ATTACHMENT 2

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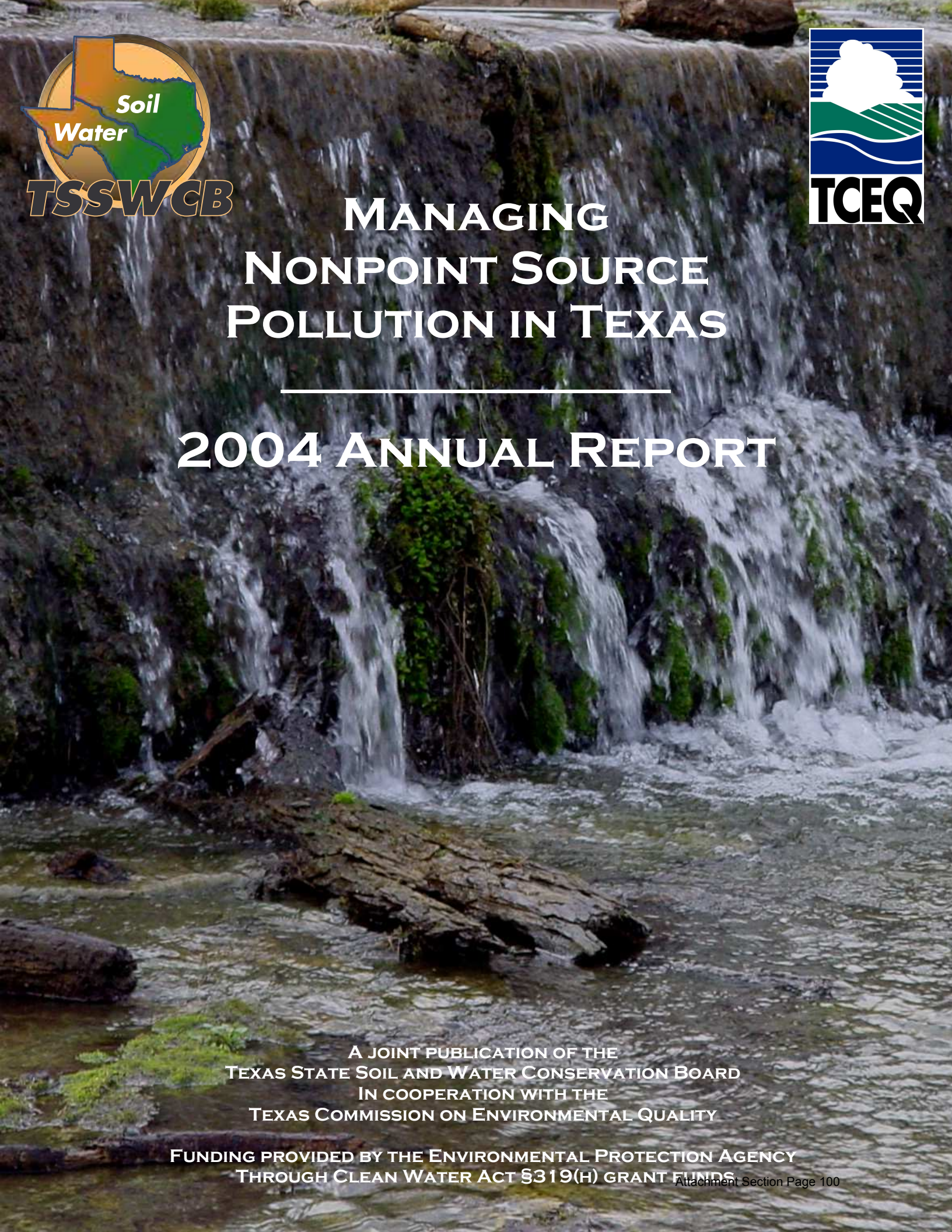

Managing Nonpoint Source Pollution in Texas

2004 Annual Report

A joint publication of the
Texas State Soil and Water Conservation Board
In cooperation with the
Texas Commission on Environmental Quality

Funding provided by the Environmental Protection Agency
Through Clean Water Act §319(h) grant funds

Managing Nonpoint Source Pollution in Texas: 2004 Annual Report

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Published and distributed

by the

Texas State Soil and Water Conservation Board

P.O. Box 658

Temple, TX 76503

and by the

Texas Commission on Environmental Quality

P.O. Box 13087

Austin, TX 78711-3087

Letter from the Executive Directors

As the emphasis on water quality improvement activities shifts from *point sources* to the more difficult to identify and manage *nonpoint sources* of pollution, the federal Clean Water Act, §319(h) (CWA §319(h)) grant program has become a cornerstone for Texas and many other states to implement a watershed approach. This watershed approach is based on four principals: 1) a geographic focus based on hydrology rather than political boundaries; 2) water quality-based objectives based on scientific data; 3) coordinated priorities and integrated solutions; and, 4) diverse, well-integrated partnerships.

The Texas Commission on Environmental Quality (TCEQ) and the Texas State Soil and Water Conservation Board (TSSWCB) share leadership for the abatement of nonpoint source pollution in Texas. The TSSWCB is responsible for controlling agricultural and silvicultural nonpoint source pollution and the TCEQ is responsible for managing urban and other nonpoint source pollution. However, these agencies have many other partners that play integral roles in managing nonpoint sources of pollution. Through CWA §319(h) grants, the TCEQ and the TSSWCB contract with other state and federal agencies, universities, research institutes, river authorities, local governmental entities like soil and water conservation districts and municipalities, and private consulting firms to assist with activities such as water quality monitoring, technical and financial assistance for implementing best management practices, and new emerging technologies.

Effective *communication*, a characteristic of any successful collaborative endeavor, has allowed the TCEQ and the TSSWCB to implement the State Nonpoint Source Management Program. Another key element to a successful program is effective *coordination*. Together, TSSWCB and TCEQ have forged relationships that foster coordination and cooperation from the federal level to the local level. The Environmental Protection Agency, the main agency responsible for implementing the Clean Water Act, allows and encourages Texas and other states the flexibility to use the CWA §319(h) grant program in a manner that leverages and supports the existing initiatives of other agencies.

This report highlights the State's efforts during fiscal year 2004 to assess and categorize water bodies, implement projects that reduce or prevent NPS pollution, and educate and involve the public to ensure the quality of our water resources for future generations of Texans.

Rex Isom
Executive Director
Texas State Soil and Water Conservation Board

Glenn Shankle
Executive Director
Texas Commission on Environmental Quality

INTRODUCTION

Texas Nonpoint Source Pollution Program

Management of nonpoint source (NPS) pollution in Texas is shared by two agencies. The Texas State Soil and Water Conservation Board (TSSWCB) is the lead agency for the planning, management and abatement of agricultural and silvicultural NPS pollution. The Texas Commission on Environmental Quality (TCEQ) is responsible for managing urban and other NPS pollution. Section 319(h) of the Clean Water Act (CWA) established a grant that is awarded annually by Congress to the Environmental Protection Agency (EPA). The EPA then allocates these funds among the states to implement activities supporting the congressional goals for the act. The TSSWCB and the TCEQ target CWA §319(h) NPS grant funds toward assessment, implementation, and education projects within the watersheds of NPS-impaired water bodies included in the state's most current *Water Quality Inventory and 303(d) List*. Grant funds are also used to develop total maximum daily loads (TMDLs) and to implement management practices supporting the restoration goals established in TMDLs.

> ***Nonpoint Source Pollution*** – occurs when exposed contaminants, debris, and soil from many diffuse sources are carried by rainfall runoff into rivers, lakes, wetlands, coastal waters, and even underground sources of drinking water.

The TSSWCB has 65 ongoing CWA §319(h) projects addressing a wide array of agriculture and silvicultural issues. Federal funds totaling $27 million have primarily been used to address NPS pollution from dairy and poultry operations, prevent atrazine runoff, treat saltcedar, provide technical assistance and assist with other implementation activities. (Figure 1.)

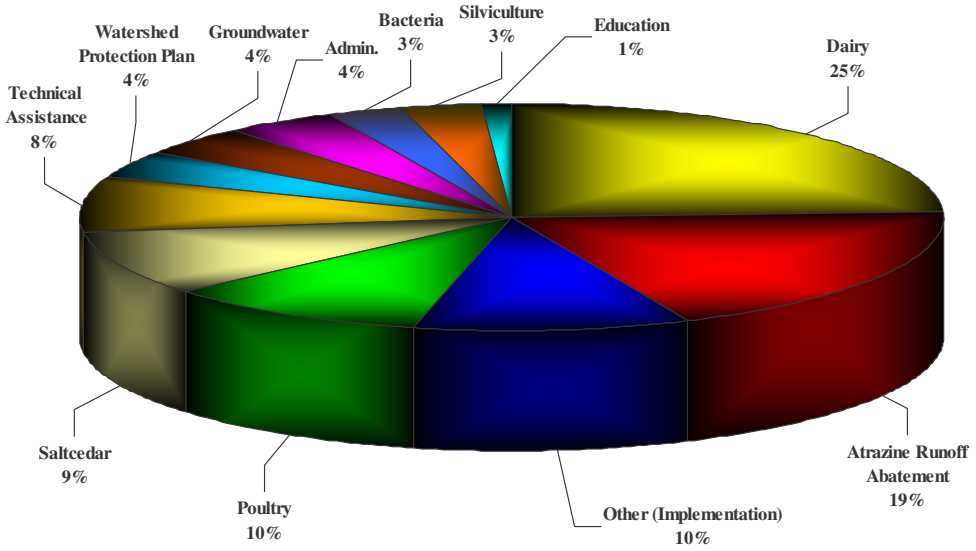

Figure 1. TSSWCB active state and federal §319(h) grants for FY 2000 – FY 2004.

The TCEQ has 44 ongoing CWA§319(h) projects dealing with a wide range of urban and rural issues. Federal funds totaling $17 million have primarily been used to assess and address NPS pollution from multiple sources including oil and gas, dairies, urban stormwater and others. (Figure 2.)

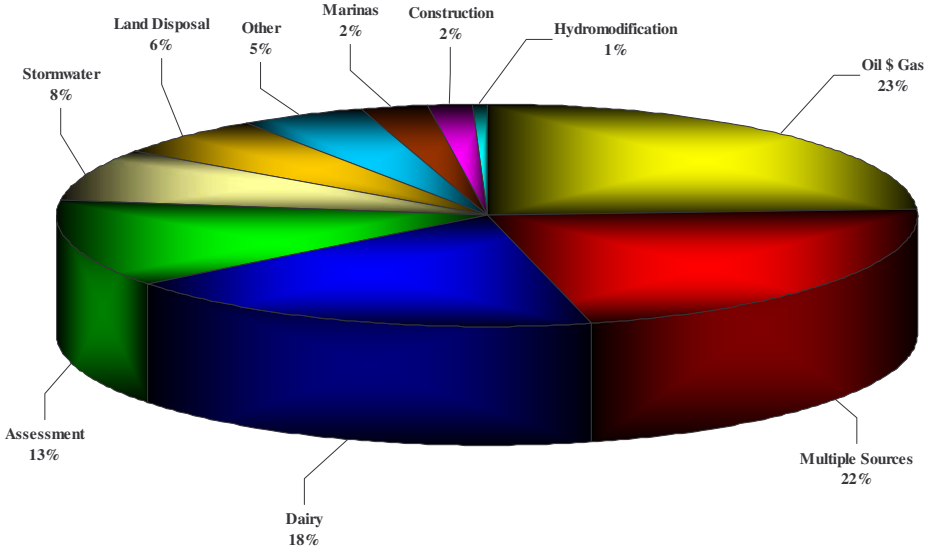

Figure 2. TCEQ active state and federal §319(h) grants for FY 2000 – FY 2003.

Update on Texas' NPS Pollution Assessment Report and Management Program

The State is currently updating the NPS Management Program that will guide the State's NPS activities for the next five years. The NPS Management Program revision is in the last stages of completion. The formal "response to comments" (RTC), addressing EPA's most recent set of comments, has been completed and will be sent in January 2005 for EPA review, along with the newly revised Draft.

Following negotiation with EPA, the document will begin the Publications Review process and Public Comment period, which should take approximately two months. TSSWCB Board members and TCEQ Commissioners will then review for formal approval and permission to forward to the Governor. The Attorney General will provide certification of the State's authority to implement the plan, and the Governor's signature will finalize the document. The review by the Attorney General and the Governor is projected to take an additional month, placing completion of the revised NPS State Management Program by April 2005.

ASSESSMENT

Water quality assessment activities in Texas are coordinated by the TCEQ and include identification of high priority impaired/impacted water bodies. These assessments guide the development and implementation of strategies to address NPS pollution.

Every two years, Texas and the other states must assess the quality of their water and submit a report to the EPA detailing the extent to which each water body in the state meets water quality standards. The TCEQ publishes this biennial assessment as the *Texas Water Quality Inventory and §303(d) List*.

Summary of the 2004 Water Quality Assessment

In 2004, Texas assessed approximately 11% of its total river miles, 80% of lake acres, 85% of bay square miles, and 100% of the Gulf square miles within its jurisdiction. The total area for each type of water body includes both classified and unclassified segments. (Figure 3.)

For 2004, the TCEQ conducted a targeted water quality assessment of 195 water bodies (out of the 732 assessed in 2002). The targeted water bodies were primarily those identified as concerns in 2002 because the data set for them was too small to allow for a full assessment, but a number of measurements did not meet the criteria defined in the standards. These 195 targeted water bodies were prioritized for more intense monitoring over the last two years. The *2004 Water Quality Inventory and §303(d) List* provides an up-to-date status for them.

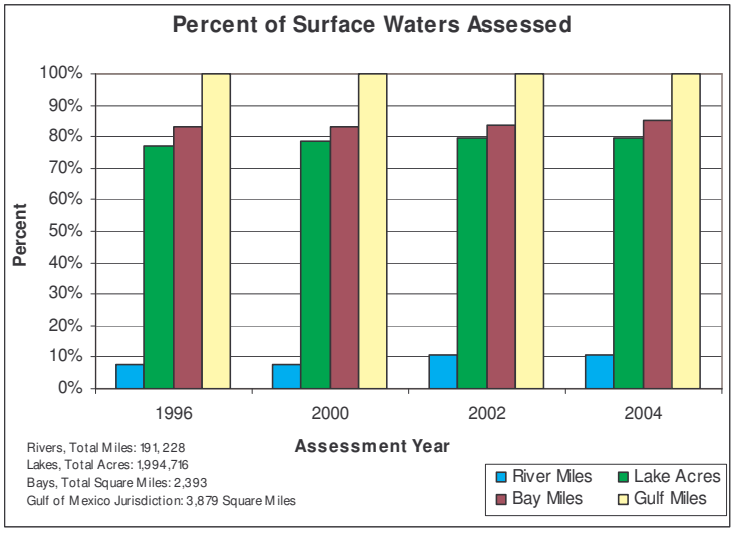

Fig 3. Percent of surface waters assessed in Texas.

Due to the extensive number of total river miles in the state (191,288 miles) and limited resources for monitoring, Texas can only assess a small percentage of its rivers in comparison to the number of lakes and estuaries that are assessed. However, priority river segments, and those thought to be at the highest risk for pollution, are targeted for assessment every year. The TCEQ strategy for choosing the segments for additional monitoring and assessment is designed to make the coverage as representative of the state as possible. At annual meetings to plan and coordinate monitoring, stakeholders participate in the process to identify the river segments for sampling and assessment.

While the percentage of lakes and estuaries that were assessed for each Water Quality Inventory has remained fairly constant, rising gradually since 1996, the total number of river miles assessed has increased by 41%. This is largely due to increased coordination and planning among the state and local organizations participating in the Texas Clean Rivers Program (CRP), which provides data for the assessment.

The increase in the number of water bodies and constituents that are monitored has led to a concurrent rise in the number of water bodies identified as impaired, from 147 identified in 1996, to 306 water bodies identified in 2004, with a total of 399 impairments. However, overall water quality remains good, with most water bodies meeting their standards. (Figure 4.)

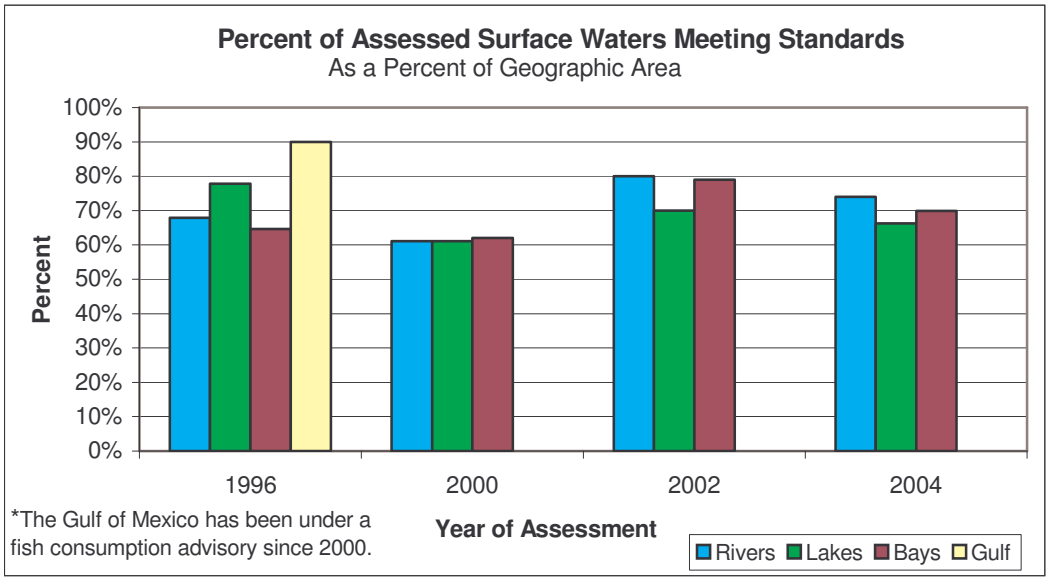

Fig 4. Percent of assessed waters meeting standards.

Causes of Impairments

As part of the assessments, potential and known sources of impairment are identified. Table 1 illustrates the relative proportion of 10 general causes of impairment for the water bodies on the draft 2004 CWA §303(d) List. Sources of pollution leading to these impairments are both point and nonpoint. Both urban and rural nonpoint sources of bacteria contribute to the cause of the largest portion of impairments, natural and human point and nonpoint sources of oxygen-demanding substances and nutrients contribute to low dissolved oxygen. The sources of chloride, sulfate, and TDS are primarily nonpoint. Metals and other toxic substances have both point and nonpoint sources in the watershed.

Table 1. Causes of impairments for water bodies on the 2004 303(d) List.

Category	Sub-Category	Number of Water Body/Parameter Combinations	Use
Bacteria	In Water	183	Recreation
	In Shellfish	14	Oyster Waters
Dissolved		104	Aquatic Life

Category	Sub-Category	Number of Water Body/Parameter Combinations	Use
Oxygen			
Toxicity	In Ambient Water	7	Aquatic Life
	In Ambient Sediment	5	
Organics	In Water	0	Fish Consumption, Aquatic Life
	In Fish/Shellfish	19 (29)	
Metals	In Water	10	Fish Consumption, Oyster Waters, Aquatic Life
	In Fish/Shellfish	14	
Dissolved Solids	Chloride	8	General (new standards changes resulted in delistings)
	Sulfate	2	
	Total Dissolved Solids	11	
Temperature		1	General
pH		13	General
Nutrients	Nitrogen	1	General, Public Water Supply Use
Biological	Habitat, Macrobenthos Community, or Fish Community	7	Aquatic Life
Total		**399**	

TCEQ Continuous Water Quality Monitoring Initiative

Eleven continuous water quality monitoring stations in seven counties throughout Texas have been deployed since June 2001. Of these, four stations were established in the Bosque and Leon River watersheds primarily to assess NPS nutrient contributions and their impact on water quality. The sites have been equipped to monitor traditional water quality parameters such as temperature, pH, dissolved oxygen, and specific conductance since 2001. Nutrient analyzers were added in the summer of 2004 to continuously monitor ammonia, reactive phosphate, and nitrate.

In October 2004, the monitoring station at Clifton was toured by local officials and Governor Rick Perry. Additional continuous monitoring stations will be added in the Bosque watershed to provide a continuous record of nutrient dynamics and loads to downstream water bodies. These stations will provide information on accidental discharges of pollutants to the river. Continuous water quality monitoring is still a pilot project, but after further experience and validation of the data, information from the station may also be used to evaluate the success of nonpoint source best management practices (BMPs) and wastewater permits in improving water quality.

Total Maximum Daily Load (TMDL) Program

From the CWA §303(d) List , certain water bodies are targeted for TMDLs to address conditions that do not meet the water quality standards. On the draft 2004 CWA §303(d) List, there are 103 water bodies affected by nonpoint sources only, 18 by point sources only, and 185 by both nonpoint and point sources. Of the water bodies listed in 2004, 113 are targeted for TMDL development. Texas has completed 58 TMDLs since 1998 and has 78 TMDLs in progress.

Bacteria Source Tracking and Targeted Bacteria Monitoring

As shown in Table 1, bacteria are the leading cause of impairment in Texas surface waters. After a water body is listed because of high concentrations of bacteria, the origin of the contamination must be determined. This is where bacteria source tracking (BST) comes into play. BST is based on the premise that all warm-blooded animals harbor unique strains of E coli. By determining the bacterial strain, the host animal can be identified.

The State has made significant progress on building a comprehensive bacteria source library that allows for tracking a particular type of bacteria to a specific species of animal. By the end of fiscal year 2004, the bacteria associated with 60 different species had been determined, primarily from the most common species of livestock, wild birds, domestic pets, and wild animals, but also including some zoo animals. Currently there are more than 20 projects in which bacteria source tracking is being used throughout Texas.

Source Water Assessment and Protection (SWAP)

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

Source Water Assessment

The SWAP Program assesses public drinking water sources to determine the susceptibility of each source to 227 potential contaminants. A source water assessment report has been provided to each of 6,000 public water systems (PWS) and is intended to lead to the implementation of source water protection projects and BMP implementation. The source water assessments are used by the TCEQ SWAP program to drive the prioritization and implementation of Source Water Protection (SWP) activities, and the recommended best management practices (BMPs) aimed at minimizing or eliminating the affects of NPS contaminants.

Source Water Protection

The hallmark of Source Water Protection is to identify a PWS's water source, sensitive contributing areas, possible sources of contamination (PSOCs), and recommend BMPs to eliminate or minimize the threat of contamination. These recommendations often advocate the involvement of other agencies/organizations having relevant expertise and/or jurisdiction to provide increased public awareness, educational programs, site-specific protection plans, and local ordinances.

During FY 2004, twenty-three assessment-driven source water protection (SWP) projects were completed. TCEQ sponsored SWP activities were specifically targeted on Inks Lake, Lake Brownwood, Lake Nacogdoches, Lake LBJ, Lake Marble Falls, and Lake Stamford, addressing potential NPS impacts and management alternatives. Groundwater based systems were addressed by third parties implementing SWP activities subject to TCEQ SWAP standards.

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

Implementation

The State manages all CWA §319(h) funds efficiently and effectively to focus NPS abatement efforts, implementation strategies, and available resources in watersheds identified as impacted by NPS pollution in the latest state-approved *Texas Water Quality Inventory and §303(d) List* required by the CWA §305(b) and CWA §303(d). NPS activities are coordinated closely with the TMDL Program to identify, plan and fund practices that support state-approved TMDL Implementation Plans and Watershed Protection Plans in waters affected by NPS pollution.

A coalition of government and private organizations is necessary to develop and implement water quality protection and restoration strategies. Texas' Watershed Approach focuses efforts on the highest priority water quality problems by engaging well-integrated partnerships to address and implement coordinated solutions.

North Bosque River Restoration Initiative

The North Bosque River in north central Texas is degraded by excessive nutrient loading. The source has been attributed, in part, to growth of the local dairy industry and resultant increases in land application of manure waste. In December 2002, the TCEQ and the TSSWCB adopted "An Implementation Plan for Soluble Reactive Phosphorus in the North Bosque River Watershed" to implement two TMDLs approved by EPA in December 2001. Three practices for controlling nonpoint sources of phosphorus were identified in the plan: 1) phosphorus application rates in waste application fields; 2) reduced phosphorus diet for dairy cows to reduce the phosphorus content of dairy waste; and, 3) removing approximately half of the dairy-generated manure from the North Bosque River watershed for use or disposal outside the watershed.

Exporting Composted Dairy Manure from the Watershed

The TSSWCB and the TCEQ, in partnership, initiated an innovative regional project to reduce phosphorus levels in the North Bosque and Leon River watersheds. The Dairy Manure Export Support (DMES) program offers financial incentives to commercial haulers to transport raw manure from dairy farms in the North Bosque and Leon River watersheds to commercial composting operations approved by the TCEQ's Composted Manure Incentive Project (CMIP). The raw manure is then processed by composting so it may be put to beneficial use. Organizations such as the Texas Department of Transportation (TxDOT) and municipalities, as well as agricultural producers and the general public are some of the target purchasers of the composted product. The TCEQ provides rebates to these target purchasers to facilitate the development of a sustainable market.

DMES funding was provided by three CWA §319(h) grants (1999, 2000, and 2002 fiscal years) from EPA totaling $2,696,885 and by an appropriation of $1,131,726 from the 77th Texas Legislature. The initial target amount of manure to be exported from dairy farms participating in the project was 300,000 tons during a 36-month project period from November 2000 through October 2003. As of October 31, 2004, more than 816,000 tons of manure has been hauled under the DMES program. (Figures 5 and 6.) It is estimated that this prevented the land application of approximately 2.7 million lbs of phosphorus.

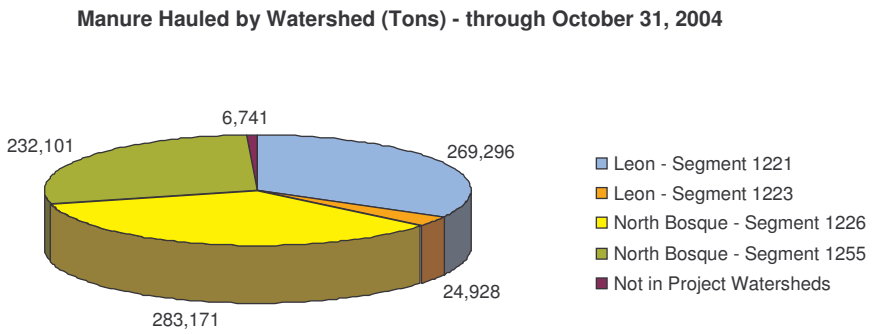

Fig 5. Dairy manure hauled by watershed (tons) – through October 31, 2004

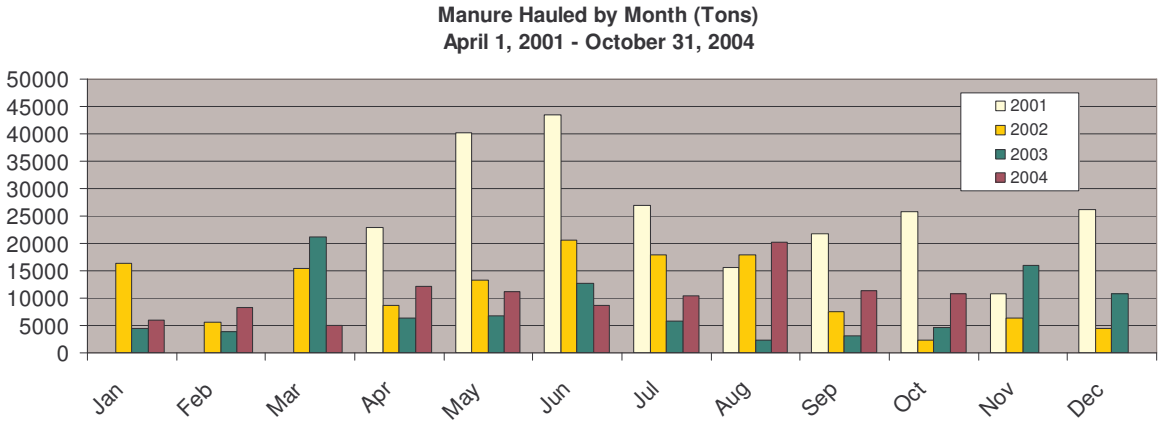

Fig 6. Dairy manure hauled by month (tons) – April 1, 2001 – October 31, 2004.

Composted Manure Incentive Program

During the first half of the year, the TCEQ's Small Business and Environmental Assistance (SBEA) staff hosted several "Compost Gets Results" workshops and made presentations to key audiences at outreach events. Between October 2003 and February 2004, more than 200 participants attended SBEA's workshops around the state. Staff received survey results from 101 attendees. More than half of the participants stated they had used the techniques discussed in the workshop, (such as erosion control, top dressing, lawn top dressing, and filter berms), either personally or on behalf of their organizations.

Under a new program developed by the Texas Cooperative Extension (TCE), private agricultural and wholesale purchases of dairy compost will work with their local Soil and Water Conservation Districts (SWCD) to obtain rebates on compost purchases. Purchasers will receive $4.00 and $1.00 will be retained by the SWCD for administration. The plan was approved by TCEQ and EPA, and developed in cooperation with the TSSWCB, and the Upper Leon, Cross Timbers, and Hamilton-Coryell SWCDs.

During the Summer of 2004 the CMIP provided funding for the purchase and use of 3,600 cubic yards of composted manure at Fort Hood. Equal amounts of compost were purchased from six approved compost facilities in August. This demonstration project will document the erosion

control and reclamation benefits of using composted manure in certain areas of Fort Hood that are impacted by armored tank exercises. It will also assess the relative effectiveness of older and newer composted manure in stock at the CMIP facilities. The use of compost for restoration at Ft. Hood is expected to significantly reduce soil erosion and improve water quality.

Since inception of the CMIP program, a total of 297,350 cubic yards of compost have been sold. Out of this total, 268,212 cubic yards were physically transported out of the North Bosque and Leon watersheds, representing a product export rate of 90%. The annual export of composted dairy manure has increased throughout the project period and is approaching the TMDL target of 50% removal from the North Bosque watershed. (Figure 7.)

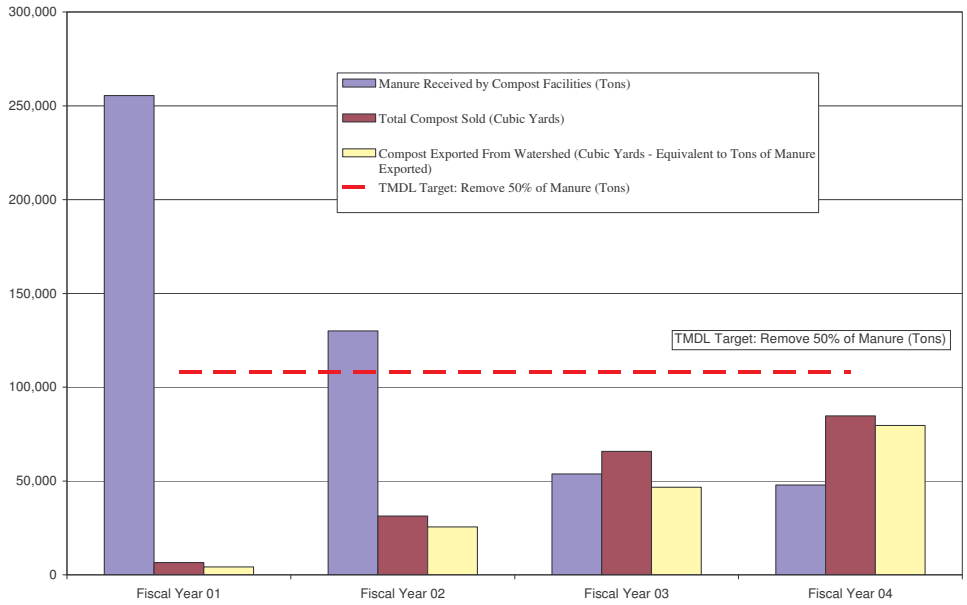

Fig 7. Fate of North Bosque watershed dairy manure received at CMIP facilities.

At the end of FY 2004, TxDOT had purchased 202,510 cubic yards of dairy manure compost thereby surpassing their target goal of 200,000 cubic yards. TxDOT is expected to surpass that usage in FY 2005.

The March-April 2004 issue of the Federal Highway Administration's publication *Public Roads* recapped some of the highlights of the award-winning Texas compost program. In December 2003, the TxDOT-TCEQ partnership, as well as the overall compost project, was nominated for the "Innovations in American Government Award", a program of the Ash Institute for Democratic Governance and Innovation at Harvard University's Kennedy School of Government. This program recognizes creative initiatives at the federal, state and local level that are results-driven and address important problems. Although the compost project did not win the award, it placed in the top 50 semi-finalists, out of 1,000 entries nationwide.

Preliminary Evaluation of Impacts from the Manure Composting Program on Stream Water Quality

Texas Institute for Applied Environmental Research (TIAER) has released a report titled *Preliminary Evaluation of Impacts from the Manure Composting Program on Stream Water Quality*. In this preliminary report TIAER has documented 19% (not statistically significant), 24% (marginally significant), and 39% (statistically significant) reductions in orthophosphate phosphorus (PO_4-P) concentrations for three microwatershed monitoring sites in the North Bosque River watershed.

The land area above these three sites had the highest level of participation in the manure composting program when the amount of manure hauled was normalized on a per cow per unit land area basis. About 50% of the land area in the drainage areas above the two sites showing significant reductions was associated with dairy waste application fields. These results indicate a positive correlation between the practices employed under the Implementation Plan and a reduction in phosphorus loadings.

Dairy Waste Management Demonstration Project

A coalition of federal, state, and local organizations are providing funding and support to construct and promote a dairy waste management demonstration project in the North Bosque watershed. The project aims to reduce 80% of the phosphorus in the liquid waste stream of the demonstration dairy. A comprehensive nutrient management plan (CNMP) for the dairy will be used to direct the demonstration. An anerobic manure digester and good land application and conservation practices will be employed to manage the operation's nutrients. A permitted dairy producer in the North Bosque Watershed, Keith Broumley, has been recruited and agreed to implement the project on his farm. TIAER has designed a monitoring plan to assess both the digester operations and runoff from application fields.

Funding for the digester comes from federal EPA CWA §319(h) NPS pollution prevention grants, United States Department of Agriculture (USDA) - Natural Resource Conservation Service (NRCS), Department of Energy, and private funds. The TCEQ, the TSSWCB, and the Brazos River Authority (BRA) are providing pass-through NPS grants and cost share funds. Private sources of both in-kind services and funds include the Texas Farm Bureau, United Cooperatives Services, Altria Group Inc., and the Broumley Dairy. The BRA is the lead partner and will provide overall management and administration for this project.

A construction contractor was selected in April 2004 and excavation work began in June. Construction of the digester was completed in Fall 2004. After the digester is operational, the United Cooperative Services, a rural electric cooperative in Cleburne, has agreed to compensate the producer retail value for the amount of electricity produced by the digester on a "net metering" basis for a period of two years.

Evaluating New Technologies – Reducing the Nutrient Content of Dairy Effluent

The TSSWCB has contracted with the Texas Water Resources Institute (TWRI) to test new technologies designed to reduce water pollution associated with animal production systems, principally dairies. The focus is restricted to reducing phosphorus in dairy effluent that is applied to waste application fields. Two technologies have already been selected, while the overall project is designed to accommodate four additional technologies that are yet to be determined. The two selected technologies include an electrocoagulation system, and a geotextile solids separation system. The demonstration of these technologies is planned for Spring 2005.

Establishing a Watershed Coordinator to Enhance Communication and Planning

With dozens of various agency and municipal pollution abatement efforts underway in the North Bosque watershed, effective coordination of these activities is critical to prevent duplication and maximize limited funding. The TSSWCB has contracted the Brazos River Authority to provide overall coordination of these activities in the watershed. A monthly newsletter and website on North Bosque activities is produced and hosted by the BRA. The BRA is also developing a watershed plan that when completed will support and enhance the TMDL Implementation Plan for Soluble Reactive Phosphorus in the North Bosque River Watershed.

Salinity Reduction in the E.V. Spence Reservoir

E. V. Spence Reservoir was placed on the *1998 CWA* §303(d) List because sulfate and total dissolved solids (TDS) concentrations exceeded the segment standards criteria of 450 mg/L, and 1,500 mg/L, respectively. These loadings are a result of both natural and man-made, nonpoint pollution which is prevalent in numerous locations within the basin. Surface water traveling across mineral beds such as salt flats, the dissolution of natural underground mineral deposits, and the concentration effects of certain types of plants are the primary causes of the natural pollution. Improper brine disposal, leaking oil well casings, and the over-pressurization of down-hole formations are the prime sources of the man-made pollution.

In August 2001, the TCEQ adopted the "Implementation Plan for Sulfate and Total Dissolved Solids TMDLs in the E.V. Spence Reservoir" to implement two TMDLs approved by EPA in May 2003. A suite of measures were outlined in this implementation plan including: 1) point source controls, 2) modification of reservoir operations, 3) water quality diversions, 4) oil well plugging, 5) weather modification, 6) remediation of magnesium plant site, and 7) targeted brush control. To assist with implementation of the TMDL, TSSWCB and TCEQ obtained CWA §319(h) funds to implement the targeted brush control and oil well plugging measures described in the implementation plan.

Oil and Gas Well Plugging Initiative

The TCEQ and the Texas Railroad Commission (RRC) collaborated to fund plugging of abandoned oil and gas wells in the E.V. Spence Reservoir watershed in order to eliminate the threat of future contamination from these pollutants. The Phase I project targeted Segment 1411 and encompassed seven counties in West Texas: Borden, Scurry, Howard, Mitchell, Nolan, Sterling and Coke. This project was completed in August 2002, during which 197 abandoned, non-compliant oil wells were plugged. Data collection and analysis from this project provided valuable information to the TCEQ with respect to load allocation and it was determined that additional well plugging initiatives were needed in the TMDL Implementation Plan for the E. V. Spence Reservoir.

The RRC continued to evaluate problem areas in the E. V. Spence Basin and identified several

abandoned wells in Runnels County, which were not included in the original project area of Phase I. Runnels County encompasses a large portion of Segment 1426 running southeast of the E. V. Spence Reservoir, which is also a contributor to salinity levels in the Upper Colorado drainage basin. The RRC is currently working on an initiative to plug 115 abandoned wells in Runnels County, and have identified 100 candidate wells, plugging 77 wells to date. This project is on schedule and will be completed August 2005.

Phase II began during May 2004 to identify and plug 80 more abandoned, non-compliant wells in the same seven-county area targeted during Phase I. Due to the recent initiation of this project, only six wells have been plugged to date.

Well plugging activities performed by the RRC complement the TSSWCB's projects to control salinity from natural causes such as saltcedar. Don Horner, District 7C Director of the Texas RRC stated, "Having the TCEQ grant money has helped the RRC to re-enter and re-plug wells in Runnels and Coke Counties sooner than otherwise, since the RRC Oil Field Clean Up Fund has put a priority on unplugged well-bores. Most of the wells we re-entered were found to have a water flow at the surface after the surface plug was drilled out, and most, if not all of these wells had inadequate surface casing based on today's water quality protection depths set by the TCEQ. The data gathered from these plugs has proved how necessary this program is to protecting fresh water."

Chemical and Biological Control of Saltcedar

The TSSWCB is also currently funding three projects under their CWA §319(h) program to support the Implementation Plan for the Sulfate and TDS TMDLs in the E.V. Spence Reservoir. These projects are reducing NPS loadings resulting from invasive brush species on agricultural lands by chemically and biologically treating saltcedar in riparian areas along the Colorado River and its tributaries. In areas where chemical control is not feasible due to sparse stands or close proximity to sensitive vegetation, the project staff are introducing the Chinese leaf beetle (*Diorhabda elongate*) to the E. V. Spence Reservoir, and monitoring the results with satellite imagery. They are also modeling the dispersal rate of the leaf beetle and evaluating the use of the leaf beetle to manage saltcedar regrowth, following chemical treatment.

In other areas of the watershed, the TSSWCB is chemically treating saltcedar in a 150-ft wide corridor (75 ft on each side of the river) along the Colorado River and its tributaries. During FY 2004, the first year of the project, approximately 1,500 acres were scheduled to be treated; however, there was no spraying due to undesirable leaf canopy conditions. Therefore, the acreage scheduled for 2004 will be combined with the acreage scheduled for 2005, to treat approximately 2,770 if conditions are conducive.

Diverting Saline Water Away from the Reservoir

The Colorado River Municipal Water District (CRMWD), which provides water to the cities of Odessa, Big Spring, and Snyder, owns and operates three major west Texas surface water supplies on the Colorado River: Lake J.B. Thomas, E.V. Spence Reservoir, and O.H. Ivie Reservoir. One of the management practices outlined in the TMDL Implementation Plan is the diversion of saline water entering the reservoir from upstream to prevent salt concentrations in the reservoir from increasing further. The CRMWD operates a diversion system which functions to

prevent highly mineralized surface water in the Colorado River and in Beals Creek (a tributary to the Colorado River) from reaching E.V. Spence Reservoir. These diversion works were placed in operation in December of 1969. CRMWD now has the capability of impounding up to 100,900 acre-feet of poor quality water for evaporation.

The diversion system captures poor quality surface water during normal flow periods and pumps it to nearby storage reservoirs for evaporation. During rainfall events, salt concentrations are significantly lower from normal flow conditions. These storm events are not commonplace in the watershed, and offer some of the best opportunities for lowering salt concentrations in the E.V. Spence Reservoir.

Typically, the first flush of runoff from a rain event has a high salt content due to washing off the buildup of minerals accumulated since the last rain event. However, as flow continues, the salt concentration usually decreases. In November 2004, TCEQ deployed two continuous monitoring sites on Beals Creek and the Colorado River to measure temperature, flow, and specific conductance. The ability to continuously monitor the saline concentration allows the CRMWD to manage their diversions more accurately and effectively. The result is twofold: poor quality water is removed from the system; and the maximum amount of higher quality water is kept in the system.

Water Quality Management Plans (WQMP)

A WQMP is a site-specific plan developed through and approved by soil and water conservation districts for agricultural or silvicultural lands. A WQMP includes appropriate land treatment practices, production practices, management measures, and/or technologies. The purpose of WQMPs is to achieve a level of pollution prevention or abatement determined by the TSSWCB, in consultation with local soil and water conservation districts, to be consistent with state water quality standards.

The passage of Texas Senate Bill 503 directed the TSSWCB to implement WQMPs in Texas. The Agency has been implementing WQMPs since the mid 1990s and has completed over 6,000 plans in the state of Texas. Fiscal year 2004 was a productive year for the Senate Bill 503 program. A total of 996 WQMPs covering 238,336 acres were developed and certified by the TSSWCB. Approximately $1,940,000.00 was obligated for cost-share assistance. WQMPs have been and continue to be a very effective tool used to address NPS pollution from agricultural and silvicultural lands, animal feeding operations (AFOs) (i.e. dairy and poultry operations), and implemention of TMDLs (i.e. Arroyo Colorado, Bosque River, Aquilla, etc.).

WQMPs for Poultry Operations

Since 1993, dry-litter poultry operations throughout Texas have voluntarily participated in the WQMP to promote conservation and take advantage of financial assistance for conservation, mortality, and waste management. Since 1999, seven projects funded by EPA through grants from CWA §319(h) have provided technical and financial assistance through local SWCDs to poultry producers to obtain and implement certified WQMPs. In 2001, the Texas Legislature passed Senate Bill 1339, which required all Texas poultry producers to obtain and implement a WQMP certified by TSSWCB. The TSSWCB has certified more than 1,300 WQMPs on poultry operations statewide. During FY 2004 the combined efforts of the TSSWCB regional offices in Mount Pleasant, Wharton, and Dublin resulted in the development of

140 WQMPS. Also during 2004, 95 WQMPS were revised and a total of 257 status reviews were conducted.

Due to changes made by the EPA to the federal regulations for concentrated animal feeding operations (CAFOs), the TCEQ adopted a rule that requires dry-litter poultry operations with 125,000 or more broilers or pullets, 82,000 or more layers or breeders, or 55,000 turkeys to operate under a water quality permit. Prior to this change, all dry-litter poultry operations were considered nonpoint source and were not required to have a permit. The requirement for a permit becomes effective in April 2006. TSSWCB estimates between 300-500 existing poultry operations will require a permit. Most of those farms already have a certified WQMP.

The final CAFO Rule adopted by TCEQ recognizes that a poultry operator's existing WQMP meets the majority of the technical requirements required by a permit. The TSSWCB Staff is currently working on a new guidance document and is conducting public meetings to assist poultry producers in utilizing their existing WQMPs as a component to the general permit.

Arroyo Colorado Watershed Protection Plan

The Arroyo Colorado flows through Hidalgo, Cameron and Willacy County in the Lower Rio Grande Valley of Texas into the Laguna Madre. Flow in the Arroyo Colorado is sustained by waste water discharges, agricultural irrigation return flows, urban runoff, and base flows from shallow groundwater. The Arroyo is the major source of fresh water to the lower Laguna Madre, an economically and ecologically important resource to the region. The Laguna Atascosa National Wildlife Refuge and several county and city parks are located within the Arroyo watershed. The mild climate, semi-tropical plants and animals, and many recreational opportunities draw large numbers of people to the Arroyo Colorado watershed. One third of the stream is also used for shipping from the Gulf Intracoastal Waterway to the Port of Harlingen.

The lower reaches of the Arroyo Colorado have historically failed to meet some of their uses under the *Texas Surface Water Quality Standards* due to fecal coliform bacteria and low dissolved oxygen. According to TCEQ's 2003 estimates, in order to meet the dissolved oxygen criteria (24-hour average of 4.0 mg/L and minimum of 3.0 mg/L) at least 90% of the time during the critical period between March and October, a 90% reduction in nitrogen, phosphorous, and oxygen demanding substances will be necessary. These load reductions are not technically achievable. Additionally, study results indicate that the dissolved oxygen problem in the tidal segment is related as much to the physical setting and geomorphology of the Arroyo Colorado as it is to the loading of nutrients and oxygen-demanding substances from the non-tidal segment. Consequently, the TCEQ's TMDL Program is working with the Arroyo Colorado Watershed Steering Committee to develop a watershed protection plan (WPP) that will improve conditions in the Arroyo Colorado.

Watershed Protection Plan Development

In response to this impairment, a local effort has been initiated to develop a watershed protection plan (WPP) to improve conditions in the Arroyo Colorado. Working with the TCEQ, the TSSWCB, and other agencies, a local steering committee will devise and implement strategies to increase dissolved oxygen in the Arroyo and improve its environmental condition.

The Arroyo Colorado Watershed Steering Committee has established several work groups to address the five major components of the watershed plan: wastewater infrastructure; agricultural issues; habitat restoration; refinement of the TMDL analysis; and public education. The project has significant financial support from federal nonpoint source grants under CWA §319(h). Already, the stakeholders have made great progress. The Education and Outreach Work Group has developed an outstanding multimedia presentation about pollution problems in the Arroyo and how to get involved in addressing them. In May 2004, the TCEQ and the Habitat Restoration Work Group established contracts with Texas A&M's Sea Grant program and the Texas Parks and Wildlife Department (TPWD) to provide an independent watershed coordinator and a habitat restoration specialist to assist in the development of the WPP. The WPP is expected to be completed January 2006.

Water Quality Management Plans (WQMP) in the Arroyo Colorado

Concurrent to the Watershed Protection Plan development efforts, the TSSWCB, in conjunction with local SWCDs and the NRCS, are implementing WQMPs to reduce NPS from agricultural operations. TCEQ (2003) estimates that between 1989 and 1999, agricultural NPS runoff was responsible for 87% of the suspended sediment, 41% of the BOD, 68% of the nitrate, 64% of the ammonia, and 49% of the phosphate load in the Arroyo (Segment 2201). Through the use of state cost-share funds and a number of CWA §319 projects in the Arroyo Colorado watershed the TSSWCB and SWCDs have begun addressing the loading attributed to the approximately 290,000 acres of irrigated cropland in the watershed. To date, the TSSWCB has certified 223 WQMPs covering 28,702 acres. Through these WQMPs approximately 10,000 acres have been contracted for incentive payments for nutrient management, 7,634 acres have had irrigation land leveling done and 96,483 feet of subsurface drains and 143,570 feet of irrigation pipeline have been installed. Approximately 98% of the 28,702 acres mentioned above is designated as irrigated cropland. Much work remains to be done in the Arroyo, but the State is confident that water quality improvements will be achieved.

USDA - Natural Resources Conservation Service (NRCS)

For FY 2004, with the funding for water quality, saltcedar, water quantity and brush control/water quantity, EQIP (Environmental Quality Incentives Program) provided cost share assistance to 902 producers and $17,121,338 in direct cost share assistance. Also the county base funding of $31,497,942 was used to solve high priority resource problem identified at the county (SWCD) level. Many counties addressed water quality issues, particularly sedimentation with this assistance.

Santa Rosa Springs Water Quality Preservation Project

The Santa Rosa Springs are located in Northern Pecos County between Grandfalls and Fort Stockton. At one time, there were 42 live springs in Pecos County, including the famous Comanche Springs, Leon Springs, Santa Rosa Springs, and the Diamond Y Spring. Due to irrigation draw-down, drought, and the encroachment of water depleting saltcedar, that number has been reduced to only two: the Santa Rosa, and the Diamond Y Springs. These springs are a unique feature because they are located in the heart of the Chihuahuan Desert.

The Santa Rosa Springs were used primarily for irrigation, until sometime around 1950 when decreased flow caused irrigation to cease. The owners at the time decided that they should create a water district to try to bring the flow of the spring back. The Pecos County Water Control and Improvement District #2 was created in 1955 by an act of the Texas Legislature. There were $800,000 in bonds authorized by Pecos County for use by the district, but only $180,000 was actually spent. Several schemes were attempted to provide additional water for the spring including: dredging; building a dam; and drilling a well to tap into an artesian formation. Due to the prolonged drought, the artesian formation that the water district hoped to tap into was not flowing. Instead of filling the spring with water, the well drained the spring. The water district did manage to put a makeshift cap on the well before abandoning operations in the early 1960s. Several years later it came time to make payments on the bonds. The county couldn't levy enough taxes to pay the bonds, so they defaulted on them. There was a series of lawsuits filed, and the issue was finally settled by the U.S. Supreme Court upholding the water district as being valid. The county worked out a deal to pay off the bonds with the oil companies that owned the minerals under the land. The owners that created the water district filed for bankruptcy, and the ranch was sold. The county never went through the formal process to dissolve the district; they just quit levying taxes.

Schuyler Wight III purchased the property in 1987. In 1999, after seeing successful results from saltcedar management experiments on the Pecos River, Mr. Wight began treating the dense stands of saltcedar that had grown up in and along the catchments around the old spring. As the saltcedar died out, the historic spring began bubbling back to life.

In January 2001, Mr. Wight found the old abandoned Pecos County Water Control and Improvement District well flowing near the spring. He immediately called the Texas Railroad Commission (RRC) because he assumed that it was an old oil well. The water from the well was determined to have salinity concentrations as high as 78,000 mg/L. In comparison ocean water generally has a salinity of 35,000 mg/L. A temporary cap was installed on the wellhead by the RRC to stop the flow of approximately 100,000 barrels per day of salt water while they searched for a responsible operator. Since the water district responsible for the well was no longer in operation the well became Mr. Wight's responsibility. The immediate concern was that the salt formation would move upward or outward and reach the Santa Rosa Spring or the Pecos Tertiary Alluvium fresh water aquifer. Additionally, there was a concern that saltwater would flow approximately four miles and empty directly into the Pecos River. Mr. Wight sought the assistance of the TSSWCB. As a result, the TSSWCB's initiated two CWA §319(h) projects to decommission the water well in order to prevent the destruction of the environmentally and historically significant Santa Rosa Springs and subsequent contamination of parent groundwater by excessive salinity. The Pecos

County Water Control and Inspection District #2 well was successfully decommissioned in July 2004. It is estimated that this prevented the flow of almost two tons of salt per day into the spring and eventually the Pecos River.

Clean Water State Revolving Fund (CWSRF)

The Texas Water Development Board (TWDB) continues to facilitate the funding and implementation of nonpoint source projects consistent with the Texas NPS Management Program. The TWDB did not fund any NPS projects during the 2004 fiscal year. They are currently in the process of completing the development of a linked deposit loan program that can be utilized by private entities to fund the implementation of NPS projects on private property. It is anticipated that the funds could be used as loans to match Environmental Quality Incentives Program (EQIP) projects or other abatement projects approved by the TCEQ or TSSWCB. The TWDB continues to meet with stakeholders including potential applicants, the TSSWCB, and the TCEQ, to increase awareness of EPA's Clean Water State Revolving Fund (CWSRF) as a funding alternative for identified management plan projects which address nonpoint source and estuary problems.

Galloway-Hammond Project

The Lower Colorado River Authority (LCRA) and the City of Burnet have begun work on a CWA §319(h) grant project to install and demonstrate stormwater best management practices on Hamilton Creek to reduce the nutrient and sediment loads into the stream which ultimately flows into Lake Travis.

The goal of this project is to filter stormwater runoff, retain pollutants, and reduce runoff volume from impervious surfaces and playing fields at the Galloway-Hammonds Recreation Center, through a series of structural and non-structural BMPs. Progress in 2004 has resulted in 95% completion of one water quality pond. This pond has functioned well during recent rainfall events, with preliminary monitoring showing a TSS reduction from 44 mg/L to 16 mg/L during one storm event. In addition to addressing the nonpoint source concerns for the Galloway-Hammonds Recreation Center, this project will serve as a demonstration of alternative methods to manage stormwater runoff for Highland Lakes Region developers and engineers.

EDUCATION

NPS education efforts are aimed at increasing awareness of NPS pollution and encourage voluntary NPS pollution prevention activities. Public education and awareness are essential because everyone who lives or works in a watershed can contribute to nonpoint source pollution. Although measuring success from state, regional and local education programs is difficult to quantify, the potential to achieve water quality improvements is greatly enhanced by education and public involvement. There are several state, regional, and local organizations that have programs to educate and inform the public on environmental issues promoting stewardship and protection of natural resources. These organizations continue to develop new programs every year.

Texas Silvicultural Nonpoint Source Pollution Project

The Texas Silvicultural NPS Pollution Project has had a tremendous impact on water quality in the forested region of East Texas. Through this project, the forestry community has been able to prevent almost 12,000 tons of sediment from reaching streams and 96,000 tons of sediment from eroding off East Texas forestlands every year, by using Forestry Best Management Practices.

The Texas Forest Service recently began an innovative, high-tech monitoring project designed to test the effectiveness of our state recommended BMPs. This project will provide data on the effectiveness of our BMPs by measuring stream habitat, biological communities, and physiochemical properties before and after forest operations. Another method that is often used is to monitor randomly chosen forestry sites for BMP implementation. The most recent monitoring recorded the highest ever BMP implementation rate in the history of the program. (Figure 8.) To date, more than 800 forest operations have been evaluated for the implementation of BMPs. Early projections show the current round to meet or exceed these record levels.

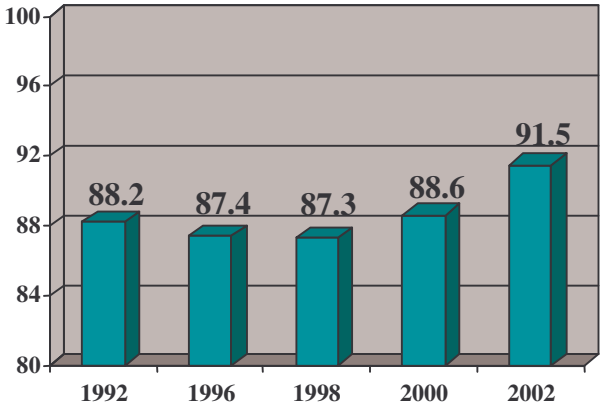

Figure 8. Overall BMP implementation since 1992.

Education and technical assistance has been vital to the success of this project in protecting water quality.

- *To date, more than 2,700 loggers have been trained in BMPs through 109 workshops. An online BMP refresher course is scheduled to be released this spring. An estimated 500 people per year are expected to participate.*

- *More than 30 major forest landowner workshops, reaching nearly 4,000 people, have been held throughout Texas to inform landowners on the importance of using BMPs, reforestation, and wildlife management.*
- *An aggressive advertising campaign that includes radio and TV ads, newspaper articles, newsletters, and billboards has targeted more than one million people.*
- *The Texas Forestry Best Management Practices Handbook was updated in 2004, allowing the forestry community to achieve greater water quality protection.*

TCEQ TMDL Program

The TCEQ's TMDL Program uses four primary forums for statewide education — its Web site, the brochure *Clean Water for Texas*, an annual report of implementation progress, and coordination with statewide forums like the Stakeholder Work Groups of the CRP and of the NPS Management Program. Regionally, the TMDL Program coordinates its projects with the CRP Basin Steering Committees. For some of the more simple TMDL projects, the existing CRP forum may serve as the advisory group for the project.

Statewide Coordination and Education

Through its Web site, the TMDL Program provides an annual report on the status of TMDL implementation, summaries of all completed and current TMDL projects, and program descriptions such as *Clean Water for Texas*. The Program also operates a Web-based service that sends water program news to subscribers by email. Approximately 215 members had subscribed to the TMDL email news through November 2004, with new members subscribing each week.

Since its publication in July 2004 through November 2004, the annual report, *Implementing TMDLs in Texas: A Status Report*, has been downloaded more than 3,800 times. The project overviews and *Clean Water for Texas* are used at stakeholder meetings, workshops, and other public forums throughout the state to educate people about the TCEQ's water quality restoration activities and plans.

The TMDL Program stays in regular communication with its partners in regional, state and federal government agencies, and educational institutions through work on projects and at meetings of statewide stakeholder forums.

Regional and Local Participation

The projects in watersheds where there is strong local interest, or where many parties and activities may be required to successfully develop and implement a TMDL, the TCEQ forms local stakeholder advisory committees. Members of these groups represent diverse interests in the community, including local businesses, government agencies, agriculture, environmental and civic groups, wastewater dischargers, and individuals.

In 2004, the TCEQ's TMDL Program held 30 meetings working with 12 local stakeholder groups on projects that address surface waters impacted by nonpoint sources. In addition, the TMDL staff met with CRP stakeholder groups or held public meetings to inform local residents about TMDL projects in their watersheds.

Education is a key aspect of every stakeholder group's work. The TCEQ and its contractors in the TMDL project provide education and information to the stakeholders about the findings of scientific investigations and modeling. The stakeholders work with other area residents to raise the issues in public forums and build support for needed activities. Each stakeholder group works with the TCEQ and the project's lead organization to develop materials that are specific to local

problems. Some examples of materials developed by and for stakeholder groups in 2004 are: a multimedia presentation about pollution problems in the Arroyo Colorado developed by the TCEQ and the Arroyo Colorado TMDL Steering Committee and its Education Work Group; and a brochure developed by the Houston-Galveston Area Council and the Houston Ship Channel Dioxin TMDL Stakeholder Group

Texas Watch Volunteer Monitoring and Environmental Education Project

Texas Watch conducts NPS education and training activities through a statewide partner network that includes the Texas CRP, federal agencies, schools, regional councils, and municipalities. Through this network Texas Watch supports monitoring projects by certifying volunteer monitors and trainers, coordinates watershed assessment projects, conducts watershed education activities and initiatives that communicate NPS information to and educators via training and curriculum, and to the general public through presentations and public forums.

In 2004, the Texas Watch monitoring network was active in 18 of the 23 major river basins in Texas with 3599 volunteer hours contributing to 878 monitoring events at 195 sites. In addition to supporting monitoring activity, Texas Watch presented information about reducing NPS to more than 1,500 students and 100 adults, certified 136 teachers, and coordinated three regional meetings that attracted over 150 participants. Examples of additional Texas Watch activity include:

- Collaboration in developing monitoring projects that involve local and regional partners assisting with technical expertise, monitoring equipment, data analysis and response efforts.

- Coordination of "United by the River", a partnership between the cities of Laredo and Nuevo Laredo and International Boundary and Water Commission (IBWC). Activities have included a formal proclamation by City of Laredo, certification of city staff as Texas Watch Trainers, certification of Laredo ISD teachers and Gary Job Corps participants as Volunteer Monitors, and a public NPS education forum. Through these efforts volunteer monitors have become part of a growing network of concerned citizens working to address water quality threats in an area projected to grow from 11.8 million people to 19.4 million in 2020.

- Development of a third and fourth part of a curriculum suite that parallels the Texas Watch monitoring and assessment manuals. These curricula enable teachers to translate water quality monitoring activities into a classroom environment saving time and resources.

- Coordination of a statewide sampling event in conjunction with the annual October 18 World Water Monitoring Day. This event promotes water quality monitoring as well as encourages collaboration and cooperation between Texas Watch volunteers and monitoring professionals.

TCEQ Small Business Water Pollution Prevention Campaign Focuses on Laredo and the Rio Grande Valley

A NPS Public Education Campaign funded primarily through a CWA §319(h) grant was kicked off on July 13th in Laredo and the Rio Grande Valley by the TCEQ. This campaign was to address nonpoint source pollution along the border.

The education campaign of, "Please Don't Feed the Storm Drain," began as a statewide initiative in 2002. The campaign was created to better inform the public about how common household waste and chemicals can contaminate drinking water sources, especially in TMDL watersheds. The water pollution campaign specifically targets residents who contribute pollutants, such as motor oil and pesticides that wash down storm drains and into creeks, lakes, and rivers that serve as sources for drinking water.

The cornerstone of the Laredo and Rio Grande Valley campaign was a radio announcement, written and sung in both English and Spanish. The lyrics, "Don't feed the storm drain, better stop and think. It flows into the rivers, into what our children drink," and goes on to give tips for the public to properly dispose of chemicals and protect storm drains. Various local sponsors provided free airtime for the spot to run on Laredo and Valley stations throughout the summer.

In addition to the radio campaign, the TCEQ enlisted television meteorologists in the targeted areas to deliver pollution prevention tips during their summer forecasts. The TV public service announcements developed in 2002 were recycled and distributed throughout Laredo and the Rio Grande Valley. The TCEQ conducted outreach through radio remotes at H-E-B grocery stores to educate shoppers as they bought products with potential water pollutants. Informational brochures were also developed to distribute throughout the Arroyo Colorado watershed to raise awareness.

A research report was conducted to assess the effectiveness of the campaign among consumers and stakeholders. The objective of the report was to measure the impact of the awareness, perceptions, and actions related to reducing nonpoint source pollution in Texas and specifically in the Laredo/Rio Grande Valley area.

Friends of the Rio Grande

During FY2004, TCEQ, in cooperation with the IBWC, initiated "Friends of the Rio Grande" as an education and outreach program modeled after the Texas CRP. Local entities are invited to submit proposals for reimbursement for education and outreach efforts on the Rio Grande. Through the Clean Rivers Program contract, IBWC will provide up to $40,000 of state funds in reimbursement to local entities for education and outreach projects such as purchase of Texas Watch monitoring kits and river clean-up events.

Border 2012 Environmental Program

The TCEQ is a partner with the EPA, other U.S. border states, and Mexican counterpart agencies in the implementation of the bi-national Border 2012 Environmental Program. The TCEQ provides a staff member in the Laredo and El Paso offices to work directly with local task forces to help organize regional workgroups and media-specific task forces (including water quality) and provide support to the Border 2012 program.

In 2004, EPA began providing competitive grants for Border 2012. The City of Brownsville was awarded $25,000 for three projects related to nonpoint source pollution, to be implemented in FY2005. The three projects include a workshop for all City public works supervisors (other cities in the Lower Rio Grande Valley will be invited to send staff), an educational outreach initiative aimed at local public schools, and a training program in environmental management systems (including water discharges) for selected city staff. Those staff will be certified as inspectors for NPS pollution, and subsequently will make presentations and offer training to local businesses that have been the targets of various complaints.

Tres Palacios Campaign to Eliminate Illegal Dumping

The LCRA in conjunction with the Matagorda County Environmental Health Department (MCEHD), are conducting a nonpoint source public education and enforcement campaign addressing illegal dumping in the Tres Palacios River Basin. The goal of the project is to curtail illegal dumping and discharges through enforcement, using the local crime stoppers hotline through a partnership with Matagorda County Crime Stoppers. The project is also conducting an education campaign that includes signs at bridge crossings, billboards throughout the watershed, and public service announcements in local newspapers and radio stations.

In 2004, LCRA worked extensively with citizens' groups, municipal, and county officials to facilitate the public education campaign. LCRA also worked with the Matagorda County Assistant District Attorney and the Bay City Police Department to develop an inter-local agreement regarding the prosecution of perpetrators of illegal dumping. In 2004, the crime stoppers tip line received approximately 25 calls reporting illegal dumping. Local law enforcement officials investigated a variety of complaints including the improper disposal of septic tank waste, building materials, and oil field sludge. The investigations led to the identification of many perpetrators and the cleanup of the waste materials. LCRA continues to work with the CRP Steering Committee to address the problem of illegal dumping in the Tres Palacios River Basin and to possibly expand the program to additional counties within the LCRA jurisdiction.