*underground sources of drinking water*
USGS	*United States Geological Survey*
USIBWC	*United States International Boundary Water Commission*
UST	*underground storage tank*
VCP	*Voluntary Cleanup Program*
WET	*Water Education for Teachers*
WPAP	*water pollution abatement plan*
WQMP	*water quality management plans*
WRP	*Wetlands Reserve Program*

APPENDIX K WEB SITES OF INTEREST

This list offers readers with web addresses for web sites that contain information about the programs, agencies, and organizations discussed in this document. Many are organizational home pages that have links to more detailed information regarding nonpoint source pollution.

Bay and Estuary Programs

Coastal Bend Bay and Estuaries Program
http://www.cbbep.org/

Galveston Bay and Estuaries Program
http://gbep.state.tx.us

Cities

City of Abilene
http://www.abilenetx.com

City of Austin
http://www.ci.austin.tx.us/

City of Dallas
http://www.dallascityhall.com/

City of Denton
http://www.cityofdenton.com

City of El Paso
http://www.ci.el-paso.tx.us/default.asp

City of Fort Worth
http://www.fortworthgov.org

City of Houston
http://www.houstontx.gov/

City of Laredo
http://www.ci.laredo.tx.us/

City of San Angelo
http://www.sanangelotexas.org

City of San Antonio
http://www.sanantonio.gov

Council of Governments

Council of State Governments
http://www.csg.org/csg/default

Houston Galveston Area Council
http://www.h-gac.com/HGAC/home/

North Central Texas Council of Governments
http://www.nctcog.org

Federal Agencies

National Natural Resources Conservation Foundation
http://www.nrcs.usda.gov/

National Oceanic and Atmospheric Administration
http://www.noaa.gov/

U.S. Army Corp of Engineers
http://www.usace.army.mil/

U.S. Coast Guard
http://www.uscg.mil/USCG.shtm

U.S. Department of Agriculture
http://www.usda.gov/

U.S. Environmental Protection Agency
http://www.epa.gov/

U. S. Geological Survey
http://www.usgs.gov/

Groundwater Protection

Barton Springs/Edwards Aquifer Conservation District
http://www.bseacd.org/

Edwards Aquifer Authority
http://www.edwardsaquifer.org/

Groundwater Protection Council
http://www.gwpc.org/

Texas Alliance of Groundwater Districts or Texas Groundwater Alliance
http://www.texasgroundwater.org/

Texas Groundwater Protection Committee
http://www.tgpc.state.tx.us/

Industrial Councils

Texas Chemical Council
http://www.txchemcouncil.org/

Texas Nursery and Landscape Association
http://txnla.org/

Interstate and International Agencies

American Water Works Association
http://www.awwa.org/

Association of State Drinking Water Administrators
http://www.asdwa.org

Association for State and Interstate Water Pollution Control Administrators
http://www.asiwpca.org/

Border Environment Cooperation Commission
http://www.cocef.org/ingles.php

International Boundary and Water Commission
http://www.ibwc.state.gov/

North American Development Bank
http://www.nadbank.org/

Pollution Control Administrators
http://www.asiwpca.org/

Rio Grande/Rio Bravo Basin Coalition
http://www.rioweb.com

River Authorities

Brazos River Authority
http://www.brazos.org

Lower Colorado River Authority
http://www.lcra.org/index.html

San Antonio River Authority
http://www.sara-tx.org

Upper Colorado River Authority
http://www.ucratx.org

State Agencies

Agriculture Resource Protection Authority
http://www.agr.state.tx.us/

Bureau of Economic Geology (University of Texas)
http://www.beg.utexas.edu

Coastal Coordination Council
http://www.glo.state.tx.us/coastal/ccc.html

Railroad Commission of Texas
http://www.rrc.state.tx.us

Structural Pest Control Board
http://www.spcb.state.tx.us/

Texas Agricultural Experiment Station
http://agresearch.tamu.edu/

Texas A&M On-Site Treatment Training Center
http://primera.tamu.edu/IRRGSYS/waste.htm

Texas Commission on Environmental Quality
http://www.tceq.state.tx.us/index.html

Texas Cooperative Extension Services
http://texasextension.tamu.edu/

Texas Department of Agriculture
http://www.agr.state.tx.us

Texas Department of State Health Services
http://www.DSHS.state.tx.us

Texas Department of Licensing and Regulation
http://www.license.state.tx.us/

Texas Department of Transportation
http://www.dot.state.tx.us

Texas General Land Office
http://www.glo.state.tx.us

Texas Farm Services Agency
http://www.fsa.usda.gov/tx/

Texas Forest Service
http://txforestservice.tamu.edu/

Texas Forestry Association
http://www.texasforestry.org/

Texas Institute for Applied Environmental Research (Tarleton State Univ.)
http://tiaer.tarleton.edu/

Texas Office of Attorney General
http://www.oag.state.tx.us/

Texas On-Site Wastewater Treatment Research Council
http://www.towtrc.state.tx.us/

Texas Parks and Wildlife Department
http://www.tpwd.state.tx.us

Texas Secretary of State Office
http://www.sos.state.tx.us/

Texas State Soil and Water Conservation Board
http://www.tsswcb.state.tx.us/

Texas Watch (Texas State University)
http://www.texaswatch.geo.swt.edu/

Texas Water Development Board
http://www.twdb.state.tx.us

Texas Water Resources Institute (Texas A&M University)
http://twri.tamu.edu/