

# *Managing* NONPOINT SOURCE POLLUTION IN TEXAS 2 0 0 7   A N N U A L   R E P O R T



**TCEQ**  
Texas Commission on  
Environmental Quality



**TSSWCB**  
Texas State Soil & Water  
Conservation Board





# Managing Nonpoint Source Pollution in Texas

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# From The Executive Directors

The U.S. Environmental Protection Agency (EPA) provides grant funding to Texas to implement the State of Texas Nonpoint Source Management Program. The Management Program addresses the goals, objectives, and various strategies underway in Texas to reduce and prevent nonpoint source (NPS) pollution and provides a schedule to measure progress against. The responsibility of implementing this program is divided between the Texas Commission on Environmental Quality (TCEQ) and the Texas State Soil and Water Conservation Board (TSSWCB). This document is produced annually in accordance with Section 319(h) of the Clean Water Act (CWA) and is used to report Texas' progress toward meeting the Act's goals and objectives and toward implementing its strategies as defined in the Management Program.

In the past year, a significant focus of both the TSSWCB and the TCEQ has been on developing watershed protection plans (WPPs). Integral to watershed protection plans are community-based solutions, voluntary initiatives, sound science, and fiscal responsibility. These stakeholder-driven plans give the decision-making power to the local groups most committed to the goals specified in the plans. The watershed planning process merges the scientific and regulatory concerns of state and federal agencies with the social and economic considerations of local groups and communities and thereby increases public understanding of all the issues involved. Most importantly, it increases public commitment to the solutions.

We are pleased to submit the 2007 Annual Report to the EPA. In partnership with the EPA and other federal, state, regional, and local watershed stakeholders, the TCEQ and the TSSWCB will continue to work toward the goal of ensuring safe water for future generations of Texans.



Rex Isom  
Executive Director  
Texas State Soil and  
Water Conservation Board



Glenn Shankle  
Executive Director  
Texas Commission on  
Environmental Quality

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## CHAPTER 1

# Introduction

## Defining Nonpoint Source Pollution

**N**onpoint source (NPS) pollution is all water pollution that does not come from point sources. Point sources are regulated “end of pipe” outlets for wastewater or storm water from industrial or municipal treatment systems.

NPS pollution occurs when rainfall or snowmelt flows off the land, roads, buildings, and other features of the landscape. This runoff carries pollutants into drainage ditches, lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water. NPS pollution also includes flows of polluted water from non-permitted sources such as car washes and leaking septic tanks. Common NPS pollutants include

- Fertilizers, herbicides, and insecticides from agricultural lands and residential areas;
- Oil, grease, and toxic chemicals from spills, roads, urban areas, and energy production;
- Sediment from construction sites, crop and forest lands, and eroding stream banks; and
- Bacteria and nutrients from livestock, pet wastes, and leaking septic systems.

Some NPS pollution starts as air pollution deposited onto the ground and into waterways (atmospheric deposition). Changes in the flow of waterways due to dams and other structures (hydromodification) can also cause NPS pollution.

## What Guides NPS Pollution Management in Texas?

Under the federal Clean Water Act, Texas and other states must establish water quality standards for waters in the state, regularly assess the status of water quality, and implement actions necessary to achieve and maintain those standards. The mission of the Texas NPS Program is to protect the quality of the State’s water resources from the adverse effects of NPS pollution. This protection is provided through cooperative implementation using the organizational tools and strategies defined below.

### Partnerships

The TCEQ is designated by law as the lead state agency for water quality in Texas. The TSSWCB is the lead agency in the State for abatement of agricultural and silvicultural NPS pollution management. The TCEQ administers the NPS Program for all other sources of NPS pollution.

Management of NPS pollution in Texas involves partnerships among many organizations. With the extent and variety of NPS issues across Texas, cooperation across political boundaries is essential. Many local, regional, state, and federal agencies play an integral part in managing NPS pollution, especially at the watershed level. They provide information about local concerns and infrastructure and build support for the kind of pollution controls that are necessary to prevent and reduce NPS pollution. By establishing coordinated frameworks to share information and resources, the State can more effectively focus its water quality protection efforts.



*J. Buratti, An Open Storm Water Drainage in Central Texas*



*TSSWCB, Local, regional, and state participants at the Plum Creek Stakeholder Meeting*

## The Texas NPS Management Program

The Texas Nonpoint Source Management Program (NPS Management Program <[www.tceq.state.tx.us/comm\\_exec/forms\\_pubs/pubs/sfr/068-04\\_index.html](http://www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/sfr/068-04_index.html)>) is the State's official roadmap for addressing nonpoint source pollution,

presenting its goals, priorities, programs, and milestones for the program. The program publication is updated every five years. The NPS Management Program, which is prepared jointly by the TCEQ and the TSSWCB, is required by Section 319 of the federal CWA. The NPS Annual Report, which is also required by Section 319, provides an annual update of progress toward meeting the goals and milestones set forth in the NPS Management Program. Additionally, the Annual Report briefly summarizes the State's NPS program and how it is integrated with the State's other water quality programs.

## The Texas Surface Water Quality Inventory and 303(d) List

The TCEQ and other organizations collect water quality data statewide in order to develop the Texas Water Quality Inventory and CWA 303(d) List (Inventory and 303(d) List). The Inventory and 303(d) List includes the identification of surface water bodies that do not meet one or more of the standards defined in the Texas Surface Water Quality Standards. Data also indicate whether NPS pollution is a contributing factor to the impairment. The TCEQ and the TSSWCB prioritize water bodies identified as impaired or threatened by NPS pollution for CWA Section 319(h) grants and other available funding.

For the groundwater portion of the Inventory and 303(d) List, select aquifers are represented by maps showing both the locations of water wells sampled and those exceeding health or risk-based criteria for constituents of concern. It also summarizes sources and types of groundwater contamination taken from the Joint Groundwater Monitoring and Contamination Report which is prepared by the Texas Groundwater Protection Committee (TGPC).

Specific activities related to the Inventory and 303(d) List are described in Chapter 2.

## The Watershed Approach

Protecting the State's streams, lakes, bays, and aquifers from the impacts of NPS pollution is a complex process. Texas uses a Watershed Approach to focus efforts on the highest priority water quality issues of both surface water and groundwater. The Watershed Approach is based on the following principles:

- Geographic focus based on hydrology rather than political boundaries;
- Water quality objectives based on scientific data;
- Coordinated priorities and integrated solutions;
- Diverse, well-integrated partnerships.

For groundwater management, the geographic focus is on aquifers rather than watersheds. Otherwise, the approach is the same. Wherever interactions between surface water and groundwater are identified, management activities will support the quality of both resources.

## C h a p t e r 2

# Progress Towards Meeting the Goals and Objectives of the NPS Management Program

The State's Management Program for NPS 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, planning, implementation, and education. The TCEQ and TSSWCB have established goals and objectives for guiding and tracking the progress of NPS management in Texas. The goals describe guiding principles for all activities under the NPS Management 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 this report, which is submitted to EPA in accordance with CWA requirements. Although not comprehensive, this chapter reports on a variety of programs that directly support the goals and objectives of the NPS Management Program. Chapter 3 reports on projects specified in the NPS Management Program milestone table.

## Clean Water Act Section 319(h) Grant Program

Section 319(h) of the CWA established a grant that is awarded annually by Congress to the EPA. The EPA then allocates these funds to the states for activities supporting the congressional goals of the CWA. The TCEQ and the TSSWCB target these grant funds toward all NPS activities consistent with the long- and short-term goals defined in the Texas NPS Management Program.

### Emerging Issue Related to Funding Under the CWA Section 319(h) Grant Program

As new federal National Pollutant Discharge Elimination System (NPDES) rules as well as state rules have begun to regulate municipal storm sewer systems and other "storm water" pollution sources by permit, the distinction between point source and nonpoint source has become more complex. This distinction is important in regard to federal funding of NPS activities. The NPS Program created by Section 319 of the federal CWA is prohibited from funding activities required by a point source permit, including storm water permits. Storm water fits the traditional definition of NPS pollution but in some situations it is collected and managed under permit requirements through a storm sewer system. As NPDES rules now require certain types of industrial facilities, construction sites, and entire urbanized areas to control runoff under storm water permits, much of the urban component of storm water management has been reclassified as point source and thus not fundable with Section 319(h) funds. Federal guidelines do, however, allow the NPS program to fund NPS management measures in permitted urbanized areas if the activities are not specifically required by the storm water permit.

### Summary of CWA Section 319(h) Grant-Funded Projects

In fiscal year (FY) 2007, the TCEQ had fifty-one active multi-year CWA Section 319(h) grant-funded projects which had a total budget of \$16 million in federal funds, addressing a wide range of NPS issues as indicated in Figure 2.1.

In FY 2007, the TSSWCB had seventy-six ongoing CWA Section 319(h) grant-funded projects which had a total budget of \$17 million in federal funds addressing a wide array of agricultural and silvicultural NPS issues (Figure 2.2). Specific project actions include development and implementation of watershed protection plans and total maximum daily loads, supporting targeted educational programs, and implementing best management practices (BMP) to abate NPS pollution from dairy and poultry operations, silvicultural activities, grazing operations, and row crop operations.

Figure 2.1

**TCEQ Current NPS Grant-Funded Projects**

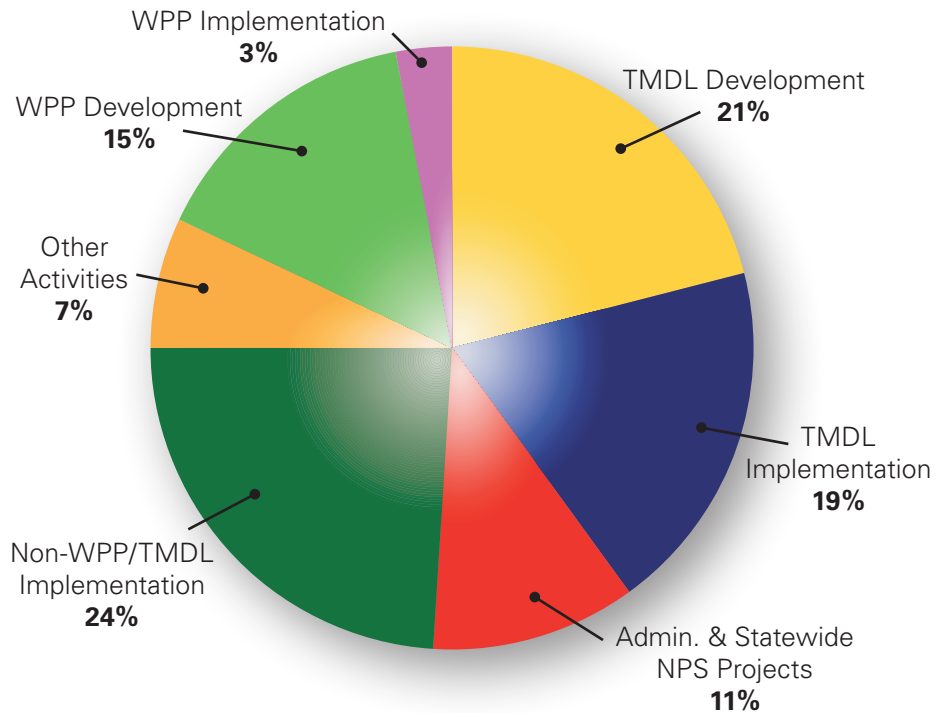
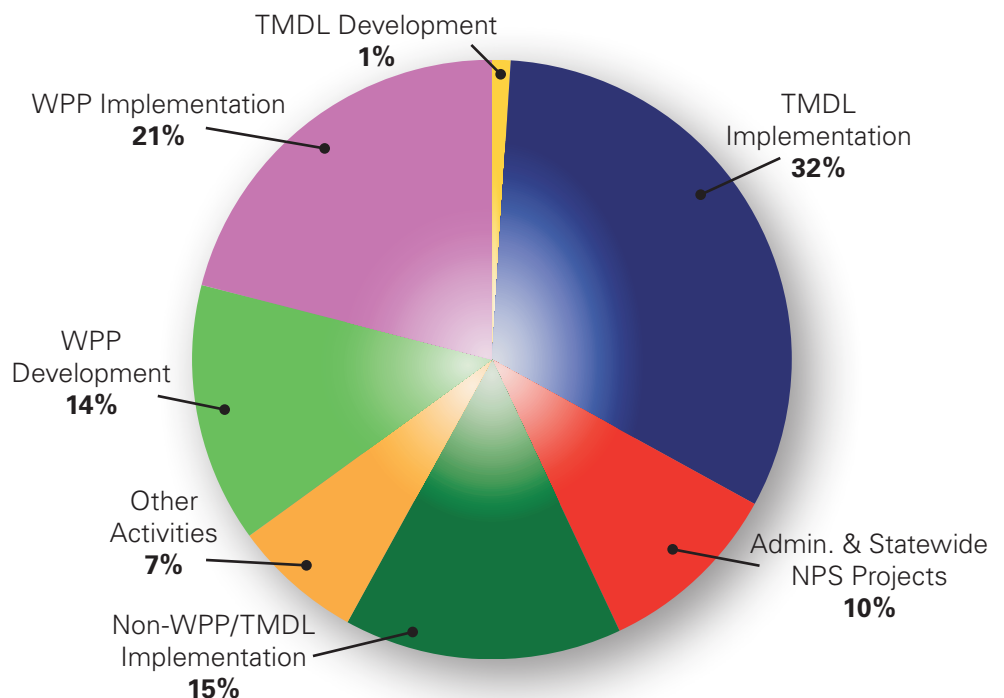


Figure 2.2

**TSSWCB Current NPS Grant-Funded Projects**



*Best Management Practices are actions that attempt to prevent and reduce NPS pollutant loadings in Texas' surface water bodies, groundwater, wetlands and coastal areas.*



## Data Collection and Assessment

One of the goals of the NPS Management Program is to collect and assess water quality data. Data collection requires the coordination of appropriate federal, state, regional, and local entities as well as private sector and citizen groups. The TCEQ's Surface Water Quality Monitoring (SWQM) program, operating from the central office and sixteen regional offices, conducts both routine monitoring and special studies. In addition, the Clean Rivers Program (CRP), a collaboration between the TCEQ and fifteen regional water agencies, collects surface water quality data throughout the State in response to both state needs and local stakeholder interests. Furthermore, the TCEQ acquires water quality data from other state and federal agencies after assuring the quality of the data are comparable to that of data collected by the TCEQ's programs.

Data are assessed by the TCEQ to determine if a water body meets its designated use(s) or if water quality improvement activities are achieving their intended goals. For impaired waters, water quality data can be used in the development of Watershed Protection Plans (WPP) and Total Maximum Daily Loads (TMDL). Data are also used to determine sources of pollution, the adequacy of regulatory measures, watershed improvements, and restoration plans. The data collection primarily guides the distribution of CWA Section 319(h) grant funds toward water quality assessment activities in high priority, nonpoint source-impacted watersheds, vulnerable and impacted aquifers, or areas where additional information is needed.

### New Surface Water Quality Database Brought On-line in 2007

All surface water quality data are stored at the TCEQ in a database called the Surface Water Quality Monitoring Information System (SWQMIS). The SWQMIS was put into production in March 2007 after a multi-year development process. This new database has simplified uploading and entry of data, enhanced reporting capabilities, and added automation tools for the assessment process. The SWQMIS is now the repository for eight million surface water quality data measurements from over eight thousand sampling sites in Texas dating back to the late 1960's. The database is growing by more than 450,000 measurements every year. These data are made publicly available at <[www8.tceq.state.tx.us/SwqmisWeb/public/index.faces](http://www8.tceq.state.tx.us/SwqmisWeb/public/index.faces)>.

### Texas Water Quality Assessment

The TCEQ assesses the status of the State's water quality every two years. The assessment 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 period on record in making its assessment. The quality of waters described represents a snapshot of conditions during the limited time period considered in the assessment. Water bodies identified as impaired or threatened by NPS pollution are given priority for CWA Section 319(h) grants and other available funding.

The Inventory and 303(d) List is an important management tool produced as part of the assessment. It identifies water not meeting statewide and/or segment-specific water quality criteria established by the TCEQ to ensure designated uses are met. The Inventory and 303(d) List is subject to review and approval by the EPA.



*The TCEQ SWQM team members conducting habitat assessment*

### ***Categories Indicate Water Quality Status***

Available data on each water body are assessed, and the results reported in the Water Quality Inventory. Each area of a water body assessed for each parameter is assigned to one of five categories which provides information to the public, the EPA, the TSS-WCB, and other TCEQ programs about current water quality status.

For example, water bodies in Category 1 and 2 meet the water quality standards, and simply require routine monitoring and preventive action. Category 5 constitutes the 303(d) List of Impaired Waters. For Category 4 water bodies, the TCEQ has a restoration plan in place if the impairment is caused by pollutants. Categories 4 and 5 are further divided into subcategories that communicate the specific strategies the state is using, or plans to use, to address surface waters that are not meeting standards.

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.

### ***Summary of the 2006 Texas Water Quality Inventory and 303(d) List***

In 2007, the TCEQ concluded work on the statewide water quality assessment of nine hundred and twenty-five water bodies for the 2006 CWA Section 303(d) List. A significantly greater number of water bodies were surveyed and assessed than in previous years, primarily due to new monitoring data contributed by the CRP partners and their local cooperators.

As more water bodies and data have become available for assessment, there has been a thirty one percent increase in the number of impairments on the CWA Section 303(d) List. The largest net increase was for bacteria, an increase of about sixty percent. Most of the new water bodies are small streams, and this type of water body often does not support the criteria for bacteria. There was also a large increase in biological listings because the data used to directly evaluate the health of aquatic communities became increasingly available. Seventy-five impairments were delisted in 2006, more than twice the number delisted in the previous assessment. Most of the delisted water bodies are now identified as meeting criteria, which resulted from having more complete and accurate data sets available. A description of the categories, and the results, by category, for the 2006 Inventory and 303(d) List are illustrated in Table 2.1.



Table 2.1  
**Water Bodies Assigned to Each Assessment Category  
 in the 2006 Water Quality Inventory**

Category	Definition	Number of Water Bodies	Stream/ River Miles	Reservoir/ Lake Acres	Estuary Square Miles	Ocean Coast Miles*
1	Attaining the water quality standard and no use is threatened.	9	341.40	104,628.00	277.40	0
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.	369	11,667.94	886,943.10	1,111.59	0
3	Insufficient or no data and information to determine if any designated use is attained. Many of these water bodies are intermittent streams and small reservoirs.	With insufficient data: 131	3,261.02	6,448.00	0.01	0
		With no data: Unknown number	168,452.06	420,195.00	310.77	0
4	Standard is not supported or is threatened for one or more designated uses but does not require the development of a TMDL.	17	265.60	25,594.00	29.13	0
5	The water body does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants.	399	7,239.98	550,791.90	664.10	388
Total Number of Water Bodies Assessed		794				
Total Number of Water Bodies Surveyed		925				
Total Water Body Sizes in Texas			191,228	1,994,600	2,393	388

\* Ocean Coast Miles are calculated from ocean square miles divided by ten miles to the offshore limit.

### Summary of 2006 Impairments

Impairments can be grouped by the cause and the beneficial use of the water body affected as illustrated below in Table 2.2. Elevated levels of bacteria which impair the contact recreation use cause the largest number of water body impairments. Many of these bacteria impairments are the result of urban and agricultural NPS pollution. Low dissolved oxygen, impairing many of the same water bodies, results in an unhealthy environment for aquatic life. Dissolved oxygen levels are depressed by both point and nonpoint sources of oxygen-demanding substances and nutrients which over-fertilize aquatic plants and algae. Contaminants in fish tissue originate primarily from the landscape. Organic contaminants such as pesticides runoff from urban and agricultural land; mercury, reaches the watershed through atmospheric deposition.

Table 2.2  
**Causes of Impairments Identified on the 2006 303(d) List**

Impairment Group	Media	2006 Number of Impairments	Use
Bacteria	in water	291	Recreation
	in shellfish	21	Oyster Waters
Dissolved Oxygen		96	Aquatic Life
Toxicity	in ambient water	5	Aquatic Life
	in ambient sediment	6	
Organics	in water	0	Fish Consumption, Aquatic Life
	in fish/shellfish	31	
Metals (except Mercury)	in water	4	Fish Consumption, Oyster Waters, Aquatic Life
	in fish/shellfish	0	
Mercury	in water	1	Fish Consumption, Oyster Waters, Aquatic Life
	in fish/shellfish	15	
Dissolved Solids	chloride	13	General
	sulfate	6	
	total dissolved solids	11	
Temperature		0	General
pH		13	General
Nutrients	nitrogen	0	General, Public Water Supply
Biological	habitat, macrobenthos community, or fish community	30	Aquatic Life
<b>Totals</b>		<b>543</b>	

### **Summary of the 2008 Water Quality Inventory and 303(d) List**

In 2007, the TCEQ assessed several specific groups of water bodies for the 2008 Inventory and 303(d) List. These water bodies include classified segments and other segments with a pending regulatory reason for evaluation or the need to initiate or revise planning activities such as a TMDL or standards revision. The TCEQ relied on cooperators, such as local and state water management agencies, to identify additional water bodies for the assessment. Public comment will be solicited in January 2008 and the Draft 2008 Water Quality Inventory and 303(d) List will be submitted to the EPA for approval on April 1, 2008.

### **Continuous Water Quality Monitoring Network**

The purpose of the TCEQ's Continuous Water Quality Monitoring Network (CWQMN) is to collect and display ambient water quality data in "real-time". "Real-time" means that the data collected in the field are reported almost simultaneously to the TCEQ so that it knows about changes in surface water quality in critical watersheds. The stations are located throughout Texas using a combination of *in situ* probes and automated analysis instruments and monitor parameters, such as temperature, pH, dissolved oxygen, specific conductance, chlorophyll *a*, soluble reactive phosphorus, nitrate, and ammonia. Data are transmitted from the stations to the TCEQ using phone modems, wireless modems and satellite telemetry. Once data are transferred, they are stored in the Leading Environmental Analysis and Display System (LEADS) database.

The data are also displayed on the World Wide Web for public access at <[www.tceq.state.tx.us/assets/public/compliance/monops/water/wqm/tx\\_realtime\\_swf.html#data](http://www.tceq.state.tx.us/assets/public/compliance/monops/water/wqm/tx_realtime_swf.html#data)>.



During FY 2007, the TCEQ, cooperators, and contractors established twenty new CWQMN stations, including both surface and groundwater monitoring stations. In FY 2008, the TCEQ will continue to install CWQMN stations based on documented data needs.

The TCEQ will focus, for the next two years, on improving data return rates at about one quarter of the stations where technical and environmental factors have resulted in less than target performance. Several causes were identified and the TCEQ will work to address those issues in FY 2008.

The TCEQ secured CWA Section 319(h) funding for two surface water/groundwater NPS projects. These projects include continuous water quality monitoring at significant recharge features to the Edwards Aquifer. The data are utilized to control storm water inflow structures in order to reduce pollutant loading to the aquifer.

## Planning

### Watershed Protection Plans

The TCEQ and the TSSWCB apply the watershed approach to managing NPS pollution by supporting the development and implementation of WPPs. These plans are developed through local stakeholder groups and a significant portion of the funding for preventing NPS pollution under the federal CWA is dedicated to the development and implementation of WPPs where nonpoint source pollution has contributed to the impairment of water quality.

In Texas, WPPs are locally developed water quality plans that coordinate activities and resources to manage water quality. They facilitate the restoration of impaired water bodies and/or the protection of threatened waters before they become impaired. These stakeholder-driven plans give the decision-making power to the local groups most vested in the goals specified in the plans. Bringing groups of people together through watershed planning efforts combines scientific and regulatory water quality factors with social and economic considerations.

While WPPs can take many forms, the development of plans funded by CWA Section 319(h) grants must follow guidelines issued by the EPA. These guidelines can be found at: Nonpoint Source Program and Grants Guidelines for States and Territories, <[www.epa.gov/fedgrstr/EPA-WATER/2003/October/Day-23/w26755.htm](http://www.epa.gov/fedgrstr/EPA-WATER/2003/October/Day-23/w26755.htm)>.

In 2007, the TCEQ and the TSSWCB facilitated the development of WPPs (Table 2.3) throughout Texas by providing technical assistance and/or funding through grants to local stakeholder groups. There are also WPPs that are being developed or have been developed in Texas independently of those listed in the table. Therefore, the following list is not intended to be comprehensive of all the watershed protection planning efforts currently underway in Texas in 2007.

The following web links provide an overview and summary of WPPs completed or in progress in Texas: the TSSWCB, <[www.tsswcb.state.tx.us/wpp](http://www.tsswcb.state.tx.us/wpp)> and the TCEQ, <[www.tceq.state.tx.us/assets/public/compliance/monops/nps/mgmt-plan/wpp-item-update0907.doc](http://www.tceq.state.tx.us/assets/public/compliance/monops/nps/mgmt-plan/wpp-item-update0907.doc)>. Specific WPP activities are described in Chapter 3.

### Total Maximum Daily Loads and Implementation Plans

When current control actions or pollution prevention strategies are not sufficient to attain water quality standards, the State takes action to restore some impaired segments through its TMDL Program. Before any effective plan of action can be developed, it is first necessary to determine the source(s) of a pollutant and the amount by



*A CWQMN Station at Caddo Lake*

Table 2.3  
**Texas Watershed Protection Plans**

<b>TCEQ Watershed Protection Plans</b>	<b>Links</b>
Arroyo Colorado Watershed	<a href="http://www.arroyocolorado.org/">http://www.arroyocolorado.org/</a>
Bastrop Bayou Watershed	<a href="http://www.bastropbayou.org">http://www.bastropbayou.org</a>
Brady Creek Watershed	<a href="http://www.ucratx.org/NPSBrady.html">http://www.ucratx.org/NPSBrady.html</a>
Caddo Lake Watershed	<a href="http://www.netmwd.com/Caddo%20Lake%20Protection%20Plan/Caddo_index.html">http://www.netmwd.com/Caddo%20Lake%20Protection%20Plan/Caddo_index.html</a>
Dickinson Bayou Watershed	<a href="http://www.dickinsonbayou.org/">http://www.dickinsonbayou.org/</a>
Hickory Creek Watershed	<a href="http://www.cityofdenton.com/pages/mygovenvironmentalwater319grant.cfm">http://www.cityofdenton.com/pages/mygovenvironmentalwater319grant.cfm</a>
Lake Granbury Watershed	<a href="http://www.brazos.org/gbWPP.asp">http://www.brazos.org/gbWPP.asp</a>
Upper San Antonio River Watershed	<a href="http://sara-tx.org/site/water_quality/water_qual_mon/wpp/wppintro.html">http://sara-tx.org/site/water_quality/water_qual_mon/wpp/wppintro.html</a>
<b>TSSWCB Watershed Protection Plans</b>	<b>Links</b>
Buck Creek Watershed	<a href="http://www.tsswcb.state.tx.us/managementprogram/buckcrkwpp">http://www.tsswcb.state.tx.us/managementprogram/buckcrkwpp</a>
Concho River Watershed	<a href="http://www.ucratx.org/CRiverRest_UCRA.html">http://www.ucratx.org/CRiverRest_UCRA.html</a>
Granger Lake Watershed	<a href="http://www.tsswcb.state.tx.us/managementprogram/granger">http://www.tsswcb.state.tx.us/managementprogram/granger</a>
Leon River Watershed	<a href="http://www.tsswcb.state.tx.us/managementprogram/leonwpp">http://www.tsswcb.state.tx.us/managementprogram/leonwpp</a>
Pecos River Watershed	<a href="http://pecosbasin.tamu.edu/">http://pecosbasin.tamu.edu/</a>
Plum Creek Watershed	<a href="http://pcwp.tamu.edu/">http://pcwp.tamu.edu/</a>

which it must be reduced to attain standards. This is accomplished by developing a total maximum daily load — a budget for a pollutant. A TMDL:

- Determines the maximum amount (load) of a particular pollutant that a segment can receive each day and still both attain and maintain its water quality standards;
- Identifies the source(s) that contribute to the load of the pollutant;
- Assigns the load to categories (nonpoint source, point source, margin of safety).

The TCEQ and the TSSWCB are both responsible for developing TMDLs for Texas' water bodies. The TSSWCB focuses on developing TMDLs for impairments in watersheds where agriculture and/or silviculture are significant land uses. The TCEQ must focus on addressing all impairments because it has overall authority for managing the quality of surface waters.

TMDLs must allow for seasonal variations, anticipate future growth, and include a margin of safety to account for uncertainties in the analysis. After developing a TMDL, the TCEQ works with stakeholders to formulate an action plan to implement it — the I-Plan. An I-Plan is a blueprint that describes how the pollutant reductions described in the TMDL will be achieved.

The TCEQ makes an extensive effort to identify the people who have a stake in restoring an impaired water body, and consults with them to develop TMDLs and I-Plans. The goals and methods of both TMDLs and I-Plans are reported and discussed in public forums such as basin steering committees or advisory groups formed specifically to work on a particular TMDL project.

The TMDL Program uses several avenues for statewide education: its Web site, the brochure Clean Water for Texas, a biennial report on the status of TMDL implementation, an e-mail news list, the stakeholder work groups of the CRP, the NPS Management Program, and the Galveston Bay Estuary Program. The TMDL Program

will also host a statewide forum, with the TMDL Participation Coordinating Committee being formed by the TCEQ in 2008. Regionally, the TMDL program coordinates its projects with the CRP Basin Steering Committees and Soil and Water Conservation Districts if agriculture or silviculture may be affected by the TMDL. For some TMDL projects, the existing CRP forum serves as the advisory group for the project; for other projects, a separate advisory group may be formed, or the state may conduct public meetings within the watershed at key points in the project development. TMDLs and I-Plans are integral components in Texas' overall program to improve and protect the quality of the rivers, lakes, and bays.

The following web link provides an overview and summary of TMDLs and I-Plans completed or in progress in Texas: <[www.tceq.state.tx.us/implementation/water/tmdl/nav/tmdlsapproved.html](http://www.tceq.state.tx.us/implementation/water/tmdl/nav/tmdlsapproved.html)>. The status and description of TMDL projects related to nonpoint sources can be found in Chapter 3.

Close coordination between the TCEQ and the TSSWCB on the development of TMDLs, I-Plans, and WPPs is critical to the success of the state's efforts to improve the quality of the state's impaired surface waters. Consequently, the TCEQ and the TSSWCB have executed a Memorandum of Agreement that describes how the two agencies will cooperate in their mandated tasks to manage water quality.

## NPS Program Implementation

The second goal of the NPS Management Program involves the management of CWA Section 319(h) grant funds and the leveraging of additional funds to efficiently and effectively target implementation activities to areas identified as impacted or at risk for being impacted by NPS pollution. Implementation activities are conducted with the goal of preventing and reducing NPS pollution in surface water, groundwater, wetlands, and coastal areas, through the execution of TMDL I-Plans, WPPs, recommendations from the Joint Groundwater Monitoring and Contamination Report, the Texas Groundwater Protection Strategy, and the TSSWCB-certified Water Quality Management Plans (WQMPs) on agricultural and silvicultural lands. The following sections, as well as Chapter 3, provide an update on various programs and projects that involve NPS implementation activities and are examples of additional funding that target NPS pollution. Specific detail related to the NPS Management Program project milestones can be found in Chapter 3.

### Coastal Management Program

The steady growth of industry, marine commerce, agriculture, commercial and recreational fishing and tourism activity along the Texas Coast requires the implementation of a variety of programs to manage coastal natural resources. The Texas Coastal Management Program which is managed by the Texas General Land Office is responsible for the development and implementation of the Texas Coastal NPS Pollution Control Program which identifies potential sources of coastal NPS pollution and develops prevention programs to protect coastal natural resources. A part of the Coastal Management Program is the Coastal NPS Grant Program (also known as Section 6217 grants) which implements one or more of the fifty-four management measures listed in Texas Coastal NPS Pollution Control Program. Some of the projects with significant initiatives or activities in 2007 are described in the following sections.

#### Mad Island Marsh

Mad Island Marsh has historically been a very important wetland for saltwater and freshwater plants and wildlife. The marsh is situated on West Matagorda Bay, in Matagorda County, Texas. The Runnells Family Mad Island Marsh is part of an expansive coastal wetlands system which, sixty years ago, stretched nearly unbroken along the mid- and upper-Texas Gulf Coast. Currently, degradation of the habitat is due to uncontrolled nutrient loading and exotic and noxious species, such as the Common Reed, *Phragmites australis* Cav. In the first phase of this restoration effort, the Texas

General Land Office (GLO) contracted with the Texas Rice Industry Coalition for the Environment to prevent fertilizer, cattle manure, silt, and pesticide runoff through the installation of water control structures on the ditches that drain the farm and grazing fields. The water control structures will redirect the current uncontrollable flow into the marsh into a natural water flow over the prairie. Further, the Texas Rice Industry Coalition for the Environment will use the dirt from the ditch banks to build a forty-acre wetland unit. This additional wetland habitat in the ditches will support countless numbers of wildlife species. Another portion of the project is the restoration of a sixty-acre abandoned farm field into native prairie. The restored grasslands will serve as an effective filter for nutrient and chemical runoff.

### **Dickinson Bayou**

The Texas AgriLife Extension Service, in conjunction with its various partners, established the Dickinson Bayou Restoration Working Group and developed a comprehensive wetland restoration plan for Dickinson Bayou. The Texas AgriLife Extension Service is currently designing a NPS pollution and prevention community outreach campaign, focusing on human impacts on wetlands, wetlands and water quality, and individual or large-scale preservation and enhancement of wetland resources. Publications about the bayou include informational brochures regarding restoration work



*C. York, Dickinson High School Science Club members assist in the Dickinson Bayou restoration work, October 2007*

for volunteers and the restoration plan, with features of completed restoration sites. The Texas AgriLife Extension Service, with assistance from Keep Dickinson Beautiful, the City of Dickinson, and the Galveston Bay Foundation, has worked with landowners along the bayou to encourage the improvement or creation of wetland habitat on personal property. The local landowners can view the demonstration of restoration practices at Paul Hopkins Park, in central Dickinson. The Texas AgriLife Extension Service, Reliant Energy, the Texas Parks and Wildlife Department, and Keep Dickinson Beautiful, completed the Paul Hopkins Park wetland restoration by establishing native wetland vegetation at sites where exotics had invaded the wetlands. Education and outreach signage was placed at this and other restoration sites.

### **Aransas County New Development Initiative**

The Texas AgriLife Extension Service conducted stakeholder strategic planning activities in Aransas County to assist local communities in balancing future growth while preserving open spaces and natural resources. The multi-day workshops aided Aransas County residents in directing growth within their community. Emphasis was placed on growth alternatives that direct development to already-developed areas in order to protect undisturbed open space and natural resources as well as make the community more pedestrian friendly and "walkable". Ultimately, this project resulted in a community-endorsed document that city and county leaders may use in future planning efforts. The document included feedback from residents on how they would like to see their community develop and the various types of codes and regulations that could be used to achieve these development goals.

### **Galveston Bay Estuary Program**

The Galveston Bay Estuary Program (GBEP), a program of TCEQ, is part of a network of twenty-eight National Estuary Programs in the United States, working with local stakeholders to restore and protect estuaries that are threatened by pollution, development, or overuse. Galveston Bay is classified as an estuary, which is a semi-enclosed body of water where freshwater from rivers, bayous and tributaries mixes with salt water from the Gulf of Mexico. This mixing provides an environment that shelters aquatic plants unique to this area and offers a nutrient rich environment that nurtures

juvenile marine organisms such as shrimp, oysters, crabs, and numerous fish. Additionally, the bay and its watershed provide important recreation and open space for the region's four million plus residents and visitors.

The GBEP is a partnership of stakeholders, which includes an advisory committee, the Galveston Bay Council and its six standing subcommittees. The GBEP and its stakeholders implement a Comprehensive Conservation Management Plan, the Galveston Bay Plan. The second highest priority of the Plan is controlling or eliminating NPS pollution. The Nonpoint Source Pollution Action Plan is the portion of the Plan that was developed in order to reduce and eliminate pollutants from nonpoint sources entering Galveston Bay, including toxins, nutrients, pathogens, sediment, and oxygen-depleting substances. The specific goals of this action plan are to reduce NPS pollutant loads from industry, agriculture, construction, sewage, and marinas.

The GBEP provides technical and financial assistance, through workshops, conferences, and grants, on storm water quality issues to Galveston Bay area municipalities. GBEP encourages the use of storm water management program initiatives that provide minimum control measures, often called best management practices, for six areas: public education and outreach; public involvement and participation; illicit discharge detection and elimination; construction site storm water runoff control; post construction storm water management in new developments; and pollution prevention for municipal operations.

As an example, the GBEP is supporting, through funding and technical assistance, locally driven watershed wide management planning efforts to improve water quality, including streams listed as impaired for aquatic life use, contact recreation, and public health. Since 2005, five non-regulatory, watershed management planning efforts have been initiated in the Galveston Bay area, Armand Bayou, Clear Creek, Dickinson Bayou, West Bay and Bastrop Bayou. A major focus of each plan, when completed, will be solutions to NPS pollution problems, including developing BMPs that will be implemented by local governments and citizens.

Additionally in 2006, the GBEP awarded a grant to the City of Baytown to develop a video to train construction site operators to comply with TPDES storm water regulations. The project was a part of efforts by the Galveston Bay Construction Alliance (Alliance) to improve water quality and prevent storm water pollution into Galveston Bay.

The Alliance created a training video in both English and Spanish (24 minutes) that provides information on storm water requirements for construction projects as well as an introduction into the potential BMPs that could be utilized at construction sites. The training is primarily for owners of construction projects and general contractors who supervise construction projects. Viewing of the training video is a prerequisite for obtaining a building permit in all participating municipalities. In addition to the development of the video, the funding provided the necessary viewing equipment for all participating municipalities to ensure that no conflicts arose pertaining to the availability of a television and DVD player or VCR so applicants for permits could efficiently complete this requirement.

The project provided local jurisdictions with the capability of establishing a regional report card for local developers that conduct business within their boundaries via the publication of a Web site for online data entry regarding the improvement (or lack thereof) in storm water compliance for those projects where key personnel have viewed the training video.



*Roseate Spoonbill*

Participating local and regional governments include City of Baytown; City of Pasadena, City of Seabrook, City of League City, City of Webster, City of La Porte and, City of Friendswood, City of Texas City and Chambers County.

### The Texas-Mexico Border Program

The Texas – Mexico Border Region’s population boom, highly productive industry, agriculture and ranching, trade and commerce, and tourism poses unique water quality issues. One of the continuous efforts to address the challenge of community growth is the Colonia Initiatives Program.



*O. Muñoz, Pre-plumbing Preparation in a Colonia*

The Texas Legislature initiated the Colonia Initiatives Program in 1999. Colonia, also known as an Economically Distressed Area (EDA), is a low income, residential community that often lacks the basic necessities of wastewater infrastructure and potable water. Untreated wastewater is often discharged into local canals, creeks, and streams, which in turn flow into larger water bodies. Poor quality roads in the colonias often prevent proper drainage, thereby resulting in pooling of sewage on the ground during heavy rains. Many homes cannot meet county building codes because they lack indoor bathrooms and plumbing, a prerequisite for connection to local water lines and sewage systems.

The Texas Water Development Board (TWDB) administers three programs to connect colonia residents’ homes to water and wastewater services: the Colonias Wastewater Treatment Assistance Program, the Colonia Plumbing Loan Program, and the EDA Program. These programs provide loans and grants to sponsoring local governments for sewers and wastewater treatment facilities and low interest loans to colonia residents for basic plumbing facilities. The program coordinators serve as advocates among border colonia residents, state agencies, local governments, and utility companies. The quality of life in the colonias has greatly improved in recent years due to the efforts of these programs. As of August 2007, twenty-two counties in Texas were receiving financial assistance through the TWDB’s EDA Program. The funds awarded for facility planning grants and construction grant/loan commitments totaled \$521,047,972. More information is available on the Texas Water Development Board’s Web site at: <[www.twdb.state.tx.us/assistance/financial/fin\\_infrastructure/edapfund.asp](http://www.twdb.state.tx.us/assistance/financial/fin_infrastructure/edapfund.asp)>.

### Pollution Prevention Program

The key to controlling household hazardous wastes (HHW) from NPS pollution is often prevention. Preventing contaminants from reaching surface and groundwater mitigates environmental risks from pollution and eliminates the need for expensive cleanup programs. Household hazardous wastes are produced in households and if

*Z. Rascoe, City of Temple 2007 HHW and Solid Waste Collection Event*



disposed of improperly pose a threat to human health and the environment. Household hazardous wastes come in many different shapes and forms. Household products that contain corrosive, toxic, ignitable, or reactive ingredients such as some types of paints, cleaners, oils, batteries, and pesticides can contribute to NPS pollution if not used and disposed of properly. These wastes can almost all be legally disposed in landfills that can accept regular trash. However, local governments

and businesses working with the TCEQ's Small Business and Environmental Assistance (SBEA) HHW Program provide alternative disposal options, so many people choose to dispose of HHW in a more environmentally protective manner. Such disposals are performed through local collection programs and managed by cities and partner agencies.

The SBEA HHW Program primarily assists local HHW collection events and programs with technical and regulatory information, as well as general information for citizens of Texas on HHW issues. Other activities include the coordination of quarterly meetings of a HHW network of managers. More information about the SBEA HHW Program can be found at, <[www.tceq.state.tx.us/assistance/nav/household\\_chem\\_waste.html](http://www.tceq.state.tx.us/assistance/nav/household_chem_waste.html)>.

In 2007, approximately 2,239,596 pounds of HHW were collected and reported to the SBEA HHW Management Program (Table 2.4).

Table 2.4

### Household Hazardous Waste Collected in 2007

Waste	Amount Reported	Weight (pounds)
Household chemical disposed	1,571,695 pounds	1,571,695
Auto batteries	8,040 batteries	160,800
Antifreeze	4,785 gallons	39,715
Tires	12,847 tires	128,470
Used Oil	43,698 gallons	327,735
Oil Filters	11,181 filters	11,181

### The Texas Groundwater Protection Committee and Pesticide Management

The Texas Groundwater Protection Committee (TGPC) strives to identify areas where new or existing groundwater programs can be enhanced, and to improve coordination among agencies involved in groundwater activities. Its membership is made up of nine state agencies and the Texas Alliance of Groundwater Districts. Created by the Texas Legislature in 1989, the TGPC bridges the gap between state groundwater programs, improves coordination between member agencies and works to protect groundwater as a vital resource. Specific management measures are described in The Texas Groundwater Pesticide Management Plan (PMP, 2001) and the Texas NPS Management Program.

The PMP focuses on the protection of groundwater from specific pesticides. One useful tool in pesticide management is the TCEQ's Inter-agency Pesticide Database which compiles all of the groundwater results in the State for which pesticides have been analyzed. The database includes more than 173,000 sample results from twelve agencies. Recently, the TCEQ completed its sixth Pesticide Water Quality Issues Report (2007) for the EPA. The following paragraph summarizes some significant pesticide management related activities of the past year in the State of Texas.

#### **Agricultural Chemicals Subcommittee**

The Agricultural Chemicals Subcommittee of the TGPC is the primary vehicle for inter-agency coordination and communication regarding pesticides-in-groundwater issues. The TCEQ staff supports the development of the pesticide-specific PMPs through groundwater monitoring in the Panhandle Region, recently adding urban pesticide screening by immunoassay analysis in Austin and San Antonio, and continuing the cooperative screening program for atrazine. More specific work on the pesticide-specific PMPs is awaiting changes to the pesticide program requirements by the EPA. The TCEQ staff also participated in discussions at various venues relative to changes to the PMP for 2008. Pesticides of interest and concern are anticipated to be addressed, as is the inclusion of surface water quality and protection from pesticides. In order to address and coordinate pesticide program changes at the EPA, new changes to the Ag-

gricultural Chemicals Subcommittee's State Management Plan Task Force, were developed and adopted. These program changes included an updated name for the group—the PMP Task Force of the Agricultural Chemicals Subcommittee.

### **The Railroad Commission of Texas Program**


The Railroad Commission (RRC) of Texas has several regulatory divisions that oversee the Texas oil and gas industry, gas utilities, pipeline safety, safety in the liquefied petroleum gas industry, and the surface mining of coal. Further, the RRC regulates activities and the wastes generated as a result of exploration, development or production of oil or gas or geothermal resources, including transportation of crude oil or natural gas by pipeline. One of the goals of the RRC is the stewardship of Texas' natural resources and environment. An ongoing program of the RRC that supports environmental protection in Texas is the Oil Field Cleanup Program.

The Oil Field Cleanup Program is responsible for well plugging, site remediation, and special response programs. The cleanup program utilizes funds from the oil and gas industry through various fees, taxes, and penalties. The impact of the Oil Field Cleanup Fund is clearly demonstrated by the increase in the number of wells plugged and sites remediated. The RRC uses a priority system, which ranks wells for plugging in order of their threat of pollution to the environment, human health and safety, and wildlife. This priority system is necessary to assure that wells posing the greatest threat of pollution and safety concern are plugged first. In 2007, approximately \$18,537,524 was invested in the plugging of 1,536 wells.

## **Education**

The third goal of the NPS Management Program is to conduct education and technology transfer activities to help raise awareness of NPS pollution and prevent activities contributing to the degradation of water bodies, including aquifers, by NPS pollution.

Education is a critical aspect of managing NPS pollution. Public outreach and technology transfer are integral components of every NPS grant project, WPP, TMDL, and I-Plan. This section highlights some of the NPS education and public outreach activities conducted in Texas in FY 2007.



*Education and public outreach activities provide opportunities for public involvement in activities which help reduce the amount of NPS pollution entering Texas water bodies and ensure the quality of water resources for future generations.*

### **Texas Watch Volunteer Monitoring and Environmental Education Program**

Texas Watch is a network of trained volunteers and supportive partners working together to collect information about the natural resources of Texas as well as ensure the information is available to all Texans. Established in 1991, Texas Watch is administered through a cooperative partnership between Texas State University, the TCEQ, and the EPA. The program is affiliated with the River Systems Institute (RSI) - Texas State University in San Marcos. Currently, over 400 Texas Watch volunteers collect water quality data on lakes, rivers, streams, wetlands, bays, bayous, and estuaries in Texas.

The Texas Watch program continued in 2007 to focus its efforts in TMDL and WPP project areas (specifically Orange County, Petronila and Oso Bay/Oso Creek, and the Arroyo Colorado). It also developed new training programs, materials and strategies in partnership with Aquarena Center and the River Systems Institute. Over the last two years the Texas Watch volunteer monitoring program has supported an estimated 1,425 volunteer monitors collecting water quality data at 255 sites, documented 3,656 monitoring hours, and conducted 40 training sessions with 251 new volunteers completing their certification.



In 2007, the Texas Watch program conducted twenty-five NPS pollution education sessions statewide reaching over six hundred individuals in targeted watersheds. At the Texas Rivers Center at Texas State University, Texas Watch introduced NPS education as a priority for the Aquarena Center Education Programs. In coordination with the Environmental Education Tours Office at Aquarena, Texas Watch has conducted NPS presentations to 463 participants since April of 2007. The addition of NPS education signs, displays, and an interpretive brochure for the Aquarena Wetlands Walk has allowed Texas Watch to offer an NPS education message to 31,574 visitors to Aquarena between May 1 and August 15, 2007 (Aquarena hosts up to 150,000 visitors per year). Informal, random sampling of 494 visitors indicated that people from almost all the major watersheds in the state are visiting the park.



*Texas Watch volunteer training*



In addition to conducting training and education workshops, the Program conducted watershed protection meetings (completed in the fall of 2007) in four targeted watersheds. The meetings emphasized information about the TMDL or WPP Projects and provided opportunities for networking, discussion, and volunteer and partner recognition. For more information, visit <[texaswatch.rivers.txstate.edu](http://texaswatch.rivers.txstate.edu)>.

*Stakeholders learn about NPS pollution using a custom model of the Arroyo Colorado Watershed*

## Texas Watershed Steward Program

The Texas Watershed Steward (TWS) program was initiated to increase citizen understanding of watershed processes and to foster increased local participation in watershed management and watershed protection planning activities across the State.

In 2007, the Texas AgriLife Extension Service, with support from CWA Section 319(h) funds received from the TSSWCB, completed the curriculum for the TWS program. The curriculum is comprised of five different units including a program introduction, an overview of watershed systems, an overview of watershed impairments, watershed management and regulation, and community-driven watershed protection strategies. The curriculum is compiled into a full-color handbook that also includes a comprehensive glossary of terms, and three appendices providing detailed information on federal, state, and local water quality agencies and organizations, important Web sites pertaining to water quality projects, management, and regulation, and a list of important activities for communities to engage in to help protect their local water resources. In addition, interactive training modules were developed for each of the five curriculum units to serve as the foundation for each training event.



*Watershed Steward training in the City of Kyle, December 2007*

The first training for the TWS program will be held in December 2007 in Kyle, at the Plum Creek Community Center. This training will serve to foster support for the Plum Creek WPP and to increase citizen awareness and knowledge regarding impairments in the Plum Creek Watershed. The event is expected to be attended by individuals representing local businesses, small business owners, cities, agricultural producers, schools, state environmental agencies, and universities. Participants will complete the five modules and participate in hands-on demonstrations including a rainfall simulator, rainwater harvesting, and a watershed flow model for the Guadalupe River Basin. Other interactive displays include water quality testing and monitoring equipment, benthic macroinvertebrate sampling tools, NPS identification containers, and an aerial tour of the Plum Creek Watershed using Google Earth.

The second training event for the TWS program will take place in January 2008 in the Buck Creek Watershed located in Collingsworth County. Future training locations for the program are currently being prioritized with the help of the TSSWCB and other project partners. For more information on the TWS program, please visit <[tws.tamu.edu](http://tws.tamu.edu)>.

### **Students in Action: Plum Creek Watershed Students Join Monitoring Efforts with the Guadalupe-Blanco River Authority**

In October 2006, the Guadalupe-Blanco River Authority (GBRA) staff met with school officials to propose that area students participate in the Plum Creek water quality monitoring effort for the 2006-2007 school year. The GBRA conducts ongoing water quality monitoring funded by TCEQ's Clean Rivers Program. Current results indicate concerns due to elevated bacteria and nutrient levels in Plum Creek. The combined uses of the land, and the effects of these uses on water quality in Plum Creek, made it an excellent candidate for a watershed-wide education effort. As a result, during 2007, students from seven elementary schools in the Plum Creek Watershed played an active role in an innovative water monitoring program.

GBRA donated water monitoring test kits, all needed supplies, watershed map posters and student workbooks to the schools. A total of seven hundred and sixty fourth and fifth grade students, as well as eighteen teachers, conducted the first of three rounds of water quality testing. Students used the Texas Watch model for their monitoring and tested water from Plum Creek for temperature, dissolved oxygen, pH, turbidity, nitrates and phosphates. Additional testing rounds were conducted in February and May of 2007. This effort is continuing in the 2007-2008 school year.

The Texas AgriLife Extension Service will host a site on the Plum Creek Watershed Partnership Web site <[pcwp.tamu.edu/index.html](http://pcwp.tamu.edu/index.html)> for students to post their water quality test results. The Web site will also contain a discussion forum where the students can post questions and discussion topics to interact with the stakeholders,

scientists, and agencies involved. Ideally, students will review and discuss their results with students in other parts of the watershed. This project also provides opportunities for students to present their findings in a public setting, such as a Parent-Teacher Association meeting, school board meeting, city council meeting, County Commissioners Court session, or to the GBRA Board of Directors. The GBRA has a model of the Guadalupe River Basin available to set up at schools or public meetings to promote an understanding of nonpoint source pollution. Students participating in this project can assist with presenting the model and promote discussion about nonpoint source pollution in the watershed where they live and go to school.

### **YardWise Public Outreach Program**

The YardWise program is a new statewide effort aimed at teaching Texans how to care for their yards in a way that will reduce the amount of soil erosion and yard care chemicals in the environment. The YardWise program follows four steps: (1) the "Don't Bag It" program of grasscycling and efficient watering, (2) mulching and composting, (3) integrated pest management, and (4) green landscape design and planning, including native and adapted plant selection. The program goal is to help the public maintain a healthy yard with less cost, less work, and less waste.

A new statewide YardWise outreach project has been launched to reduce landscaping chemicals and nutrients in creeks, lakes and aquifers in metropolitan areas of Texas that have water quality problems. The targeted urban watersheds include: Dallas, Fort Worth, Houston, Corpus Christi, San Antonio, Austin, and the Lower Rio Grande Valley.

This project utilizes and coordinates already existing local and statewide outreach resources for educational content and techniques. It coordinates and extends these resources through web products and a media campaign with public service announcements to be launched in the spring of 2008. The TCEQ publication, *A Green Guide to Yard Care* in 1998 (updated in 2006), Texas AgriLife Extension materials, and the City of Austin's "Grow Green" program have provided some of the initial content. The Web site portion of the project has been launched. Surveys were sent to regional contacts to solicit additional local resource content for project web pages. The web site will be permanently hosted by the Lady Bird Johnson Wildflower Center at <[www.YardWise.org](http://www.YardWise.org)>. Established monitoring practices and performance measures will be used as baseline data for this project. (NOTE: performance will be based on the number of public exposures to the project messages, not water quality monitoring.)



### **The 15th National Nonpoint Source Monitoring Workshop**

The Texas River Systems Institute and the TCEQ organized, planned, and conducted the 15th National Nonpoint Source Monitoring Workshop on August 27-30, 2007. The workshop focused on national as well as local and regional water monitoring conditions. The theme for the workshop was "Monitoring for Decision Making," and included seminars on NPS pollution and karst aquifers; detecting change in water quality from BMP implementation; modeling applications for NPS pollution and control strategies; integrating social indicators monitoring with environmental monitoring; nonpoint source pollution; TMDLs; and river restoration projects. The program was organized into 3 plenary sessions and 14 break-out sessions. The workshop was attended by 191 state, federal, regional, and local participants. Two special sessions highlighted coal tar sealants and volunteer monitoring. A mini-workshop on social indicators was also conducted. Four field trips were conducted on August 28. Workshop organizers conducted a post-conference survey of participants - evaluations were overwhelmingly positive. The next National Nonpoint Source Monitoring Workshop will be held in Columbus, Ohio on September 14-18, 2008.



### **Lower Colorado River Campaign Against Illegal Dumping**

The Lower Colorado River Authority (LCRA) developed an anti-dumping enforcement and public education campaign. The campaign initially focused on Matagorda County. However, the campaign was later expanded to include additional counties in the lower Colorado River basin. The campaign provided law enforcement training and advertised a 1-800 tip line to report dumping. Law enforcement officials investigated 49 illegal dumpsites in Matagorda County. LCRA also worked with local officials to install "No DUMPING" signs at bridge crossings where trash was routinely dumped. The LCRA conducted an

aerial survey that identified over 300 dumpsites along the Colorado River and its tributaries. Copies of the aerial survey DVD were distributed to county officials and the LCRA presented the aerial survey results to law enforcement officials associated with the Regional Environmental Taskforce. The LCRA also created an education campaign featuring "Finley", a cartoon catfish character. Finley presented messages to "Report Illegal Dumping" and to protect water quality. Finley was used on billboards with anti-dumping slogans, radio spots, movie theatre advertisements, school book covers and children's place-mats at restaurants. Approximately 35,000 place-mats were distributed. The education messages were also viewed by over 76,000 patrons at one movie theatre in a six month period.



## C h a p t e r 3

# Progress Towards Meeting Milestones

Texas measures the progress and success of its NPS Management Program in terms of two types of achievements: programmatic and environmental. Programmatic achievements involve progress toward the long and short term goals and the milestones set forth in the NPS Management Program. These programmatic achievements contribute to environmental achievements. Environmental achievements are measurable, demonstrable improvements in the quality of either surface water or groundwater impacted by NPS pollution.

The Clean Water Act Section 319 requires that state NPS Annual Reports address progress made towards meeting the milestones defined in the NPS Management Program. The milestones established in the NPS Management Program address specific water quality issues for priority water bodies. This chapter provides a synopsis of the progress made in 2007 to address those issues and the projects involved in achieving that progress. It also provides summaries of work performed in several additional water bodies not included in the NPS Management Program as well as several state-wide initiatives.

Each of the categories of milestones presented in the NPS Management Program represents an element in the planning and execution of strategic action to address water quality issues on a watershed basis:

- Stakeholder Group: Employ or develop a local watershed committee for public involvement;
- Data Review: Complete the assessment of pollutant problems and inventory pollutant sources;
- Targeted Assessment: Complete water quality monitoring and determine origin and fate of pollutants;
- Modeling: Develop and apply model(s) to determine numerical load allocations;
- Action Plan: Develop a detailed action plan – TMDL, I-Plan, and/or WPP;
- Implementation: Implement actions in the watershed, monitor for effectiveness, and adjust strategies.

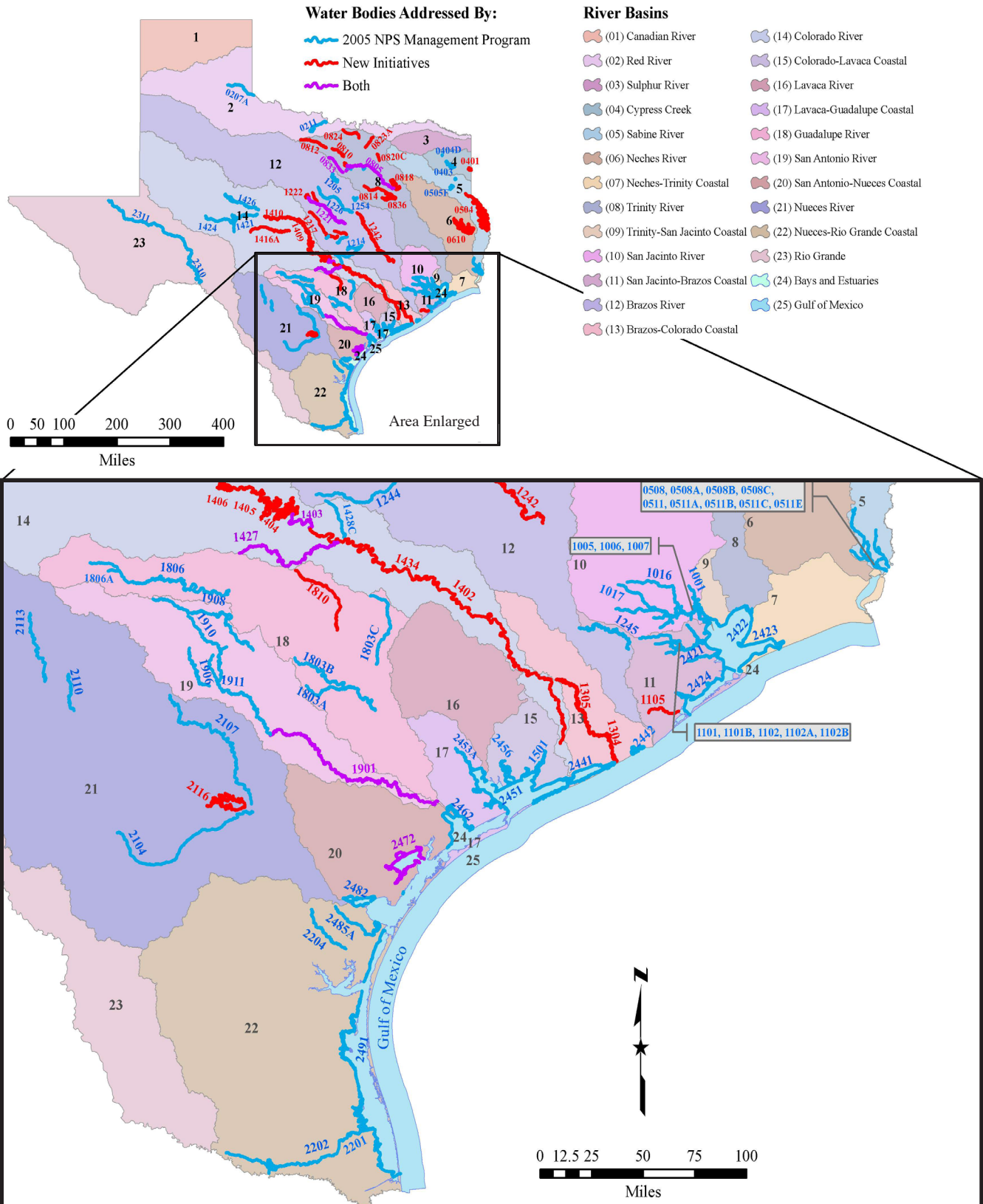
The following map of milestone items is provided to help locate information about specific water bodies, impairments, and issues. This chapter gives the milestone entries as listed in the NPS Management Program, followed by new initiatives in alphabetical order by water body, followed by multi-basin, statewide, and national initiatives.





Figure 3.1

# Map of Water Bodies Addressed by NPS Projects in FY 2007



## Milestone Progress in 2007

Each milestone progress update includes

- **Watershed(s):** the name of the watershed(s) addressed, followed by the corresponding water body segment number(s) in parentheses, where applicable;
- **Issue(s):** the pollutant(s) and/or other issues in the watershed(s);
- **Milestone(s) for 2007:** the milestone(s) identified in the Management Program for addressing each watershed issue in 2007;
- **Project:** the names and brief descriptive summaries of the NPS projects involved in making progress toward the milestones in addressing the watershed's issue(s); and
- **Progress in 2007:** the actual progress made toward and/or beyond those milestones in 2007 and summaries of the actions taken to accomplish that progress.

For milestone items addressed by more than one project, the entry indicates "Progress in 2007, by Project" and is followed by the list of projects and the progress made by each toward the milestones. There is some overlap in geography and scope among these milestones.

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### **Watershed(s): Assessing Tidal Streams (0511, 1501, 2453A)**

**Issue(s):** Dissolved oxygen

**Milestone for 2007:** Implementation

**Project:** **Assessing Aquatic Life Use in Tidal Streams**

**Progress in 2007:** The assessment was completed prior to 2007. The data have been provided to the TCEQ Water Quality Standards Team for their use in establishing water quality standards and criteria. A TMDL will be developed if the standards are deemed appropriate and the data gathered indicate a continued impairment.

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### **Watershed(s): Aquilla Reservoir (1254)**

**Issue(s):** Atrazine

**Milestone for 2007:** Implementation

**Project:** **Aquilla Reservoir TMDL for Atrazine**

**Progress in 2007:**

**Implementation/Effectiveness Monitoring:** The water body has been removed from the CWA Section 303(d) List. Routine monitoring was continued for verification that the reservoir meets standards. Three samples were collected during 2007 and all three verified compliance with water quality standards. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/10-aquilla.html](http://www.tceq.state.tx.us/implementation/water/tmdl/10-aquilla.html)>.

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### **Watershed(s): Armand Bayou (1113, 1113A)**

**Issue(s):** Dissolved oxygen

**Milestone for 2007:** Implementation

**Progress in 2007, by Project:**

#### **Armand Bayou TMDL**

**Implementation/Effectiveness Monitoring:** Segment 1113 has been listed for depressed dissolved oxygen on the CWA Section 303(d) List since 1996 and for bacteria since 2006. The TMDL project is inactive pending further data. Routine monitoring was continued in order to determine whether the bayou meets water quality standards. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/23-armandbayou.html](http://www.tceq.state.tx.us/implementation/water/tmdl/23-armandbayou.html)>.

#### **Armand Bayou Local Initiative Watershed Plan**

A local initiative led by Texas Sea Grant and the Trust for Public Land developed the Armand Bayou WPP Phase I. Phase I represents the current state of the watershed,



the current management programs and practices, and strategies used throughout the watershed, with particular focus on the preservation of open space. Point of contact: John Jacob, <jjacob@tamu.edu>. Project Web site: <www.armandbayou.org>.

**Action Plan:** The Phase II Armand Bayou WPP is underway and will build on the Phase I plan to begin to implement the mission and vision of the Watershed Partnership. Stakeholders continue meeting during this phase.

### **Watershed(s): Arroyo Colorado (2201)**

**Issue(s):** Dissolved oxygen

**Milestone for 2007:** Targeted Assessment, Action Plan and Implementation

**Progress in 2007, by Project:**

#### **Arroyo Colorado Watershed Protection Plan**

The tidal segment of the Arroyo Colorado (2201) has consistently failed to meet the State's water quality standards designed to protect aquatic life use in tidal streams of the State because dissolved oxygen concentrations in the upper eight miles of the segment are often lower than the criteria established to assure optimum conditions for aquatic life. This project will implement components of the WPP. Point of contact: Laura De La Garza, <lauradlg@tamu.edu>. Project Web site: <arroyocolorado.org>.

**Action Plan:** The Arroyo Colorado Watershed Partnership established several work groups to address the seven major components of this plan: wastewater infrastructure, agricultural issues, habitat restoration, refinement of the TMDL analysis, public education, land use/development, and monitoring. The partnership submitted a WPP addressing dissolved oxygen in the watershed in 2006.

**Implementation:** The TCEQ executed a contract with the Texas Water Resource Institute (TWRI) to implement aspects of the WPP, including hiring a grant writer to assist with funding needs for implementation and a data manager to develop a basin-wide water quality database.

#### **Construction of Wetland Treatment Systems in the Arroyo Colorado Watershed**

One of the principal components of the Arroyo Colorado WPP is the Pollution Reduction Plan. The Arroyo Colorado Pollution Reduction Plan is designed to achieve reductions in concentrations of total nitrogen, total phosphorus, biochemical oxygen demand (BOD), and suspended sediment in Segments 2201 and 2202. This project will: 1) implement enhanced wastewater and storm water treatment projects proposed in the Arroyo Colorado Pollution Reduction Plan; 2) produce wetland systems capable of polishing treated effluent from municipal wastewater treatment facilities as well as providing primary treatment for rainfall runoff; and 3) provide valuable tools for environmental education and outreach, and building awareness and participation in water quality improvement efforts in the Arroyo Colorado Watershed.

**Implementation:** Land appraisal information has been received from the City of San Juan and is pending from the City of San Benito. Land title information has been received from the City of San Juan and the City of San Benito. The Cities of San Juan and San Benito are concurrently working on the amendment to their Texas Pollution Discharge Elimination System permit (discharge permit) and the engineering design of the wetland system. The City of La Feria is currently working on the amendment of their discharge permit and the engineering design of the wetland system. Construction of the wetland is pending the approval of the discharge permit amendment.

#### **Education of Best Management Practices in the Arroyo Colorado Watershed**

The overall objective of this project is to educate agricultural producers on how to better produce and manage their acreage and in doing so to reduce the potential for NPS pollution. Project Web site: <www.tsswcb.state.tx.us/managementprogram/arroyoeduc>.

**Implementation:** The Arroyo Education Project provided 3,940 agricultural producers, youths, and residents from Cameron, Willacy, Starr, and Hidalgo Counties with training and information on BMPs, crop production techniques, pesticide safety, soil testing, and WQMPs through 2007.

### **WQMP Implementation Assistance in the Arroyo Colorado Watershed**

This project consists of TSSWCB working cooperatively with local soil and water conservation districts (SWCD) in the Arroyo Colorado Watershed to provide technical and financial assistance to landowners in the implementation of WQMPs. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/arroyowqmp](http://www.tsswcb.state.tx.us/managementprogram/arroyowqmp)>.

**Implementation:** The Southmost & Hidalgo SWCD hired technicians to develop, implement, and maintain WQMPs. Through 2007, sixty-three WQMPs have been developed within the watershed.

### **Arroyo Colorado Agricultural Nonpoint Source Assessment**

The primary focus of this project is to better characterize agricultural runoff in the Arroyo Colorado, assess and demonstrate the effects of BMP implementation at the field and sub-watershed level, and measure progress towards meeting WPP goals. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/arroyonps](http://www.tsswcb.state.tx.us/managementprogram/arroyonps)>.

**Data Review:** A complete historical data review and analysis related to water quality and agricultural best management practices implemented in the watershed is ongoing.

**Targeted Assessment:** Data collection for future recalibration of the Soil Water Assessment Tool (SWAT) model is scheduled to begin in FY 2008 in order to better estimate the total NPS loading into the river.

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#### **Watershed(s): Arroyo Colorado (2201, 2202, 2202A)**

**Issue(s):** Legacy Pollutants and Organics in edible fish tissue

**Milestone for 2007:** Implementation

#### **Project: Reassessment of Fish Consumption Risk**

In December 2005 and January 2006, the Texas Department of State Health Services (DSHS), formerly the Texas Department of Health, collected fish tissue samples from the Arroyo Colorado and Donna Reservoir and Canal to reassess the risk associated with consuming fish from those areas.

**Progress in 2007:** The DSHS fish tissue studies were ongoing in 2007 and the Risk Characterization Report was scheduled to be completed in winter 2007.

**Implementation:** Implementation of the I-Plan for the legacy pollutants (adopted in 2001) was ongoing.

**Targeted Assessment:** Reassessment of the fish consumption risk for these water bodies was ongoing. The Risk Characterization Report is pending.

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#### **Watershed(s): Brandy Branch Reservoir (0505E)**

**Issue(s):** Selenium in edible fish tissue

**Milestone for 2007:** Implementation

**Project:** None

**Progress in 2007:** The water body impairment was removed from the CWA Section 303(d) List in 2004 because the Texas DSHS rescinded the fish advisory based on new fish tissue data. The fish consumption use is now fully supporting.

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#### **Watershed(s): Buck Creek (0207A)**

**Issue(s):** Bacteria

**Milestone for 2007:** Action plan and Implementation

#### **Project: Buck Creek Watershed Protection Plan**

The objectives of this project are to: (1) identify the specific sources of the bacteria, (2) evaluate alternatives for restoring the water body, and (3) develop a WPP to restore the water body through a stakeholder driven process. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/buckcrkwpp](http://www.tsswcb.state.tx.us/managementprogram/buckcrkwpp)>.

**Progress in 2007:**

**Stakeholder Group:** Stakeholders have been identified and organized. The initial stakeholder meeting was held in June 2007. Informational programs on topics such as principles of watershed hydrology, primary nonpoint source pollution types, and agri-

cultural BMPs for protecting water quality (i.e. alternative watering, riparian management issues, livestock and wildlife management, grazing management, shade development, feeding strategies, cross fencing, and prescribed burning) were also provided.

**Targeted Monitoring:** Phase II of the project continued where Phase I concluded. Monitoring activities will include bacterial source tracking (BST). The TSSWCB and partners will work together to identify the specific sources of the bacteria and evaluate alternatives for restoring the water body.

**Action Plan:** Project activities include the development of a WPP to restore the water body through a stakeholder driven process.

**Watershed(s): Buffalo and White Oak Bayous (1013, 1014, 1017)**

**Issue(s):** Bacteria

**Milestone for 2007:** Action Plan and Implementation

**Progress in 2007, by Project:** These water bodies are listed in the State's Water Quality Inventory and 303(d) List as not supporting their designated uses for contact recreation. The water quality goal of the TMDLs is to restore and maintain the beneficial uses of the impaired water bodies. Project activities included public participation, sample collection, and data analysis, modeling and the calculation of load allocations.

**TMDLs for Bacteria in Buffalo and White Oak Bayous**

**Modeling:** Work continued on the development of a TMDL for bacteria in the Buffalo and White Oak Bayou Watersheds. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/22-buffalobayou.html](http://www.tceq.state.tx.us/implementation/water/tmdl/22-buffalobayou.html)>.

**BMP Evaluation for the Control of Bacteria**

**Targeted Assessment:** Data was collected to determine the removal efficiency for bacteria in existing dry and wet detention basin BMPs in the Houston area. The results of the sampling were evaluated and recommendations were presented in a final report

**Watershed(s): Cedar Lake (2442)**

**Issue(s):** Bacteria

**Milestone for 2007:** Implementation

**Project:** Bacteria Source Tracking Investigation

**Progress in 2007:**

**Targeted Assessment:** The Middle Texas Coast TMDL Project for Oyster Waters is ongoing. A project funded by the Texas GLO is investigating the source of bacteria in Cedar Lakes through BST protocols.

**Watershed(s): City of Denton /Hickory Creek (0823)**

**Issue(s):** Nutrients, Sediment, and Dissolved oxygen

**Milestone for 2007:** Action Plan and Implementation

**Progress in 2007, by Project:**

**Hickory Creek Watershed Protection Plan and BMP Implementation**

The City of Denton is working with stakeholders to develop a WPP for Hickory Creek and to construct demonstration BMPs to show how natural looking BMPs can be effective at reducing pollutants. Point of contact: Ken Banks, <[kenneth.banks@cityofdenton.org](mailto:kenneth.banks@cityofdenton.org)>. Project Web site: <[www.cityofdenton.com/pages/mygovenvironmentalwater319grant.cfm](http://www.cityofdenton.com/pages/mygovenvironmentalwater319grant.cfm)>.

**Modeling:** The City of Denton completed modeling of Hickory Creek to determine the pollutant loads and major pollutant sources in the watershed.

**Action Plan/Stakeholder Group:** The City of Denton held two meetings with stakeholders to develop the WPP. The sources of loadings related to land use have been investigated and a Technical Memorandum has been completed identifying pollutant sources.

**Implementation:** Construction on the demonstration BMPs at the Denton Fire Station Training Facility and the airport are complete.

**Watershed(s): Clear Creek Tidal (1101) and Clear Creek Above Tidal (1102)****Issue(s):** Legacy pollutants and Volatile organic compounds**Milestone for 2007:** Targeted Assessment and Implementation**Project: Reassessment of Fish Consumption Risk**

Both segments of Clear Creek were added to the CWA Section 303(d) List in 1996 for carbon disulfide, chlordane, trichloroethane, and dichloroethane in edible fish tissue. The DSHS rescinded the fish advisory for both segments of Clear Creek in 2002, and the TCEQ removed them from the Section 303(d) List for legacy pollutants and volatile organic compounds. The DSHS was conducting a study in 2007 to verify that both water bodies continue to meet the standard.

**Progress in 2007:****Targeted Assessment:** Sampling for the study has been completed.**Watershed(s): Clear Creek (1101, 1101B, 1102, 1102A, 1102B, 2425)****Issue(s):** Total dissolved solids (TDS), Bacteria**Milestone for 2007:** Implementation**Progress in 2007, by Project:****Clear Creek TMDL for TDS and Chloride**

**Implementation:** In 2006, the Clear Creek Above Tidal (1102) segment was delisted for chloride because it met the water quality standard criteria. It was moved to Category 4a on the CWA Section 303(d) List for total dissolved solids due to the completion of a TMDL. The implementation of the TMDL I-Plan is ongoing. Project Web sites: <[www.tceq.state.tx.us/implementation/water/tmdl/08-ccchlor.html](http://www.tceq.state.tx.us/implementation/water/tmdl/08-ccchlor.html)> and <[www.tceq.state.tx.us/assets/public/implementation/water/tmdl/43ccsalts/43-clearcreekpo.pdf](http://www.tceq.state.tx.us/assets/public/implementation/water/tmdl/43ccsalts/43-clearcreekpo.pdf)>.

**Clear Creek TMDL for Bacteria**

**Targeted Assessment:** The development of the TMDL for bacteria in Clear Creek is ongoing. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/68-clearcreekbacteria.html](http://www.tceq.state.tx.us/implementation/water/tmdl/68-clearcreekbacteria.html)>.

**Watershed(s): Clear Fork of the Trinity River (0831, 0833)****Issue(s):** Dissolved oxygen**Milestone for 2007:** None**Project(s):** None

**Progress in 2007:** A Use Attainability Analysis was completed in 2003. A change to the water quality standards is being considered by the TCEQ.

**Watershed(s): Coastal Bend Bays****Issue(s):****Milestone for 2007:** Implementation

**Progress in 2007, by Project:** see Petronila Creek, Copano Bay, Gulf Coast Oyster Waters, Nueces Bay, Oso Bay projects

**Watershed(s): Colorado and San Gabriel Rivers, Brushy and Petronila Creeks (1214, 1244, 1426, 2204)****Issue(s):** Chloride, Sulfate, and TDS**Milestone for 2007:** Action Plan and Implementation**Progress in 2007, by Project:****Produced Water Impacts to Surface Water in the Nueces-Rio Grande Coastal Basin (Petronila Creek)**

The RRC is investigating the nature and extent of known salinity contamination thought to be contributing to water quality problems in the impaired reach of Petronila Creek, de-

veloping remediation/abatement alternatives or BMPs, and implementing the BMPs.

**Targeted Assessment:** The RRC has installed monitoring wells and has conducted a ground-based preliminary investigation. Surface water sampling has also occurred. Data from the field investigations has been compiled into a draft technical memorandum.

#### **Produced Water Impacts Downstream of E.V. Spence Reservoir**

The RRC is investigating the nature and extent of known salinity contamination thought to be contributing to water quality problems in E.V. Spence Reservoir, developing remediation/abatement alternatives or BMPs, and implementing the BMPs.

**Targeted Assessment:** The RRC has completed the field investigation of the Ballinger Seep. It appears that the main source of saline water seepage may be an uncased cable tool well. The investigation indicated that the well feeds the seeps along the drainage to the Colorado River and recommendations were made to re-enter and re-plug the well. A BMP feasibility study was conducted at the Wendkirk Oil Field. It was determined that the high salinity in the groundwater and seeps within the Wendkirk Oil Field contribute to the salinity impact on the Colorado River.

#### **Petronila Creek Salt Water Discharge Minimization Project- Phase II**

The project goal includes the plugging of twenty abandoned, unplugged or improperly plugged oil and gas wells.

**Implementation:** The RRC plugged eight wells. The number of orphaned wells in this county has decreased significantly due to the recent upturn in the oil and gas industry, which led to the acquisition of many abandoned wells by investors for additional production. Because of the reduced number of orphaned wells, the RRC has received an extension to this interagency contract to allow additional time to identify and plug wells to satisfy the project goal.

#### **Colorado River below E.V. Spence TMDL (1426)**

**Modeling:** A TMDL was adopted February 7, 2007. The document, Two Total Maximum Daily Loads for Chloride and Total Dissolved Solids in the Colorado River, may be viewed at <[www.tceq.state.tx.us/assets/public/implementation/water/tmdl/32colorado/32-uppercoloradotmdladopted.pdf](http://www.tceq.state.tx.us/assets/public/implementation/water/tmdl/32colorado/32-uppercoloradotmdladopted.pdf)>.

**Action Plan:** The commission approved the I-Plan on October 10, 2007.

#### **San Gabriel Rivers (1214)**

Segment was delisted in 2002 after new data was collected and analyzed. Routine monitoring continuing to verify that water quality standards are being met.

#### **Brushy Creek (1244)**

Segment was delisted in 2002 after new data was collected and analyzed. Routine monitoring continuing to verify that water quality standards are being met.

#### **Petronila Creek TMDL (2204)**

**Modeling:** A TMDL was adopted January 10, 2007 and received EPA approval March 14, 2007. The document, Three Total Maximum Daily Loads for Chloride, Sulfate, and Total Dissolved Solids in Petronila Creek Above Tidal, may be viewed at <[www.tceq.state.tx.us/assets/public/implementation/water/tmdl/32petronila/32-petronilatmdlapproved.pdf](http://www.tceq.state.tx.us/assets/public/implementation/water/tmdl/32petronila/32-petronilatmdlapproved.pdf)>.

*(See Oso Creek and Oso Bay in the section above for another project involving Petronila Creek.)*

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#### **Watershed(s): Concho River (1421, 1422, 1423, 1424, 1425)**

**Issue(s):** Impaired macrobenthos community, Chloride, TDS, Dissolved oxygen, and Nutrients

**Milestone for 2007:** Action Plan and Implementation

**Progress in 2007, by Project:**

#### **Concho River Basin Watershed Protection Plan**

This project will provide an assessment of existing and potential water quality threats related to on-going NPS pollution within the Concho River Basin and will also provide a WPP. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/conchowpp](http://www.tsswcb.state.tx.us/managementprogram/conchowpp)>.

**Targeted Monitoring:** Water quality monitoring was conducted at numerous sites to include hydrologic monitoring of both ground and surface waters and several storm sampling events; development continued on the water quality and hydrologic database for this project.

**Action Plan:** The Upper Colorado River Authority (UCRA) staff worked towards completion of the draft WPP. Portions of the WPP were presented at a July 12, 2007 meeting of the Stakeholder Advisory Group.

**Implementation/Outreach:** Public participation and outreach activities are on-going and include the creation and distribution of a quarterly e-newsletter, entitled Stream Segments.

### **Concho: Downtown San Angelo Urban NPS Abatement Project**

This project was part of a revitalization effort for a portion of the North Concho River that runs through downtown San Angelo. The project was to build a storm water treatment/recirculation pond system, which also serves a "living laboratory" and learning tool for public education and outreach activities in the basin. Project Web site: <[www.ucratx.org/NPSDTownSAngelo.html](http://www.ucratx.org/NPSDTownSAngelo.html)>.

**Implementation/Effectiveness Monitoring:** Construction on the downtown Aqua Swirl BMP and storm water ponds was completed during the summer of 2007. The project quality assurance project plan (QAPP) was approved in July. Effectiveness monitoring began in August and will continue under the Clean Rivers Program.

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### **Watershed(s): Copano Bay (2472)**

**Issue(s):** Bacteria in oyster waters

**Milestone for 2007:** Implementation

**Progress in 2007, by Project:**

### **TMDL Development for bacteria in Copano Bay**

**Modeling:** Development of the TMDL for bacteria in Copano Bay was ongoing in 2007.

### **Surface Water Quality Monitoring to Support Development and Implementation of Bacteria TMDLs in the Copano Bay Watershed**

This project will generate data of known and acceptable quality for surface water quality monitoring of river stations on Segment 2472 (Copano Bay), Segment 2001, Segment 2002 (Mission River), and Segments 2003 and 2004 (Aransas River) for field, conventional (total suspended solids and turbidity), flow (non-tidal river segments), and bacteria parameters to support the TMDL for bacteria in oyster waters in Copano Bay in Aransas and Refugio Counties. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/copanoswqm](http://www.tsswcb.state.tx.us/managementprogram/copanoswqm)>.

**Targeted Monitoring:** Sample collection is scheduled to start in FY 2008.

### **Education Program for Improved Water Quality in Copano Bay**

The overall goal of this project is to improve the water quality in Copano Bay and its tributaries by increasing awareness of the water quality issues throughout the watershed and providing education and demonstrations for landowners and livestock owners in the watershed on practices to decrease or prevent bacteria from entering waterways. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/copanoedu](http://www.tsswcb.state.tx.us/managementprogram/copanoedu)>.

**Implementation/Education:** Specific educational programs will be targeted to small landowners (Urban Rancher), cattlemen (Lone Star Healthy Streams), horse owners (identified through this project), and the general public.

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### **Watershed(s): Dallas Legacy Pollutants (0805, 0841, 0841A)**

**Issue(s):** Chlordane, DDT, DDD, DDE, Dieldrin, Heptachlor epoxide, Polychlorinated Biphenyl (PCB)

**Milestone for 2007:** Targeted Assessment and Implementation

**Progress in 2007, by Project:**

### Reassessment of Fish Consumption Risk

Legacy pollutants are already restricted and no additional loading is expected. The endpoint target of the TMDLs is the reduction of fish tissue contaminant concentrations that constitute an acceptable risk to fish consumers, allowing the Texas DSHS to remove the restrictions in fish consumption. The ultimate endpoint goal is the complete removal of the fish consumption ban advisories

**Implementation:** Implementation of the I-Plan for the Dallas area legacy pollutants is ongoing.

**Targeted Assessment:** Reassessment of the fish consumption risk for these water bodies is ongoing.

### Watershed(s): Dickinson Bayou (1103)

**Issue(s):** Dissolved oxygen and Bacteria

**Milestone for 2007:** Implementation

**Progress in 2007, by Project:**

#### Dickinson Bayou: A TMDL for Dissolved Oxygen

**Modeling:** Preliminary calibration of a fully dynamic in-stream water quality model and preliminary TMDL load allocations were developed in December 2007. These were presented at a stakeholder meeting in December 2007. The draft TMDL report is currently being developed. The TMDL is scheduled for adoption in 2008. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/17-dickinson.html](http://www.tceq.state.tx.us/implementation/water/tmdl/17-dickinson.html)>.

#### Dickinson Bayou: A TMDL for Bacteria

**Data Review:** Historical data review and analysis and the Load Allocation Methodology Report were completed in November 2007. A draft Sampling Plan and QAPP were completed in December 2007. Sampling is scheduled to begin March 2008. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/80-dickinsonbayoubacteria.html](http://www.tceq.state.tx.us/implementation/water/tmdl/80-dickinsonbayoubacteria.html)>.

#### Dickinson Bayou Watershed Protection Plan

A Dickinson Bayou Watershed Partnership involving more than fifty stakeholders has undertaken the development of a WPP for both Dickinson Bayou Tidal (1103) and Dickinson Bayou Above Tidal (1104) Segments, addressing both the dissolved oxygen and bacteria issues.

**Action Plan:** The Dickinson Bayou Watershed Partnership formed five workgroups. Multiple workgroup meetings were conducted in October through December of 2006 leading to an agreement on an overall model for the Dickinson Bayou WPP. A draft of the WPP is now available online. Meetings of the Partnership continued throughout 2007. Point of contact: Bud Solmonsson, <[bsolmonsson@tamu.edu](mailto:bsolmonsson@tamu.edu)>. Project Web site: <[www.dickinsonbayou.org](http://www.dickinsonbayou.org)>.

### Watershed(s): E.V. Spence Reservoir (1411)

**Issue(s):** Sulfate and TDS

**Milestone for 2007:** Implementation

**Progress in 2007, by Project:**

#### Leaf Beetle Dispersal Model project

The goal of this project is to aid in implementing the I-Plan for sulfate and total dissolved solids by biological control of Saltcedar in riparian areas along the Colorado River of Texas and its tributaries in an effort to reduce NPS pollution loadings resulting from invasive brush species on agricultural lands. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/beetlemodl](http://www.tsswcb.state.tx.us/managementprogram/beetlemodl)>.

**Targeted Monitoring: Modeling:** The Leaf Beetle Dispersal Model project developed linear models of Saltcedar biomass against leaf beetle larvae.

#### E.V. Spence Saltcedar Project

The goal of this project is to aid in implementing the I-Plan for sulfate and total dissolved solids TMDLs in the E.V. Spence Reservoir by chemically treating Saltcedar in

riparian areas along the Colorado River and its tributaries in an effort to reduce NPS pollution loadings resulting from invasive brush species on agricultural lands. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/evspence](http://www.tsswcb.state.tx.us/managementprogram/evspence)>.

**Implementation:** Through the E.V. Spence Saltcedar Project, the Colorado River Municipal Water District (CRMWD) worked with the EPA and U.S. Fish and Wildlife Service to revise pesticide regulations to allow use of Arsenal against Saltcedar in Coke, Runnels and Mitchell Counties. The TSSWCB continued to apply herbicide to Saltcedar in a 150-foot wide corridor (75 feet on each side of the river) along the Colorado River and its tributaries. Approximately 7,400 acres were treated in 2007.

#### **Produced Water Impacts to Surface Water Upstream of E.V. Spence Reservoir**

The RRC is investigating the nature and extent of known salinity contamination thought to be contributing to water quality problems in E.V. Spence Reservoir, developing remediation/abatement alternatives or BMPs, and implementing the BMPs.

**Targeted Assessment:** The RRC completed a feasibility study in April to reduce the salt load into the Upper Colorado River via Beals Creek. A recovery trench has been chosen and designed as the most effective BMP for the West O'Daniel Seep. Design of the system will include the storage of the captured seep water in storage tanks and then hauling the water in vacuum trucks from the tanks to a RRC permitted commercial disposal well. The field investigation and preliminary BMP evaluation for Dugout Creek have been completed. The investigation determined that the O'Ryan Seep and Pharaoh Seep are both contributing high saline concentrations in the alluvial flow of the drainage from the two seeps to the confluences with Dugout Creek.

#### **Continuous Water Quality Monitoring Network (See Chapter 2)**

**Implementation:** Real time monitors are being used to support management of inflows to the reservoir, to allow diversion of flows with high levels of TDS away from the reservoir.

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#### **Watershed(s): Fort Worth Legacy Pollutants/Trinity River (0806, 0806A, 0806B, 0829, 0829A)**

**Issue(s):** Chlordane, DDE, Dieldrin, PCBs

**Milestone for 2007:** Reassessment of Fish Consumption Risk

**Progress in 2007:**

**Targeted Assessment:** Risk Characterization Reports have been prepared for Echo Lake and Lake Como. A Risk Characterization Report is pending for Fosdic Lake. The fish consumption advisory was lifted for Lake Como as a result of sampling and analyses performed under this project (see Chapter 4, Water Quality Improvements). The fish consumption advisory was retained for Echo Lake.

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#### **Watershed(s): Galveston Bay (specific segments not listed in NPS Management Program)**

**Issue(s):** Bacteria in oyster waters

**Milestone for 2007:** Implementation

**Progress in 2007:** (See *Gulf Coast Oyster Waters – Bays in the Upper Texas Coast below*. See also the discussion of the TCEQ Galveston Bay Estuary Program in Chapter 2.)

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#### **Watershed(s): Gilleland Creek (1428C)**

**Issue(s):** Bacteria

**Milestone for 2007:** Action Plan and Implementation

**Project:** Gilleland Creek: A TMDL for Bacteria

**Progress in 2007:**

**Modeling and Action Plan:** The TCEQ adopted the TMDL project for bacteria in Gilleland Creek on August 8, 2007. Project Web site: <<http://www.tceq.state.tx.us/implementation/water/tmdl/69-gillelandcreekbacteria.html>>.



**Watershed(s): Guadalupe River above Canyon Lake (1806)****Issue(s):** Bacteria**Milestone for 2007:** Action Plan and Implementation**Project:** Guadalupe River Above Canyon Lake: A TMDL Project for Bacteria**Progress in 2007:**

**Action Plan:** The TCEQ adopted the TMDL for bacteria in the Guadalupe River on July 25, 2007. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/65-guadalupeabovecanyon.html](http://www.tceq.state.tx.us/implementation/water/tmdl/65-guadalupeabovecanyon.html)>.

**Watershed(s): Gulf Coast Oyster Waters (2421, 2422, 2424, 2432, 2439, 2441, 2442, 2451, 2452, 2453, 2456, 2456, 2462, 2472)****Issue(s):** Bacteria**Milestone for 2007:** Action Plan and Implementation**Project:** Gulf Coast Oyster Waters TMDL**Progress in 2007:**

**Modeling and Action Plan:** Projects have begun under separate project names in the Upper, Middle, and Lower Coast to develop TMDLs.

- Bays in the Upper Texas Coast. After analysis, the work group determined that a TMDL is needed for this group of bays. The Upper Coast Oyster Waters TMDL project was begun in 2006 and is ongoing. Bacteria loadings from waterways in the Houston area contribute to the problem in the Galveston Bay system. Project Web site: <<http://www.tceq.state.tx.us/implementation/water/tmdl/74-uppercoastoyster.html>>.
- Bays in the Middle Texas Coast. The oyster reefs in Lavaca Bay were mapped to determine the extent of the resource. The Middle Texas Coast TMDL Project for Oyster Waters, initiated in 2006, is ongoing and includes the Cedar Lakes.
- Bays in the Lower Texas Coast. Project staff determined that a TMDL was needed for the bays on the lower coast. The TMDL project for Copano, Port, and Mission Bays began in 2004. In 2006, the project was expanded to address bacteria coming from the watersheds of the Mission and Aransas Rivers. TMDL development is ongoing.

**Watershed(s): Houston Ship Channel (1001, 1005, 1006, 1007, 2421, 2426, 2427, 2428, 2429, 2430, 2436, 2438)****Issue(s):** Dioxin**Milestone for 2007:** Modeling, Action Plan, Implementation**Project:** Houston Ship Channel Dioxin TMDLProject Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/26-hscdioxin.html](http://www.tceq.state.tx.us/implementation/water/tmdl/26-hscdioxin.html)>.**Progress in 2007:**

**Modeling:** Sampling and modeling activities were continued in 2007. Completion of the TMDL is scheduled for December 2008.

**Watershed(s): Houston Ship Channel (1001, 1005, 1006, 1007, 1013, 1014, 1016, 1017, 2426, 2427, 2428, 2429, 2430, 2436)****Issue(s):** Nickel**Milestone for 2007:** Implementation**Project:** Houston Ship Channel Nickel TMDL**Progress in 2007:**

**Targeted Assessment:** The TCEQ continues to track the waste load allocation for nickel in the Houston Ship Channel. Through 2007, the waste load allocation was 139.3727 lbs/day which results in an allowance for future growth of 8.5647 lb/day. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/01-houship.html](http://www.tceq.state.tx.us/implementation/water/tmdl/01-houship.html)>.

**Watershed(s): Lake Austin (1403)****Issue(s):** Dissolved oxygen**Milestone for 2007:** Implementation**Progress in 2007, by Project:****Dissolved Oxygen Improvement Project in the Headwaters of Lake Austin**

The EPA recommended delisting the dissolved oxygen impairment in 2001 because it is caused by hydromodification rather than by pollutant loading. The TCEQ had already adopted a TMDL and an I-Plan recommending operation of an aeration system installed by the LCRA. In this project, the TCEQ funded installation of three innovative technologies – a profiling buoy, real time monitoring, and optical dissolved oxygen datasondes – to help regulate the aeration. Also, the LCRA conducted a study to determine the optimal release pattern through the dam to raise the dissolved oxygen levels in the discharges.

**Implementation/Effectiveness Monitoring:** The treatment system met the target of increasing the level of dissolved oxygen in the water entering Lake Austin by more than 1.5 mg/L (average) in 2007. However, these increases did not result in attainment of the standard (5.0 mg/L) in 2007.

**Targeted Assessment:** Routine monitoring continued in 2007 to determine compliance with water quality standards. For sampling conducted in 2007, 7 out of 10 samples collected met the mean criterion for dissolved oxygen and 5 out of 10 samples collected met the minimum criteria.

**Watershed(s): Lake Granbury (1205)****Issue(s):** Bacteria**Milestone for 2007:** Targeted Assessment and Implementation**Project: Lake Granbury Watershed Protection Plan**

The objectives of this project are to develop a WPP that defines methods and actions to reach stakeholders' attainable goals in order to reduce the bacteria concentrations in the man-made canals surrounding Lake Granbury. The increasing threat from aging, inadequate septic systems is one of the many likely contributions of bacteria to the canals. Point of contact: Tiffany Morgan, <tiffanym@brazos.org>. Project Web site: <www.brazos.org/gbwpp.asp>.

**Progress in 2007:**

**Stakeholder Group:** Three stakeholder meetings were held in FY 2007.

**Targeted Monitoring:** The QAPP for routine monitoring was finalized and plans were being developed for bacteria source tracking and septic dye tracer/cove circulation. Monthly monitoring continued for over forty sites in the coves of the lake and three sites within the main body of the lake.

**Modeling:** Soil maps and land use maps were finalized. Modeling of loading related to potential sources is underway. The stakeholders approved the modelers approach and set the following preliminary goals: (1) reduce and/or maintain bacteria concentrations in the canals below a geometric mean of 53 MPN/100mL; and (2) reduce and/or maintain bacteria percent exceedance below 5%.

**Data Review:** Historical data analysis has been completed. A water quality characterization report with trend analysis was produced.

**Watershed(s): Lake Granger (1247)****Issue(s):** Sediment**Milestone for 2007:** Targeted Assessment and Implementation**Project: Lake Granger Watershed Assessment and Implementation Project**

The objectives of this project are to: 1) Facilitate the development of a watershed plan for the Lake Granger Watershed; 2) Install Best Management Practices for the purpose of reducing erosion within the watershed; 3) Reduce sediment loadings by

20-30% (based on RUSLE calculations or other applicable means); 4) Reduce total suspended solids concentration in the reservoir by 30%; 5) Reduce nutrient loadings from agricultural lands; and 6) Monitor for results. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/granger](http://www.tsswcb.state.tx.us/managementprogram/granger)>.

**Progress in 2007:**

**Targeted assessment:** The Blackland Research and Extension Center has completed the initial bathymetric survey and is in the process of finalizing the results.

**Stakeholder Group and Education/Outreach:** The Brazos River Authority (BRA) hosted a project meeting in Taylor on June 20th. The primary purpose of the meeting was to discuss the findings of Blackland Research and Extension Center's bathymetric survey and the ongoing efforts of other entities in the watershed. Also discussed was the formation of urban and rural working groups to focus on specific sections of the WPP. Point of contact: Jay Bragg, <[jbragg@brazos.org](mailto:jbragg@brazos.org)>.

**Implementation:** The Little River San Gabriel SWCD hired a technician to develop, implement, and maintain WQMPs. Through 2007, fifty-one WQMPs have been developed within the watershed.

**Watershed(s): Lake O' the Pines (0403)**

**Issue(s):** Dissolved oxygen

**Milestone for 2007:** Implementation

**Progress in 2007, by Project:**

**Assessment and Mitigation of Agricultural and Other NPS Activities in the Cypress Creek Basin**

The primary goal of this project is to evaluate the effectiveness of selected BMPs in reducing nutrient inputs to Big Cypress Creek and Lake O' the Pines by documenting runoff quality from sites representing dominant soil and land use types, with and without BMPs implemented and replace failing septic systems thus initiating a nutrient reduction program by mitigating overflowing sewage from on-site systems in the rural areas. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/cypress](http://www.tsswcb.state.tx.us/managementprogram/cypress)>.

**Targeted Assessment:** Approximately 150 soil samples and 65 runoff samples were collected by Northeast Texas Municipal Water District (NETMWD) staff from twelve sites. The HDR Engineering firm's data validation process was completed and validated data has been submitted to Dr. George Ward for initiation of the SWAT modeling process.

**Targeted Assessment:** Approximately 150 soil samples and 65 runoff samples were collected by NETMWD staff from twelve sites. Validation of water and soil samples was completed. Validated data were submitted for initiation of the SWAT modeling process.

**Development of the I-Plan for the dissolved oxygen TMDL in Lake O' the Pines**

**Implementation:** The development of the I-Plan for dissolved oxygen in the Lake O' the Pines is ongoing. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/19-lakeopines.html](http://www.tceq.state.tx.us/implementation/water/tmdl/19-lakeopines.html)>.

**Watershed(s): Lavaca and Chocolate Bays (2453)**

**Issue(s):** Dissolved oxygen, and Mercury in edible fish tissue

**Milestone for 2007:** Implementation

**Project: Lavaca and Chocolate Bays: Evaluating Water Quality for Aquatic Life and Mercury in Fish and Shellfish**

**Progress in 2007:**

**Targeted Assessment:** Sampling results for dissolved oxygen and mercury in water indicated that TMDLs are not necessary for those parameters. Based on those results, the TCEQ removed dissolved oxygen and mercury in water from the list of impairments for Lavaca Bay and Chocolate Bay in the CWA Section 303(d) List. Mercury in fish and crab tissue is being addressed by the Superfund Program. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/27-lavacabay.html](http://www.tceq.state.tx.us/implementation/water/tmdl/27-lavacabay.html)>.

**Watershed(s): Little Wichita (0211, 0212)****Issue(s):** Dissolved oxygen and TDS**Milestone for 2007:** Action Plan and Implementation**Project:** None in 2007**Watershed(s): Martin Creek Reservoir (0505F)****Issue(s):** Selenium in edible fish tissue**Milestone for 2007:** Implementation**Project:** **Martin Creek Reservoir: Assessing the Safety of Fish Consumption****Progress in 2007:**

**Targeted Assessment:** The water body was first listed in 1996 on the CWA Section 303(d) List. The water body impairment was removed from the list in 2004. The Texas DSHS rescinded the fish consumption advisory for selenium in fish tissue in October 2003, based on new fish tissue data. The fish consumption use is now fully supported.

**Watershed(s): Matagorda Bay / Tres Palacios Bay (2451, 2452, 2456, 2483A)****Issue(s):** Dissolved oxygen**Milestone for 2007:** Action Plan and Implementation**Project:** **Matagorda Bay: TMDL for Dissolved Oxygen and pH****Progress in 2007:**

**Targeted Assessment:** The project found that there was an error in the original listing of Matagorda Bay/Powderhorn Lake (2451) and Carancahua Bay (2456) for depressed dissolved oxygen resulting in these impairments being removed from the CWA Section 303(d) List. Tres Palacios/Turtle Bay (2452) and Lavaca Bay/Chocolate Bay (2456) were renamed and reclassified as Tres Palacios Harbor and the Lavaca Bay Ship Channel, segments 2453A and 2453D, respectively, and were removed from the Section 303(d) List because their dissolved oxygen levels met the standard for their new designation. All these water bodies are still listed for bacteria. Conn Brown Harbor (2483A) was found to meet its dissolved oxygen standard and was also removed from the Section 303(d) List for that impairment. Project Web site: <[www.tceq.state.tx.us/assets/public/implementation/water/tmdl/62matagorda/62-matagordapo.pdf](http://www.tceq.state.tx.us/assets/public/implementation/water/tmdl/62matagorda/62-matagordapo.pdf)>.

**Watershed(s): Middle Brazos River Basin (1217A, 1243)****Issue(s):** Dissolved oxygen**Milestone for 2007:** Action Plan and Implementation**Project:** None

**Progress in 2007:** Rocky Creek (1217A) was delisted for bacteria in 2002 because it met water quality criteria. The water body was delisted for dissolved oxygen in the 2006 because it met criteria. Biological data collected from the North Fork of Rocky Creek indicates that it supports a relatively healthy biological community, better than that which would be expected based upon the results of the dissolved oxygen monitoring. The TCEQ's Water Quality Standards program is reviewing data from the North Fork of Rocky Creek to determine if a site-specific criterion for dissolved oxygen would be appropriate for the creek. Likewise, Salado Creek (1243) was delisted for total dissolved solids because a new water quality standard was established. Also, Salado Creek was delisted for dissolved oxygen in 2006 because further investigation determined that the standard was met.

**Watershed(s): North Bosque River (1226, 1255)****Issue(s):** Nutrients**Milestone for 2007:** Modeling and Implementation**Progress in 2007, by Project:**

### **Dairy Manure Export Support (DMES) Project**

The project consists of the TSSWCB working cooperatively with participating entities, dairy producers, manure haulers, and others in the Bosque and Leon River watersheds to provide technical and financial assistance to landowners, haulers and composters in the creation and removal of a marketable, composted product. Project Web site: <<http://www.tsswcb.state.tx.us/managementprogram/dmes>>.

**Implementation:** The TSSWCB Dairy Manure Export Support Project hauling reimbursements were discontinued in February 2007. Approximately 20,000 tons of manure was hauled to compost facilities between September 2006 and February 2007.

### **Composted Manure Incentive Project (CMIP)**

This project involved recruitment of new composting operations to convert and export manure from the North Bosque and Leon watersheds (in coordination with the DMES project), together with a rebate program for purchases of the composted manure and technical assistance to both compost facilities and compost users. Project Web site: <[www.tceq.state.tx.us/compliance/monitoring/nps/projects/compost.html](http://www.tceq.state.tx.us/compliance/monitoring/nps/projects/compost.html)>.

**Implementation; Evaluation:** The TCEQ discontinued the CMIP compost purchase rebate at the end of FY 2006. In FY 2007, the TCEQ project staff conducted a comprehensive survey of compost rebate users, twenty-three site visits with interviews at rebate user locations, and exit interviews with the five compost facilities participating in the project. Compost exports from the North Bosque River watershed for 2007 were estimated to be approximately 50,000 cubic yards; yielding a reduction of phosphorus loading of approximately 220,000 lbs. Exports from the Leon River watershed under this project were approximately 30,000 cubic yards containing 132,000 lbs of phosphorus. See feature in Reductions in Pollutant Loadings in Chapter 4.

### **Comprehensive Nutrient Management Plan (CNMP) Program**

A CNMP is a resource management plan containing a grouping of conservation practices and management activities which, when combined into a conservation system, will help ensure that both agricultural production goals and natural resource concerns dealing with nutrient and organic by-products and their adverse impacts on water quality are achieved. Project Web site <[www.tsswcb.state.tx.us/cnmp](http://www.tsswcb.state.tx.us/cnmp)>.

**Implementation:** The TSSWCB completed guidance for the CNMP Program in 2003. As of August 31, 2007, the TSSWCB has certified forty-six CNMPs for Concentrated Animal Feeding Operations in the North Bosque River watershed.

### **Environmental Monitoring and Response System Pilot Expansion in the Upper North Bosque River**

**Targeted Assessment:** Two new Environmental Monitoring and Response System sites were deployed – one on the main stem of the North Bosque River at State Highway 6, and one on Scarborough Creek in the Upper North Bosque River watershed.

### **Extending TMDL Efforts in the North Bosque River Watershed**

This project will provide storm and routine monitoring of tributaries that contribute NPS loadings to an impaired water body in order to assess agricultural NPS reductions. Project Web site: [www.tceq.state.tx.us/implementation/water/tmdl/06-bosque.html](http://www.tceq.state.tx.us/implementation/water/tmdl/06-bosque.html).

**Targeted Assessment:** Wet-weather conditions allowed the Texas Institute for Applied Environmental Research (TIAER) to collect eighty grab samples for analysis out of a potential maximum of one hundred samples. TIAER submitted a draft interim project report on post-TMDL implementation activities and their effect on water quality at microwatershed stream sites for data collected through December 2006. Information presented in the TIAER report, Extending TMDL Efforts in the North Bosque River Watershed: Assessment Data through 2006 indicates a positive correlation between participation in the compost program and reductions in phosphorus in the stream through December 2006. See Chapter 4 for more details.

### **Field Validation of the Texas Phosphorus Index**

The information attained from the field studies will help validate and improve the Texas Phosphorus Index. With this information and additional studies similar to this

across the State, quantitative assessments to predict the amount of phosphorus in runoff utilizing the Texas Phosphorus Index can be estimated. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/pindex](http://www.tsswcb.state.tx.us/managementprogram/pindex)>.

**Targeted Assessment and Modeling:** Soil samples were analyzed for Mehlich III extractable phosphorus for all of the forty sites identified in Erath, Bosque, McLennan, Comanche, Hamilton, and Coryell counties with Phosphorus Index risk ratings of low, medium, and very high, non-calcareous vs. calcareous, and soil test P low to high (>200 ppm). Comparisons were made of different extractable phosphorus concentrations to soluble and suspended runoff phosphorus. Currently awaiting results.

### **North Bosque River Watershed Water Quality Assessment Project (TMDL Effectiveness Monitoring)**

**Targeted Assessment:** Routine bi-weekly monitoring was conducted at nine sites, six of which are on the main stem of the river, two tributaries, and one PL-566 reservoir. Storm water monitoring increased substantially this year with record rainfall from May through August. Flooding caused equipment failures and required some of the equipment to be re-furbished. Sites that were washed out had to be re-installed. The draft and final interim assessment report was completed, and data was submitted to the TCEQ.

### **Phytoremediation of excessively high phosphorus soils and subsequent reduced P runoff into North Bosque River**

This project will develop and demonstrate remedial BMPs for both abandoned and currently used waste application fields that will bring soil phosphorus levels back to safe levels. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/phytonbr](http://www.tsswcb.state.tx.us/managementprogram/phytonbr)>.

**Implementation/Effectiveness Monitoring:** The project team has spent considerable time in the field setting up data collection and demonstration sites on three operating dairies and the search continues for defunct dairies for inclusion in the project.

**Stakeholder Group:** The TSSWCB Phytoremediation project team, including dairymen when possible, has convened every quarter to discuss results and make plans for additional efforts. Results of the Phytoremediation research were presented at the Dairy Field Day during the second quarter of 2007.

### **Demonstration and Transfer of Selected New Technologies for Animal Waste Pollution Control**

This project provides for testing of new technologies designed for reducing water pollution associated with animal production systems, principally dairies. The focus is restricted to reducing phosphorus in dairy waste streams. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/evalnewtch](http://www.tsswcb.state.tx.us/managementprogram/evalnewtch)>.

**Implementation/Education:** The demonstration by Envirolink at the Sherywn Wood dairy near Stephenville and has been completed. Data analysis and writing of the final report is now underway and will be completed during the next quarter. The demonstration by Natural Biotechnology has been officially cancelled. The final demonstration will be conducted by Ozona Environmental.

### **Dairy Compost Field Trials in Reclamation at a Rock Quarry**

The University of Texas Center for Research and Water Resources, in partnership with TIAER, is providing scientific assessment of the erosion, sediment, and pollutant control effects of Erosion Control Compost (a mulch blend) compared to standard storm water BMPs in rock quarry reclamation through multi-year field trials at a Vulcan Materials quarry. This study provided demonstration and technology transfer to the mining and construction industries and will provide a basis for estimating sediment and pollutant load reduction effects of this BMP in other NPS projects. See the related article in Chapter 4.

**Modeling and Effectiveness Monitoring:** runoff sampling and analysis for twelve (75%) of the storm events to be monitored for the project has been completed. Preliminary analysis of results has been completed and used for a partial estimate of sediment load reduction from the CMIP project.

### **Storm water Best Management Practices Using Composted Manure, Filter Berms Filter Socks and Erosion Control Compost in Rock Quarry Operations**

Three projects demonstrating compost BMPs at partner mining operations were established – Vulcan Materials, Alcoa Sandow, and Stonewall Materials.

**Implementation/Education:** A total of 1,775 cubic yards of dairy manure compost together with 400 cubic yards of yard trimmings compost and 1,100 cubic yards of mulch, were used to treat twenty acres of recently mined land at the Vulcan Materials quarry. An additional acre was treated with 260 cubic yards of dairy manure compost at the Stonewall Materials quarry. The twenty-two workshops and eight demonstrations that were conducted drew 806 people. Extensive educational materials were provided including a CD with resource documents on using mulch and compost.

### **Dairy Waste Management Demonstration Project**

The TCEQ provided support for a manure digester system for one large dairy to demonstrate the significant reduction in phosphorus going to land application. The system provides significant filtration and removal of 80% of the phosphorus from the liquid stream which is digested for biogas extraction. The system provides significant filtration and removal of 80% of the phosphorus from the liquid stream which is digested for biogas extraction. The solid portion is extracted in a front-end solid/liquid separator, and biosolids are recovered after the digestion process. Both solids streams go to compost production for bedding use or export. The TSSWCB supported the development of a CNMP as a roadmap for agronomic application of the liquid residue.

**Implementation:** The treatment system at the Broumley Dairy continued to undergo repair work during 2007 to address issues associated with the oxidation pond liner and electrical generation equipment. TIAER completed monitoring activities and developed an economic analysis report on the system.

### **Fort Hood Land Reclamation & Storm water BMPs Belton Lake, Nolan Creek/ South Nolan Creek, North Bosque, Upper North Bosque (1220, 1218, 1226, 1255)**

The TCEQ SBEA staff partnered with Fort Hood staff to conduct workshops and demonstrations for military establishments, staff employees, engineers, and other interested parties. These demonstrations showed how the use of BMPs, such as filter berms and filter socks for runoff control, sediment trapping, and storm water filtration from armored maneuvering activities, can reduce runoff volumes and sediment loading to local water bodies.

**Implementation/Education:** The project was completed in August 2007. The Final Report was submitted December 2007. Approximately 1,340 cubic yards of compost was used from the Bosque watershed. A total of 4,280 cubic yards of compost and 2,240 cubic yards of wood mulch were used to cover 28 acres. Four thousand linear feet of filter sock was used to detain and filter storm water runoff.

### **Web Based Water Quality Data Repository**

**Implementation/Education:** The system and corresponding Web site that were created for this project proved to be a very useful tool. Tracking software used to evaluate the Web site indicates that usage varied greatly from one month to the next. It is suspected that these variances were dependent on newspaper articles or press releases. However, these factors were not accurately tracked. In August 2006, the BRA instituted new tracking software that allows us to more accurately determine the data that users are looking for when they assess the site. While several items were identified as needing improvement, the BRA does plan to continue to use the system, and may possibly expand the scope so that data are publicly available for the entire basin.

### **Evaluation and Assessment of Nonpoint Sources of Pollution along the Brazos River and North Bosque Rivers Utilizing Aerial Video and Mapping Techniques**

**Implementation/Education:** The project entailed a helicopter fly-over of the lower two-thirds of the Brazos River originating at the confluence of the Salt and Double Mountain Forks southward to the Gulf Coast. The purpose of the flights was to obtain

a photographic record of the riparian zones along the rivers to document land uses, such as illegal dumps or quarrying activities that may be impacting water quality. An interactive DVD documenting the flight as well as a hard copy atlas was produced. These new tools will aid the BRA and other partners in their oversight and protection of water resources in the basin.

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**Watershed(s): Nueces Bay (2482)**

**Issue(s):** Zinc, Selenium

**Milestone for 2007:** Action Plan and Implementation

**Project: Nueces Bay Zinc TMDL Project**

**Progress in 2007:**

**Action Plan:** The TMDL adopted in 2006 determined that there were no nonpoint sources of zinc. The I-Plan was approved in October 2007. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/21-nuecesbay.html](http://www.tceq.state.tx.us/implementation/water/tmdl/21-nuecesbay.html)>.

**Implementation:** Implementation of the I-Plan is ongoing (addressing point sources).

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**Watershed(s): Orange County: Cow Bayou, Adams Bayou and tributaries (0508, 0508A, 0508B, 0508C, 0511, 0511A, 0511B, 0511C, 0511E)**

**Issue(s):** Bacteria, Dissolved oxygen, pH

**Milestone for 2007:** Action Plan and Implementation

**Project: Orange County Watersheds: TMDL Project for Bacteria, Dissolved Oxygen, and pH**

**Progress in 2007:**

**Action Plan:** Seventeen TMDLs addressing all three impairments in Adams Bayou, Cow Bayou, and their tributaries were adopted by the TCEQ on June 13, 2007 and approved by the EPA on August 28, 2007. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/37-orangecounty.html](http://www.tceq.state.tx.us/implementation/water/tmdl/37-orangecounty.html)>.

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**Watershed(s): Oso Bay (2485, 2491)**

**Issue(s):** Dissolved oxygen

**Milestone for 2007:** Action Plan and Implementation

**Project: Oso Creek/Oso Bay Watershed Implementation Assistance**

One objective of this project is to estimate the loadings of nutrients, pesticides, and selected inorganic ions originating from croplands in the Oso Creek watershed that drains to Corpus Christi Bay.

**Progress in 2007:**

**Targeted Monitoring:** Sampling of runoff for nutrients and sediment will continue through September 30, 2007, with analysis and final report due by March 31, 2008. Continuous rainfall and stream flow data collection is ongoing. Suspended-sediment yield (load per acre) from the monitored subbasins averaged 570 pounds per acre, total nitrogen and total phosphorus in runoff averaged 0.9 pounds per acre and 0.5 pounds per acre, respectively. Atrazine and glyphosate were detected in all runoff samples. Estimated total runoff loads of atrazine and glyphosate from the combined monitored subbasins (10,432 total acres) were 6.8 pounds and 21.8 pounds, respectively.

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**Watershed(s): Oso Creek and Oso Bay (2485, 2485A)**

**Issue(s):** Bacteria

**Milestone for 2007:** Action Plan and Implementation

**Progress in 2007, by Project:**

**Oso Creek and Oso Bay: TMDL for Bacteria**

**Modeling:** A TMDL for Oso Bay was adopted on August 2007. Stakeholders requested a separate TMDL for Oso Creek and TCEQ agreed. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/67-osobaybacteria.html](http://www.tceq.state.tx.us/implementation/water/tmdl/67-osobaybacteria.html)>.



### **Petronila Creek, Oso Creek, and Oso Bay Illegal Dumping Education & Cleanup Campaign**

The Coastal Bend Council of Governments (COG) is coordinating the implementation of a project addressing bacteria problems in Oso Bay, Oso Creek, and Petronila Creek. The project includes an education and outreach component to raise the level of public knowledge of Petronila Creek, Oso Creek, and Oso Bay, improve water quality, and to discourage and reduce future illegal dumping in those and surrounding watersheds. In addition, cleanup events will be held to reduce trash buildup and illegal dumping in the watersheds.

**Implementation:** In FY 2007, community recycling and water quality education activities were conducted in the area. Twenty-two presentations were given to over 2,200 students and 200 teachers in area schools, along with a presentation to the Texas Environmental Health Association and a Boy Scout Troup. In addition, information was provided to citizens at an Earth Day/Bay Day event with approximately 20,000 children and adults in attendance.

### **On-site Sewage Facility Up-grades in the Oso Creek Watershed**

**Implementation:** The Coastal Bend Bays & Estuaries Program with Nueces County is overseeing an On-Site Sewage Facility improvement need assessment and prioritization plan. The initial project meeting was on November 20, 2007.

### **Watershed(s): Pecos River (2310, 2311)**

**Issue(s):** Chloride, Sulfate, and TDS

**Milestone for 2007:** Action Plan and Implementation

#### **Project: Pecos River Watershed Protection Plan**

Through this project a WPP will be developed to assess current management measures as well as determine what future management measures need to be implemented in the river basin to protect the water quality of the Pecos River. Point of contact: Will Hatler, <wlhatler@ag.tamu.edu>. Project Web site: <pecosbasin.tamu.edu>.

#### **Progress in 2007:**

**Action Plan:** Work on the WPP project was ongoing in 2007, and a draft plan is due in 2008.

### **Watershed(s): Sabinal River (2110)**

**Issue(s):** Nitrate-nitrite

**Milestone for 2007:** Modeling and Implementation

#### **Progress in 2007, by Project:**

#### **TMDL I-Plan for Nitrate-Nitrogen**

The goal of this project is to reduce nitrate-nitrogen levels to make the river useful as a source of drinking water. Project Web site: <www.tceq.state.tx.us/tmdl/45-sabinalnitrate.html#iplan>.

**Implementation:** The TCEQ approved the I-plan on August 23, 2006. Implementation is ongoing.

#### **Nueces Basin Headwaters Stewardship Project**

Using public education, this project will concentrate on water quality concerns, impairments, and threats to water quality and streambed conditions in five headwater stream segments of the Nueces River Basin. Project Web site: <www.tsswcb.state.tx.us/managementprogram/nueces>.

**Implementation/Education:** The Nueces River Authority has designed and implemented an education program targeted at five Nueces Basin headwater stream segments to raise the level of public awareness of the NPS pollution that threatens the area streams and encourages pollution prevention. This project was extended from June 2007 to February 2008.

**Watershed(s): Salado Creek (1910)****Issue(s):** Dissolved oxygen**Milestone for 2007:** Implementation**Progress in 2007, by Project:****TMDL for Dissolved Oxygen**

**Modeling:** The TMDL was completed in 2001. Project staff determined that the water quality standards for support of the aquatic life use have been met. It was decided that an I-plan approved by the TCEQ is not necessary since a load reduction is not required to attain the standards. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/11-salado.html](http://www.tceq.state.tx.us/implementation/water/tmdl/11-salado.html)>.

**Action Plan:** Local organizations have taken action to preserve and enhance water quality in Salado Creek. Measures include the introduction of reused water to supplement the base flow in the stream, the rehabilitation of the sewage-collection system in the watershed, the establishment of additional park areas along the creek, public education, and continued water quality monitoring.

**BMP Upgrade and Continuous Monitoring at Sinkhole in Salado Creek**

**Stakeholder Group:** A contract was initiated for the BMP Upgrade Project. A draft QAPP has been prepared. The BMP upgrade and monitoring activities are set to begin in spring of 2008.

**Watershed(s): San Antonio River (1901, 1910, 1910A, 1911), Leon River**

**(1221), and Peach Creek (1803C)** (This item combines two separate milestones from the NPS Management Program with overlapping scope)

**Issue(s):** Bacteria**Milestones for 2007:** Targeted Assessment, Modeling, Action Plan and Implementation**Progress in 2007, by Project:****TMDL for Bacteria**

**Modeling:** The TMDL for bacteria has been completed for the Upper San Antonio River including Salado and Walzem Creeks. Three TMDL projects are ongoing. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/34-uppersanantoniobac.html](http://www.tceq.state.tx.us/implementation/water/tmdl/34-uppersanantoniobac.html)>.

**Upper San Antonio River Watershed Protection Plan**

The San Antonio River Authority developed a WPP to address elevated bacteria concentrations in the main stem of the Upper San Antonio River (1911) above Loop 410 South, almost entirely within the City of San Antonio. The project also evaluated the compatibility of planned downtown river improvements with restoration of water quality in the river. Point of contact: Steve Lusk, <[stevelus@sara.tx.org](mailto:stevelus@sara.tx.org)>. Project Web site: <[www.sara-tx.org/site/water\\_quality/water\\_qual\\_mon/Projects\\_and\\_Studies.html](http://www.sara-tx.org/site/water_quality/water_qual_mon/Projects_and_Studies.html)>.

**Action Plan:** The Upper San Antonio River WPP was presented to the TCEQ in the fall of 2006.

**Targeted Monitoring:** The San Antonio River Authority continued routine and storm water monitoring to provide baseline data for measuring progress and BMP effectiveness during and after implementation.

**Implementation:** The San Antonio River Authority secured grant funding for a project to implement a portion of the plan including public education and housekeeping practice improvements to minimize food waste and bird droppings in the River Walk, to begin in 2008.

*(See also multi-basin project "Lone Star Healthy Streams" below, addressing lower San Antonio River.)*

**Watershed(s):** South Central Texas (1427, 1806A, 1803A, 1803B, 2107, 2104, 2113, 1906, 1913, 1908)

**Issue(s):** Bacteria and Dissolved oxygen

**Progress in 2007, by Project:** The segments that did not result in TMDLs were recommended for delisting in 2006. Onion Creek (1427) the Upper Cibolo Creek (1908), and Upper Frio River (2113) were removed from the 2006 CWA 303(d) List.

#### **Elm and Sandies Creeks TMDL – Phase II (1803A, 1803B)**

**Modeling:** A TMDL for bacteria and dissolved oxygen for Elm and Sandies Creeks is ongoing. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/31-elmsandies.html](http://www.tceq.state.tx.us/implementation/water/tmdl/31-elmsandies.html)>.

#### **Atascosa River TMDL – Phase II (2107)**

**Modeling:** A TMDL for bacteria and dissolved oxygen in the Atascosa River is ongoing. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/31-atascosa.html](http://www.tceq.state.tx.us/implementation/water/tmdl/31-atascosa.html)>.

#### **Mid Cibolo Creek TMDL – Phase II (1913)**

**Modeling:** A TMDL for bacteria and dissolved oxygen for Mid Cibolo Creek was developed. On July 25, 2007, the TCEQ remanded the TMDL for additional changes in response to public comment. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/31-midcibolo.html](http://www.tceq.state.tx.us/implementation/water/tmdl/31-midcibolo.html)>.

**Watershed(s):** Tarrant Regional Water District (0818, 0809)

**Issue(s):** Chlorophyll a, Nutrients, Dissolved Oxygen, pH

**Milestones for 2007:** Targeted Assessment, Action Plan, and Implementation

#### **Cedar Creek Reservoir Watershed Protection Plan**

**Targeted Assessment, Action Plan, and Implementation:** The reservoir (0818), in the Trinity River Basin in Henderson and Kaufman Counties, is listed as impaired for high pH values and low dissolved oxygen, and has other water quality and habitat concerns as well. Point of contact: Woody Frossard, wfrossard@trwd.com

**Modeling and Action Plan:** Tarrant Regional Water District, with assistance from the stakeholder group, was overseeing reservoir modeling, economic analyses, stakeholder inputs, and WPP development.

#### **Eagle Mountain Reservoir Watershed Protection Plan**

The reservoir (0809) is located on the West Fork of the Trinity River just north of Lake Worth in northwestern Tarrant and southwestern Wise counties experiencing eutrophic conditions. Point of contact: Woody Frossard, wfrossard@trwd.com

**Modeling and Action Plan:** Tarrant Regional Water, with assistance from the stakeholder group, was overseeing reservoir modeling, economic analyses, stakeholder inputs, and WPP development.

**Watershed(s):** Trinity River (0805)

**Issue(s):** Bacteria

**Milestone for 2007:** Modeling, Action Plan, and Implementation

**Project:** TMDL Development for Bacteria in the Trinity River

**Progress in 2007:**

**Modeling:** The development of the TMDL for bacteria in the Trinity River is ongoing. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/66-trinitybacteria.html](http://www.tceq.state.tx.us/implementation/water/tmdl/66-trinitybacteria.html)>.

**Watershed(s):** Upper Oyster Creek (1245)

**Issue(s):** Dissolved oxygen and Bacteria

**Milestones for 2007:** Action Plan and Implementation

**Project:** TMDL for Upper Oyster Creek

**Progress in 2007:**

**Action Plan:** The TMDL for bacteria in Upper Oyster Creek was adopted by the TCEQ on August 8, 2007. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/25-oystercreek.html](http://www.tceq.state.tx.us/implementation/water/tmdl/25-oystercreek.html)>.

**Modeling:** The development of the TMDL for dissolved oxygen in Upper Oyster Creek is ongoing.

**Watershed(s): Welsh Reservoir (0404D)**

**Issue(s):** Selenium in edible fish tissue

**Milestone for 2007:** Implementation

**Project:** **Welsh Reservoir TMDL: Assessing the Safety of Fish Consumption**

**Progress in 2007:** The reservoir impairment was removed from the CWA Section 303(d) List after the Texas DSHS rescinded the fish consumption advisory in October 2004. Project Web site: <[www.tceq.state.tx.us/implementation/water/tmdl/14-welshreservoir.html](http://www.tceq.state.tx.us/implementation/water/tmdl/14-welshreservoir.html)>.

## New Initiatives

The TCEQ and the TSSWCB funded projects to address water quality issues in several additional priority water bodies for which there are no milestones in the NPS Management Program. These Agencies, together with their partners, have also undertaken several statewide initiatives and preventive projects in the watersheds of unimpaired water bodies. Although there are no official milestones set for these watersheds and issues, the progress accomplished by these projects is presented as in the section above, according to the milestone categories used in the NPS Management Program.

**Watershed(s): Bastrop Bayou (1105)**

**Issue(s):** Bacteria, Nutrients

**Progress in 2007, by Project:**

**Bastrop Bayou Watershed Protection Plan**

**Stakeholder Group:** Planning for the initial stakeholder meeting began in FY 2007.

**Data Review:** Compiling and evaluating a data inventory began in order to determine pollution sources and the reductions that will be needed.

**Watershed(s): Brady Creek (1416A)**

**Issue(s):** Dissolved oxygen

**Progress in 2007, by Project:**

**Brady Creek Watershed Protection Plan and NPS/Urban Runoff Water Pollution and Abatement Demonstration Project II**

This project is considered Part II of the Brady Creek Water Quality Improvement Project. Activities consist of the construction of a series of gabion filtration structures at storm water outfalls located along Brady Creek below the Elm Street low water crossing in downtown Brady. The BMPs were selected by the Citizen's Advisory Committee as part of the Brady Creek Master Plan. The project was extended until August 2008 to allow the UCRA, who is conducting the project, additional time to collect water quality data and to develop a stakeholder driven WPP that will encompass the entire watershed.

**Implementation:** Five gabion filtration structures were constructed at outfalls along Brady Creek in spring 2007 to treat storm water runoff. Effectiveness monitoring is underway.

**Maintaining Sediment Prevention through Repair of Floodwater-Retarding Structures in McCulloch County**

**Modeling:** Baylor University has generated sub-watershed, soil, and land use maps for the Brady Creek and Deep Creek watersheds using the Natural Resource Conser-

vation Service (NRCS) SWAT Geographic Information Systems (GIS) interface. The university has selected four representative watersheds and two alternate sites in McCulloch County, for the purpose of conducting volume and sediment surveys.

**Implementation:** The McCulloch SWCD repaired thirteen structures in accordance with the NRCS practice standards for floodwater-retarding structures.

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**Watershed(s): Brazos River above Navasota River (1242)** – priority water body

**Issue(s):** Bacteria

**Project: Poultry Litter Application on New Sites**

The overall watershed-wide objective of this project is to educate third party applicators of poultry litter to the environmental benefits of using proper application management techniques beginning on Day 1 of application on new sites. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/plan](http://www.tsswcb.state.tx.us/managementprogram/plan)>.

**Progress in 2007:**

**Targeted Monitoring and Modeling:** The U.S. Department of Agriculture's (USDA) Agricultural Research Service (ARS) staff identified and established demonstration sites at their Soil and Water Research Center near the city of Riesel. Supplemental nitrogen fertilizer was applied to the cultivated watersheds and incorporated into the soil on February 14, 2006. Corn was planted on the cultivated watersheds on March 6th and 7th, 2006. Litter was surface applied on pasture sites but was incorporated within 24 hours of application on the cultivated sites. Wheat was sown on cultivated watersheds on November 2, 2006. A wheat harvest was attempted but not completed due to sustained, extremely wet conditions. Small wheat yield plots were harvested to compare yields.

**Education/Outreach:** Project overview, objectives, and status of project were presented to McLennan County producers during the Eastside McLennan County Farm Field Day and Tour held on June 15th in the Cottonwood, Texas area. A similar program was presented to McLennan County producers during the Westside McLennan County Farm Field Day and Tour held on June 22nd in the Crawford, Texas area. A project overview and results to date, titled "Environmental and Economic Impacts of Applying Poultry Litter to Cropland and Rangeland in Central Texas", was presented to the Texas Broiler Council at Nacogdoches on June 14, 2007.

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**Watershed(s): Caddo Lake (0401)**

**Issue(s):** Dissolved oxygen, Low pH, and Mercury in edible fish tissue

**Progress in 2007, by Project:**

**A Strategy to Protect and Restore Caddo Lake**

The NETMWD established the position of Watershed Coordinator for the Caddo Lake to provide a single point of contact for the activities of the workgroups, manage and track all workgroup activities, facilitate information exchange among the participants and, complete elements one (identify sources and causes) and five (provide a vehicle to share information and educate stakeholders) of the Caddo Lake WPP.

**Stakeholder Group:** The Caddo Lake Watershed Steering Committee held three stakeholder meetings in FY 2007. The primary focus of the stakeholders has been on controlling the spread of the invasive aquatic fern, Giant Salvinia (*Salvinia molesta*). The work was performed with funds raised by the workgroup. A rapid response plan was developed and more than thirty stakeholders have been trained and permitted by Texas Parks and Wildlife Department to handle the invasive fern. A barricade was constructed across Caddo Lake by volunteers with funding from the American Electric Power—Southwestern Electric Power Company, Cypress Valley Navigational District, the City of Marshall, Harrison County, the NETMWD, the Caddo Lake Institute, and the TCEQ, in order to prevent the weed from spreading further into the lake. The TCEQ is currently working with stakeholders on implementing changes to the Water Quality Standards for pH in Caddo Lake. Point of contact: Beverly Allen, <[Ballennetwmd@aol.com](mailto:Ballennetwmd@aol.com)>. Project Web site: <[www.netmwd.com/Caddo%20Lake%20Protection%20Plan/Caddo\\_index.html](http://www.netmwd.com/Caddo%20Lake%20Protection%20Plan/Caddo_index.html)>.

**Watershed(s): Chambers Creek, Richland-Chambers Reservoir (0814, 0836)****Issue(s):** Dissolved oxygen, High pH**Progress in 2007, by Project:****BMP Verification in Richland-Chambers Watershed**

The goal of the project is to verify the effectiveness of BMPs installed on a portion (Mill Creek) of the Richland-Chambers reservoir watershed to provide supporting information for BMP implementation within the entire Richland-Chambers reservoir watershed. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/richlndbmp](http://www.tsswcb.state.tx.us/managementprogram/richlndbmp)>.

**Modeling:** GIS data, such as land use, Digital Elevation Model data, soil-type, Weather Stations data from the National Weather Service, and stream flow / water quality data (current and historic) were collected and processed for addition to the model. Location, type, aerial extent, the farming practice BMP implemented in the Mill Creek watershed, and the CWA Section 319(h) project BMPs implemented in the Richland-Chambers Watershed are being collected. Trend analysis of water quality data from the monitoring sites at Post Oak Creek show a definite decreasing trend in total suspended solids, total and organic phosphorus levels. Watershed and water-quality modeling activity is ongoing (using Agricultural Policy Extender water quality model).

**Ellis Prairie SWCD Water Quality Project**

This project will provide producers the opportunity to participate in water quality educational activities, technical assistance, and financial assistance to implement BMPs in order to reduce the runoff of sediment, nutrients, and pesticides. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/ellisprair](http://www.tsswcb.state.tx.us/managementprogram/ellisprair)>.

**Implementation:** The Ellis-Prairie SWCD hired a technician to develop, implement, and maintain WQMPs. Through 2007, twelve WQMPs have been developed within the watershed.

**Navarro WQMP Implementation Project**

This project will provide corn and sorghum producers in the Richland Chambers Reservoir watershed with an opportunity to participate in water quality educational activities, technical assistance, and financial assistance to implement BMPs in order to reduce the runoff of atrazine. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/navrosupp](http://www.tsswcb.state.tx.us/managementprogram/navrosupp)>.

**Implementation:** The Navarro SWCD hired a technician to develop, implement, and maintain WQMPs. Through 2007, forty WQMPs have been developed within the watershed.

**Watershed(s): Choke Canyon (2116) - priority water bodies****Issue(s):** Bacteria, TDS**Project: Choke Canyon Reservoir Salt Water Discharge Minimization Project****Progress in 2007:**

**Implementation:** The RRC plugged eighty wells at a total cost of \$392,815.00, an average of \$4,900 per well. Seventy-six wells remain to be plugged. Six wells approved for plugging were acquired by investors for additional production and will not be plugged under this project.

**Watershed(s): Lampasas River (1217) – priority water body****Issue(s):** Bacteria**Project: Assessment in the Lampasas Watershed**

This project will involve a water quality monitoring program to identify pollutant loading and target problem areas within the city's failing septic systems for future BMP implementation.

**Progress in 2007:**

**Targeted Assessment:** The City of Killeen completed its plan for assessment of NPS pollutant contributions from the City of Killeen Urbanized Area within the Lampasas watershed. Assessment will begin in January 2008.

**Watershed(s):** Leon River below Proctor Lake, Resley Creek, Proctor Lake (1221, 1221A, 1222) – priority water bodies

**Issue(s):** Bacteria, Nutrients

**Progress in 2007, by Project:**

#### Leon River TMDL for Bacteria

**Modeling:** A Final Modeling Report for the TMDL was submitted in November 2006.

#### Leon River Watershed Protection Plan

The purpose of this project is to use a locally-driven, stakeholder process to develop a WPP for the Leon River Watershed above Lake Belton. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/leonwpp](http://www.tsswcb.state.tx.us/managementprogram/leonwpp)>.

**Stakeholder Group:** The Leon River TMDL Advisory Group supported the BRA in the formation of a Leon River Watershed Partnership to provide oversight to the preparation of a WPP beginning in 2008.

**Monitoring:** The TCEQ Clean Rivers Program monitoring continued in 2007.

#### Impact of Proper Fertilizer Management

The goal of this project is to increase landowner use of proper organic fertilizer management practices that will result in improved water quality in the Leon River basin, which is threatened by excess nutrients and impaired by excess bacteria, and prevent future impairment by providing an alternative to application on historically over-utilized sites. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/impact](http://www.tsswcb.state.tx.us/managementprogram/impact)>.

**Targeted Monitoring:** Six small watershed demonstration sites (4 cultivated, 2 pasture) have been established. Management records for land management and nutrient practice information on the demonstration sites have been collected and compiled for 2004, 2005, 2006 and 2007 to date. Sorghum has been planted on the cultivated sites and data related to wastewater irrigation and land management in the dairy waste application field are being collected to address stakeholder concerns.

**Education/Outreach:** Two Texas AgriLife Extension Service publications are under development. The first publication, Land Application of Organic Fertilizers or Amendments, is currently being prepared for submittal to the publisher and addresses an overview of land application of organic residuals. The second publication, titled "Organic Residuals Usage and Water Quality Impacts" is currently in the developmental stage and focuses on environmental and on-farm impacts.

*(See also "North Bosque River" for several projects addressing the Leon River as well)*

**Watershed(s):** Lower Colorado River below O.H. Ivie Reservoir to Matagorda Bay (1304, 1305, 1402, 1434, 1428, 1429, 1403, 1404, 1405, 1406, 1407, 1408, 1409, 1410)

**Issue(s):** Solid waste and Hazardous waste dumping

**Project:** Lower Colorado River Authority Campaign to Reduce Illegal Dumping

**Progress in 2007:**

**Implementation:** The LCRA hosted two meetings of the Colorado River Illegal Dumping Advisory Panel. The multi-agency panel prioritized the three hundred and twenty four dumpsites identified by the aerial survey along the river. Copies of the aerial survey DVD were distributed to county officials and the LCRA presented the aerial survey results to law enforcement officials associated with the Regional Environmental Taskforce. The LCRA also continued its multi-media education and outreach campaign in FY 2007.

**Watershed(s):** Onion Creek (1427) / Edwards Aquifer

**Issue(s):** Dissolved oxygen, Nutrients, and Sediment

**Project:** Onion Creek Continuous Water Quality Monitoring & Storm Water BMPs

The Barton Springs Edwards Aquifer Conservation District will conduct continuous monitoring at Onion Creek in order to determine the amount of pollutants that enter

the aquifer. An automated valve at a major groundwater recharge feature will be installed to close during the pollutant laden first flush and will reopen when water quality is acceptable.

**Progress in 2007:**

**Implementation:** The contract was initiated in FY 2007. The Barton Springs Edwards Aquifer Conservation District has had several meetings with the TCEQ CWQMN staff to discuss logistics of the project and two meetings with the TCEQ quality assurance staff. A sub-contractor has been selected through a competitive bidding process to install the continuous water quality monitoring equipment and provide technical support. The QAPP is under development.

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**Watershed(s): Plum Creek (1810)**

**Issue(s):** Bacteria

**Project: Plum Creek Watershed Protection Plan**

The purpose of this project is to coordinate the development of a WPP for the Plum Creek Watershed and to facilitate beginning phases of implementation.

**Progress in 2007:**

**Stakeholder Group:** A second round of draft materials of the Plum Creek WPP were released to the steering committee, workgroups, agency partners, and all other partnership members for comment and review. Work group and steering committee meetings continued to give direction and suggest appropriate restoration activities in the watershed. Point of contact: Nikki Dictson, <n-dictson@tamu.edu>. Project Web sites: <plumcreek.tamu.edu> or <tws.tamu.edu>.

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**Watershed(s): Sam Rayburn Reservoir,**

**Toledo Bend Reservoir (0610, 0504)** – priority water bodies

**Issue(s):** Dissolved oxygen, Mercury in fish

**Project: Modeling Nutrient Loads from Poultry Operations in the Toledo Bend & Sam Rayburn Reservoir Watersheds**

**Progress in 2007:**

**Modeling:** All WQMP data has been gathered with the assistance of the SWCD and NRCS field offices and organized in a Microsoft Access database. All GIS and measured data (soils, land use, climate, elevation, etc.) have been prepared for modeling. Calibration and modeling began for the Sam Rayburn Watershed using the Angelina & Neches River Authority data for nutrient calibration/validation.

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**Watershed(s): South Nolan Creek (1218)** – priority water body

**Issue(s):** Bacteria

**Project: Assessment and Targeting of Bacterial Sources in the South Nolan Creek Watershed**

**Progress in 2007:**

**Targeted Assessment:** Project equipment and materials were purchased and the tools and equipment were assessed and used for data collection. The City of Killeen laboratory was set up for analysis of monthly bacteria samples. Monthly ambient sampling and storm water event samples were collected and analyzed according to the quality assurance protocols.

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**Watershed(s): Upper Trinity Watershed**

**Issue(s):** PCBs in fish tissue, Bacteria, Chloride, Depressed dissolved oxygen, TDS, High pH

**Project: Envirocast**

Launched in March 2006, the project "Envirocast®: Increasing Nonpoint Source Pollution Prevention through Watershed Awareness in the Upper Trinity River Watershed" has in-



roduced local environmental news and information to the North Central Texas region through the Environmental Quality of Life, or e-Life broadcasting segments at CBS KTVT-11. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/envirocast](http://www.tsswcb.state.tx.us/managementprogram/envirocast)>.

**Progress in 2007:**

**Implementation/Education:** The North Central Texas COG entered into a second one-year contract with the StormCenter from March 2007 to March 2008. A total of eighteen story ideas were identified and discussed at the Local Content Provider's Network meeting. A total of fourteen stories were assigned to specific Local Content Provider's Network participants for follow-up. These participants are in the process of generating stories or background materials on these topics and will forward them in draft form to the North Central Texas COG. The COG staff will write/edit stories as needed and coordinate their submission to CBS11 and StormCenter; two of the six "Eye on the Environment" vignettes have been produced and aired through KTVT-11. The StormCenter uploaded a total of twenty-nine video stories between April 1 and June 30, 2007. Project Web site: <[ktvt.iewatershed.com/index.php?pagename=media\\_newsFeatures](http://ktvt.iewatershed.com/index.php?pagename=media_newsFeatures)>.

**Education/Outreach:** The North Central Texas COG continues to oversee and coordinate all aspects of work performed under this contract by its staff and the StormCenter. In addition, the North Central Texas COG requested a no-cost project extension until September 1, 2007 to allow for the completion of the watershed series task. The station is in the process of airing a series of stories addressing five questions and sub-questions pertaining to the results of the Upper Trinity River public awareness survey conducted in-kind by the University of North Texas. Textual information has been developed for the series, including producing and/or obtaining animations, graphics and other supporting materials. The information featured in the series incorporates some of the key findings from the survey that reveals what North Texans know about their local watersheds. The series is presented in a question and answer format and directs viewers to the e-Life Web site supplemental information about the topic.

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**Watershed(s): Multi-Basin**

**Issue(s):** Nutrients, BOD, Dissolved oxygen

**Project: Clean Texas GreenScapes: Using BMPs to Reduce NPS Pollution from Urban Landscapes**

**Progress in 2007:**

**Education:** The TCEQ contracted with the City of Weslaco to provide local administrative, logistical and activity coordination. The cities of Weslaco, Brownsville, McAllen, as well as Donna and Hidalgo Counties agreed to participate and establish eight demonstration sites. Signage was installed at each site to provide public awareness, promote compost use and recognize the partners. The City of McAllen agreed to provide compost at a reduced cost for the duration of the project. All sites had compost applied between March and April 2007 along with interpretive signage. The BMPs were installed between March and April of 2007. By July 2007, some of the demonstration sites began to show a positive response to the compost applications. Several outreach activities have been held such as presentations at professional associations and consumer workshops on compost use.

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**Watershed(s): Multi-Basin: Leon River, Plum Creek, Lower San Antonio River, Copano Bay (1221, 1810, 1901, 2472) – priority water bodies**

**Issue(s):** Bacteria

**Project: Lone Star Healthy Streams**

This project will assess and compile current knowledge regarding BMPs designed to protect grazing lands watersheds from bacteria contamination. Based on this initial task, educational programs and materials will be developed and then tested in priority watershed(s). Concurrent with the development and testing of the educational program, BMPs will be demonstrated and evaluated to determine the efficacy of various value-added BMPs. Project Web site: <[www.tsswcb.state.tx.us/managementprogram/lonestar](http://www.tsswcb.state.tx.us/managementprogram/lonestar)>.

**Progress in 2007:**

**Implementation/Education:** The Texas AgriLife Extension Service developed an integrated discussion of the effects of grazing animals on bacteria levels in water bodies and BMPs designed to minimize these impacts into educational programs, (five hundred and ninety producers were introduced to this issue). An article appearing in the May 2007 issue of The Cattleman magazine discussed the BMPs that will be conducted during this project. Additional educational programs and presentation of a poster at the 15th National NPS Monitoring Conference were in preparation for the first quarter of FY 2008. The Welder Wildlife Refuge, 2S Ranch, and USDA-ARS have all agreed to cooperate in the BMP demonstration and evaluation; monitoring will begin with final approval of the QAPP.

**Watershed(s): Multi-Basin**

**Issue(s):** Nutrients, BOD, Dissolved oxygen

**Project: Storm Water Best Management Practices Using Organic Filter Berms and Erosion Filter Socks (for homebuilders)**

Storm Water Phase II permitting dramatically affects land development construction activities that will disturb more than one acre of land. This project demonstrated the application of compost/mulch as an erosion control blanket for surface stabilization and erosion control as well as for reduction of runoff volume and sediment load; filter berms and filter socks for runoff control, sediment trapping, and storm water filtration projects, specifically in urban and subdivision developments. Events were conducted by the TCEQ SBEA Division. The activities included regional educational workshops and demonstrations on the proper design, construction and installation of the storm water management devices described above.

**Progress in 2007:**

**Education:** The demonstration project was completed in FY 2007. The Final Report was submitted December 2007. Total attendance at the 28 workshops and 30 demonstrations was 1,614. A CD of storm water outreach materials was produced and approximately 2,000 CDs were distributed. Four new compost-mulch filter sediment and erosion control installers were established as a result of this project. Two erosion control demonstrations were conducted in the Plum Creek Watershed to help support WPP implementation education and outreach efforts.

**Watershed(s): Multi-Basin**

**Issue(s):** Nutrients, Pesticides

**Project: YardWise Outreach****Progress in 2007:**

**Implementation/Education:** See the article in Chapter 2.

**Watershed(s): Statewide**

**Issue(s):** Sediment and Nutrients

**Project: Dairy Compost Practice Verification Study Continuation**

This extends a study begun as part of the Composted Manure Incentive Project, to document the long-term benefits of dairy manure compost applications in establishing newly constructed landscapes. It is providing an additional three years of monitoring any continuing improvement in plant growth and health, as well as the fate of nutrients in the soil and plant uptake, and demonstrating the results to potential users of composted manure through site visit demonstrations and publication of results.

**Progress in 2007:**

**Implementation/Demonstration:** Experimental plots were maintained in order to verify long-term effects of large initial compost applications in newly constructed landscapes. No analytical data has been collected.

**Watershed(s): Statewide****Issue(s):** Sediment and Nutrients**Project:** Texas Watch**Progress in 2007:****Implementation/Education:** See the article in Chapter 2.**Watershed(s): Statewide****Issue(s):** All**Project:** Texas Watershed Protection Planning Short Courses

The TWRI will develop a comprehensive watershed planning training program and provide three Texas Watershed Planning short courses to water professionals. The primary focus of the program will be on developing each of the nine key elements of a WPP. However, this program will be designed to also meet the objectives of the Texas NPS Management Program, the TCEQ TMDL program efforts, the NRCS watershed efforts, the TSSWCB and the TCEQ watershed protection planning efforts, along with the EPA's watershed planning needs.

**Progress in 2007:****Education:** The short course planning team had two meetings in FY 2007 to discuss project status, provide input, and coordinate project activities. The draft agenda has been developed for the short course. The first class will be held in June 2008. The Rosgen Fluvial Geomorphology Course has been organized and will occur in January 2008**Watershed(s): National****Issue(s):** All**Project:** 15th National Nonpoint Source Monitoring Workshop**Progress in 2007:****Implementation/Education:** The RSI and the TCEQ organized, planned, and conducted the 15th National Nonpoint Source Monitoring Workshop on August 27-30, 2007. The workshop was attended by one hundred and ninety-one state, federal, regional, and local participants. The theme of the workshop was "Monitoring for Decision Making." See the article in Chapter 2 for more information.

# Progress In Water Quality Improvement

Section 319(h) of the CWA requires state NPS annual reports include, “to the extent that appropriate information is available, reductions in nonpoint source pollutant loading and improvements in water quality...” This specifically applies to the water bodies of the state that have previously been identified as requiring NPS pollution control actions in order to “attain or maintain applicable water quality standards or the goals and requirements of the Clean Water Act.”

The two primary ways of measuring improvement in water quality are:

- Reductions in pollutant loadings resulting from management measures implemented, estimated with the help of models or other calculations, and
- Water quality improvements measured by changes in pollutant concentrations before and after implementation of management measures.

Other indicators of progress toward water quality improvement include physical or behavioral changes that are associated with reductions in loadings or pollutant concentrations in water bodies. Examples include restored riparian or aquatic vegetation and reduced use of fertilizers and pesticides.

## Reductions in Pollutant Loadings

### North Bosque and Leon Rivers

Composting and export of dairy manure continued in 2007 as a result of the TCEQ’s Composted Manure Incentive Project and the TSSWCB’s Dairy Manure Export Support Project. Compost sales and exports are no longer tracked, but the five compost facilities active through the latter period of the projects continued to operate in FY 2007. The compost facilities exported approximately 50,000 cubic yards of compost (with 220,000 lb of phosphorus) from the North Bosque River watershed, and approximately 30,000 cubic yards (with 132,000 lb of phosphorus) from the Leon River watershed.

The TCEQ commissioned a field study of erosion control compost (ECC), which is 50% compost, and 50% wood mulch as specified by the Texas Department of Transportation (TxDOT) using CMIP composted manure in reclamation of a rock quarry. The field conditions closely matched typical TxDOT roadside re-vegetation challenges. On the basis of the first full year of sampling the runoff from experimental plots, the study found that the composted manure treatments reduced suspended sediment loading by 98% to 99% as compared to standard treatments, and also reduced total phosphorus and total nitrogen loadings. For every acre treated with ECC to a 2” depth (with 270 cubic yards of ECC containing 135 cubic yards of CMIP compost), there was a reduction of 75,500 lbs of sediment loss for 2007. The compost-treated experimental plots alone reduced suspended sediment losses by more than a ton in the first year.

The TxDOT’s use of 7,169 cubic yards of compost in the form of ECC over the course of the CMIP rebate project, then, resulted in a first-year reduction of more than 4 million pounds of suspended sediment from road construction sites across the north and central regions of Texas. This is just one initial benefit derived from the 3% of the CMIP composted manure that TxDOT used in the form of ECC. The other 97%, which went to compost manufactured topsoil, general use compost, and compost filter berms and socks, also had sediment reduction properties, but there is no scientific basis available at present for calculating the load reduction benefit of these applications.

The compost demonstration project at quarries in Parker County in FY 2006 and 2007 made use of an additional 2000 cubic yards of compost for reclamation, including about 1000 cubic yards contained in 2000 cubic yards of ECC. Using the field study results reported above, the benefits of this demonstration project include a reduction of more than 500,000 pounds of suspended sediment losses from the quarry

site in the year following application. The compost demonstration project at Fort Hood made use of 18,000 cubic yards of ECC in 2006. Using the field study calculations again, this project resulted in a reduction of more than 5 million pounds of suspended sediment losses from the demonstration areas on Fort Hood alone. These sediment reduction results are associated with the CMIP and DMES projects in the North Bosque and Leon River watersheds but actually occurred outside those watersheds because these reclamation projects involved the use of composted manure that was exported from the two CMIP watersheds.



**Above:** Dr. Hoffman, Spring 2006 Fort Hood Site, Before ECC Application



**Right:** Compost Spreader Applying the ECC and Grass Seed

**Below:** December 2006 Fort Hood Site, After the ECC Application



## Brady Creek

Five rock filter/infiltration trenches were installed below the Elm Street Low Water Dam Crossing in Brady, Texas in FY 2007. These trenches cover 50,000 square feet and treat storm water runoff from a 190-acre urban subwatershed. The drainage area treated by the trenches consists primarily of commercial and industrial land uses. According to STEPL modeling, these trenches accomplished the following load reductions for the first year of operation beginning in 2007: 1,323 pounds of nitrogen, 132 pounds of phosphorus, and 69 tons of suspended solids.



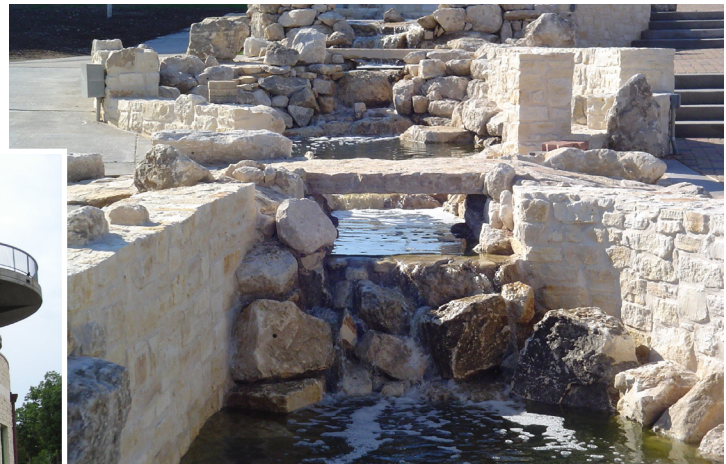
*Infiltration trenches for Brady Creek during construction*

## North Concho River

As part of a comprehensive effort to address low dissolved oxygen and nutrient concerns in the North Concho River, in 2007, the Upper Colorado River Authority installed a system to divert first-flush storm water from an urban storm outlet to an Aqua-swirl vortex separation and filtration unit. The unit accelerates separation of sediment, floating debris, and oil from the storm water, provides extended holding time for solids settling, and re-circulates the cleaned water through a cascading series of ponds. For its first year of operation beginning in 2007, this system will reduce pollutant load reductions for the urban reach of the North Concho River by 21,662 pounds/year of phosphorus and 315 tons/year of suspended solids.

**Right:** Recirculation ponds in San Angelo

**Below:** Aqua-Swirl for storm water in San Angelo



## Water Quality Improvements

### Lake Austin

Water flowing from Lake Travis into Lake Austin has seasonally low dissolved oxygen levels because it is discharged from the non-circulating bottom zone of the upper lake. The Lower Colorado River Authority reported in November, 2006 that the aeration system installed at Mansfield Dam achieved the Dissolved Oxygen Improvement Project measure of success by increasing the level of dissolved oxygen in the headwaters of Lake Austin by 1.5 to 2.5 milligrams/liter during operation of the aeration system. See the Lake Austin milestone update in Chapter 3 for details.

### Lake Como in the Trinity River Basin

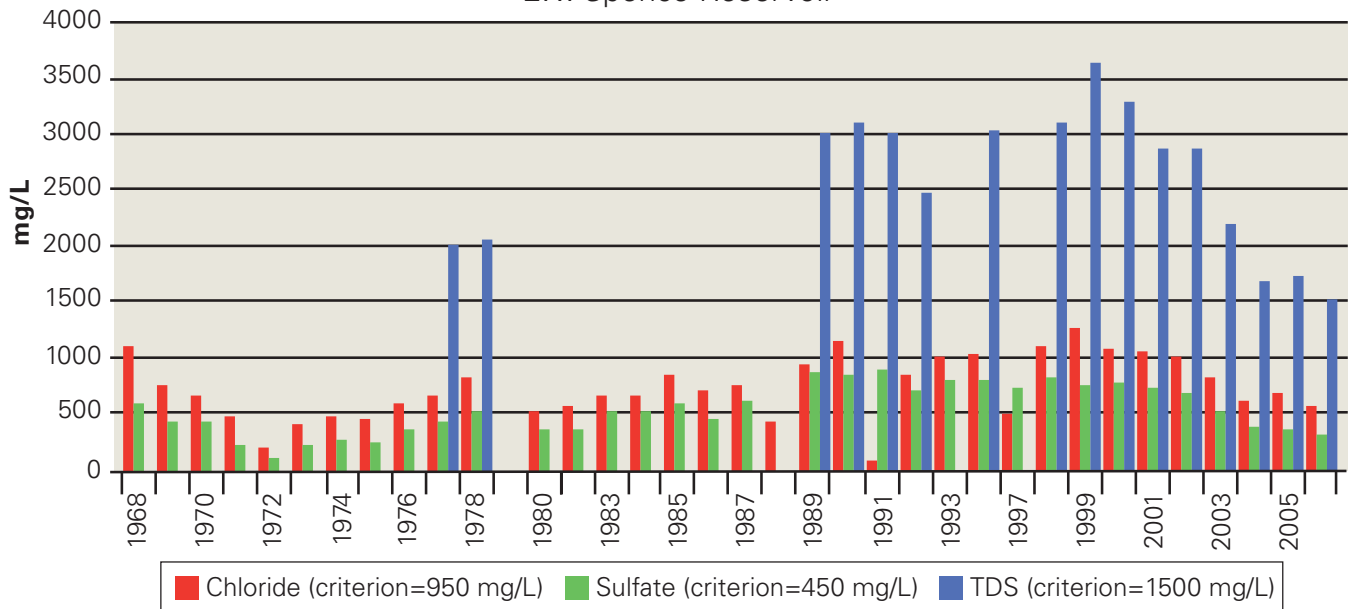
The Texas DSHS issued a fish possession ban on Lake Como in Tarrant County in 1995 due to chlordane, PCBs, dieldrin, and DDE in fish tissue. These organochlorine pesticides are "legacy pollutants" which were banned or restricted from use years ago, but continue to enter the lake in part through erosion of contaminated sediments. Monitoring of flows into the lake showed high levels of these constituents more than thirteen years after the latest pollutant ban went into effect. A TMDL to address legacy pollutants in fish tissue for several water bodies including Lake Como was approved in 2001. Options to remediate the lake as by dredging were evaluated but rejected in favor of continued monitoring and education efforts. Local, state, and federal agencies coordinated to implement a range of BMPs to address these pollutants. The City of Fort Worth Environmental Collection Center accepted legacy pollutant products from residents of Fort Worth and twenty-nine other cities in the area for safe disposal. The City of Fort Worth Environmental Management Department (FWEMD) began tracking the pesticides containing legacy pollutants received by the collection center in 2001 and logged over eight thousand pounds of these materials by 2006. The city also undertook a public education campaign to involve area residents in preventing further legacy pollutant contamination, including still-screen messages shown in movie theaters throughout Fort Worth. The FWEMD installed a message board at Lake Como showing watershed information, current health risks associated with fish consumption, and other environmental messages. A Lake Como festival and cleanup event was held in 2004.

These efforts, along with natural attenuation through degradation and continuing burial of contaminated sediments, proved effective. Fish tissue monitoring completed in 2006 showed that concentrations of the legacy pollutants complied with TMDL criteria. As a result, DSHS lifted the twelve-year ban on fish possession. With the fish consumption use now met for Lake Como, the impairment listing for the lake will be removed from the Draft 2008 303(d) List.

### E.V. Spence Reservoir

The E.V. Spence Reservoir in Coke County is naturally high in salinity, which affects its use as a source of drinking water. Nonpoint and point sources of salinity further impede uses of the reservoir and the segment downstream. Local efforts to manage nonpoint and point source pollution have led to the gradual reduction and compliance of chloride and sulfate levels. To date, TDS levels have improved, and are approaching water quality standards. There has been significant progress toward reaching the measures of success in the TMDL (Figure 4.1). The annual mean concentrations for chlorides and sulfate in 2005-6 were in compliance at all times, an enormous improvement from previous years. This is due to good rainfalls and exceptional work by the CRMWD to accurately manage their diversions using real-time water quality monitors. The mean concentration for TDS was in compliance 33% and 75% of the time during 2005 and 2006, respectively. The annual mean concentrations of all constituents in 2007 were very similar levels in 2005. See Figure 4.1 for a record of the annual mean concentrations of these constituents since 1968.

Figure 4.1  
**Annual Mean Salt Concentrations**  
 E.V. Spence Reservoir



Data were obtained from the TCEQ TRACS database and the Colorado River Municipal Water District.

### North Bosque River

The Texas Institute for Applied Environmental Research has been conducting studies in the North Bosque River watershed to evaluate whether water quality improvement efforts, such as the manure export project, are improving water quality. One study analyzed trends in water quality before and after the export project began, comparing storm event mean concentrations of nutrients and suspended solids at sub-watershed sites representing different amounts of manure haul-out. The study results showed that in the sub-watersheds where the largest percentage of manure was hauled out per cow and per acre of manure application, the concentrations of soluble reactive phosphorus (SRP, the constituent relevant to the TMDL) decreased between 19% and 23%. No significant decreases in SRP were found in sub-watersheds with low rates of manure haul-out. A June 2007 report from TIAER cited continuing downward trends in nutrient concentrations widely throughout the North Bosque watershed, particularly in phosphate-phosphorus.

An additional report by TIAER, completed in June 2007, found downward trends of chlorophyll *a*, ammonia, nitrates, and total suspended solids in Greens and Neils Creek, as well as a small reservoir on Scarborough Creek. Sites on the main stem of the North Bosque also showed significant decreases in the concentrations of nutrients, suspended solids, algae, and ammonia. Main stem improvements reflect reduced pollutant loads associated with updated wastewater treatment plants, particularly phosphorus, but are also interpreted to reflect reduced loadings due to manure haul-out.

## Other Indicators of Progress

### Galveston Bay

In November 2007, the first prize of the EPA Gulf of Mexico Partnership went to the Galveston Bay Estuary Program of the TCEQ for its East Bay Wetland and Water Quality Protection Project. Under this project, the GBEP and its partners installed over three miles of erosion control structures protecting the shoreline and eight thousand acres of coastal habitat in the East Bay, largely by relocating Smooth cordgrass (*Spartina alterniflora*) behind the breakwater along the refuge's shoreline, stabilizing the water's edge. The area's marshes had been experiencing erosion encroachment of up to twenty feet per year. For more information, visit [home.tceq.state.tx.us/internal/exec/communication/natresource/dec07/ebwetland.html](http://home.tceq.state.tx.us/internal/exec/communication/natresource/dec07/ebwetland.html).





# Acronyms

<b>ARS</b>	Agricultural Research Service (of the USDA)	<b>NRCS</b>	Natural Resource Conservation Service (of the USDA)
<b>BMP</b>	Best Management Practice	<b>PCB</b>	Polychlorinated Biphenyl
<b>BOD</b>	Biochemical Oxygen Demand	<b>PMP</b>	Texas Groundwater Pesticide Management Plan
<b>BRA</b>	Brazos River Authority	<b>QAPP</b>	Quality Assurance Protection Plan
<b>BST</b>	Bacterial Source Tracking	<b>RRC</b>	Railroad Commission of Texas
<b>CMIP</b>	Composted Manure Incentive Project	<b>RSI</b>	River Systems Institute - Texas State University
<b>CNMP</b>	Comprehensive Nutrient Management Plan	<b>SBEA</b>	Small Business and Environmental Assistance, Division of TCEQ
<b>COG</b>	Council of Governments	<b>SRP</b>	Soluble Reactive Phosphorus
<b>CRMWD</b>	Colorado River Municipal Water District	<b>SWAT</b>	Soil and Water Assessment Tool
<b>CRP</b>	Clean Rivers Program	<b>SWCD</b>	Soil and Water Conservation District
<b>CWA</b>	Clean Water Act	<b>SWQM</b>	Surface Water Quality Monitoring
<b>CWQMN</b>	Continuous Water Quality Monitoring Network	<b>TCEQ</b>	Texas Commission on Environmental Quality
<b>DMES</b>	Dairy Manure Export Support Project	<b>TDS</b>	Total Dissolved Solids
<b>DSHS</b>	Texas Department of State Health Services	<b>TGPC</b>	Texas Groundwater Protection Committee
<b>ECC</b>	Erosion Control Compost	<b>TIAER</b>	Texas Institute for Applied Environmental Research
<b>EDA</b>	Economically Distressed Areas	<b>TMDL</b>	Total Maximum Daily Load
<b>EPA</b>	U.S. Environmental Protection Agency	<b>TPDES</b>	Texas Pollutant Discharge Elimination System (permit)
<b>FWEMD</b>	Fort Worth Environmental Management Department	<b>TSSWCB</b>	Texas State Soil and Water Conservation Board
<b>FY</b>	Fiscal Year	<b>TWDB</b>	Texas Water Development Board
<b>GBEP</b>	Galveston Bay Estuary Program	<b>TWRI</b>	Texas Water Resources Institute
<b>GBRA</b>	Guadalupe-Blanco River Authority	<b>TWS</b>	Texas Watershed Steward Program
<b>GIS</b>	Geographic Information System	<b>TxDOT</b>	Texas Department of Transportation
<b>GLO</b>	General Land Office of Texas	<b>UCRA</b>	Upper Colorado River Authority
<b>HHW</b>	Household Hazardous Waste	<b>USDA</b>	U.S. Department of Agriculture
<b>I-Plan</b>	Implementation Plan for a TMDL	<b>WPP</b>	Watershed Protection Plan
<b>LCRA</b>	Lower Colorado River Authority	<b>WQMP</b>	Water Quality Management Plan
<b>LEADS</b>	Leading Environmental Analysis and Display System		
<b>NETMWD</b>	Northeast Texas Municipal Water District		
<b>NPDES</b>	National Pollutant Discharge Elimination System		
<b>NPS</b>	Nonpoint Source		





