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Texas Nonpoint Source Pollution Management Program 2000 Annual Report

A joint publication of the

Texas State Soil and Water Conservation Board
and the
Texas Natural Resource Conservation Commission

2000 Annual Report

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A New Direction

In the past few years, implementation of the Clean Water Act has broadened to include new ways of protecting and restoring water quality. Where we once looked almost exclusively at point source causes of water pollution, the focus has now shifted toward nonpoint sources.

Why the shift? The control of point sources represented the easier and more direct way to improve water quality. Billions of dollars have been spent in the last 20-30 years to address pollution from cities and industries in one of the great environmental success stories. While some work still remains to be done with point source pollution, the emphasis has shifted in recent years to address NPS concerns.

Texas has many programs to address nonpoint source pollution abatement, and many state agencies are involved in this endeavor

The watershed approach seems to be the most realistic method for controlling pollution of our nation's waters. This approach addresses water quality in a more comprehensive way, looking at all the potential sources of pollution within a landscape that drains to a river, stream, lake, or estuary. A new acronym, TMDL, has come to the forefront. Short for *total maximum daily load*, this acronym has become the newest catchphrase mentioned by state legislators and agency personnel. The TMDL is now a key tool in the management of nonpoint source pollution in Texas.

States are facing a big challenge with these recent changes. Nonpoint source pollution abatement may very well require funding at the same or higher levels as was directed toward point source pollution controls in the past. Section 319(h) of the Clean Water Act provides grant funding for state programs to abate pollution from nonpoint sources; addressing some of these problems, however, can be quite costly. These grants are not designed to cover all the costs of the state's nonpoint source pollution programs. They also require state or local matching funds.

NPS prevention is an effort that requires the combined activities of many organizations at both a state and local level. Fortunately, Texas has many programs to address nonpoint source pollution abatement, and many state agencies are involved in this endeavor. Leadership for the abatement of nonpoint source pollution in Texas is divided between two agencies. The Texas State Soil and Water Conservation Board is responsible for agricultural and silvicultural nonpoint source pollution. The Texas Natural Resource Conservation Commission is responsible for urban and other nonpoint source pollution. In addition, other state agencies have programs and responsibilities that play an integral part in managing nonpoint sources of pollution. Some aspects of the state's program, such as water quality monitoring, may be contracted out by these agencies to research institutions, private consulting firms, or state or local government agencies.

The following report highlights the projects and progress of programs in Texas for 2000. Much has already been accomplished, but much remains to be

done as Texas continues to step forward to meet the challenge of abating non-point source pollution.

James M. Moore, Director
Conservation Programs
Texas State Soil and Water Conservation Board

James D. Thomas, Director
Technical Analysis Division
Texas Natural Resource Conservation Commission

Purpose of This Report and Acknowledgments

This report provides an overview of the activities that the State of Texas is undertaking to limit the effects of nonpoint source (NPS) pollution on the state's waters.

Several state agencies have responsibility for controlling various aspects of NPS pollution in Texas. This report highlights some of their efforts.

The majority of the responsibility for managing nonpoint and point source pollution in the state falls on two agencies. The Texas State Soil and Water Conservation Board (TSSWCB) is the lead agency for controlling NPS pollution from agricultural and silvicultural sources. The Texas Natural Resources Conservation Commission (TNRCC) is the lead agency for controlling pollution from point sources and from urban and other non-agricultural nonpoint sources.

Several state agencies have responsibilities for controlling various aspects of NPS pollution

This report was produced jointly by the TSSWCB and the TNRCC. Other agencies that assisted with this report include the Texas Forest Service (TFS), the Texas Parks and Wildlife Department (TPWD), the Texas General Land Office (GLO), the Texas Department of Health (TDH), the Railroad Commission of Texas (RRC), the Texas Department of Transportation (TxDOT), and the Texas Department of Agriculture (TDA).

Other contributors to this report included the Galveston Bay Estuary Program and the Coastal Bend Bays and Estuaries Program. In addition, various other city and local governments, including soil and water conservation districts, river authorities and educational entities contributed to this report.

What is NPS Pollution?

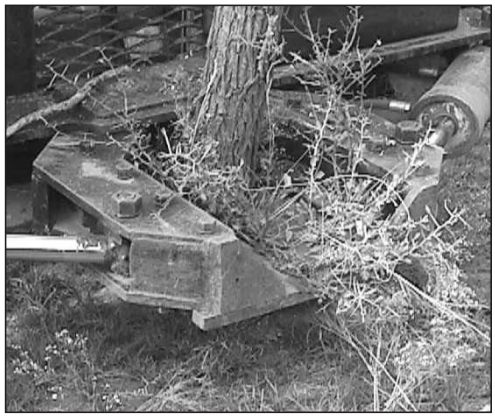
NPS pollution is water pollution coming in small amounts from a large number of sources carried by rainfall runoff into streams, lakes or bays. It is normally associated with agricultural, silvicultural, and urban runoff, as well as runoff from construction activities.

By contrast, pollution that comes in large amounts from a single source is called point source pollution. Point source pollution has been extensively addressed over the past three decades, largely through the process of issuing permits to dischargers such as industrial plants and sewage treatment facilities.

Pollution results in alteration of the chemical, physical, biological and/or radiological integrity of water. Impairment of beneficial uses occurs when the rate at which pollutant materials entering water bodies or groundwater exceeds their natural assimilative capacities.

Because of the large number of nonpoint sources and the fact that they are largely unregulated, the voluntary and preventative efforts of citizens, businesses, service organizations, and other groups are the most efficient means for NPS abatement and are an essential part of the effort to address NPS pollution in Texas.

Programs That Abate Nonpoint Source Pollution



NPS Grant Program

Congress revised the Clean Water Act (CWA) in 1987, adding Section 319, which provides for a national NPS water pollution prevention and control program. Through the grant program established under Section 319(h), the Environmental Protection Agency (EPA) provides funding to Texas to implement activities that achieve Congress' goal of controlling and abating NPS pollution.

The mission of the state's grant program, as indicated in the *1999 Texas Nonpoint Source Pollution Assessment Report and Management Program* (TNRCC, SFR-68/99), is to provide funds to assist in the protection of the quality of water resources in Texas from adverse effects of NPS pollution. This protection is provided through interagency, cooperative implementation of a diverse range of strategies that emphasize pollution prevention, a watershed approach, and a community-based perspective.

Grass filter strips grown at the edges of cropped areas are one practice used by farmers to combat NPS pollution.

The grant is awarded annually by Congress to the EPA. The money is divided among EPA regions, which again divide the amount among the states in their respective regions. A financial summary of grant amounts and expenditures is included at the end of this report.

In Texas, the grant is divided between the two agencies the Texas Legislature has given the primary responsibility of abating NPS pollution within the state. The TSSWCB and the TNRCC are responsible for maintaining a statewide management program that satisfies federal requirements contained in Section 319 of the CWA. The current management program was approved by the EPA on February 25, 2000.

The TSSWCB, the TNRCC and the EPA target grant funds toward implementation and demonstration projects within the boundaries of NPS-impacted watersheds. Project eligibility is primarily determined by the most current 303(d) list of impaired waters in Texas. Section 303(d) of the CWA requires states to develop a list of water bodies that do not meet, or are not expected to meet, state water quality standards. Those waters identified on the 303(d) list with impairment of beneficial uses due all or in part to NPS pollution comprise the state's list of NPS-impacted waters, which is required under Section 319.

Grant funds available under Section 319(h) are also used to develop and implement TMDLs in NPS-impacted watersheds, and to provide technical and financial assistance to cities and agricultural and silvicultural producers

for implementing management practices that support attainment of the restoration goals established in TMDLs.

Stakeholder Involvement

Planning, coordination, and grant management are essential elements of a successful NPS program. Texas uses interagency agreements and multi-agency task forces to ensure this coordination happens. The state has long-standing relationships with federal agencies like the USDA-Natural Resources Conservation Service (NRCS) and the United States Geological Survey (USGS). The NRCS is a very active partner in agricultural NPS management, and the USGS is an invaluable resource in water quality monitoring and assessment activities. EPA Region 6 provides technical assistance and program guidance.

Several state agencies are actively involved with the TNRCC and the TSSWCB in NPS management, including the TDA, the TFS, the GLO, the RRC, the TDH, the Texas Water Development Board (TWDB), and the TPWD. Key cooperators from academia include the Texas Agricultural Experiment Station (TAES), which includes the Blackland Research Center of Texas A&M University; the Texas Agricultural Extension Service (TAEX); the Texas Institute for Applied Environmental Research (TIAER); the Center for Research in Water Resources at the University of Texas; the Texas Water Resources Institute at Texas A&M University; and the Bureau of Economic Geology.

Representatives of all of these agencies serve on a number of committees that coordinate NPS management activities, such as the Texas Groundwater Protection Committee, the Clean Rivers Program Stakeholders Workgroup and its NPS Technical Workgroup, and the State Agricultural/Silvicultural Nonpoint Source Advisory and Coordinating Committee and the Surface Water Protection Committee.

Program Development

The TNRCC has held numerous meetings and events throughout the year to seek input from stakeholders on a statewide, regional, and local basis. Overall, these meetings allowed the TNRCC to communicate how collaborative efforts in every aspect of water quality management have improved the state's ability to address water quality concerns and impairments.

Due to this increased involvement, stakeholders will have extensive review and input of projects proposed for funding under Section 319(h) grants. At the request of stakeholders, the review process will be supported by information available from all state water quality programs, thereby ensuring coordination among the responsible agencies.

In 2000, the CRP Stakeholders Group and its NPS Technical Workgroup contributed to the development of new guidance for assessing Texas' surface and finished drinking water quality data and the 2002 methodology for the Texas 303(d) List. They also participated in discussions to determine funding priorities for the various water monitoring programs, including NPS implementation projects.

The TNRCC and the TSSWCB will ensure that stakeholders continue to be involved in the development of the state's water quality management programs, as their input is critical to ensuring the programs address stakeholder concerns.

Monitoring Coordination

Annual monitoring coordination meetings are held in each of the 15 river basin areas organized under the Clean Rivers Program (CRP). Participants outline specific monitoring needs for their basins, such as background or status monitoring for NPS projects. These needs are considered when the next year's monitoring schedule is developed. The TNRCC's most recent Water Quality Inventory [CWA Section 305(b) assessment], the CRP summary assessments, and the 303(d) list are starting points for evaluating basin monitoring needs. Key participants in these meetings include the CRP partner agencies, representatives of the basin steering committees, surface water quality monitoring staff of the TNRCC central and regional offices, and the USGS.

The Clean Rivers Program coordinates water quality planning and monitoring with stakeholders from each river basin.

Numerous other qualified agencies may be involved in the actual monitoring through subcontracts. In addition to allocating resources, the annual meetings are used to ensure consistent quality assurance of the data collected. Each monitoring agency agrees to collect data under an approved quality assurance plan.

Statewide Planning Meeting

The TNRCC annually sponsors a meeting of the CRP Stakeholder Group to look at the "big picture" for Texas water quality issues. The primary purpose of the meeting is to confirm that the level of effort under the state's water quality programs meets the needs of the stakeholders, and will continue to do so.

At the January 2000 meeting, the TNRCC presented the current and future focus of the Clean Rivers and Nonpoint Source Management Programs and requested input regarding further actions the programs may take to improve their effectiveness.

This was an opportunity for the TNRCC to communicate with and receive feedback from a wide audience on the new approach of the 1999 Nonpoint Source Management Program. Due to the gap between funding under the program and the scope of NPS program needs, the TNRCC determined that instead of managing many small projects throughout the state, a better approach would be to manage a few large projects that have a greater potential to positively impact water quality. These larger scale projects require greater cooperation and more management time, but the rewards are also greater.

The stakeholders unanimously agreed with maintaining a collaborative approach to solving water quality problems, and that larger scale projects would be a more effective approach for managing NPS pollution. The general method-

ology and approach outlined in the Texas Nonpoint Source Management Program also received support from the stakeholders.

TMDL Program

Section 303(d) of the CWA requires states to identify water bodies that do not meet, or are not expected to meet, state water quality standards for their use and to establish total maximum daily loads (TMDLs) addressing all point and nonpoint sources of pollution that impact those water bodies (see the highlight "Tools of the Trade").

Those water bodies that do not meet one or more designated uses are generally referred to as impaired, though they may still support the majority of their designated uses. The term "threatened" is used to refer to those water bodies for which the state expects that one or more water quality standards will not be met within two years.

Water bodies identified on the 303(d) list are prioritized for TMDL development based on a variety of factors. For more details on list development and prioritization, see "Methodology for Developing the Texas Clean Water Act Section 303(d) List" in the draft 2000 Texas 303(d) List, available from the TNRCC Nonpoint Source Program.

TMDLs are just one aspect of restoring water quality. To be effective, a strategy for implementing them must be developed. The TMDL report and its associated implementation plan are combined in a Watershed Action Plan that lays out the entire program for restoring an impaired water body.

A TMDL report is a summary of how the loading allocation for point, nonpoint, and background sources of a pollutant was derived. An implementation plan is a summary of the management strategies needed to restore the water quality. After the Commission approves a TMDL, its implementation plan is developed. For more information on TMDL development in Texas, see *Developing Total Maximum Daily Load Projects in Texas: A Guide for Lead Organizations* (GI-250), available from the TNRCC.

Tools of the Trade

Water Quality Management Plan (WQMP) – a site-specific plan which includes appropriate practices, management measures, and technologies to address water quality considerations on an entire farm or ranch. WQMPs are developed through SWCDs.

Best Management Practices (BMPs) – practices or combinations of practices that are the most effective practical means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

Total Maximum Daily Load (TMDL) – a technical analysis that: 1) determines the maximum loadings of a pollutant or pollutants of concern that a water body can receive and still both attain and maintain its water quality standards; and 2) allocates this allowable loading to point and NPS categories in the watershed.

TMDL Implementation Plan – a detailed description and schedule of the regulatory and voluntary management measures necessary to achieve the pollutant reductions identified in the TMDL. The implementation plan is prepared by taking into account naturally-occurring levels of the pollutants, the nature of existing permitted and non-permitted human sources, the content and expiration dates of existing permits in the watershed, the potential for future growth, and any other known significant factors.

Watershed Action Plan – the compilation of a TMDL and its implementation plan. The watershed action plan provides local, regional, state, and federal organizations with a comprehensive strategy for restoring and maintaining water quality in an impaired water body.

By the end of 2000, several TMDL reports were drafted, approved by the Commission, and submitted to the EPA. These TMDLs were for: legacy pollutants in streams and reservoirs in Fort Worth; sulfate and total dissolved solids in E.V. Spence Reservoir; dissolved oxygen in Lake Austin; and legacy pollutants in streams and a reservoir in Dallas and Tarrant Counties.

Drafts of several other TMDL reports were made available for public comment in 2000 and will be finished in 2001. These include: legacy pollutants in the Arroyo Colorado, chlordane in Clear Creek, volatile organic compounds in Clear Creek, nutrients in the North Bosque River and Upper North Bosque River, and atrazine in Aquilla Reservoir.

Successful TMDL development and implementation requires close coordination between the TSSWCB and the TNRCC, as well as extensive participation by soil and water conservation districts (SWCDs), CRP partner agencies, other state agencies, local governments, and stakeholders in the affected watersheds. The state uses several strategies and existing programs to restore water quality in waters with NPS impacts. Many of these will be highlighted in this report.

Water Quality Management Plan Program

In 1993, the Texas Legislature took a major step toward controlling water pollution from agricultural and silvicultural nonpoint sources when it passed Senate Bill 503. Senate Bill 503 authorized the TSSWCB to assist agricultural and silvicultural producers in meeting the state's water quality goals and standards through voluntary, incentive-based programs.

The bill also granted certified Water Quality Management Plans (WQMPs) the same legal status as point-source discharge permits issued by the TNRCC. The provisions of Senate Bill 503 are administered by the TSSWCB through and in cooperation with local SWCDs.

There were 780 WQMPs certified in fiscal year 2000

The TSSWCB established the WQMP Program to implement Senate Bill 503. The program assists agricultural and silvicultural producers in the development and certification of WQMPs. A WQMP is a site-specific plan that includes appropriate practices and technologies to address water quality considerations on an entire farm or ranch.

The TSSWCB adopted the Field Office Technical Guide developed by the NRCS as the criteria applicable for WQMPs. This guide contains technical information and important conservation considerations specifically tailored for the geographic area of each SWCD. Both the TSSWCB and local SWCDs are involved in the development and maintenance of the technical guide.

The WQMP Program provides cost-share assistance to help pay some of the cost of installing water quality management practices on private property in areas identified by the TSSWCB as having or having the potential to devel-

op NPS pollution problems. The TSSWCB, in cooperation with local SWCDs, investigates water quality complaints relating to agricultural and silvicultural operations.

There were 780 WQMPs certified in fiscal year 2000. In all, there are 4,564 active plans established since the beginning of the program in 1993. The WQMP Program is currently implementing WQMPs in conjunction with TMDL projects in the North Bosque River, Arroyo Colorado, and Lake O' the Pines watersheds.

For more information on controlling water pollution by developing a WQMP and obtaining certification, contact the TSSWCB or a local SWCD office.

State Brush Control Program

The Texas Brush Control Program was created in 1985 by Senate Bill 1083 and is administered by the TSSWCB through local SWCDs. The TSSWCB must prepare and adopt a state brush control plan, including a comprehensive strategy for managing brush in critical areas where brush is contributing to a substantial water conservation problem.

The TSSWCB administers the State Brush Control Program in critical areas where brush is contributing to water conservation problems.

This is a voluntary program in which landowners may contract with the state for cost-share assistance. Working through local SWCDs, landowners develop resource management system plans addressing brush control, soil erosion, water quality, wildlife habitat, and other natural resource issues.

The removal of brush affects not only the quantity, but also the quality of water in an affected area. As part of the E.V. Spence Reservoir TMDL, for example, brush control has been recommended by the TNRCC as a method to improve the water quality in the reservoir where salinity has been a concern. This TMDL showed that increases in stream flow from brush removal and the removal of the salt-concentrating salt cedar can decrease salinity in the reservoir.

Increases in water yields to creeks and streams are also important to many plants and animals. For aquatic organisms, there is no greater devastation than a dry river or a dry creek bed.

In 1999, the 76th Texas Legislature appropriated a two-year program budget with $7 million for brush control cost-share in the North Concho River Watershed. The North Concho River Watershed comprises about 950,000 acres. As much as 432,000 acres, or 45 percent of the watershed, is infested with mesquite and juniper that should be controlled. By the end of 2000, the five SWCDs within the watershed completed 120 conservation plans with landowners addressing brush and other resource concerns on 451,000 acres of land.

Also in 1999, the 76th Legislature directed the TSSWCB to work with local entities to complete eight brush control feasibility studies for the following watersheds: Frio River Basin, Nueces River Basin, Pedernales River Basin, Wichita River Basin, Canadian River Basin, Middle Concho River Basin, Upper Colorado River Basin, and the Edwards Aquifer.

Texas A&M University was contracted by the TSSWCB to estimate water yields and determine the economic feasibility of brush control for each watershed. Local river authorities and municipal water authorities assembled hydrologic evaluation reports for each basin. Organizations involved include the Canadian River Municipal Water Authority, Red River Authority, Upper Colorado River Authority, Lower Colorado River Authority, and the Nueces River Authority.

All brush control feasibility studies were completed during 2000, and concluded that brush control for water yield is feasible in all of the watersheds studied.

Coastal NPS Pollution Control Program

The Texas Coastal Management Program was approved by the National Oceanic and Atmospheric Administration (NOAA) on January 10, 1997. The Texas Coastal Management Program is administered by the Texas Coastal Coordination Council and staff of the GLO.

Section 6217 of the Coastal Zone Act Reauthorization Amendments requires each state with an approved Coastal Management Program to develop a federally approvable program to control coastal NPS pollution. The program must be submitted within 30 months of Coastal Management Program approval.

As a result, the Texas Coastal Nonpoint Source Pollution Control Program (GLO, 1998) was submitted in December 1998 by the Coastal Coordination Council. The Coastal Management Program recognizes the TSSWCB and the TNRCC as holding primary responsibility over the development and implementation of the NPS program. Other supporting agencies involved include the GLO, TPWD, TXDOT, and the RRC.

At this time, the Coastal Management Program is under review by NOAA and the EPA. The participating agencies have responded to comments on the initial submittal of the 1998 program. Texas estimates approval of the program in mid-2001. In addition, a 15-year program strategy and a five-year implementation plan were developed for the coastal NPS program.

Texas proposes to implement its Coastal NPS Pollution Control Program through a group of networked programs that would combine geographical and categorical approaches to addressing NPS pollution. The geographical approach is addressed through Texas' basin management cycle, which provides a framework for coordinating, developing, and implementing water quality management programs throughout the state. Key water quality activities such as monitoring, assessment, data management, permitting and reporting are coordinated on a basin-wide scale.

The categorical approach is addressed through the state's Section 319(h) NPS Program, and through the TNRCC's Water Quality Management Program, Texas Pollution Discharge Elimination System (TPDES) Program, Section 401 Water Quality Certification Program, and the Water Pollution Control and Abatement Program.

These programs encompass all categories of NPS pollution listed in the federal guidance for the development of coastal NPS pollution control programs. Many of the programs rely on non-regulatory measures for implementation of best management practices (BMPs) and reduction of NPS pollution. Non-regulatory measures are used first. If initial voluntary measures do not work, backup enforcement authorities are employed. Together, these programs have pollution control measures that are equal to or more stringent than the measures described in Section 6217(g).

Key water quality activities such as monitoring, assessment, data management, permitting and reporting are coordinated on a basin-wide scale.

In addition to working within the programs listed above, the Coastal NPS Program will coordinate with numerous other programs, such as the Galveston Bay Estuary Program and the Coastal Bend Bays and Estuaries Program, to ensure wide participation and input into the Coastal NPS Program.

The Coastal NPS Program will be implemented over three five-year periods. The first five-year implementation plan is for fiscal years 2001-2005. The second period will be for fiscal years 2006-2010, and the third period will be for 2011-2015.

Federal Grant Program for the Coastal Zone

Section 309 of the Coastal Zone Management Act, as amended in 1990, created a grant program that encouraged states to propose Coastal Management Program changes in nine potential enhancement areas.

Texas' first Section 309 Assessment and Strategies Report was submitted to NOAA on March 2, 1998. In the first three years of implementation, Texas focused on three of the nine priority enhancement areas: protecting wetlands, improved pubic access to the shoreline, and addressing cumulative and secondary impacts to natural resources from NPS pollution.

A fourth enhancement area, coastal hazards, was ranked as a medium priority. While coastal hazards pose great threats to the coastal zone, Texas is pursuing avenues to address this issue outside the Section 309 program. Texas intends to continue its emphasis on the same three priorities and complete its initial objectives in these areas during the next three years.

Landowner Incentive Program

The Private Lands Initiative of the TPWD has been enhanced and renamed the Landowner Incentive Program. Under the program, challenge grants provide funds (25 to 90 percent cost share) to private landowners for work that manages, conserves, and restores rare habitats for the benefit of endangered and threatened species.

These grants are awarded on a competitive basis to projects that meet priority needs and will make effective demonstration projects. Such demonstrations promote landowner-to-landowner communication, one of the most effective conservation techniques. So far, TPWD has awarded over $1 million in cost-share funds through the program.

Monitoring and Assessment Activities

Identifying the Problems

Identifying actual and potential impacts from NPS pollution is a vital aspect of NPS pollution management. A problem must be identified and well-defined before it can be addressed effectively.

Monitoring and assessment has to occur at several levels: to routinely and systematically identify threats or impairments; to conduct detailed assessments of problems and identify their sources; and to monitor the effectiveness of BMPs or other measures implemented to protect or restore water quality.

Surface Water Assessment

Through the Clean Rivers Program, Texas coordinates the finite resources of state, federal, regional, and local monitoring organizations to obtain the best possible coverage at an effective cost.

Water quality data are collected at a network of fixed monitoring stations located at key points in the watershed to provide trend information and an overall assessment of the basin. Basins are delineated into subwatersheds, which are grouped and systematically monitored at a more intensive level. All subwatersheds are reviewed over a five-year period. Targeted monitoring, such as special studies and TMDLs, are carried out to provide information for developing and refining monitoring techniques, site-specific water quality standards, permit levels, and watershed action plans, and for assessing the success of implementation activities.

Through the Clean Rivers Program, Texas coordinates the finite resources of state, federal, regional, and local monitoring organizations

Resources available to address this wide array of monitoring needs are limited. For this reason, the Texas Legislature appropriated approximately $8 million in 1999 for TMDL development for fiscal years 2000 and 2001. Monies allocated to Texas for assessment under the federal Clean Water Action Plan are also used to support targeted monitoring.

Monitoring for protection of aquatic life and habitat is also carried out by the TPWD. As part of its fisheries management plan, it routinely monitors fish populations, aquatic vegetation, and related water quality parameters. In addition, the TPWD investigates fish kills and any type of pollution event that may cause the loss of fish or wildlife resources. The TPWD also conducts instream flow studies to interpret various factors impacting aquatic life, and generally participates in fish sampling for watershed action projects.

The Texas Surface Water Protection Committee continued to meet quarterly in 2000. This committee is composed of the TSSWCB, the TNRCC, the TDA, the TPWD, the TAEX, the TAES, and several private interest groups and individuals. The committee originally focused its efforts on surface waters that had pesticide contamination.

In 2000, the committee was reorganized. It will now take a more holistic approach to NPS pollution by addressing industrial and nutrient contamination

in addition to pesticides. The Surface Water Protection Committee collects various data and coordinates the efforts of state agencies for the improvement of surface water quality. It also makes action strategy recommendations to elected officials and state agency directors.

Groundwater Assessment

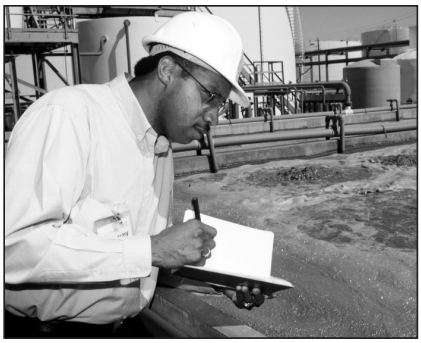
Groundwater contamination in Texas is documented in the annual *Joint Groundwater Monitoring and Contamination Report* (TNRCC, SFR-056/98), a collaboration by the member agencies of the Texas Groundwater Protection Committee. According to this report, petroleum products are the most common contaminants, reflecting the large number of leaking underground storage tanks in the state.

Some of the activities in place to address this problem include initiatives of the TNRCC's Office of Waste Management, and the state's urban and rural wellhead protection programs. Less-common contaminants include pesticides, solvents, other organic compounds, heavy metals, and salts.

Source Water Assessment and Protection

The 1996 Amendments to the Safe Drinking Water Act required each state to prepare a source water assessment for all public water supplies. Previously, federal regulations focused on sampling and enforcement, with emphasis on the quality of delivered water.

The 1996 amendments also emphasized the importance of protecting the sources of drinking water, often referred to as "source water." The TNRCC's Source Water Assessment and Protection Program (SWAP) is responsible for three aspects of the TNRCC's drinking water program: source water protection, source water assessment, and vulnerability assessment.



The TNRCC continued working with the USGS to develop and implement a methodology for assessing the susceptibility of public water supplies to various contaminants.

Groundwater supplies are considered susceptible if a potential source of contamination exists in the contributing area for the public water well, and the contaminant travel time to the well is short. Susceptibility is also affected by the soil zone, vadose zone and aquifer matrix materials. In addition, particular types of land use/cover can cause the supply to be deemed more susceptible to contamination. Finally, detection of various classes of contaminants in water from wells in the vicinity of a public water well may indicate susceptibility of the public supply even though there may be no identifiable potential source of contamination or land use activity to account for it.

Surface water systems are by nature susceptible to contamination from both point and nonpoint sources of contamination. The degree of susceptibility of a public water supply to contamination can vary, and is a function of the environ-

mental setting, water and wastewater management practices, and land use and cover within a water supply's contributing watershed.

For example, an intake of water for a public water supply made downstream from extensive urban development may be more susceptible to NPS contamination than an intake downstream from a forested, relatively undeveloped watershed. Surface water supplies are also susceptible to contamination from point sources, which may include permitted discharges, or from other introduction of contaminants.

During 2000, the SWAP team continued working with the USGS in a cooperative effort to develop and implement a scientifically defensible methodology for assessing the susceptibility of public water supplies to various contaminants. This requires the development of datasets based on the most accurate, readily available hydrologic, hydrogeologic, point source, NPS, water quality, and other natural resource and environmental data.

The strong methodology for determining susceptibility that will result from this project will better enable the TNRCC SWAP team to do several things. One is to focus its source water protection efforts on public water supplies that are more susceptible to contamination. It may also make it possible to reduce monitoring costs associated with ensuring safe drinking water. It should assist the public in developing an improved understanding of the source of their water. And finally, this information will support the implementation of BMPs as needed to protect source water.

Source Water Assessment and Protection in Atrazine Threatened Water Bodies

During 2000, the SWAP program agreed to coordinate TNRCC activities in source waters identified on the 303(d) list as threatened with contamination from atrazine. The SWAP program works in partnership with the TSSWCB, the TDA, the TAES, the NRCS, and regional and local organizations such as SWCDs, river authorities, councils of government, and municipalities.

The coordinated strategy involves two major components. The first strategy is the implementation of BMPs. Second is monitoring raw and finished drinking water to verify mean atrazine concentrations and compliance with the maximum contaminant level (MCL) of 3 micrograms per liter established in the Safe Drinking Water Act.

In addition to addressing the atrazine threat, the SWAP program will assist public water systems in identifying other sources of contamination, and will provide a comprehensive protection strategy for all contaminants within a drinking water supply area.

Water Rights Program

The Instream Uses team of the TNRCC is responsible for reviewing water rights applications, and receives funding support under the state's Performance

Partnership Grant from the EPA. The Instream Uses team assesses the effects that issuance of a water use permit will have on existing instream uses, including water quality, fish and wildlife habitat, recreation, and freshwater inflows to bays and estuaries.

Factors that contribute to recommending or requiring a streamflow restriction include the perennial nature of the stream, water quality issues, aquatic life use and biological integrity of the stream, presence of species of concern, and recreational uses. In addition to flow restrictions, mitigation may be recommended for altered, inundated, or destroyed terrestrial or riparian wetland habitats, or to prevent possible adverse water quality impacts.

During fiscal year 2000, the TNRCC completed 52 environmental reviews of water rights applications

During 2000, the TNRCC completed 52 environmental reviews of water rights applications. The applications included 25 for perennial water bodies, 26 for intermittent streams, and one for a tidal stream. In order to protect existing instream uses, staff recommended either flow or minimum water elevation restrictions, implementation of a mitigation plan, maintenance of a riparian buffer zone, or utilization of BMPs in 86 percent of the reviews.

The following BMPs were included in mitigation plans or as special conditions of water rights permits to mitigate impacts to aquatic and riparian habitats and/or minimize pollutant loading from stormwater runoff: creation of wetland habitat, enhancement or maintenance of riparian buffer zones and natural areas, utilization of retention/detention ponds, filtration basins, and development of vegetated berms. In addition, temporary BMPs (silt fencing, erosion blankets, etc.) were recommended during construction activities.

In addition to reviewing water rights applications, the TNRCC continued to manage the Guadalupe River Instream Flow Study under the fiscal year 2000 categorical NPS grant. This interdisciplinary study, conducted in cooperation with the TWDB, the TPWD, and the Guadalupe-Blanco River Authority, focused on the collection of biological, physical habitat, water quality, and hydraulic data from selected study reaches to develop a hydrological and physical habitat model. Data will be used to model conditions under various flow rates in order to determine the best way to protect the existing instream uses in the basin.

The TNRCC also initiated a contract with TIAER to conduct the first phase of the Trinity River Instream Flow Project. The Trinity River Basin was selected for study because of the projected high demand for consumptive water use, numerous water quality concerns, and proposed water reuse projects.

The main objective of the Phase 1 study is to identify and organize the existing historical information on the hydrology, biology, physical habitat, and aquatic life use of the Trinity River within the study area. Data and information com-

patible with spatial analysis will be organized into a GIS-based tool for use in planning and executing the next phase of the project.

The ultimate goal of the instream flow project is to determine the flows necessary to maintain the existing instream uses including water quality in the Trinity River Basin above Lake Livingston.

Coastal Bend Bays and Estuaries Program

Excessive growths of phytoplankton, a minute aquatic plant, have been a problem in the Coastal Bend area, particularly in Baffin Bay and its associated tertiary bays. These excessive growths, or "blooms," of phytoplankton are commonly referred to as "brown tides."

Agricultural NPS runoff has long been believed to have a stimulating effect on phytoplankton populations. Fertilizers and pesticides are two main components in agricultural runoff that may have the same effect, though they act in different ways. Fertilizers can supply limiting nutrients, while pesticides can limit grazers. The expected net effect of both would be blooms of phytoplankton.

A research project was conducted through the Coastal Bend Bays and Estuary Program to assess the direct effect of cropland runoff on growth and maintenance of phytoplankton in general, and brown tide alga in particular. There were two main approaches to the study. One approach looked at the effects of experimental runoff. The other part of the study entailed the observation of stable isotope tracers in bay organisms.

The general conclusion was that runoff waters exhibited no enhancement of brown tide growth

Partners in this project included the TSSWCB, the San Patricio County SWCD, the Kleberg-Kenedy SWCD, the Marine Science Institute, the University of Texas at Austin, the Institute of Marine Science, the University of Alaska, the Corpus Christi Agricultural Research and Extension Center, the TAES, the NRCS, and the USGS.

In the first approach, runoff collected from drainage ditches was added to mesocosms containing bay water in various mixtures in order to compare biological responses to untreated mesocosms and ambient bay water. The hypothesis was that agricultural runoff could contain nutrients that might positively influence biomass and the primary productivity of brown tide algae, or that pesticides might vegetatively influence phytoplankton and benthic organisms.

The second approach involved conducting a survey of stable isotope tracers in Baffin Bay. Stable isotopes integrate effects over longer periods of time and can resolve partitioning between new and regenerated productivity.

The general conclusion was that runoff waters exhibited no enhancement of brown tide growth. There was no evidence of enhanced brown tide growth in any of the treated mesocosms. Also, there were no changes to the zooplankton populations that could be attributed to anything other than changes in salinity.

Stable isotope tracers in the bay did not respond as if influenced by a large addition of fertilizer-laced runoff. Results from the tracer and experimental

studies indicated that effects of runoff due to a three-inch rainfall event that was studied must have been very small to immeasurable.

Dilution of Baffin Bay water by agricultural runoff collected from drainage ditches had only a slight effect on brown tide and phytoplankton production. This was due to the already high levels of nutrients in bay waters.

Work is also being done to characterize septic system problems in the Nueces Coastal Basins and to develop a plan for remediation. A total constituent loadings model for the Nueces Coastal Bend is being developed as well.

Texas Beach Watch Project

In August 1998, the GLO first launched a comprehensive program to sample the water at some of the state's most visited beaches along the Gulf of Mexico to test for the presence of harmful bacteria. The testing program, called Texas Beach Watch, gave the state of Texas and its citizens baseline data on the health of Gulf waters.

The GLO launched a comprehensive program to sample the water at some of the state's most visited beaches to test for the presence of harmful bacteria.

The purpose of the program is to protect the health and safety of the hundreds of thousands of Texans who visit state beaches each year. Continued growth of population and development is projected for the Texas coast.

The program for fiscal year 2001 is designed to include 13 beaches in six Texas counties: Galveston, Nueces, Cameron, Jefferson, Brazoria, and Matagorda. Funded by the GLO, the locally controlled program involves county and city governments, universities, and organizations representing beachgoers. Recipients of GLO contracts agree to test specified sites for Enterococcus bacteria and issue public advisories if water samples exceed EPA criteria. If elevated bacteria levels are detected, a verification sample is taken.

The program is conducted by coastal communities, with the GLO providing operating procedures, manuals, and federal grant money, the TNRCC supplying training, and the TDH providing expertise. Training sessions, organized by the TNRCC and attended by the GLO and representatives of the local programs, were held in Galveston and in Corpus Christi in November 2000.

Protecting Public Health—Fishable Waters

The Commissioner of Health is charged under Chapter 436 of the Texas Health and Safety Code with ensuring public safety by evaluating the risk to consumers of eating fish caught in state waters. The Commissioner may declare any area of the state to be a prohibited area for the taking of aquatic life if health risks due to contamination in fish or shellfish tissue are found to be unacceptable.

The TDH Seafood Safety Division is responsible for collecting fish and shellfish tissue for laboratory analyses and assessing human health risk

associated with consuming contaminated fish and shellfish. Surveys of aquatic life to determine these risks are conducted within laboratory and funding constraints.

After a lake, river, stream, or coastal water has been surveyed for chemical contaminants in fish or shellfish, the Commissioner of Health may issue a fish consumption ban or advisory. A news release of any actions is made available to the media. Closures and advisories are published as hard copies that are free to the public, and are also made available on the Seafood Safety Division's Web site. Closures and advisories are also made available through other means as appropriate.

Implementation Programs

Statewide and Regional Implementation

Surface Water Atrazine Action Plan and NPS Pollution Emergency Response

The Surface Water Atrazine Action Plan was developed prior to fiscal year 2000 to address 303(d)-listed water bodies that are threatened or impaired by atrazine contamination.

Atrazine is a pesticide commonly used on corn and grain sorghum to control competing broadleaf weeds. It is also used in "weed and feed" products for lawn maintenance. The ultimate goal of the plan is to remove the 11 affected water bodies from the 303(d) list. The plan is being implemented by a multi-agency task force through the assistance of an organized professional team, the use of BMPs, and continued sampling of water quality.

Partners in the program include the TSSWCB, the TNRCC, the TDA, the TPWD, the TAES, the Texas Agricultural Extension Service (TAEX), and the NRCS. Several other agencies and interested parties have been involved, including the EPA, the Brazos River Authority, the Sabine River Authority, the Texas Agricultural Experiment Station (Blackland Research and Extension Center), the Aquilla Water Supply District, and Syngenta (formerly Novartis), a private corporation.

The TSSWCB, the TDA, the TAEX, and Syngenta took an active role at the local level in fiscal year 2000 by sponsoring many training meetings for pesticide applicators. These meetings reached hundreds of agricultural producers and led to an increased awareness of water quality in general. In addition, Syngenta continued its voluntary pesticide monitoring program with the public water suppliers.

The TSSWCB and TNRCC delineated the atrazine threatened or impaired watersheds, and developed a partnership approach within these watersheds. The TSSWCB provides educational outreach and technical and financial assistance to agricultural producers for BMP implementation, while the TNRCC conducts monitoring to verify attainment of the water quality screening criteria.

The TSSWCB developed projects to address all 11 water bodies listed as atrazine threatened or impaired in fiscal year 2000. These projects, which are coordinated by SWCDs, provide corn and sorghum producers with an opportunity to implement BMPs on their land while receiving technical and/or financial assistance. The EPA provided financial assistance for these projects through Section 319(h) grants. An inventory of land management and information on the number, type, and location of BMPs implemented will be developed in fiscal year 2001.

These 11 atrazine remediation projects meet the criteria for the TSSWCB's NPS Emergency Response Program. This program addresses pesticide problems

in public drinking water supplies, as well as NPS pollution caused from natural disasters.

Atrazine Projects in the Brazos River Basin

The TNRCC recommended removal of the Marlin City Lake System from the 2000 303(d) List as a result of data indicating atrazine levels were declining, in part due to the source water protection activities carried out in the watershed (see details in the *1999 Texas Nonpoint Source Pollution Management Program Annual Report*, available from the TNRCC or the TSSWCB).

The TSSWCB and Syngenta (formerly Novartis) completed a survey of agricultural atrazine management practices, which documented responsible use of the product. As a result, a TMDL will not be developed for this water body.

In addition, the Aquilla Reservoir was assessed as not supporting its designated use as a public drinking water supply when samples of finished drinking water violated the maximum contaminant level (MCL) for atrazine.

The MCL requires a running annual average of 3 micrograms per liter or lower to maintain the drinking water use. The running annual average for the second quarter of 1997 through the first quarter of 1998 was 4 micrograms per liter. After the MCL violation, the TNRCC listed Aquilla Reservoir on the 1998 303(d) List as impaired for atrazine, and assigned the reservoir a high priority for TMDL development. Subsequently, the Aquilla Water Supply District began additional treatment to remove atrazine and to date has had no additional MCL violations.

The TMDL report for atrazine in Aquilla Reservoir was developed and released for public comment in 2000

During 2000, monitoring of water quality in the Aquilla Reservoir watershed continued. Routine samples were collected from Aquilla Reservoir and its tributaries. Storm water samples were also collected from the tributaries of the reservoir. These samples were analyzed for atrazine, alachlor, metolachlor, and simazine.

The TMDL report for atrazine in Aquilla Reservoir was developed and released for public comment in 2000. It is scheduled for approval by the TNRCC, and submission to the EPA in 2001.

Public and stakeholder participation associated with this project in 2000 included four meetings of the local watershed stakeholder committee, as well as quarterly meetings of the Surface Water Protection Committee, a technical advisory group. The local stakeholders prepared a survey, which was administered to agricultural producers within the watershed, to document atrazine management practices. Results will be compared to surveys administered in 2001 and 2002 to gauge the degree to which BMPs are implemented.

Source Water Protection Projects

For the nearly 10,000 residents of Bonham, in northeast Texas, nearby Lake Bonham is a source of drinking water, a focus of commerce, and a setting for residential living. It is a popular camping site and home to some prime real estate.

When residents became concerned about the taste and odor of the lake water, they agreed to participate in a Source Water Protection initiative with the TNRCC. The initiative, which was among the first of its type in the country, was a pilot project designed to help the agency develop a surface water protection strategy.

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This project developed into a partnership among the city of Bonham, the Fannin County Health Department, the Fannin County Appraisal District, the U.S. Department of Agriculture, the TNRCC, and the EPA.

Project participants first identified a 1,000-foot buffer zone around the edge of the reservoir to serve as the key management area, since the entire watershed for the lake is too large for the city to manage effectively. Using information provided by the project partners, participants mapped the locations of all potential sources of contaminants. The inventory identified older septic systems as the contaminant source most likely to be causing the undesired taste and odor of the water.

As a result of these efforts, the SWAP team made several recommendations. The first was to upgrade the older septic systems. This was identified as the area of greatest need. An application for $110,000 was made to the Drinking Water State Revolving Fund (DWSRF) to pay for these upgrades. Ten percent of the DWSRF is set aside specifically for SWP projects.

A second recommendation was to reroute hazardous cargo. A bridge on U.S. Highway 82 over Lake Bonham is less than 100 yards from the intake for the water treatment plant. Local officials are working with TxDOT to reroute trucks carrying hazardous substances.

Finally, the SWAP team recommended posting signs around the reservoir identifying Lake Bonham as a source of drinking water. Roadside markers will designate the 1,000-foot buffer zone and include a hotline number for residents to use in reporting illegal dumping.

In addition, the community applied for a $4 million grant from the DWSRF to upgrade the water treatment plant. The Texas Water Development Board (TWDB) is expected to approve the loan application for the project.

Building upon the success of the Bonham project, the TNRCC embarked on its second surface water project in the summer of 2000, with the Bexar Metropolitan Water District.

These projects have aided in the development of a Source Water Protection Guidance document to be used by the TNRCC, its contractors, and local communities wanting to participate in the program.

The Texas Rural Water Association will be working in north central Texas as a Source Water Protection contractor during 2001. Other Source Water Protection projects will be implemented with the cities of Muenster, Nacogdoches, and Burleson.

Urban BMPs

Working with the TNRCC, cities and other organizations across the state took many important steps in 2000 to meet the unique challenges of abating urban sources of NPS pollution using a variety of programs and strategies. These programs employ various BMPs designed to protect and enhance water quality both within cities and in the watersheds downstream.

A key element in many of these programs is the implementation of measures designed to reduce pollution from stormwater runoff. For instance, one BMP many cities are using can be seen in the used motor oil collection programs in Deer Park, Denton, Paris, and Rockdale. These programs give citizens an easy alternative to illegally dumping motor oil and draining filters in the catch basins of storm drains.

Many cities conduct household hazardous waste collection to prevent these chemicals from reaching area lakes and streams.

Erosion and stormwater control structures also play a prominent role in protecting water quality. These BMPs are widely used across the state, in such cities as Pasadena, Addison, Beaumont, Bridge City, Conroe, Groves, Nederland, Orange, Port Arthur, Port Neches, Sour Lake, Vidor, West Orange, and Clarksville.

Other BMPs involve the deterrence and remediation of illegal dumping and littering. Many municipalities and community-based groups support anti-littering programs, which include a range of activities such as organizing volunteers and community organizations to pick up litter along waterways, posting "Do Not Litter" signs, and sponsoring storm drain stenciling campaigns that emphasize that stormwater is not treated prior to its release into local waterways. Some of the cities and organizations involved in these activities include Wake Village, Texas City, Texarkana, Redwater, Hurst, the Gulf Coast Waste Disposal Authority, Coppell, Columbus, Cleburne, and the University of Texas at Arlington.

Additionally, many organizations are involved in monitoring water quality. For instance, the Bayou Preservation Association (Houston) has several volunteer monitors who collect water samples from area bayous under the Texas Watch program and report the data to the City of Houston. Another example includes Brazoria County, which has been monitoring for bacteria in water along its beaches.

Through these and other efforts, urban areas across the state are taking an active role in the implementation of BMPs that amount to significant NPS abatement statewide. Contact the TNRCC Nonpoint Source Program for more details about BMPs used to abate urban NPS pollution.

TNRCC Office of Compliance and Enforcement

The TNRCC's Office of Compliance and Enforcement uses Section 319(h) grant support to implement three programs: the On-Site Sewage Facilities (OSSF) Program, the Edwards Aquifer Protection Program (EAPP), and the Beneficial Sludge/Biosolids Use Program (Sludge). The OSSF program is implemented in the Beaumont and Houston regional offices; the EAPP is implemented in the Austin and San Antonio regional offices; and the Beneficial Sludge/Biosolids Use Program (Sludge) operates in the Houston, Arlington, and Tyler regional offices.

The Office of Compliance and Enforcement provided technical assistance to 3,828 requestors under the OSSF, EAPP, and Sludge Program

The Office of Compliance and Enforcement is gathering information about pollutant loadings for all water bodies identified at the beginning of its NPS grant period in order to compare that data to the data collected during fiscal year 2001.

For example, improperly operating OSSFs are believed to have caused water quality deterioration in the Houston area in Chocolate Bayou, Greens Bayou, Lake Houston and the Galveston Bay system. In the Beaumont area, OSSFs have been documented to have caused water quality degradation in Pine Island Bayou, the Sabine River, the Neches River, Village Creek, Taylor Bayou, and Hildebrandt Bayou. Also believed to be problems are Adams Bayou, the San Jacinto River, and the tidal portions of Cow Bayou and the Sabine River. Similar assessments are being developed for all three programs.

The OSSF program provides for technical assistance for designers and installers of OSSF structures. The staff reviews plans for installation and monitors compliance with those plans to ensure that new facilities are designed and constructed using best current technology. Aging, failing systems are generally identified by citizen complaint and are required to be brought to current standards.

TNRCC staff provides technical assistance to local authorities, as well as oversight of the delegation of these responsibilities. The OSSF staff conducted 206 initial and follow-up inspections and reviewed 398 plans for OSSF facility designs in fiscal year 2000. Additionally, staff responded to 1,670 requests for technical assistance.

The EAPP ensures that construction activities in the Edwards Aquifer recharge zone are carried out in compliance with regulations designed to protect the aquifer. In 2000, the EAPP reviewed 95 plans for construction activities over the Edwards Aquifer and conducted 183 grant-related follow-up investigations. Additionally, the EAPP staff provided technical assistance for 1,466 requests and responded to 33 requests for assistance in the form of complaints. Investigation of these complaints and violations resulted in 33 notices of violation and eight enforcement actions for noncompliance with the regulations.

The Sludge Program, which monitors the beneficial land application of biosolids and sludge, conducted 77 investigations of sludge application operations in 2000. The program's staff responded to 70 complaints, issued 91 notices of violations, and seven enforcement actions. The staff provided technical assistance to 922 requests relevant to the Section 319(h) grant and 770, which were not related, for a total of 1,692.

The oversight of the sewage sludge transporters has become an area of concern for most of the TNRCC regional offices. Staff in all regions conducted an additional 274 investigations of sewage sludge transporters.

Galveston Bay Estuary Program

In the Galveston Bay watershed, NPS pollution remains the number one water and sediment quality issue. The Galveston Bay Estuary Program (GBEP) is one of 28 national estuary programs. The program builds consensus among citizens, business and industry, academia, and government agencies and pools together resources, expertise, and funding to support innovative projects that involve local, public, and private partners.

Urban land use areas are documented as the main contributor of NPS loads for all pollutants of concern in the Galveston Bay watershed. As the area population continues to grow, the threat of NPS pollution becomes greater.

Developing tools for managing stormwater, improving septic systems, and addressing marine sewage issues are priorities for NPS pollution prevention in the Galveston Bay watershed. Stormwater management and education about the effects of runoff are key elements in addressing these priorities.

Stormwater management occurs through the regulatory framework of the Texas Pollutant Discharge Elimination System (TPDES). Locally, the Stormwater Management Joint Task Force is responsible for the TPDES Phase I permit in the Houston, Harris County area. Recently, Phase II regulations were finalized which will require cities of less than 100,000 to develop stormwater management plans. The GBEP is working to facilitate consistency between the Phase I and II stormwater programs as appropriate.

BMPs for stormwater runoff are a voluntary means of abating pollution in the bay. The GBEP is working with a variety of agencies and stakeholders to implement BMPs through a technical assistance project for local governments. The GBEP will inventory NPS control techniques that have been evaluated by

various organizations and compile them in a comprehensive Galveston Bay Area BMP Performance Document to support implementation. A key need to track or map outreach efforts in residential areas has been identified.

In evaluating concerns about malfunctioning septic systems, the GBEP has identified a strong need for homeowner education, a regional revolving fund for upgrading ineffective systems, and a mechanism to facilitate correction for communities. With regard to boater waste issues, Galveston Bay efforts focus on increased education, enforcement, and developing better coordination among federal and state agencies to obtain grant funds available under the Clean Vessel Act and from other funding sources.

Restoration of Clear Creek

The GBEP included restoration of Clear Creek as one of its top priorities in its Comprehensive Conservation and Management Plan (GBEP-49, 1994). Several steps have been taken to reverse the trend of habitat and water resource degradation in the watershed.

Acknowledging that maintenance dredging is a necessary activity in the watershed, the GBEP sought to identify ways of making better use of the disposable material generated. A demonstration project constructed new wetlands with dredged material, thereby restoring valuable wetland habitats, enhancing the local environment, and creating homes for fish and wildlife.

Failing septic systems along Dickinson Bayou were identified for needed corrective action through the Galveston Bay Estuary Program.

Approximately 29,000 cubic yards of material were dredged and a 12-acre containment dike was constructed. The material was then moved to a designated placement area behind the dike and was seeded with "Vermillion" smooth cordgrass. An additional 4.2 acres of wetlands were subsequently created. In 1999, the project received a Coastal America Partnership Award for its innovation and successful implementation.

The Clear Creek Surface Water Quality Monitoring Program conducts bacteria and metal analyses on a daily basis to track the success of restoration efforts. Data from this program are recorded into a central database and distributed in monthly reports. The Texas Coastal Management Program also measures watershed conditions and enters the information into a geographic information system (GIS) database. Another project monitors storm sewers to detect illicit connection in the Clear Creek Watershed.

These monitoring programs evaluate the effect of ongoing restoration efforts and will support planning for future restoration efforts in the Clear Creek watershed. Clear Creek watershed restoration efforts receive financial and other support from the TNRCC, Harris County SWCD, NRCS, EPA, U.S. Fish and Wildlife Service, City of Houston, Environmental Institute of Houston, and Reliant Energy.

Protection and Restoration of Wetland Habitat

The TPWD is involved in wetland conservation throughout Texas utilizing a variety of resources. TPWD partners with agencies and organizations such as the NRCS, the U.S. Fish and Wildlife Service and Ducks Unlimited to deliver technical and financial assistance to landowners throughout the state.

In the past year, TPWD has worked with those agencies to start a new regional initiative called the East Texas Wetland Program. This program and others work to restore thousands of acres of wetlands in Texas.

Private Lands Enhancement Program

Through the Private Lands Enhancement Program, in effect since 1973, the TPWD provides technical assistance to people who desire to include wildlife management considerations in present or future land use practices.

At the request of a land manager, a TPWD biologist will schedule a personal meeting and an inspection of the property. The land manager will be asked to define the various needs and uses of the property and to establish an objective for wildlife considerations.

The biologist will provide recommendations that may include a written management plan. Many of the practices that are used in wildlife habitat management reduce NPS impacts. Implementation of the plan is completely voluntary.

Recently, TPWD added extra biologists to work directly with private landowners for improving wildlife habitat on their properties. These biologists have a "toolbox" of programs to offer the landowners, many of which are related to wetland conservation. These private land programs share the cost of the project with the landowner. In addition, TPWD has the expertise to design projects that are well-engineered and easily managed.

In 2000, 12.5 million acres in Texas were under active, written wildlife management plans.

Texas Adopt-A-Beach Program

The GLO's Adopt-A-Beach program was initiated in the fall of 1986. That year, 2,800 volunteers picked up 124 tons of trash. Since then, more than 257,000 volunteers have removed 4,700 tons of trash from Texas beaches.

The Texas Adopt-A-Beach program is an all-volunteer effort to remove debris from Texas beaches and to increase public awareness about the problem of beach litter. Twice each year, volunteers check in at sites all along the Texas coast to pick up trash.

This past spring cleanup, 7,696 volunteers picked up almost 90 tons of trash from 173 miles of Texas beaches. In the fall, a record 11,291 volunteers removed 192 tons of trash from 162 miles of Texas beaches.

The Adopt-A-Beach program also played an integral part in the passage of MARPOL Annex V, an international treaty that prohibits the dumping of plastics in the world's oceans. In July 1991, the International Maritime Organization designated the Gulf of Mexico and the Wider Caribbean as a "special area" where the dumping of trash, with the exception of finely ground food scraps, is prohibited.

While the Adopt-A-Beach program is primarily funded by the Texas GLO, support from the private sector is a key factor in the success of the program. Generous contributions have helped carry the message "Don't mess with Texas beaches" to thousands of Texans. Businesses have provided Adopt-A-Beach trash bags, gloves, coloring books, T-shirts, caps, and souvenirs while taking the opportunity to associate their companies' names with a successful and worthy cause.

Watershed-Specific Implementation

Big Cypress Creek and Lake O' the Pines

Big Cypress Creek and Lake O' the Pines were not listed on the 2000 303(d) List for dissolved oxygen and zinc, respectively, due to a reassessment of data since their original listing in 1998. This has resulted in a slight change of emphasis for the ongoing TMDL project in the watershed. The TMDL is now focusing on the remaining parameters of concern: dissolved oxygen in Lake O' the Pines (Segment 403) and selenium in Welsh Reservoir (Segment 404D).

The Lake O' the Pines TMDL addresses both point sources and nonpoint sources of pollution related to dissolved oxygen levels. In fiscal year 2000, the Quality Assurance Project Plan for the project was approved by the EPA. Base flow water quality samples were collected at 21 stations in the watershed in July and August. Rapid Biological Assessments were also conducted at seven locations in the watershed in August.

The Lake O' the Pines TMDL addresses both point and NPS pollution related to low dissolved oxygen levels

Watershed and water quality modeling activities were initiated in 2000 as well. The QUALTX model was selected to simulate steady-state stream flows. Existing data was evaluated to develop a conceptual understanding of the major hydrologic elements in Lake O' the Pines watershed. Hydrologic elements evaluated in 2000 pertained to the littoral zone, and included temperature, light infiltration, and dissolved oxygen conditions and trends within the lake.

Agricultural BMPs were implemented through a TSSWCB project in the watershed. This project, which is coordinated by SWCDs, provides technical and/or financial assistance to agricultural and silvicultural producers to implement BMPs on their lands. The EPA provided financial assistance for the project through a 319(h) grant. The project was halfway to completion at the end of fiscal year 2000. The effect this BMP implementa-

tion had on loading of agricultural pollutants will be modeled in fiscal year 2001 using the soil and water assessment tool (SWAT). The implementation and modeling project will end in April 2002.

Members of the TMDL project's local steering committee met quarterly throughout 2000. The committee identified a target endpoint for Lake O' the Pines, and determined that the numeric criteria set forth in state water quality standards, which defined a mesotrophic state for the reservoir, would represent desirable water quality conditions for Lake O' the Pines. The development of a draft TMDL allocation report will begin in fiscal year 2001.

A technical memorandum evaluating conditions related to selenium contamination in Welsh Reservoir in the Big Cypress Creek watershed concluded that selenium levels had not changed significantly over the last 12 years; selenium was not detected in water, sediment, or fish tissue samples collected downstream of the reservoir. Furthermore, selenium levels in the reservoir are not likely to decline as long as the current discharge from the Welsh Steam Electric Station continues.

Progress was also made in sampling and public outreach in the Welsh Reservoir watershed. American Electric Power, the operator of Welsh Steam Electric Station, sampled to assess possible sources of selenium upstream of the facility. Public outreach activities for fiscal year 2000 included five project steering committee meetings. The Northeast Texas Municipal Water District Web site (www.netmwd.com/TMDL/tmdl2.htm) was accessed by users over 6,800 times.

Arroyo Colorado

During fiscal year 2000, several major accomplishments were realized in relation to the Arroyo Colorado TMDL project for dissolved oxygen concerns.

As of December 31, 2000, the TSSWCB had certified 77 WQMPs in the Arroyo Colorado watershed out of an overall target goal to certify 100 plans. Implementation of these plans will reduce agricultural NPS loadings in the Arroyo. The primary issues being addressed by these WQMPs are irrigation water management and nutrient management.

The USGS, in cooperation with the TNRCC, finalized the calibration of a watershed-wide and an in-stream water quality model of both the non-tidal segment and selected areas of the tidal segment of the Arroyo.

The TIAER is currently working with the TNRCC and the USGS to incorporate the simulation output from the watershed model into a separate model capable of simulating dissolved oxygen in the mixed surface layer of the tidal segment of the Arroyo.

The tidal model will be used along with the finalized watershed model to develop a pollutant load allocation for the project in fiscal year 2001. The dissolved oxygen TMDL is scheduled to be released for public comment, approved by the commission, and submitted to the EPA for approval in late fiscal year 2001 to early fiscal year 2002.

Also in 2000, the TNRCC prepared and finalized four TMDLs for legacy pollutants in the non-tidal segment of the Arroyo (Segments 2202 and 2202A). Legacy pollutants are chemicals whose use has been banned or severely restricted, but which persist in the environment. The legacy pollutants addressed in the TMDL are chlordane, toxaphene, DDE, and PCBs. These legacy pollutant TMDLs are scheduled to be released for public comment, approved by the commission, and submitted to EPA for approval in fiscal year 2001.

A joint USGS/TNRCC investigation of the source of PCBs in the Donna Canal was also finalized in 2000. The results of this investigation will be used by the TNRCC's Superfund Cleanup Program to develop a remediation plan for the Donna Canal in fiscal year 2001.

The year 2000 also saw the establishment of the Arroyo Colorado TMDL Verification Monitoring Program. This program is designed to provide a means for measuring the level of success achieved in reaching the goals established by the Arroyo Colorado TMDL. Initial monitoring under this program is expected to provide a detailed characterization of loadings by sector and localized geographic area which represent existing baseline conditions.

Public and stakeholder participation associated with this project in fiscal year 2000 included meetings in September and October 1999, and in February 2000.

Salado Creek

Salado Creek is located in the upper portion of the San Antonio River Basin with its headwaters in extreme north central Bexar County. Many people use the well-maintained parks along the lower reaches of the creek.Water quality tests have found that low dissolved oxygen levels in the water may occasionally harm the fish community and other aquatic life. Tests have also indicated that bacteria levels are occasionally elevated, indicating a potential health risk to people who swim or wade in the creek.

Water quality tests have found low dissolved oxygen levels in the water that may occasionally harm the fish community and other aquatic life

A draft TMDL report and a Watershed Action Plan were completed in 2000 for the Salado Creek project. The draft TMDL report summarized water quality problems in Salado Creek, data collection activities, model development, and modeling exercises. Preliminary estimates of the assimilative capacity and load allocations were stated.

Technical staff of the TNRCC TMDL Team reviewed the draft TMDL report and provided comments to the project engineer. TNRCC staff commented on problem definition and assessments, model selection, and the level of specificity in the report.

The draft Watershed Action Plan included a summary of water quality problems, a survey of potential water quality management measures, and an overview of existing water quality management requirements in the watershed. Additional hydrologic data is scheduled to be collected to support the revised draft TMDL report.

Texas A&M University organized the Watershed Restoration Council comprised of citizens and stakeholders from the Salado Creek watershed. Meetings of the Council were conducted on a monthly basis. Collaborative learning workshops were focused on educating the participants about water quality, pollution, and other issues so they could provide meaningful input toward the development of a Watershed Action Plan.

This public participation effort has resulted in a list of issues and recommendations that were forwarded to the mayor of San Antonio and in the reestablishment of the Salado Creek Foundation, a non-profit organization established to help neighbors work together to protect and enhance the quality of life in the Salado Creek watershed.

E.V. Spence Reservoir

The E. V. Spence Reservoir drainage basin has been plagued with excessive chloride and total dissolved solids loadings for several years. Through several internal assessments (such as TMDLs), in addition to assessments performed by the Upper Colorado River Authority, the Lower Colorado River Authority, and the Colorado River Municipal Water District, the TNRCC has determined that the loadings are the result of both natural and man-made NPS pollution from numerous locations throughout the basin.

The TNRCC and the RRC have committed $2.6 million to plug approximately 171 wells.

Natural saltwater seeps, evaporation, farming practices, surface water traveling across mineral beds (salt flats), the dissolution of natural underground mineral deposits, and the concentration effects of plant life are the primary causes of naturally-occurring pollution in the reservoir. Past oilfield management practices, used prior to regulation, contributed to situations such as leaking oil well casings, improper brine disposal, and the over-pressurization of downhole formations. These are the prime sources of the man-made pollutants.

The RRC was awarded a portion of the 2000 319(h) grant to perform certain activities, the ultimate goal of which is a reduction of salinity in the Upper Colorado River Basin. The RRC plans to accomplish this goal over the next three years by enhancing its current oilfield cleanup program through several activities.

First, the RRC will properly plug any well that is discovered to be leaking in the Colorado River Basin. The sources of saline seeps in the Colorado River Basin (natural or oil and gas related operations) will be determined and, if possible and practicable, eliminated.

The RRC will also engage in the preventative plugging of wells that penetrate the highly pressurized and highly saline Coleman Junction Formation using BMPs defined under current regulations. Finally, the RRC will look into the assessment and possible remediation of abandoned reclamation plants and commercial saltwater disposal facilities within the Upper Colorado River Basin.

This project will enhance the state-funded pollution prevention efforts of the RRC and will restore and maintain the water quality in the Colorado River Basin, which was targeted for restoration in the 1999 Texas Unified Watershed Assessment (which is available for download from the TNRCC Web site at www.tnrcc.state.tx.us/water/quality/tmdl/unified.htm) and the 1999 319 NPS Assessment Report.

The RRC has also proposed a future work plan to apply for additional 319(h) grant funding to concentrate on 55 of the most critical wells in the Red and Canadian River basins. These basins have been identified as having salinity problems related to the oil and gas industry, very similar in nature to those found in the E. V. Spence basin.

This project is also designed to coordinate and complement implementation activities of the TNRCC's TMDL project currently underway in the E.V. Spence Reservoir watershed. Details pertaining to the current project can be viewed at www.rrc.state.tx.us.

The TMDL project for E.V. Spence Reservoir is a collaborative partnership of the TNRCC and the RRC to fund additional plugging of oil and gas wells in the watershed. Together, the agencies have committed $2.6 million to plug approximately 171 wells in the watershed through fiscal year 2002. As of December 2000, 30 wells have been plugged through this program.

The TMDL project lead organization, Colorado River Municipal Water District, and their subcontractor, Freese & Nichols, Inc., facilitated stakeholder meetings in 2000 and prepared the technical report for the E.V. Spence Reservoir TMDL.

In late 2000, the TNRCC developed the draft TMDL report, which summarized the two TMDLs for total dissolved solids and sulfate. The report included the problem definition, endpoint identification, source analysis, linkage between sources and receiving waters, margin of safety, and loading allocations.

These TMDLs are scheduled to be released for public comment, approved by the commission, and submitted to the EPA for approval in 2001.

West Fork of the Trinity River

Segments 0810 and 0812 of the Trinity River, above Lake Bridgeport in Jack and Wise counties, are listed as impaired on the state's 303 (d) list. These segments of the river are not supporting normal recreational uses due to elevated amounts of bacteria. The aquatic life use is not supported due to low dissolved oxygen levels, and chloride concentrations have exceeded the criteria for general water quality uses.

Because these parameters often indicate impacts from agricultural sources, a project was proposed with the goal of providing a 20-30 percent reduction of NPS pollution loadings from agricultural activities within the West Fork of the Trinity River. This reduction will be accomplished by providing assistance for the implementation of 32 WQMPs within the watershed.

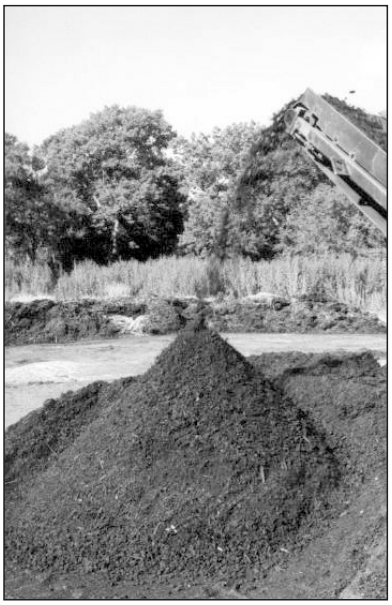
The TSSWCB, in conjunction with Jack SWCD and Wise SWCD, is providing technical and financial assistance to agricultural producers within the watershed.

Work began on this project in September 2000. By December 2000, five WQMPs had been submitted to the TSSWCB for certification.

North Bosque River

The TSSWCB and the TNRCC have jointly launched a large-scale composting project to remove excess nutrient-rich manure from the numerous dairies and other livestock facilities in the North Bosque and Leon River watersheds.

For the past year, the NPS programs at both agencies have been working with local stakeholders in the design of a dairy waste composting initiative as one strategy to address elevated phosphorus levels in the North Bosque River and elevated bacteria levels in the Leon River.



Over 1,000 truckloads of manure were delivered to compost facilities in the first month of this program.

In the fall of 2000, the TSSWCB began providing reimbursement to producers for the cost of hauling manure to composting facilities located within these two watersheds. Over 1,000 truckloads of manure were delivered to compost facilities in the first month of this program.

As of December 2000, several composting facilities had been approved by the TNRCC for participation in this program. TNRCC has also executed a contract with TxDOT to specify and use compost from participating compost facilities for roadside vegetation maintenance. In return, the TNRCC will provide an incentive payment for each cubic yard of such compost used by TxDOT.

Provisional forms and procedures for documenting manure deliveries and compost use were put into effect in November 2000. Final forms and procedures will be established by Spring 2001.

TxDOT, with assistance from the TNRCC, has conducted several training and demonstration events for TxDOT area office staff in the use of compost for the establishment and management of roadside vegetation cover. In response to this training campaign, several TxDOT areas and district offices have already begun routinely specifying the use of compost for roadside projects, and several offices have adopted policies actually requiring compost in some or all types of roadside work.

The benefits of using compost to help establish roadside vegetation include a reduction in the NPS pollution associated with roadside stormwater runoff and a reduction in the cost of vegetation maintenance.

This project has received an impressive amount of support from legislators and other state agencies. The dairy and composting industries have also been very cooperative in implementing the project.

TMDL projects are also under way in the North Bosque River. The Upper North Bosque River (segment 1255) was listed on the 1998 303(d) List for dissolved oxygen. However, reassessment of data showed that water quality standards are being met for dissolved oxygen. As a result, the TNRCC has recommended the removal of this constituent from the state's 2000 303(d) List.

The TMDL goal is to achieve a reduction of annual average soluble phosphorus loading by approximately 50 percent

The Upper North Bosque River (segment 1255) was listed on the 2000 303(d) List for chloride, sulfate, and total dissolved solids. Since then, the TNRCC has revised and submitted new water quality standards for these constituents to the EPA. These proposed new standards are being met in the Upper North Bosque River. Consequently, TMDLs are not expected to be developed for these constituents.

The North Bosque and Upper North Bosque River (Segments 1226 and1255) were also listed on the 1998 Section 303(d) List for excessive nutrient levels. Using completed model assessments of nutrient data, the TNRCC determined that sufficient information was available to prepare a TMDL for submission to the EPA.

A TMDL was drafted late in 2000 to address elevated nutrient levels in the two segments. Although this TMDL will only address elevated nutrient levels, it is expected that the project will also result in reduced bacteria and chlorophyll *a* levels. The TNRCC presented an outline of the anticipated TMDL allocation to the Bosque River Advisory Committee on August 25, 2000. The draft TMDL was released for public comment at the end of September 2000. A public hearing was held on October 23, 2000. The public comment period ended December 15, 2000.

The goal of the TMDL is to achieve a reduction of approximately 50 percent in the annual average soluble phosphorus (the limiting nutrient) loading. Both point and nonpoint sources are expected to make significant reductions to achieve the goal. The final TMDL should be submitted to the EPA for approval in the first quarter of 2001.

Armand Bayou Project

Armand Bayou is on the state's 303(d) list for impairments due to elevated bacteria levels and low dissolved oxygen. A TMDL under development for the bayou is addressing the extent and severity of the low dissolved oxygen levels. The project is also evaluating the appropriateness of the current water quality standard for dissolved oxygen levels in the bayou.

Dissolved oxygen sampling representing hot weather conditions in Armand Bayou was conducted May through September of 1999. The chemical data collected revealed that dissolved oxygen concentrations are often relatively low during hot weather, but the biological data revealed no indication of aquatic life impairment.

Analysis of the new dissolved oxygen data was conducted throughout fiscal year 2000 to identify probable pollutants to target. The TNRCC is currently reviewing the draft project report.

Education and Outreach Programs

TSSWCB Information and Education Program

The complexity and breadth of NPS pollution problems can make them difficult to quantify and fully explain to the general public. In light of this, a focused program of education and outreach is necessary to enhance public awareness of the scope of NPS problems and the methods of controlling NPS pollution.

The TSSWCB, in conjunction with the Association of Texas Soil and Water Conservation Districts, engaged in numerous activities in 2000 designed to facilitate the transfer of technology and promote an awareness of issues regarding natural resources. All educational events had some focus on water quality issues and addressed methods through which water quality can be enhanced.

The TSSWCB sponsored four teacher workshops across the state to give educators hands-on experiences with natural resource issues in their area. Topics covered in these workshops included NPS pollution, soil erosion, water quality concerns, endangered species and wildlife habitat. The workshops were co-sponsored by the Trinity Bay SWCD, the Fannin County SWCD, the Lower Sabine-Neches SWCD, the Pedernales SWCD, and the NRCS.

Teacher workshops covered NPS pollution, soil erosion, water quality, endangered species, and wildlife habitat

The TSSWCB and the Association of Texas Soil and Water Conservation Districts have also been very active in developing and expanding the "Wildlife and Recreation Management Career Development Event." This event has been adopted by the Texas Education Agency as an official curriculum to be offered by agricultural science teachers throughout the state. The project's purpose is to build awareness and better understanding of the management needed to sustain the wildlife resources of the state, and to enable young people and adults to gain insight into wildlife conservation and other conservation management practices. Other sponsors of this program include numerous SWCDs throughout the state, the TPWD, the Texas Education Agency, the Texas A&M University – Instruction Materials Service, the NRCS, and *Texas Fish and Game* magazine.

The TSSWCB and the Association of Texas Soil and Water Conservation Districts worked with the National Association of Conservation Districts to sponsor the statewide FFA Leadership Development Program on soil and water stewardship. The content of the program's speech contest deals directly and indirectly with management issues affecting urban and agricultural nonpoint sources. In fiscal year 2000, the program saw full participation in all 10 FFA areas of the state.

The TSSWCB worked with numerous SWCDs to sponsor three conservation workshops with the Boy Scouts of America. Each of these workshops drew over 250 participants, including adults and 14- to 17-year-old scouts. The scouts went through three days of intensive, hands-on learning activities centered around urban and agricultural management decisions and practices that

impact NPS pollution and other natural resource issues. Participants in these workshops met the requirements for the Soil and Water Conservation and the Environmental Science merit badges, and garnered partial credits toward numerous other badges.

In addition, the TSSWCB also co-sponsored two water quality conferences that offered five continuing education units good for use toward renewing private or commercial pesticide applicator licenses. The combined conferences drew 210 licensed pesticide applicators. Other sponsors of these workshops included the Bosque SWCD, the Hamilton-Coryell SWCD, the TAES, the Texas Farm Bureau, and the NRCS.

The TSSWCB also distributed press releases on three 319(h) projects. These releases highlighted the positive impacts the projects were having on water quality.

Spreading the Word About TMDLs

A new statewide outreach project, to be completed by 2002, will incorporate education and pollution prevention into the TMDL process.

To encourage public support and awareness in watershed areas with active TMDL projects, the TNRCC is developing a public education campaign using various media. Radio, television, public service announcements, brochures, advertisements, and fact sheets will be produced in both English and Spanish.

Topics will include how NPS pollution is assessed and accounted for in the TMDL process, stormwater issues, individual actions that can reduce NPS pollution, and BMPs. Between 24 and 30 areas are being targeted. At the completion of the campaign, a tracking mechanism will be implemented to assess the effectiveness of the campaign.

Texas Wildscapes Program

Texas Wildscapes is a program developed by the TPWD to get the people of Texas involved in restoring habitat lost to urban expansion. Certification of property as a Texas Wildscape recognizes the efforts that individual and corporate citizens are making in providing needed habitat for wildlife. Principles of the Wildscapes program have been used in a number of other endeavors by urban biologists, including school habitats and outdoor classrooms.

The program underwent a major change last year, with the focus shifting from the Wildscape packet to the newly published book *Texas Wildscapes, Gardening for Wildlife*. TPWD sold out of its first printing of 5,000 copies of the Wildscapes book and has reprinted a second run of 7,000 additional copies. Despite discontinuing promotion of the Wildscape packet in April 2000, the TPWD also received 262 requests for them during the last year.

In addition to the printed materials, 86 requests for certification only, probably associated with book sales, were received. The program currently has 1,355 certified sites in Texas representing more than 10,000 acres, many of which are

corporate sites. These numbers should grow considerably with completion of a pending alliance with the National Wildlife Federation.

319(h) Grant Program Success Stories

Watershed Project Highlight

Oak Creek Reservoir/Lake Trammell Watershed Project

The Oak Creek and Lake Trammell reservoirs, located in west central Texas, constitute major portions of the public water supply for Sweetwater, Roscoe, and Blackwell in Nolan County; Bronte in Coke County; Trent in Taylor County; and the Bitter Creek Water Supply Corporation serving customers in Nolan and Fisher Counties. In all, over 30,000 people are dependent on the watersheds above Oak Creek Reservoir and Lake Trammell as their supply of drinking water.

A long-term concern in Oak Creek Reservoir and Lake Trammell is sedimentation that has reduced, and is continuing to reduce, the quality of water captured by these structures. Sedimentation is also reducing the reservoirs' water storage capacity.

The Big Country Resource Conservation and Development Area (RC&D) and the Nolan County SWCD developed the Oak Creek/Lake Trammel Watershed Project to address this water quality issue. The TSSWCB administers and oversees 319(h) funding made available from the EPA.

So far, the project has developed more than 20 WQMPs with agricultural producers. Financial incentives are made available to producers to implement the BMPs in their WQMPs. Assistance in developing and implementing the plans is provided through the Nolan County SWCD, the Big Country RC&D, and the NRCS.

Statewide Project Highlight

Texas Forest Service Statewide BMP Project

Since 1991, the TFS' Best Management Practices Project has worked with the forestry community to ensure the protection of Texas waterways. The project is funded by 319(h) grants from the EPA through the TSSWCB.

Working with trade organizations such as the Texas Forestry Association and the Texas Logging Council, the TFS BMP Project has reached thousands with its message of water quality protection, BMP implementation, and forest stewardship.

With support from the Texas Forestry Association's Sustainable Forestry Initiative Committee and cooperation from timber companies, the BMP Project conducts workshops for loggers and foresters, highlighting the correct use and importance of BMPs in the logging industry. These full-day workshops include classroom time and field demonstrations at an actual logging site. From 1995 through 2000, 85 of these sessions have been held, training over 2,000 loggers and foresters.

A major part of the BMP Project has been the post-harvest monitoring of randomly selected logging sites for compliance with BMPs. Four rounds of this compliance monitoring have been completed so far. Overall compliance ratings are at their highest level since monitoring began in 1991.

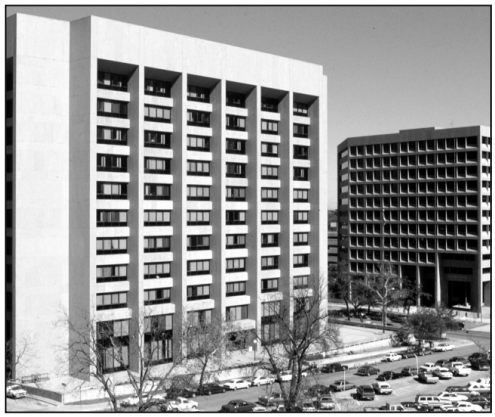
With support from the Texas Forestry Association, landowner seminars have been conducted covering topics such as forest economics, taxes, reforestation, BMPs, wildlife, consultants, logging contractors, and sustainable forestry. Twelve seminars were held in east Texas locations, one was held in the Lost Pines region of central Texas, one took place in the Dallas/Fort Worth metroplex, and one was held in Austin. Another accomplishment of this project was the development of a format for forestry WQMPs, prepared in partnership with the TSSWCB and the NRCS.

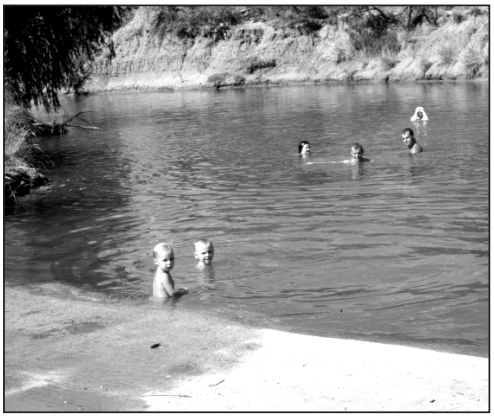
The project has reached thousands with the message of BMPs, water quality protection, and forest stewardship

Many other methods have been used to reach people and share information on water quality and forest stewardship. Presentations on BMPs and water quality have been made to hundreds of civic groups, landowner groups, and students. BMP training has also been given to county road crews in Angelina and Nacogdoches counties. Radio and television spots on the use of BMPs have been produced and aired. In addition, billboards were put up near major highways encouraging landowners to leave trees along streams.

In recognition of this project's work, the TNRCC awarded the TFS BMP Project with its Clean Texas 2000 Environmental Excellence Award. Former Texas Governor George Bush also presented the project with an award recognizing its efforts in education associated with BMPs, water quality, and good resource management.

Financial Information and Other Resources

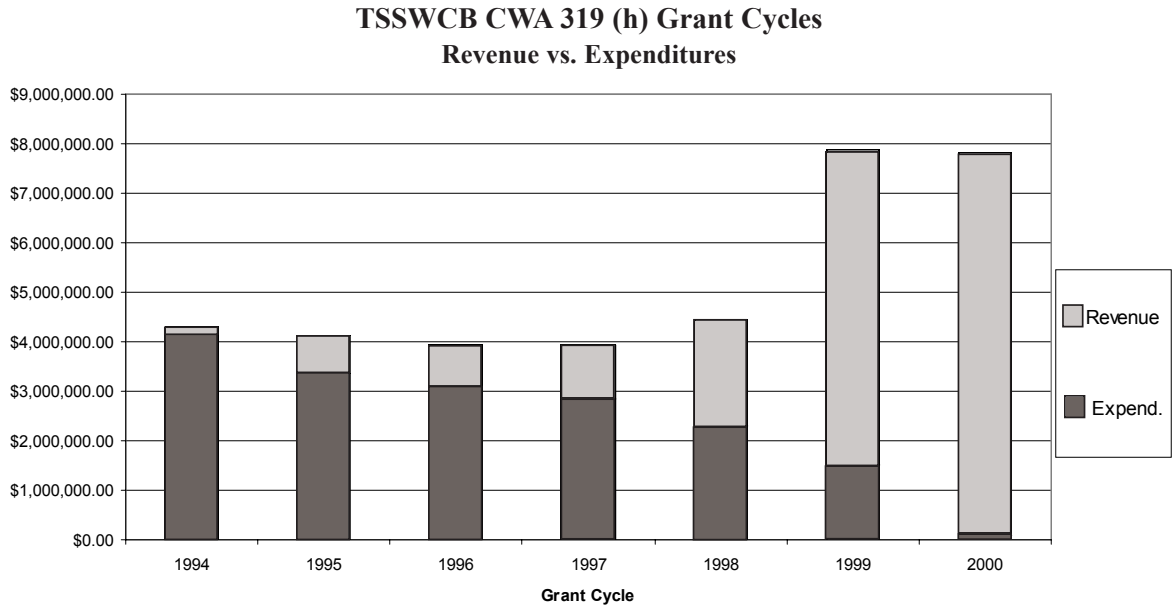




TSSWCB Grant Program Financial Report

Grant Fiscal Year	Grant Number	Total Grant Revenue (Federal + State)	Cumulative Grant Expenditures	Grant Balance	Percent Spent
1994	C9-996236-01	$4,306,290.00	$4,146,934.08	$159,356	96%
1995	C9-996236-02	$4,122,201.00	$4,349,526.99	$772,674	81%
1996	C9-996236-03	$3,925,000.00	$3,080,916.64	$844,083	78%
1997	C9-996236-04	$3,925,000.00	$2,845,911.55	$1,079,088	73%
1998	C9-996236-05	$4,447,686.00	$2,288,502.04	$2,159,184	51%
1999	C9-996236-06	$7,879,500.00	$1,528,122.06	$6,351,378	19%
2000	C9-996236-07	$7,806,667.00	$78,326.02	$7,728,341	1%

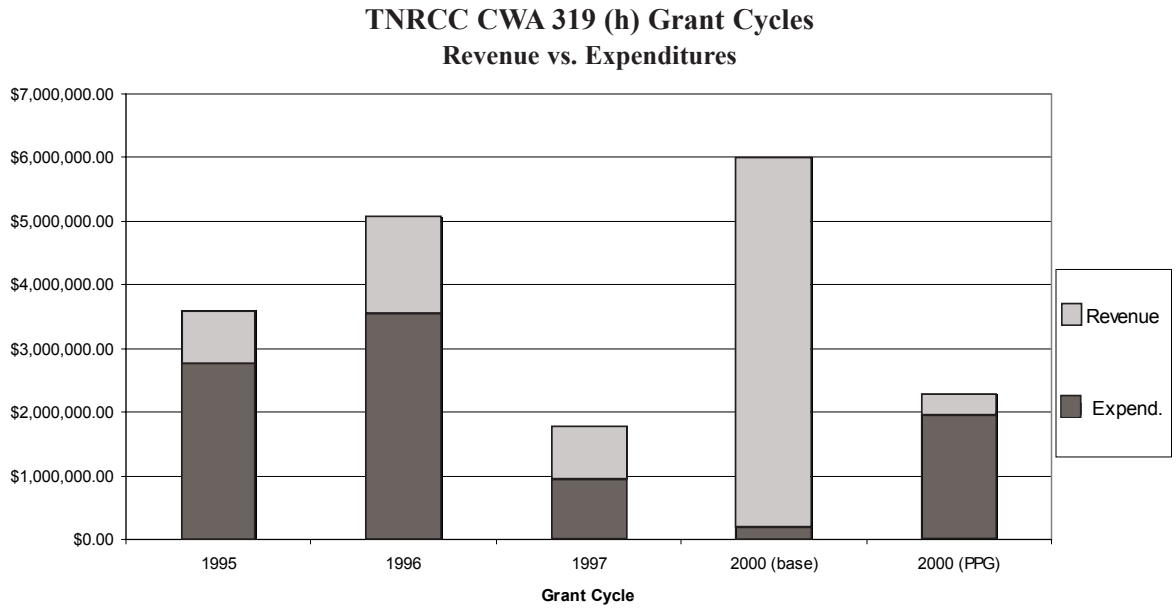
Expenditures listed are through December 31, 2000.



TNRCC Grant Program Financial Report

Grant Fiscal Year	Grant Number	Total Grant Revenue (Federal + State)	Cumulative Grant Expenditures	Grant Balance	Percent Spent
1995	C9-996146-03	$3,614,167	$2,792,606	$821,561	77%
1996	C9-996146-04	$5,072,193	$3,546,470	$1,525,723	70%
1997	C9-996146-05	$1,757,166	$907,427	$849,739	52%
2000 (Base)	C9-996146-06	$6,005,046	$214,317	$5,790,729	4%
2000 (PPG)	BG-996627-00	$2,286,657	$1,979,022	$307,635	87%

Expenditures listed are for the grant fiscal year, September 1, 1999 through August 31, 2000. The 1998 and 1999 grants are completed.



Texas State Soil and Water Conservation Board Contacts

Executive Management

Robert G. Buckley, Executive Director
P.O. Box 658
Temple, TX 76503-0658

Nonpoint Source Program

James Moore, Director of Conservation Programs
P.O. Box 658
Temple, TX 76503-0658

Kevin Wagner, Natural Resources Specialist
P.O. Box 658
Temple, TX 76503-0658

Donna Long, Program Specialist
720 E. Blackland Rd.
Temple, TX 76502

For information about TSSWCB programs and highlights in this report, contact:

Clay Wright, Technical Writer
P.O. Box 658
Temple, TX 76503-0658
phone: 254-773-2250
e-mail: cwright@tsswcb.state.tx.us

Texas Natural Resource Conservation Commission Contacts

Executive Management

Jeffrey A. Saitas, Executive Director
MC 109
P.O. Box 13087
Austin, TX 78711-3087

Glenn Shankle, Deputy Executive Director
MC 109
P.O. Box 13087
Austin, TX 78711-3087

Nonpoint Source Program

Jim Thomas, Technical Analysis Division Director
MC 164
P.O. Box 13087
Austin, TX 78711-3087

Charles Dvorsky, Section Manager
Water Quality Planning and Assessment
MC 147
P.O. Box 13087
Austin, TX 78711-3087

Linda Brookins, Team Leader
Watershed Management Team
MC 147
P.O. Box 13087
Austin, TX 78711-3087

For information about TNRCC programs and highlights in this report, contact:

Louanne Jones, Information Specialist
Water Quality Planning and Assessment
MC 147
P.O. Box 13087 phone: 512-239-2310
Austin, TX 78711-3087 e-mail: lojones@tnrcc.state.tx.us

Acronyms Used in This Report

BMP - best management practice
BRA - Brazos River Authority
CRP - Clean Rivers Program
CWA - Clean Water Act
DWSRF - Drinking Water State Revolving Fund
EAPP - Edwards Aquifer Protection Program
EPA - Environmental Protection Agency
GBEP - Galveston Bay Estuary Program
GIS - Geographic Information System
GLO - General Land Office
MCL - maximum contaminant level
NOAA - National Oceanic and Atmospheric Administration
NPS - nonpoint source
NRCS - USDA-Natural Resources Conservation Service
OSSF - on-site sewage facilities
RC&D - Resource Conservation and Development Area
RRC - Railroad Commission
SWAP - Source Water Assessment and Protection (team)
SWAT - soil and water assessment tool
SWCD - Soil and Water Conservation District
SWP - Source Water Protection
TAES - Texas Agricultural Experiment Station
TAEX - Texas Agricultural Extension Service
TDA - Texas Department of Agriculture
TDH - Texas Department of Health
TFS - Texas Forest Service
TIAER - Texas Institute for Applied Environmental Research
TMDL - total maximum daily load
TNRCC - Texas Natural Resource Conservation Commission
TPDES - Texas Pollutant Discharge Elimination System
TPWD - Texas Parks and Wildlife Department
TSSWCB - Texas State Soil and Water Conservation Board
TWDB - Texas Water Development Board
TxDOT - Texas Department of Transportation
USFWS - U.S. Fish and Wildlife Service
USGS - U.S. Geological Survey
WQMP - water quality management plan

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