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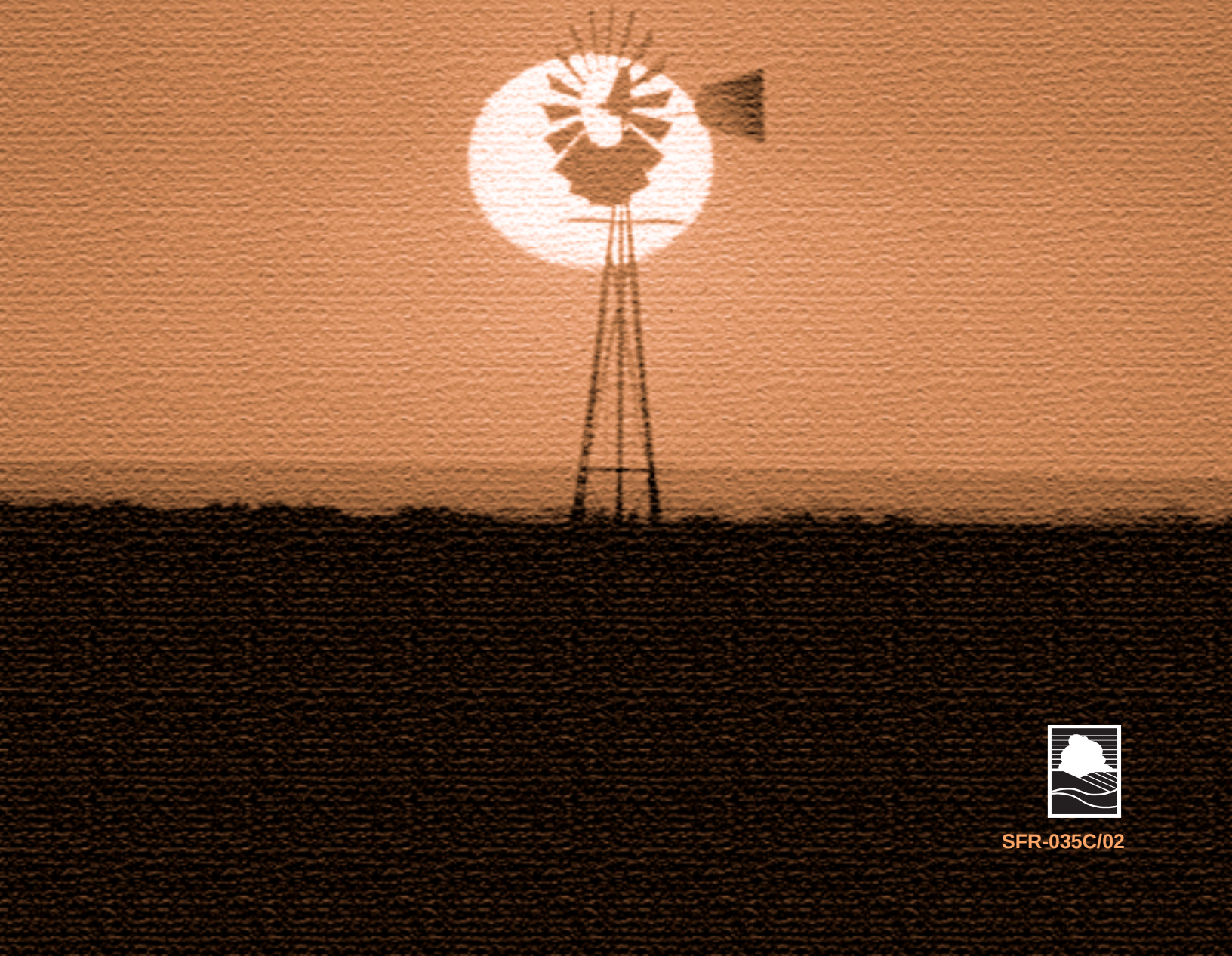
TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

STATE OF THE RIO GRANDE AND
THE ENVIRONMENT OF THE BORDER REGION

# Strategic Plan

FISCAL YEARS 2003 - 2007 VOLUME 3



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THE ENVIRONMENT OF THE BORDER REGION

# Strategic Plan

FISCAL YEARS 2003 - 2007 VOLUME 3

Submitted to the
**Governor's Office of Budget and Planning and the Legislative Budget Board**

**June 2002**


**Robert J. Huston**
**Chairman**
Austin
Term Expires: August 31, 2003

**R.B. "Ralph" Marquez**
**Commissioner**
Texas City
Term Expires: August 31, 2005

**Kathleen Hartnett White**
**Commissioner**
Valentine
Term Expires: August 31, 2007

**Robert J. Huston,** *Chairman*
**R. B. "Ralph" Marquez,** *Commissioner*
**Kathleen Hartnett White,** *Commissioner*

**Jeffrey A. Saitas,** *Executive Director*

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# EXECUTIVE SUMMARY

STATE OF THE RIO GRANDE AND THE ENVIRONMENT OF THE BORDER REGION

The *State of the Rio Grande and the Environment of the Border Region* is a report prepared by the Texas Natural Resource Conservation Commission (TNRCC) to describe the border environment as it exists in 2002. Much of this report is based on the perspective of border residents. The report also uses information that the TNRCC and other agencies have collected and assessed over time. The purpose of this document is to provide information that will assist policy makers as they work to improve and protect the environment of the Rio Grande and the border region.

## About the Report

The 2002 *State of the Rio Grande and the Environment of the Border Region* is Volume 3 of the TNRCC *Strategic Plan, Fiscal Years 2003-2007*, which also includes Volumes 1 and 2. As the first of a series of planned annual reports, it provides a detailed overview of the border. In this report, Mexico is brought into the picture when relevant data are available. Future reports will not repeat the comprehensive history and analysis included in this initial edition, but will provide an update on border conditions and will include special focus topics.

Reports that are published after September 1, 2002, will be produced under the TNRCC's new name, the Texas Commission on Environmental Quality (in Spanish, la Comisión de Calidad Ambiental de Texas). The name was changed by the 77th Texas Legislature in 2001.

## Priority Issues

While other issues have also attracted attention within different regions and are described in this report, the pressure on the quantity and quality of the border water supply is the chief concern expressed by border residents at various public meetings.

To gather public opinion about environmental issues along the border, the TNRCC relied on a variety of sources, ranging from formal hearings to board and workgroup meetings to roundtables in many cities of the region. These sessions were hosted by many different organizations, including the TNRCC, the U.S. Environmental Protection Agency (EPA), and the Mexican environmental agency (SEMARNAT). **Water quantity and water quality issues topped the lists of priorities identified by border residents at these meetings.**

The border region often is perceived as a single entity with similar characteristics. However, differences within the region occur due to economic conditions, population density, geography, and climate. Residents in different subregions of the border identified major local priorities, discussed in greater detail in following sections of this summary. The top subregional priorities were as follows:

- **Upper Rio Grande Subregion (El Paso to International Amistad Dam, about 646 miles)**—water quantity, water quality, and air quality;
- **Middle Rio Grande Subregion (International Amistad Dam to International Falcon Dam, about 294 miles)**—water quantity, water quality, and waste management; and
- **Lower Rio Grande Subregion (International Falcon Dam to the Gulf of Mexico, about 280 miles)**—water quantity, water quality, and provision of environmental infrastructure to colonias.

## Defining the Border Region

In discussing the border region, this document chiefly relies on the definition set out in the 1983 La Paz Agreement between the U.S. and Mexico. Under that definition, the U.S.-Mexico border region is the area within 100 kilometers (62.5 miles) of the international boundary. In Texas, that includes all or part of 32 counties (See Figure 1-1).

## Border Trends

Urban populations are growing rapidly in the border region, exceeding growth throughout the rest of the state and much of the nation. The McAllen-Edinburg-Mission area is the fourth-fastest growing metropolitan statistical area in the U.S. On the Mexican side of the border, population is rising even more quickly, expanding by almost 50 percent in the past 10 years. With this boom has come both an increased demand for water supplies and a strain on communities' water, wastewater, and waste management infrastructure. However, populations in small and rural counties are decreasing along the border, as they are throughout the state and nation.

Between 1996 and 2000, total U.S. exports and imports with Mexico (as measured in dollars) almost doubled. The region's economy depends on agriculture, ranching, oil and gas production, trade and commerce, industry, and tourism. Agriculture is particularly important in the Lower Rio Grande Valley, where the lack of an adequate supply of high-quality water is threatening the livelihood of farmers.

Per capita income is lower in the border region than other parts of Texas as a whole. Lower income results in fewer tax dollars for local governments to meet existing needs, to keep up with rapid growth or to plan for the future. Communities are challenged to do more with less. Many colonia residents still lack access to infrastructure and services. Colonia residents also have raised questions about environmental risks and environmental equity issues.

Illegal dumping is the top border waste management problem. Dumping increases diseases from rats, mosquitoes, and other pests living in the trash. Hazardous waste management, while a concern, is a more severe problem in other parts of the state than along the border, because there is less major industry along the border than in other parts of Texas.

In Mexico, current levels of economic growth have made the border one of that country's more prosperous regions, though it faces the same concerns as Texas border areas. Foreign-owned industrial plants called maquiladoras have thrived, attracting more residents to the border for employment. The influx of people increases the demand for drinking water, wastewater treatment, and solid waste landfills, collection stations, garbage pickup, and recycling. As a result of the continued growth of maquiladoras, border residents are requesting assurance that hazardous materials will be transported, stored, and disposed of safely.

## The Border Environment

Four main environmental areas of concern affect residents of the border. These are water quantity, water quality, waste management, and air quality.

### Water Quantity

A combination of factors has resulted in a water shortage in parts of the Rio Grande watershed, including groundwater depletion, ongoing drought, Mexico's huge backlog of water owed to the U.S. under an international treaty, and aquatic plants absorbing water and blocking stream flow.

Many communities along the border depend heavily on groundwater. Increased use is rapidly depleting the available amount of high-quality groundwater. Ciudad Juárez, Chihuahua, is projected to exceed its existing groundwater resources by 2005; its sister city, El Paso, Texas, may do the same by 2030. In Juárez, city officials have developed a plan to provide water to the city that includes development of the Conejos-Medano aquifer; treatment of Rio Grande water for reuse; desalinization of Juárez valley water; and use of Bismark mine water. Although current plans for El Paso's future water needs do not incorporate the Hueco Bolson, other approaches are being studied to meet El Paso's needs, including construction of desalinization plants for brackish groundwater and groundwater transfer from rural counties.

Cross-border sharing of groundwater poses a challenge. In many areas of the border, information is lacking about the quantity and quality of groundwater available for domestic, municipal, and irrigation use. Poor-quality groundwater, often brackish

due to high salt content (salinity), has limited use as a drinking water source.

Drought conditions have afflicted the border region since the early 1990s. The lack of rainfall combined with growing population along the border has meant an increasing demand on a smaller and smaller water supply. Water levels in the two international reservoirs—Amistad and Falcon—are at their lowest ever. In addition, unfulfilled obligations by Mexico have contributed to reduced levels of water available to Rio Grande users and have also impacted levels in the two international reservoirs.

Mexico currently owes the U.S. 1.4 million acre-feet of water under the provisions of a 1944 treaty that spells out the distribution of the waters of the Rio Grande downstream of Fort Quitman, Texas. Under the treaty, Mexico is required to provide 350,000 acre-feet annually, averaged over a five-year cycle. Local water users and Texas state officials are alarmed that Mexico has been withholding U.S. water, particularly upstream in the Río Conchos a major Mexican tributary. The water deficit has received national attention from President Bush and President Fox and both countries continue to negotiate.

The explosive growth of water-consuming, river-clogging, invasive aquatic weeds, such as water hyacinth and hydrilla downstream of International Falcon Dam, further hampers streamflow. Biological and mechanical methods alone have not cleared the weeds from the river.

In February 2001, low flows in the Rio Grande from the combined drought, water deficit, and aquatic weeds, together with natural wave motion in the Gulf of Mexico, created a sandbar that completely closed the mouth of the river. Though bulldozed away, the bar was back by year's end.

Lack of water is harming agriculture, particularly in the Lower Rio Grande Valley, where economists estimate that the water deficit alone has had an annual impact of $400 million. Significant amounts of agricultural water could be saved by improving efficiency in irrigation canals that convey and distribute water. Reducing agriculture's need for water also increases the amount of water available for municipal purposes.

## Water Quality

One of the greatest threats to water quality is the lack of sufficient water and wastewater infrastructure to keep pace with border growth. Put simply, not all communities discharging into the Rio Grande have drinking water and wastewater treatment sufficient for the size of their population. This is the chief cause of water quality problems along the Rio Grande.

A lack of adequate service increases the likelihood that raw sewage or poorly treated water can enter the river, elevating bacteria levels and the risk of contracting water-borne diseases like hepatitis A. Raw sewage, wastewater, and agricultural activity also can increase levels of nutrients in the river. Elevated nutrient concentrations encourage algal growth and decrease dissolved oxygen. Low dissolved oxygen endangers aquatic plants and animals.

> One of the greatest threats to water quality is the lack of sufficient water and wastewater infrastructure to keep pace with border growth.

Small communities, including colonias, experience unique problems in developing and operating sufficient environmental infrastructure. Their need for technical assistance is much greater than current service provides. Helping to alleviate such problems are state agencies such as the Texas Water Development Board (TWDB), the Texas Department of Housing and Community Affairs (TDHCA), the Office of Rural Community Affairs (ORCA), and the Office of the Secretary of State (SOS). In addition, the Border Environment Cooperation Commission (BECC) and the North American Development Bank (NADBank) have supported development of environmental infrastructure.

The TWDB is responsible for developing a State Water Plan through regional planning groups. The agency performs major research characterizing aquifers, water availability, and environmental flow needs and conducts periodic surveys of groundwater use. Funds to construct water and wastewater plants are distributed by the TWDB through a number of programs.

The TDHCA's Office of Colonia Initiatives improves living and housing conditions in colonias throughout the border region by providing support for water and wastewater infrastructure development.

The ORCA runs the state's Community Development Block Grants (CDBG) program to increase access to housing, sanitary infrastructure, and economic opportunity. Program money can be used for a variety of water and wastewater treatment projects, including sewer systems and drinking water treatment.

The SOS Border Colonia Initiatives Program employs seven colonia coordinators in counties along the Texas portion of the border. These coordinators help link colonia residents, local governments, and area utilities to extend basic infrastructure services to the colonias. The coordinators help track work of the TEXAS Plan, an SOS-sponsored initiative that directs funding and activity towards hooking up colonias to water and wastewater treatment service.

The BECC certifies environmental infrastructure projects, which are then eligible for funding by the NADBank. The NADBank also manages the Border Environmental Infrastructure Fund (BEIF) to provide grant funds to border communities. Appropriated annually by Congress, BEIF funds are not always adequate to meet the border's needs. The U.S. and Mexico need to agree on funds to support the BECC and NADBank and to increase those funding levels to allow the two institutions to carry out their responsibilities as described in the Agreement between the U.S. and Mexico.

In addition to the need for adequate infrastructure, water quantity problems also affect water quality in the Rio Grande. The less water available, the more concentrated pollutants can become in the river, and the less suitable the water becomes for municipal and agricultural use. The end result is a further increase in treatment costs for border communities.

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

### Waste Management

Border growth also impedes communities' ability to manage the disposal of solid and hazardous wastes. Given the concentration of population around major metropolitan areas and the lack of waste service to colonias (particularly those in rural areas), municipal solid waste issues are a principal concern.

Limited disposal options lead to an increase in illegal dumping, a problem that can only be addressed through multiple levels of cooperation among public and private entities. Improper disposal of used tires is a major concern in the region. Abandoned scrap tires can serve as habitats for pests like mosquitoes, which can carry dengue fever and other diseases.

Limited disposal options lead to an increase in illegal dumping, a problem that can only be addressed through multiple levels of cooperation among public and private entities.

The amount of hazardous waste generated along the border is low in comparison to the rest of the state, and hazardous waste facilities are few. Six Superfund sites along the border are in various stages of cleanup; at two of the six (one in Zavala County and one in Hidalgo County), cleanup has been completed. The other four are located in Cameron, Hidalgo, and El Paso Counties.

Hazardous waste transportation is a concern in border port-of-entry cities, where chemical spills pose a potential threat to public health and water supplies. Laredo, the largest port-of-entry along the border, has adopted measures to address storage and transportation of hazardous materials.

### Air Quality

Air quality problems along the border are localized. The major problems are in El Paso and Big Bend National Park, although the TNRCC continues to monitor pollution in Laredo and the Lower Rio Grande Valley.

El Paso violates federal standards for ozone, particulate matter, and carbon monoxide. The three pollutants have different effects. Ground-level ozone is a particular concern in the summer, as it affects the respiratory system, and aggravates conditions

such as asthma. Particulate matter reduces lung function, as well as causing visibility-reducing haze, a major concern in both Big Bend National Park and Guadalupe Mountains National Park. Significant research has been done on sources of haze in Big Bend National Park.

Carbon monoxide retards the blood's ability to deliver oxygen, which can cause vision problems, reduce the ability to work or learn, reduce dexterity, and—at sufficiently high levels—cause death. Residents in Laredo are on record in the meetings reviewed for this report as being worried about pollution from large numbers of trucks idling at border crossings, as well as particulate emissions from those trucks as they travel through the Laredo area.

## The Range of Border Environmental Problems

In addition to border-wide themes discussed previously, each border subregion has particular problems that generate much attention. The *State of the Rio Grande and the Environment of the Border Region* breaks out these priorities in three separate chapters, one each devoted to the Upper, Middle, and Lower Rio Grande subregions.

This report also looks at local, state, federal, and international efforts at addressing these problems and the results that have been achieved thus far, but it is not meant to provide a comprehensive action plan for the border. Developing such a multijurisdictional plan is beyond the scope of this document.

### The Upper Rio Grande Subregion

For the purposes of the report, the Upper Rio Grande subregion generally includes everything from the New Mexico-Texas state line to just above International Amistad Dam. According to residents in this area, the top three environmental priorities are water quantity, water quality, and air quality.

In the El Paso-Ciudad Juárez area, reliance on groundwater as a water supply is a key concern. Ciudad Juárez is expected to run out of groundwater in 2005, and El Paso is expected to run out in 2030. Both cities are planning alternatives to provide water for future uses. Many rural areas rely on groundwater as well. For these aquifers, the biggest concern is increasing salinity, whether due to overuse, natural salt deposits, oil-field brines, or irrigation return flows. Surface water rights have not yet been adjudicated in the region. Adjudication is a legal term referring to the manner in which water rights are allocated.

To tackle the issue of water supply, El Paso has successfully implemented an aggressive water conservation program. Water usage in El Paso is now only 152 gallons per person per day, compared to 202 gallons per person per day in Dallas. The best management practices evidenced by El Paso's water conservation efforts should be shared widely to encourage similar creative environmental problem solving throughout the border communities.

> In the El Paso-Ciudad Juárez area…Ciudad Juárez is expected to run out of groundwater in 2005, and El Paso is expected to run out in 2030. Both cities are planning alternatives to provide water for future uses.

Rising bacteria levels pose the greatest threat to surface water quality, particularly near metropolitan areas where water and wastewater infrastructure has not kept pace with growth. The same is true for bacteria levels in the Río Conchos in Mexico, a major tributary that enters the Rio Grande near the sister cities of Presidio and Ojinaga. An additional surface water problem is rising salinity upstream of the confluence of the two rivers, where surface water levels in the Rio Grande are low.

El Paso has directed considerable energy toward solving air quality problems. As stated previously, the city does not meet three national air quality standards. Vehicles and industrial facilities contribute to the problem, as well as dust from unpaved roads and agricultural operations. Complicating matters, the El Paso air basin includes Doña Ana County across the state line in New Mexico, as well as El Paso's much larger sister city, Ciudad Juárez, Mexico. Surrounding mountains trap pollutants, which become concentrated under certain meteorological conditions.

The state of Texas has made progress in improving air quality in the El Paso area since 1990. Cross-border cooperation through a Joint Advisory Committee for the Improvement of Air Quality (JAC) also has had measurable, positive results. Initially cautious about the impact of weather and other factors on pollution reduction levels, the TNRCC is planning to ask the EPA to redesignate the city as in compliance with the ozone standard.

As a foundation for setting local priorities and evaluating alternative control strategies, efforts must continue to improve air quality monitoring, emissions inventories, and ozone modeling in the El Paso-Doña Ana County-Ciudad Juárez area. The effort will require continued assistance from the EPA, SEMARNAT, and the JAC.

Residents in Presidio have expressed concern that particulate matter is a problem in their city, though monitoring currently indicates that levels fall within the allowed standard. Regional haze is a severe problem in Big Bend and Guadalupe Mountains National Parks, where visibility has been deteriorating in recent decades. Long-distance transport of air pollution, much greater than originally supposed, has led the TNRCC to cooperate with the Central States Regional Air Planning Association to analyze data and develop a cooperative approach.

The state of Texas has made progress in improving air quality in the El Paso area since 1990.

### The Middle Rio Grande Subregion

The Middle Rio Grande subregion generally runs from International Amistad Dam to International Falcon Dam. According to residents in the Middle Rio Grande subregion, the top three environmental priorities are water quantity, water quality, and waste management, including hazardous materials transport.

Laredo is the largest city in this subregion and the nation's largest inland port. From 1990 to 2000, its population grew by 45 percent, straining municipal water supplies. Several major pockets of agriculture also require increasing amounts of water. The regional water planning group has committed to investigating secondary supplies, including surface water and an increasing reliance on groundwater. Groundwater in the subregion is generally salty and can contain iron and manganese that leach naturally from surrounding soils, causing the water to have an unpleasant odor and taste.

In surface water, bacteria levels are generally elevated downstream of major cities, due in large part to inadequate or nonexistent water treatment capacity to keep up with population growth. Even where treatment plants exist, untreated effluent still can enter the river. One particular example occurs in Nuevo Laredo, where not all sewage lines are hooked into the new wastewater treatment plant. Nuevo Laredo is submitting a project to the BECC for certification to correct this problem. Grease releases are also a major problem and are being addressed by an engineering master plan for water and wastewater treatment systems in Nuevo Laredo, scheduled to be completed in mid 2002 by a U.S. firm.

Undertaken in response to concerns about toxic substances, TNRCC contracted with the Texas Department of Health to complete a 2001 fish tissue study, which found "no apparent health hazard" from consumption of fish in the Rio Grande near Laredo. In International Falcon Reservoir in Zapata County, low reservoir levels, tied to low flow in the river in general, exacerbate water quality problems by concentrating pollutants, salts, and nutrients.

The sheer volume of hazardous materials both passing through Laredo and temporarily stored in Laredo in more than 500 warehouses makes hazardous material spills a major concern to residents. The large quantities of these hazardous materials make safe handling of them imperative. Spills pose a problem for protecting surface water quality,

The sheer volume of hazardous materials both passing through Laredo and temporarily stored in Laredo in more than 500 warehouses makes hazardous material spills a major concern to residents.

again requiring particular attention to monitoring and prevention. To address these concerns, Laredo has implemented a warehouse ordinance that could be used by others. The best management practices shown by Laredo's warehouse management efforts should be shared widely to encourage similar creative environmental problem solving throughout the border communities.

In addition, storage space in the region's existing landfills is shrinking. Expansion of facilities in Laredo and proposals for new ones are raising concerns among area residents due to location of those facilities. Decreasing space and lack of solid waste infrastructure in colonias are adding to illegal dumping problems, though officials in the region are developing and encouraging litter abatement programs.

Residents of Laredo are concerned about the impact of cross-border truck traffic going through town, especially because of increased pollution caused by idling in long lines to get through U.S. Customs. A new bridge has since opened slightly upstream of Laredo, rerouting commercial traffic around downtown.

### The Lower Rio Grande Subregion

The Lower Rio Grande subregion includes the river downstream of International Falcon Dam. According to area residents, the top three environmental priorities are water quantity, water quality, and air quality.

With an economy dominated by agriculture, this subregion is particularly affected by an ongoing drought and Mexico's as-yet unresolved water debt. Economists estimate that the water deficit alone has cost the Lower Rio Grande Valley over $400 million per year. Invasive aquatic weed species—particularly water hyacinth and hydrilla—are exacerbating the shortage: they clog the river, use precious water, and block flow to downstream users.

Bacteria levels are the major surface water quality problem, particularly downstream of major metropolitan areas. The primary cause is the need for water and wastewater treatment infrastructure. Downstream of International Falcon Dam, the river does not meet state contact recreation standards due to elevated fecal coliform levels. Salt content in surface water is high. In the Arroyo Colorado, toxic organic chemicals have resulted in bans on fish consumption. Groundwater in the Lower Rio Grande Valley is generally very salty, requiring extensive treatment prior to use as a public water supply.

Economists estimate that the water deficit alone has cost the Lower Rio Grande Valley over $400 million per year.

Illegal dumping is more severe in the Lower Rio Grande subregion than anywhere else along the border. In response to illegal dumping problems, communities have begun antilitter campaigns, and a variety of landfill projects are under development, such as Hidalgo County's pilot program for solid waste collection in colonias. The best management practices shown by Hidalgo County's waste collection efforts should be shared widely to encourage similar creative environmental problem solving throughout the border communities.

Air quality in the Valley is generally good. TNRCC scientists suggest the Valley may be vulnerable to significant pollution brought by winds from other urban areas to the northeast and added to the smaller sources locally. The TNRCC is tracking developments and hopes controls established in Houston, Galveston, and other cities will reduce pollution that may be imported to the Valley.

Illegal dumping is more severe in the Lower Rio Grande subregion than anywhere else along the border.

## Cross-Border Environmental Problem Solving

Air and water resources do not adhere to political boundaries, and the increasingly porous nature of transportation across the border means that even solid waste can move between countries without great difficulty. With such a wide variety of environmental issues demanding attention, the need for cooperation among countries, states, localities, and other stakeholders has never been as clear as at the present, nor has the potential for creative solutions ever been as great.

Throughout the development of this report, the TNRCC's staff has focused on the binational, multistate nature of environmental issues and on

the need for more creative, transboundary solutions. The *State of the Rio Grande and the Environment of the Border Region* report takes particular care to highlight current cooperative efforts by groups at all levels and all along the border.

Environmental solutions frequently cross traditional boundaries in terms of agency responsibilities at federal, state, and local levels within a single country, and this report takes care to break out the laws and organizations that play key roles in addressing water quantity, water quality, air quality, and waste management priorities.

Local activities have also played a key role in environmental problem solving…

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

As a result of that commitment, the TNRCC has implemented State-to-State Strategic Environmental Plans with the environmental agencies of each of Texas' four neighboring Mexican states. In the case of the state of Chihuahua, the plan is actually tristate, because it incorporates New Mexico. A variety of programs has evolved from the communication brought about by these plans, including industry recognition and pollution prevention programs, as well as a Border Recycles Day.

Enhanced coordination by those working to improve the border environment is needed to ensure the maximum benefit for the residents of the border.

Various state agencies in Texas have developed programs that have an important effect on the border. Some, such as the Texas Water Development Board's Economically Distressed Areas Program, help communities plan and develop needed infrastructure. Others, such as the joint Texas Department of Transportation and TNRCC scrap tire collection effort, focus on cleaning up and preventing illegal dumping.

Many programs cut across environmental media, providing technical assistance, environmental education, and opportunities to promote public awareness of border concerns. Technical training and assistance, especially operator and technician training, is needed in border communities to keep pace with changing technology and regulatory requirements. In addition, high rates of employee turnover and the need for on-the-job training require that such assistance be provided in a timely fashion. Teachers, students, and the general public are limited in their access to opportunities to learn more about how the environment affects their daily lives. Environmental education groups along the border need support for their efforts to coordinate and cooperate.

Local activities have also played a key role in environmental problem solving, particularly in cross-border efforts, where sister cities have collaborated in response to potential environmental threats and concerns. One clear example is the JAC, which includes members from Ciudad Juárez in Chihuahua, El Paso in Texas, and Doña Ana County in New Mexico. Working together, the JAC has made recommendations and suggestions that have helped to greatly improve air quality. Again, many other examples exist—many sister cities have begun coordinating emergency response planning, for instance—and are discussed in more detail in the report itself.

All of the programs discussed above are designed to improve the environment of the border region. The organizations involved range from international to local, public and private. Their efforts have undeniably brought benefits to border residents. However, as with any effort that involves so many entities, duplication of effort and gaps in services may occur. Enhanced coordination by those working to improve the border environment is needed to ensure the maximum benefit for the residents of the border.

## Recommendations

### Multimedia

1. Create a **formal process** for the enhanced coordination of activities related to the

environment in the Texas border region. The formal process should work to reduce duplication and identify gaps. The process also should provide for the participation of all appropriate U.S. and Mexico federal, state, and local governments. The goal of this process would be to address environmental problems through the development of a **border environmental action plan and annual updates**.

2. Encourage the development and maintenance of programs focused on **small communities and rural areas** with emphasis on **outreach, coordination, and technical assistance** through appropriate state agencies, such as the Office of Rural Community Affairs, the Texas Department of Housing and Community Affairs, and the Texas Water Development Board.

3. Promote the sharing of **best management practices** among border communities to foster creative solutions for environmental problems, including the replication of the Laredo Warehouse Ordinance, El Paso's Water Conservation Program, and Hidalgo County's Pilot Program for Solid Waste Collection.

4. Support increased federal, state, private, and local funding of **cross-border technical training** for operators of water, wastewater, and solid waste treatment systems; persons who maintain air quality monitors; and laboratory employees who analyze environmental test results.

5. Support cooperative efforts to **increase the environmental literacy** of teachers, students, and the public through funding for development and implementation of opportunities to learn more about how the environment affects their daily lives.

## Water Quantity

6. Make all possible efforts to resolve the **outstanding water debt** under the 1944 Treaty.

7. Work with appropriate state and federal agencies on both sides of the border to improve the **characterization of groundwater quality** and availability in the border region, because groundwater quality can limit the amount available for drinking water and other purposes.

8. Support a high-level cross-border dialogue aimed at developing a consensus on **methods for controlling aquatic weeds**, particularly the use of herbicides.

9. Work with federal and state funding agencies and private entities to improve the efficiency and reduce water loss of **irrigation canals that convey and distribute water** in the Lower Rio Grande Valley.

## Water Quality

10. Encourage a federal increase in the **Border Environment Infrastructure Fund (BEIF)** administered by the North American Development Bank (NADBank).

11. Encourage the U.S. and Mexico to **agree on funds to support the BECC and NADBank and to increase funding levels** to allow the two institutions to carry out their responsibilities, as described in the Agreement between the U.S. and Mexico.

12. Encourage the BECC and NADBank to expedite the provision of **water and wastewater services** in communities currently lacking such services, especially colonias.

## Solid Waste

13. Work with local governments in developing strategies to **improve solid waste service and provide alternatives to illegal dumping**.

## Air

14. Work with the EPA, SEMARNAT, and the Joint Advisory Committee for the Improvement of Air Quality in the Ciudad Juárez, Chihuahua-El Paso, Texas-Doña Ana County, New Mexico Air Basin (JAC) to **improve air quality monitoring, emissions inventories, and ozone modeling on both sides of the border**.

# INTRODUCTION

STATE OF THE RIO GRANDE AND THE ENVIRONMENT OF THE BORDER REGION

This report is about the Rio Grande and the border environment. The report focuses primarily on the border region of Texas and the Rio Grande watershed in Texas, although other parts of the border and watershed outside of Texas are covered where appropriate.

The Rio Grande region is subject to many interests and pressures. To characterize this region requires a review of complex issues associated with its natural and economic resources, its people, and the density of its population.

Through this report, the TNRCC provides insight on the environment of the Rio Grande and the border region as it exists in 2002 from the perspective of border residents and information the agency has collected and assessed over time. Policy makers and border residents have used many forums to indicate their concerns and priorities, and these are central to the body of the information provided here.

Chapter 2, the Overview, offers information on issues common to the entire border region. The report then focuses on three specific geographic areas (subregions) in Chapters 3–5, termed the Upper, Middle, and Lower Rio Grande, respectively. Chapter 6 highlights programs that cross traditionally defined categories or boundaries. Recommendations for future actions are contained in Chapter 7. The Appendices contain a variety of resources to assist readers.

This report is Volume 3 of the TNRCC *Strategic Plan, Fiscal Years 2003–2007*. Volume 1 of the *Strategic Plan* goes into detail about the agency's current activities. Volume 2, *State of the Texas Environment*, focuses on issues the state will face in the near future and identifies resources to address those issues.

Although Volumes 1 and 2 of the *Strategic Plan* are published biennially, this border report will be updated annually. As the first report in a series, this edition is an initial characterization of aspects of the border environment in which the TNRCC plays a role. Subsequent reports will not restate the history and analysis, but will focus on special topics.

Future reports that are published after September 1, 2002, will be produced under the TNRCC's new name, the Texas Commission on Environmental Quality (in Spanish, la Comisión de Calidad Ambiental de Texas). The name was changed by the 77th Texas Legislature in 2001.

Additional information on environmental issues and the border region is located on TNRCC's Web site and in print documents. Details on accessing this information, including how to order publications, can be found in Appendix D, For More Information.

## Intended Audience

This report provides information to assist policy makers as they work to improve and protect the environment of the Rio Grande and border region. The information also will be useful to border residents and others interested in the border environment. The report illustrates the complexities of environmental protection along the border and the difficult choices that face decision makers as they try to address many pressing problems with limited resources.

## The TNRCC's Office of Border Affairs

The TNRCC's Border Affairs staff prepared this report with cooperation from other TNRCC

divisions and offices and numerous state and federal agencies that are involved with the border and its environment. Border Affairs staff supports TNRCC objectives in five areas:

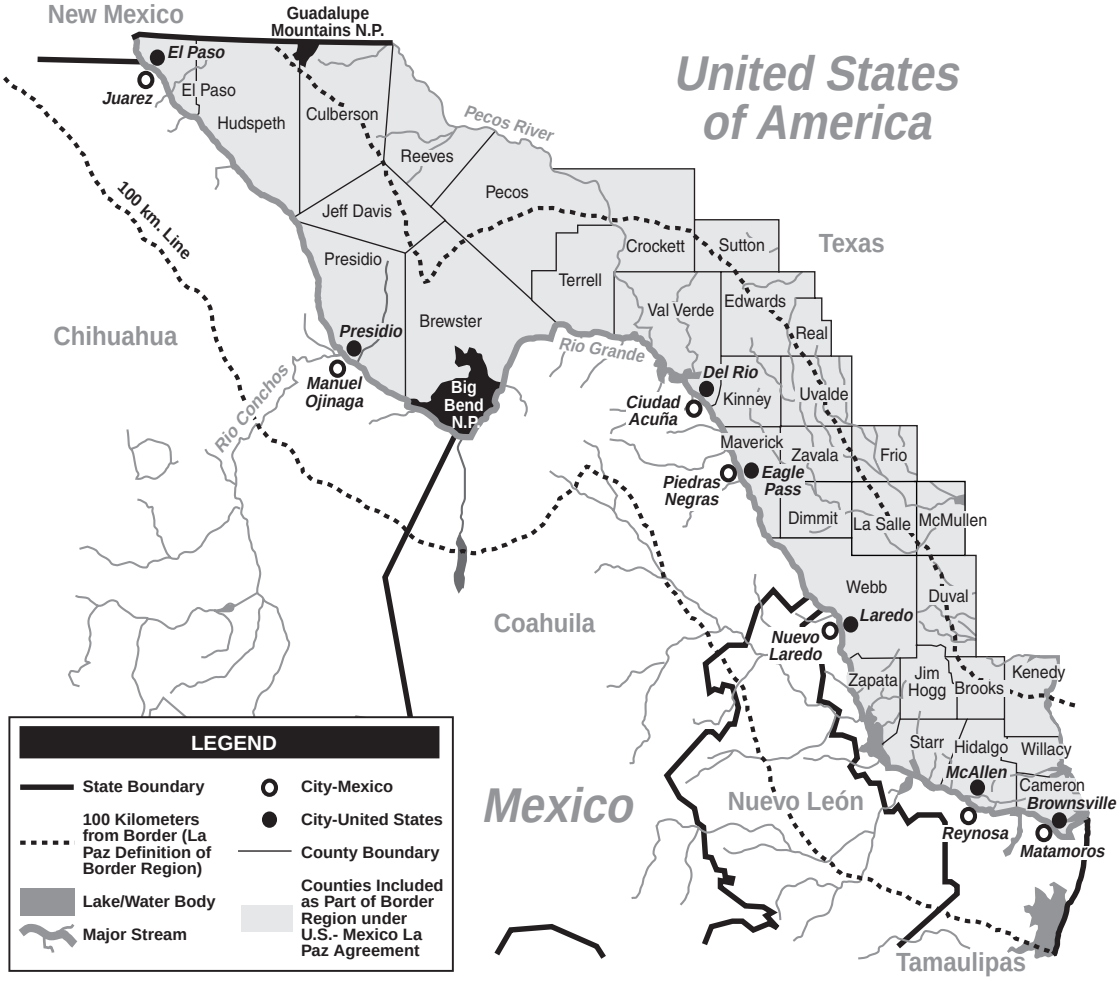
- Working with TNRCC regional offices in the border region.
- Serving as a clearinghouse for border environmental information, including the development of the *State of the Rio Grande and the Environment of the Border Region*.
- Developing cross-border projects through cooperative efforts with Mexican counterparts and other stakeholders, including the private sector and nongovernmental organizations, to address common environmental problems.
- Partnering with entities related to the North American Free Trade Agreement—such as the Border Environment Cooperation Commission, the North American Development Bank, and the North American Commission on Environmental Cooperation—on issues that affect Texas.
- Identifying and addressing issues with other border U.S. and Mexican states through the Ten State Initiative, the U.S.-Mexico Border Governors' Conferences, and the workgroups related to the binational program under the La Paz Agreement.

## Defining the Border Region

For Texas, the Rio Grande defines the entire international border between the U.S. and Mexico. Texas has four Mexican states as neighbors. From east to west, these are Tamaulipas, Nuevo León, Coahuila, and Chihuahua.

**Figure 1-1**

**U.S.-Mexico Border Region in Texas and Four Neighboring Mexican States**




The Mexican States and New Mexico data were taken from the 1999 ESRI Data & Maps CD. The counties and parks were derived from the U.S. Census Bureau 1998 TIGER/Line dataset. The cities of Mexico are noncertified public sector data (for general reference only). The Rio Grande and its tributaries were from the TNRCC 1994 Rio Grande Hydro layer. The remaining streams were derived from the U.S. Census Bureau 1992 TIGER/Line dataset.

The border region from north to south is defined in different ways by different entities for analytical and programmatic purposes. In this report, the TNRCC uses the definition in the La Paz Agreement between the U.S. and Mexico, which was signed in 1983. The agreement defined the border region as extending 100 kilometers (62.5 miles) on either side of the boundary between the two countries. On the Texas side, this includes all or parts of 32 counties (see Figure 1-1.)

In some cases, this report refers to regions established by the Texas Water Development Board for regional water planning, or to Councils of Governments regions for solid waste planning. When the scope of the region changes, the difference is clearly indicated.

## Public Input

During the previous three years, the TNRCC and other organizations have held many forums to hear local perspectives on the environment. These forums ranged from formal public hearings to meetings of boards, commissions, and workgroups. In addition to the TNRCC, entities conducting these sessions included the following:

- Texas Senate Committee on Border Affairs;
- U.S. Environmental Protection Agency (EPA); and
- Secretaria de Medio Ambiente, y Recursos Naturales (SEMARNAT).

The following is a list of some of these sessions, which occurred from 1999 to 2001, and which captured the public input used in this report:

- Hearings and meetings of the Texas Senate Committee on Border Affairs held in Austin, Brownsville, San Antonio, Laredo, McAllen, El Paso, Eagle Pass, Irving, and Houston in 1999 and 2000.
- Southwest Border Congressional field hearing called by U.S. Congressman Silvestre Reyes in El Paso in May 2001.
- U.S.-Mexico Border Coalition of Resource Conservation and Development (RC&D) Councils meeting held in El Paso in May 2001.
- Quarterly meetings of the Good Neighbor Environmental Board (GNEB)—a border-wide advisory board with public- and private-sector members that reports to the U.S. President and Congress. The director of the TNRCC's Office of Border Affairs sits on the GNEB.
- Quarterly meetings of the Joint Advisory Committee for the Improvement of Air Quality in the Ciudad Juárez, Chihuahua-El Paso, Texas-Doña Ana County, New Mexico Air Basin (JAC).
- EPA-sponsored U.S.-Mexico Border Environmental Justice Roundtable held in El Paso in January 2001.
- EPA-TNRCC Environmental Roundtable sessions held in Brownsville, Edinburg, El Paso, and Laredo in March 2001.
- Stakeholder meetings of the Clean Rivers Program Steering Committee held in Harlingen, Laredo, and El Paso in June and July 2001.
- U.S.-Mexico Border Summit organized by The University of Texas-Pan American in Edinburg in August 2001.
- Public meeting called by EPA Administrator Christine Whitman and SEMARNAT Secretary Victor Lichtinger in El Paso in October 2001, which featured presentations by nongovernmental organizations, university academics from both sides of the border, and representatives of U.S. Indian tribes.
- Public meeting on the visibility problems in Big Bend National Park in Alpine in October 2001 organized by the TNRCC.
- Laredo-area Interagency Environmental Health Workgroup meetings in September and December 2001.
- TNRCC public meeting regarding elements of the State Implementation Plan related to ozone in El Paso in December 2001.

This report primarily addresses the priorities of people in Texas. Where appropriate, cross-border programs and activities in other states are included as they impact Texas.

## Border Priorities

During the meetings and hearings previously listed, residents throughout the border region consistently identified the same two environmental problems as priorities.

**The top two priorities for the entire border region are the following:**

**1. water quantity, and**

**2. water quality.**

Residents also identified a different third priority for each subregion, explained in detail in Chapters 3, 4, and 5.

## The Need for Cooperation at Multiple Levels

Environmental stresses can have far-reaching effects. Attempting to describe or control pollution geographically presents the greatest challenges when water or air resources are involved. The binational and multistate extent of the Rio Grande watershed, for instance, means that water-related stresses, whether related to quantity or quality, usually are transported downstream. Air pollution can be trapped in an air basin that crosses political boundaries and also can travel hundreds and even thousands of miles across many borders.

Therefore, successfully addressing environmental problems in the border region requires cooperation between the U.S. and Mexico. This cooperation must be multidimensional, involving governments at every level, voluntary nongovernmental organizations, private businesses, and the public.

At the federal level, the need for cooperation was first recognized in allocating the waters of the Rio Grande when a series of binational treaties beginning early in the 20th century empowered the International Boundary and Water Commission (IBWC). The need to engage on a much broader set of environmental issues resulted in the signing by the U.S. and Mexico of the La Paz Agreement in 1983. Ten years later, the North American Free Trade Agreement (NAFTA) further reinforced ties between the U.S. and Mexico. It included environmental side agreements that established both trilateral and binational entities to address environmental issues.

Even within a single country, environmental issues often cut across the jurisdictions of more than one federal agency. For instance, in the U.S. the EPA is the lead federal environmental agency, but other departments may have important roles to play. Similarly, more than one state or local agency often makes critical contributions in resolving a problem. Effectively addressing these issues demands that agencies work together, each contributing its own expertise and authority.

One dimension to this cooperation is the interaction among neighboring states. To nurture positive relationships and programs, the Ford Foundation and the Western Governors' Association helped develop what is known as the Ten States Initiative—formalized communication and collaboration among the environmental agencies of the four U.S. and six Mexican border states. Coordination of established state programs with newer federal initiatives is needed. Simultaneously, the proximity of many U.S. cities to their Mexican sister cities directly across the border means that cross-border interactions at the municipal level can be crucial to success with many issues.

The private sector also has an important role to play in environmental protection on the border. Businesses must not only respond to regulations, but also consider how they voluntarily can improve environmental conditions within their facility, as well as improve the quality of their releases into the air and water in surrounding communities. Texas and the Mexican states are helping to foster this voluntary spirit. The joint industry recognition program between the states of Texas and Tamaulipas described in Chapter 6 is just one example. Citizens' associations interested in a wide range of environmental, health, and community improvement objectives also bring much energy and resources to bear.

This report makes extensive use of data and information from other publications, documents, and Web sites, referenced in Appendix J, Bibliography.

## Changes Since September 11

On September 11, 2001, the nation was shaken by terrorist attacks in the U.S. These events caused a ripple of changes in everyday life for citizens and visitors alike across the country. The U.S.-Mexico border region is no exception.

Some environmentally significant changes to everyday life along the border include an increase in security at border crossings. This increase has had several results:

- longer lines at border crossings and traffic delays that can affect air quality;

- enhanced emergency response awareness and planning; and
- reexamination of agencies' jurisdictional responsibilities.

Such changes often shift priorities and resources. Since September 11, the TNRCC has been redefining its role and coordinating its response in dealing with potential environmental catastrophes. These efforts include taking steps to improve the security at significant infrastructure where human health or the environment could be at risk. Such infrastructure includes public drinking water facilities, wastewater treatment facilities, dams, bridges, and industrial facilities. More information on security efforts can be found on the TNRCC web site, listed in Appendix E, Web Sites of Interest.

STATE OF THE RIO GRANDE AND THE ENVIRONMENT OF THE BORDER REGION

# OVERVIEW

This chapter first provides background information on the geographic characteristics of the border region and on population and economic trends. The next section presents an overview of the major environmental topics of concern featured in subsequent chapters: water quantity, water quality, waste management, and air quality. This chapter also includes information about federal and state regulations and jurisdiction, as well as sources of environmental problems.

The border region is experiencing unprecedented growth. Throughout the last decade of the twentieth century, the rate of population growth has exceeded, and will almost certainly continue to exceed, that of the Texas average population growth. The passage of the North American Free Trade Agreement (NAFTA) in 1993 has contributed to this growth.

While cross-border trade benefits the U.S. as a whole, the communities on the border have borne a significant share of the negative impacts of such trade in the form of traffic congestion, increased air and water pollution, and depletion of natural resources. Many observers of border affairs wonder if local natural resource use can sustain this rate of growth, especially with regard to water (EPA, 2001).

While this document describes actions to address environmental problems being taken by local, state, federal, and international entities, it is not a comprehensive action plan for the border region. Such a multijurisdictional plan is beyond the scope of this report.

## Geography of the Region

The Rio Grande serves as 1,254 miles of the 1,952 mile U.S.-Mexico international border. Known as the Río Bravo (wild river) in Mexico, the Rio Grande is the international boundary that separates Texas from the four neighboring Mexican states of Chihuahua, Coahuila, Nuevo León, and Tamaulipas.

The Rio Grande originates in the San Juan Mountains of southern Colorado and travels a total of 1,824 miles, flowing south through New Mexico and then southeast along the border of Texas before emptying into the Gulf of Mexico at Boca Chica. The geography of the Rio Grande basin varies from mountains to subtropical desert or tropical areas (Eaton and Andersen, 1987).

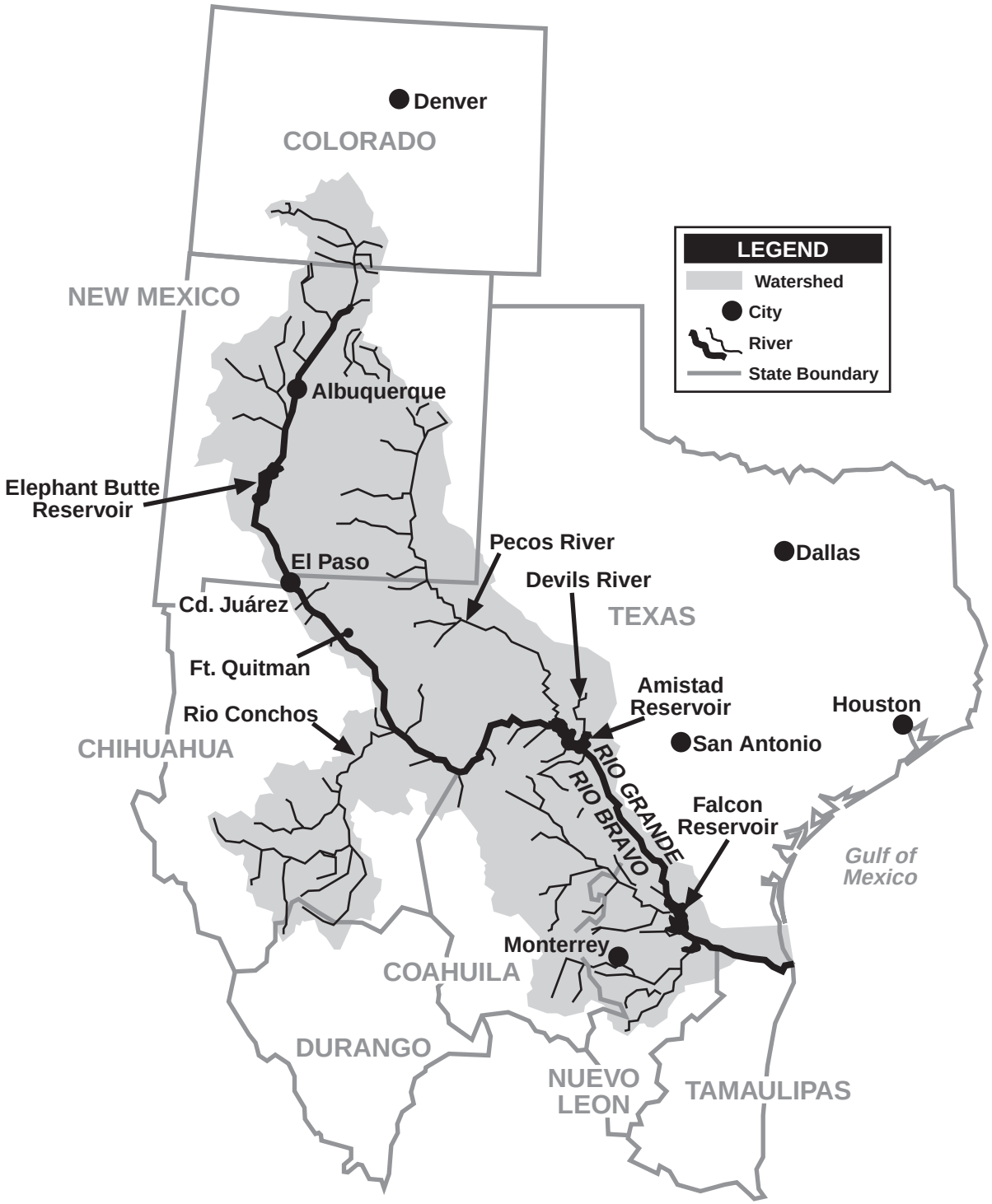
However, the river doesn't always flow continuously from the mountains to the sea. At times, there is little or no flow in the stretch downstream of El Paso until the Rio Conchos joins the Rio Grande at Ojinaga/Presidio. Since February 2001, a sandbar has closed the mouth of the Rio Grande at the Gulf of Mexico two times because of low-flow conditions in the river.

The Rio Grande and its tributaries drain a land area that includes 335,000 square miles of three U.S. states (Colorado, New Mexico, and Texas) and five Mexican states (Chihuahua, Coahuila, Durango, Nuevo León, and Tamaulipas). (Figure 2-1 shows the entire watershed.) However, only half of this total area actually drains into surface waters that eventually flow to the Gulf of Mexico. The *actual* drainage area of the Rio Grande is only 182,215 square miles. About half of this drainage area lies in the U.S. (88,968 square miles), with a little more than half of that area lying within Texas (48,259 square miles).

### Climate

In Texas, the northwestern portion of the Rio Grande basin is mostly desert, with the climate becoming less arid and more tropical as the river

**Figure 2-1**
**Rio Grande Watershed**




flows toward the Gulf of Mexico. In general, the region is warm and windy (Schmandt and Ward, 1991). As a whole, temperatures are higher in the southeastern part of the basin than in the northwestern part. The Rio Grande basin averages more 100-degree Fahrenheit days than any other part of Texas for the months of May through September. Del Rio, Eagle Pass, and Laredo all have higher average monthly temperatures than either El Paso or Fort Stockton in July through September.

Precipitation tends to be lowest in the western and northern part of the basin, increasing as one

moves toward the Gulf of Mexico. For example, rainfall averages 8.8 inches in El Paso and 13.9 inches in Fort Stockton in the upper portion of the basin, but averages 21.5 inches at Eagle Pass and 26.6 inches at Brownsville (Bomar, 1995). The upper Rio Grande receives flow from snowmelt, but downstream of El Paso most water comes from thunderstorms and tropical storms (Schmandt and Ward, 1991).

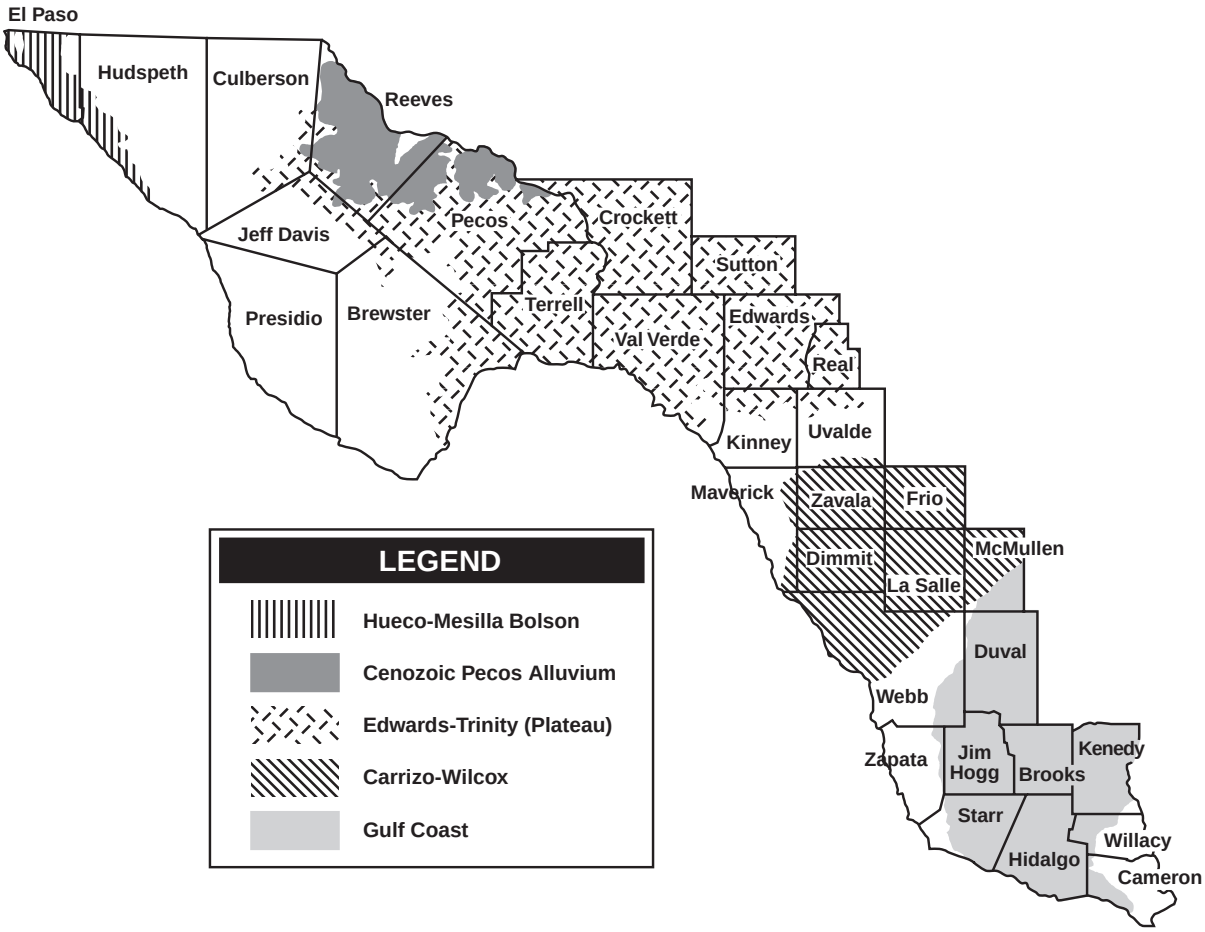
### Tributaries of the Rio Grande

The primary tributaries of the Rio Grande in Texas are the Pecos River and Devils River; and in Mexico the Río Conchos, Río San Rodrigo, Río Salado, Río Alamo, and Río San Juan. The International Falcon and Amistad Reservoirs, which began operating in 1954 and 1968, respectively, are the two major surface impoundments on the international reach of the Rio Grande. Constructed to facilitate binational water supply and to control flood waters, both are managed by the U.S. and Mexican sections of the International Boundary and Water Commission (IBWC).

### Major Aquifers and Their Uses

Several major aquifers supply water in the Texas portion of the border area. (See Figure 2-2.) In the upper region, these include the Bolson deposits—the Mesilla and Hueco—and the Cenozoic Pecos Alluvium, along with the Edwards-Trinity (Plateau). In the middle and lower Rio Grande basins in Texas, the aquifers that are used mainly for municipal and agricultural water supply include the Edwards-Trinity (Plateau), the Carrizo-Wilcox aquifers, and the Gulf Coast (TWC, 1992).

**Figure 2-2**
**Major Aquifers of Texas in the Border Region**



## Population Trends

According to the 2000 census, the Texas population in the border region was 2,125,464, which represents 10.2 percent of the state's entire population of 20,851,820. The urban population of the border region has grown rapidly in recent decades, with this growth expected to continue. Most of the people along both sides of the Texas portion of the U.S. border with Mexico live in seven pairs of sister cities.

On the U.S. side, McAllen-Edinburg-Mission, was the fourth fastest-growing metropolitan statistical area (MSA) in the country. It trailed only Las Vegas, Nevada; Naples, Florida; and Yuma, Arizona. Two other border communities—Laredo and Brownsville-Harlingen-San Benito—ranked ninth and twenty-eighth, respectively (U.S. Census Bureau, 2001b).

Table 2-1 shows the growth in these seven population centers on both sides of the border. As the table indicates, the border cities in Texas grew by 29.2 percent from 1990 to 2000, with most of that growth occurring in the area from Laredo to the Gulf of Mexico. This rate of growth was faster than that of the state as a whole, which grew by 22.8 percent.

Interestingly, the 15 percent growth rate of Texas' largest border city, El Paso, was only moderate compared to the other six population centers, four of which grew by more than 25 percent (TSDC database). Nevertheless, the seven counties that include these population centers in which the MSAs lie are projected to grow from a total population of around 1.8 million to 2.9 million by the year 2020—an increase of more than 50 percent (TEP database).

**Table 2-1**
**Population Growth of Sister Cities on the Border**

| City/*Municipio*, State | 1990 Population | 2000 Population | Percentage Increase |
|---|---|---|---|
| El Paso, Texas MSA* | 591,610 | 679,622 | 14.9% |
| Ciudad Juárez, Chihuahua | 798,499 | 1,217,818 | 53.0% |
| Presidio, Texas | 3,072 | 4,167 | 35.6% |
| Ojinaga, Chihuahua | 23,910 | 24,313 | 2.0% |
| Del Rio, Texas | 30,705 | 33,867 | 10.3% |
| Ciudad Acuña, Coahuila | 56,336 | 110,388 | 96.0% |
| Eagle Pass, Texas | 20,651 | 22,413 | 8.5% |
| Piedras Negras, Coahuila | 98,185 | 127,898 | 30.0% |
| Laredo, Texas MSA | 133,239 | 193,117 | 44.9% |
| Nuevo Laredo, Tamaulipas | 219,468 | 310,277 | 41.0% |
| McAllen-Edinburg-Mission, Texas MSA | 383,545 | 569,463 | 48.5% |
| Reynosa, Tamaulipas | 282,667 | 419,776 | 49.0% |
| Brownsville-Harlingen-San Benito, Texas MSA | 260,120 | 335,227 | 28.9% |
| Matamoros, Tamaulipas | 303,293 | 416,428 | 37.0% |
| The seven Texas cities or MSAs | 1,422,942 | 1,837,876 | 29.2% |
| The seven Mexican *municipios* | 1,758,448 | 2,602,585 | 48.0% |

* Metropolitan Statistical Area

Sources: Texas State Data Center, **http://txsdc.tamu.edu**; Mexican National Institute of Statistics, Geography, and Informatics (INEGI) **www.inegi.gob.mx**; and "XI Censo General de Población y Vivienda, 1990."

On the Mexican side, growth in the border cities has been even greater, expanding almost 50 percent in the past 10 years (INEGI Census database).

On both sides of the border, rapid population growth and already scarce natural resources have created serious environmental challenges. More people mean increased demand for water and potentially less water for people downstream. Greater water usage, in turn, results in increased wastewater, which must be treated before it is discharged. Population growth results in the need to dispose of more solid waste.

## Small Communities

Unless otherwise noted, most of this section on small communities relies on information contained in the *Texas Border Region Environmental Infrastructure Needs Assessment* published by the Texas Water Development Board in April 1997, in cooperation with the TNRCC. This publication is available in the TNRCC Library.

While much of the attention on the border is focused on large cities, 90 percent of the communities in the 32 Texas border counties contain less than 15,000 people. Many of these communities are rural, and they represent 17 percent of the border population; yet in the 1997 TNRCC/TWDB report—the most recent year for which figures are available—the rural communities required 27 percent of the water and wastewater improvements in terms of dollars.

These 32 border counties contain 245 communities, as defined by service area. In 1997 these communities needed $230 million in water improvements and $457 million in wastewater system improvements. Those needs did not take into account potential new requirements to comply with new federal drinking water rules for arsenic.

For wastewater, 42 percent of the need is in small communities, even though less than 10 percent of the population is in those same communities. Of the need for water in small communities in 1997 in the border region of Texas with Mexico, 56 percent of the need was in areas not defined as colonias and with under 15,000 people.

Small communities experience many problems in their attempts to install environmental infrastructure. These include insufficient staff, limited tax bases, and lack of technical expertise. A pervasive problem is that, because of their small size, they do not have staff to handle all the work necessary to complete an infrastructure project. The Asherton case study in Chapter 6 highlights this issue. In addition, these small communities lack knowledge of how to access funding sources and lack sufficient staff to prepare applications for funding. The need for technical assistance is much greater than current service levels.

Complicating the problems for small communities is that demographic trends over the last century show that they are losing population to urban areas, which attract workers with the prospect of jobs (Major urban, 2002). Some rural areas also have been hit hard economically for various reasons, such as globalization and the corresponding increase in overseas competition. For example, the Angora wool area of Texas, discussed in Chapter 4, has seen declines due to competition from Australia (Kilborn, 2002).

Small towns also have limited tax bases, and a small number of people often cannot bear the financial burden of improvements. Initial costs to build facilities are high and must be distributed over a small number of people. When a community's annual budget does not exceed $50,000, the cost of simple drinking water testing may be 10 percent or more of the entire annual budget (TWDB, 1995).

To better address the needs of small communities, the Texas Legislature created the Office of Rural Community Affairs in 2001. This office consolidated development and health care programs from several agencies to better coordinate and deliver services to rural communities.

## Economic Conditions

The economy of the border region depends on agriculture and ranching, oil and gas production, trade and commerce, industry, and tourism. Generally, economic conditions within the border area are worse along the border than in the state of Texas as a whole. Of the 35 poorest counties in terms of per capita income in the United States, 13 are in the 32 counties in the Texas portion of the border area (see Figure 1-1) (TNRCC, 2000b).

### Colonias

Both sides of the border have witnessed the development of settlements known as *colonias* in

the United States and as *colonias populares* in Mexico. Colonias have substandard housing. They also are distinguished by the lack of one or more forms of infrastructure or service, such as drinking water, wastewater collection, trash pickup, electricity, or paved roads. Colonias are typically semirural settlements in areas in Texas where subdivision regulations are few or nonexistent. The following discussion is limited to areas under the jurisdiction of Texas.

With more than 1,400 colonias, mostly along the border with Mexico, Texas has both the largest number of colonias and the largest colonia population of any state in the U.S. ("Colonias," 2002). Approximately 450,000 people live in these Texas colonias (Secretary of State, 2001). The population is predominately Hispanic and of U.S. origin: 65 percent of all colonia residents, and 85 percent of those under age 18, were born in the U.S.

Colonia residents are sometimes transient, living only sporadically in Texas if they travel to other parts of the country to take advantage of work during different growing seasons. This makes provision of services and education on issues such as public hygiene and proper disposal of municipal solid waste more difficult. Health problems go hand-in-hand with the poverty of the region.

The problems with Texas colonias date back to 1950, when developers created unincorporated subdivisions in rural areas and sometimes also in flood plains. These developers divided the land into small lots, put in little or no infrastructure, and then sold the lots to low-income individuals seeking affordable housing. A limited supply of housing along the border contributes to the development of new colonias and to the expansion of existing ones. However, for the most part, where model subdivision rules are in place, no new colonias are developing.

Houses in colonias often have been constructed in phases by their owners as they can afford materials. Such shelters may lack electricity, plumbing, and other basic amenities. Untreated wastewater may collect in pools, contributing to waterborne diseases. Vehicles traveling over unpaved roads can cause dust to rise, increasing particulate matter in the air that affects the health of local residents ("Colonias," 2002).

Since 1989, the Texas Legislature has passed a series of laws designed to ensure that developers do not continue to create new rural subdivisions without the required supporting infrastructure. In addition, various state agencies have worked together to enact rules and regulations, and have undertaken enforcement actions, to ensure the use of model subdivision rules. Texas voters also have approved $250 million in bonds to improve existing colonia infrastructure.

The Texas Legislature established the Economically Distressed Areas program (EDAP) in 1989 to address the basic water and wastewater needs of these areas. The program authorized $250 million in bonds for grants and loans to develop water and wastewater projects in economically distressed areas. The EPA has assisted the colonias through the state agencies by also providing funding for construction of colonias wastewater infrastructure. The total federal assistance under the Colonia Wastewater Treatment Assistance Program is $300 million. The Fiscal Year 1999 Congressional appropriation for EPA included drinking water infrastructure as an allowable cost for the colonia assistance funding. Prior appropriations were limited to wastewater assistance. The TWDB also administers the EPA funded Colonia Plumbing Loan Program. This loan program to colonia residents may be used to finance connections to wastewater projects as well as for indoor plumbing improvements.

Over the last 11 years (1991–2002), the TWDB, through its EDAP, has provided an estimated $485 million in state and federal funding commitments for the design and construction of 71 water or wastewater projects. An additional $5.5 million has been awarded for facility plan development. As of February 28, 2002, 39 projects have been completed and an additional 32 are currently under construction or in the process of developing plans and specifications. When these 71 projects are completed they will provide service to approximately 234,217 colonia residents. Another 22 projects are in the facility planning stage and, if constructed, are expected to provide service to an additional 47,841 colonia residents.

Colonia projects are typically much more complex and challenging than traditional ones. The efforts needed to successfully complete EDAP projects are significant for the TWDB and its local partners. Approximately 104,000 residents are

now benefitting from adequate water and/or wastewater services from TWDB EDAP-funded projects. The number of residents receiving new service increases each month as different projects progress and are completed.

The EPA has also provided financial assistance to the Texas Office of the Attorney General (OAG) for its Colonia Strike Force program. The OAG continues to work toward the investigation and prosecution of those who violate Texas laws which are intended to prevent the proliferation of colonias along the Texas/Mexico border. Currently, there are nine cases of pending colonias litigation by the OAG (EPA, 2001). The OAG has also established an education and outreach program to inform local governmental officials and the affected public about the special requirements in the border area for subdividing and selling residential lots and for obtaining utility service to them.

## Environmental Equity

The goal of environmental equity, also called environmental justice, is to ensure that people—regardless of race, national origin, or income—are protected from disproportionate impacts of environmental hazards. Environmental justice provides a way for people to face problems and design practical solutions to address environmental challenges.

The TNRCC's environmental equity program seeks to improve the quality of life for residents of low-income and urban communities by proactively considering their environmental and health concerns. The TNRCC's goal is to build partnerships and tackle problems before they complicate good-faith efforts to resolve disputes between the communities and the industries that maintain facilities in those neighborhoods.

As part of TNRCC's Office of Public Assistance (OPA), the Environmental Equity Program serves as a liaison between industries and communities to encourage the development of joint solutions to environmental justice concerns.

## Health

The health problems along the border between Texas and Mexican states respect no geographic boundaries. Many environmental health problems tend to be more prevalent along the border than in most other parts of the state or nation. For example, shigellosis and Hepatitis A in the border region are almost three times the national average.

Two specific examples include the following:

- **Respiratory problems**: Respiratory problems are often associated with air pollution, especially in El Paso. Although significant progress has been made recently in improving the air quality, two studies conducted in that city have confirmed that asthma-related emergency room visits and disease incidence rates have increased immediately after those days on which high levels of particulate matter have been recorded. Asthma is a chronic inflammatory disorder of the lungs characterized by repeated episodes of coughing, wheezing, and mucus production (Parks and Wallis, 2000 and National Center, 1995).
- **Dengue fever:** Dengue fever is a mosquito-borne illness often associated with collections of stagnant water. Mosquitos can breed in water collected in the illegal dump sites and piles of discarded tires often found along the border. Historically, the only locally acquired cases of dengue fever in Texas have been in Cameron and Hidalgo Counties, but now locally acquired cases exist in Starr, Webb, and Willacy Counties as well. In 1999 more than half the cases in Texas (30 out of 55) were in Webb County alone.

Illegal dumping creates additional public health hazards. Children playing around illegally dumped trash can be hurt. Disease can be transmitted from rats, mosquitos, and other pests living in the trash. Harmful chemicals and other materials can contaminate drinking water. When one person litters or otherwise dumps illegally, others follow and the garbage accumulates. Cleanup of litter and other illegally dumped materials on public property puts a strain on local government. Also, it is illegal to let anyone dump garbage on private property, and the property owner may have to pay for cleanup (Texas Senate, 2000a).

As with the problems of colonias, health problems often go hand-in-hand with poverty. The percent of uninsured people in the border area in the under-19 and over-65 population is higher than the

percent of uninsured people in the entire state of Texas in those two groups: 31.3 percent and 35.2 percent, respectively, versus 25 percent and 26.7 percent for the state as a whole (Texas Senate, 2000a).

### Maquiladoras

Many people from the interior of Mexico who move north to the Mexican side of the border find jobs in maquiladoras. A maquiladora is a foreign-owned assembly plant that receives tariff-free raw materials from the home country and then ships most of its assembled products back to the home country for sale. Most are U.S. owned. Mexico requires that parent companies return the maquiladora wastes to the country of origin. While maquiladoras create valuable economic activity and jobs, many of them also generate various wastes, along with a need for infrastructure and natural resources (water supplies and wastewater treatment for both the plants and the employees' homes, for instance). Local municipalities lack the revenues necessary to meet that demand (TNRCC, 2000b).

Although the maquiladora program has been in place since the mid-1960s, the number of maquiladoras and the number of maquiladora employees have grown substantially since the North American Free Trade Agreement (NAFTA) was signed in 1993. As shown in Table 2-2, the number of maquiladoras has increased by about 50 percent since June 1993, while the number of employees has almost doubled. Since the peak of activity in the fall of 2000, the number of maquiladoras has remained fairly steady, but the number of employees had fallen by about 16 percent as of October 2001 due to the downturn in the North American economies (INEGI database).

The TNRCC has been invited by Mexico to participate in several pollution prevention and reduction programs targeted at maquiladoras. These are described in Chapter 6.

### North American Free Trade Agreement (NAFTA)

The North American Free Trade Agreement has accelerated economic activity between the U.S. and Mexico, which, like population growth, is likely to continue. According to the U.S. Census, in 1996 U.S. exports to Mexico totaled almost $57 billion, while U.S. imports from Mexico totaled over $74 billion (U.S. Census Bureau, 1997). By 2000, those figures had almost doubled, to over $111 billion and almost $136 billion, respectively (U.S. Census Bureau, 2001a).

Much of the traffic in goods between the U.S. and Mexico crosses the border by truck, and approximately 80 percent of that truck traffic passes through Texas. During 2000, almost 2.4 million trucks crossed into Texas from Mexico—more than 60 percent of them through Laredo, the largest inland port-of-entry in the U.S. This volume of traffic often results in long lines of truck traffic at certain border ports-of-entry, some waiting to cross for hours with engines idling. The idling trucks increase the level of air pollution. (Texas...Development, 2002)

As part of NAFTA, the U.S. and Mexico also created a side agreement to provide environmental infrastructure for the border region. This agreement established the Border Environment Cooperation

**Table 2-2**
**Number of Maquiladoras and Their Employees in Mexican States Bordering Texas**

| Month/Year | Chihuahua | | Coahuila | | Nuevo León | | Tamaulipas | | Totals | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Maq | Empl | Maq | Empl | Maq | Empl | Maq | Empl | Maq | Empl |
| June 1993 | 339 | 172,139 | 172 | 44,816 | 84 | 23,749 | 274 | 93,569 | 869 | 334,273 |
| Oct. 2000 | 441 | 334,963 | 282 | 116,428 | 160 | 72,566 | 379 | 187,581 | 1,262 | 771,538 |
| Oct. 2001 | 436 | 269,820 | 275 | 107,354 | 169 | 56,267 | 401 | 164,984 | 1,281 | 598,425 |

**Source:** Banco de Información Económica, Mexican National Institute of Statistics, Geography, and Informatics (INEGI), **www.inegi.gob.mx**

Commission (BECC) and North American Development Bank (NADBank). Administrative expenses of both institutions and the NADBank loan funds are financially supported equally by both the U.S. and Mexican governments. The role of the BECC is to certify environmental infrastructure projects, which are then eligible for funding by the NADBank.

The EPA has helped support the NADBank by providing money to the Border Environment Infrastructure Fund (BEIF). Often border communities cannot rely solely on loans, and the BEIF funds have been critical to the success of the BECC and NADBank because they are given as grants to reduce the loan amounts for potential projects.

However, the U.S. Congress has not always appropriated enough money for EPA to pass through to the NADBank for all eligible projects to get funded. The Project Development Assistance Program (PDAP) funds, administered by the BECC, have fluctuated over time.

### Land Use

Agriculture plays an important role in the economy of the 32 counties of the Texas border region. Direct crop and livestock income in 1999 was $1.15 billion, or 8 percent of Texas' $14.4 billion total income from crop and livestock (Bureau database). The border accounted for 14.7 percent of Texas' $4.5 billion in crop receipts, with the four counties of the Lower Rio Grande Valley—Starr, Hidalgo, Cameron, and Willacy—combining for 9.1 percent of all crop receipts in Texas. In addition, all citrus and many of the vegetables produced in Texas come from these same four counties. Seven border counties—Crockett, Edwards, Kinney, Sutton, Uvalde, Terrell, and Val Verde—account for a major share of the world's mohair fleece (Salinas, 2002).

The Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA) identifies major land resource areas (MLRAs) as geographic areas that have relatively homogeneous patterns of soil, climate, water resources, land use, and type of farming. The Rio Grande basin consists of the Trans Pecos; the Edwards Plateau; the Northern, Central, and Western Rio Grande Plains; and the Lower Rio Grande Valley MLRAs. The Lower Rio Grande MLRA is identified as the eighth most threatened MLRA in the U.S. This area—which includes the metropolitan areas of McAllen, Harlingen, and Brownsville—has only 2,550 square miles. However, 85 percent of the development in this area of the state is occurring on prime and unique soils (Salinas, 2002).

The USDA-NRCS makes available technical and financial assistance to agricultural producers who voluntarily protect the natural resources of the area. The natural resources include the soil, water, air, plants, and animals. Issues include water and air quality, water quantity, grazing lands, wildlife, and soil erosion and productivity.

The USDA-NRCS also operates and maintains the Resource Conservation and Development (RC&D) Program. The RC&D is a program led by local volunteer councils that helps people care for and protect their natural resources in a way that improves the local economy, environment, and living standards. Issues addressed by RC&D councils encompass impaired water quality, impaired air quality, sustainable agriculture, grazing lands, preservation and identification of prime and unique farmland, and limited access to conservation technology and programs. Other issues include limited ability to coordinate across state and national boundaries.

## U.S. and Mexican Governments

Both the U.S. and Mexican governments have federal systems. However, in the U.S., the federal government has delegated much environmental regulatory authority to the states. In Mexico, the federal government still retains some authority, although recent changes in federal law allow the devolution of more powers to the states.

### EPA and SEMARNAT

The Mexican federal environmental agency that is equivalent to the EPA is the Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). Created as a consolidation of other agencies in 1994, SEMARNAT covers a wide range of issues—environmental protection, forestry, and species and land protection. In the U.S., these same areas of responsibility are distributed among multiple agencies.

Due to its organizational structure, SEMARNAT differs from its counterparts in the

U.S. The following contrasts between the two approaches to environmental protection are noteworthy:

- **Centralization**: Authority and resources in Mexico are more centralized at the federal level than in the U.S. Water management is an example.
- **Involvement**: Generally, public input in decision making, information distribution to the public, and the existence of environmental advocacy and nongovernmental organizations are more common in the U.S. than in Mexico.
- **Laws and regulations**: Generally, various environmental legislation and regulatory mechanisms in the U.S. are more numerous than those in Mexico (EPA, 2001).

The EPA, assisted by the U.S. Departments of Interior and Health and Human Services, and SEMARNAT have represented their respective countries in the Border XXI Program, which is the framework of cooperation building on the La Paz Agreement. The Border XXI program was created in 1996 to promote sustainable development in the border region. Federal and state officials of both nations met regularly to discuss issues ranging from air to hazardous waste, water, and emergency response. In October 2001, the EPA Administrator and SEMARNAT Secretary agreed that the next phase of the binational border environmental program should be based on an approach that allows for increased participation by border residents and local governments. Recently ended, the Border XXI program focused primarily on specific elements of the environment—air, water, and land ("EPA," 2001).

### Ten State Initiative and Strategic Environmental Plans

At the state level, environmental officials routinely exchange technical information, as well as information on environmental events and opportunities. In 1996 environmental representatives from all 10 U.S.-Mexico border states (the Ten State Initiative) met in Austin for the first time to discuss issues affecting the border region. As a result of a commitment made at that meeting, U.S. and Mexican states have implemented cooperative plans, partly funded by the EPA. In Texas, the TNRCC has implemented State-to-State Strategic Environmental Plans between the TNRCC and the environmental agencies of each of the four Mexican states bordering Texas. With regard to the Mexican state of Chihuahua, the State-to-State Plan involves a tri-state partnership that includes New Mexico's environmental agency.

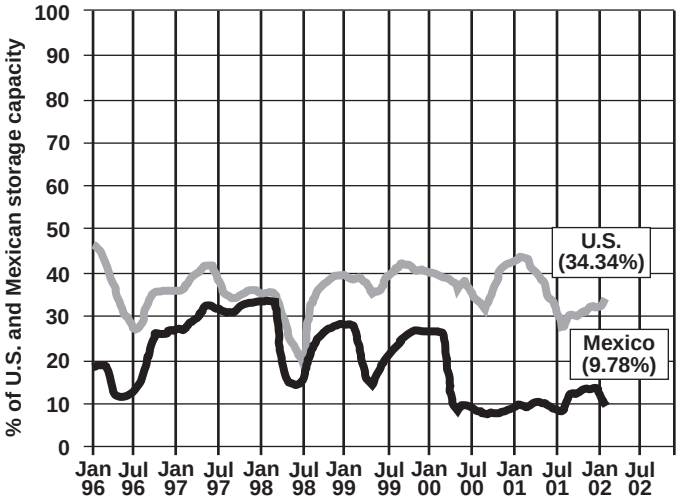
The plans have resulted in frequent communication and programs ranging from industry recognition for pollution prevention to a Border Recycles Day. Both of these programs are described in Chapter 6. The long history of friendship between the border states in the U.S. and Mexico is also evident at the local level, where sister cities have collaborated, for example, on air monitoring and on joint emergency response to potential environmental threats and disasters (Border database).

## Water Quantity—Overview of the Border Region

The Rio Grande has not seen worse times in terms of water quantity since the "drought of record," the drought of the 1950s. For most of the decade of the 1990s and continuing through November 2001, the region has experienced a prolonged drought, with water assigned to Texas users in International Amistad and Falcon Reservoirs in

**Figure 2-3**

**International Amistad-Falcon Reservoir System: Percent of Capacity**




Note: When Amistad and Falcon lakes are both full (conservation capacity) the United States can store 3,326,157 acre-feet and Mexico can store 2,656,787 acre-feet. The graph above details the percentage of conservation capacity from 1996 to the present.

*Source: International Boundary and Water Commission*

January 2002 dropping to its lowest winter level since the reservoirs began operating as a system in 1968 (Rubinstein, 2002). (Figure 2-3 shows water availability for the U.S. and Mexico over the past six years.)

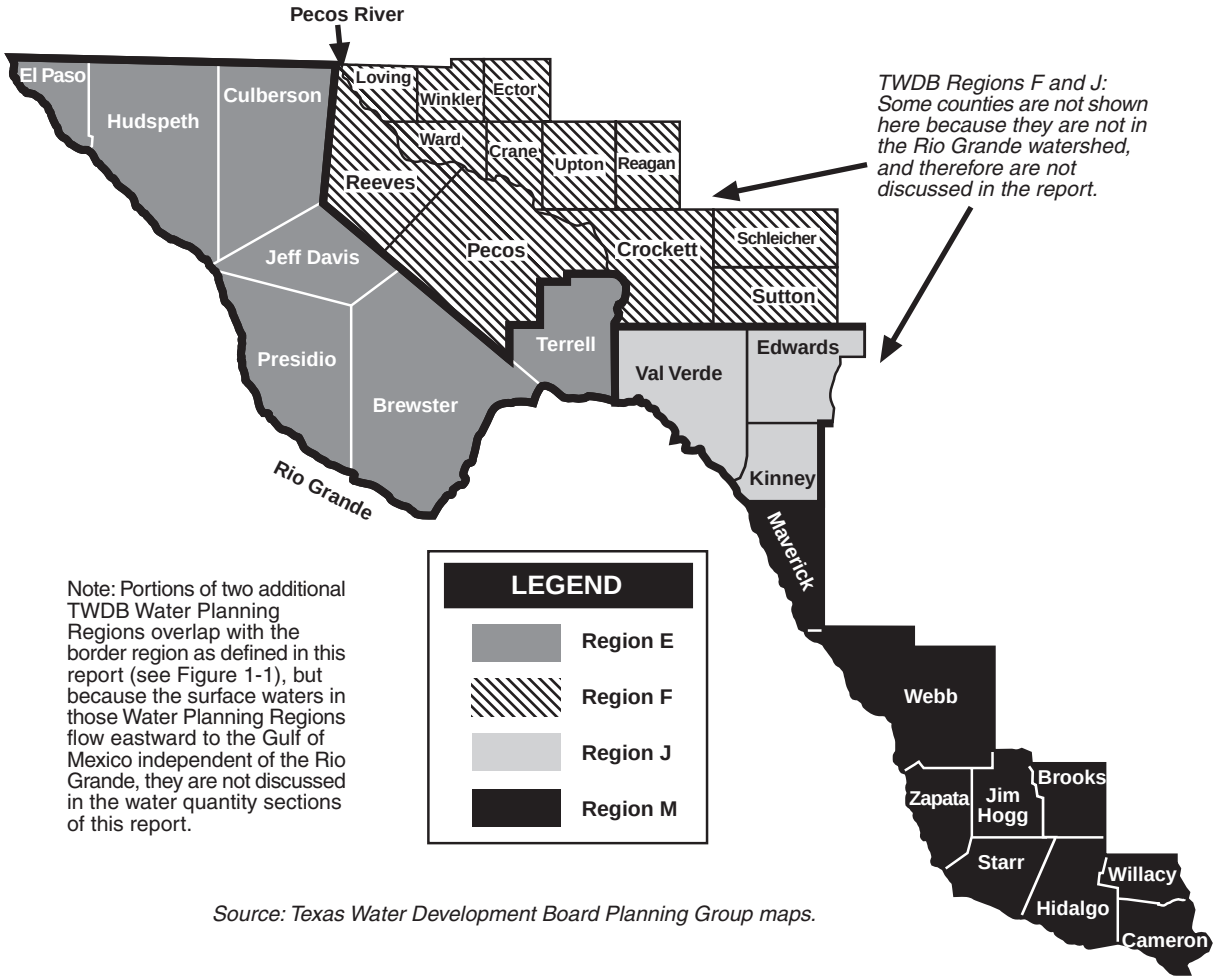
While droughts are considered natural, cyclical conditions, the explosive growth of exotic aquatic weeds in the Rio Grande downstream of International Falcon Reservoir also has hindered delivery of water to users. The aquatic weeds have grown dramatically in the past few years. How they were introduced into the river is not known. Their presence affects the river in two ways—the weeds themselves remove water from the river to support their growth, and they impede the flow of water to downstream users. The growth of these weeds has affected water delivery to users in Starr, Hidalgo, Cameron, and Willacy Counties, as well as to Mexican municipalities such as Matamoros in Tamaulipas.

Dependent in large part on agriculture, the economy of the Lower Rio Grande Valley (LRGV) has been hurt by the lack of water, because Mexico has not fulfilled terms of a 1944 treaty between the U.S. and Mexico. (The treaty is described more completely in the surface water overview later in this chapter.) Finally, the combination of drought and low flows due to aquatic weeds downstream of International Falcon Reservoir resulted in the mouth of the Rio Grande closing in February and again in November 2001.

Many communities along the border also depend heavily on groundwater sources for municipal water supply, but increased use is rapidly depleting the amount of high quality water available. Ciudad Juárez, Chihuahua, is projected to run out of groundwater in 2005; its sister city of El Paso, Texas, may run out by 2030.

**Figure 2-4**

**Water Planning Regions of the Texas Water Development Board in the Rio Grande Watershed**




*Source: Texas Water Development Board Planning Group maps.*

## Water Use in the Rio Grande Basin

Enacted in 1997, Senate Bill 1 required the Texas Water Development Board (TWDB) to develop a State Water Plan. The State Water Plan is based on local participation and is designed to meet local needs during drought-of-record conditions. Of the 16 regional planning groups created under Senate Bill 1 (identified alphabetically by the TWDB as Regions A-P), several are in the Rio Grande basin in Texas (see Figure 2-4), and all have developed plans for meeting water needs for the next 50 years in their respective regions. Discussing those details in depth, however, is beyond the scope of this report. These detailed plans can be found at the TWDB Web site at **http://www.twdb.state.tx.us**.

In this report, TWDB Regions E and F will be considered in the Upper Rio Grande basin, TWDB Region J will be considered in the Middle Rio Grande, and TWDB Region M will be considered in the Lower Rio Grande.

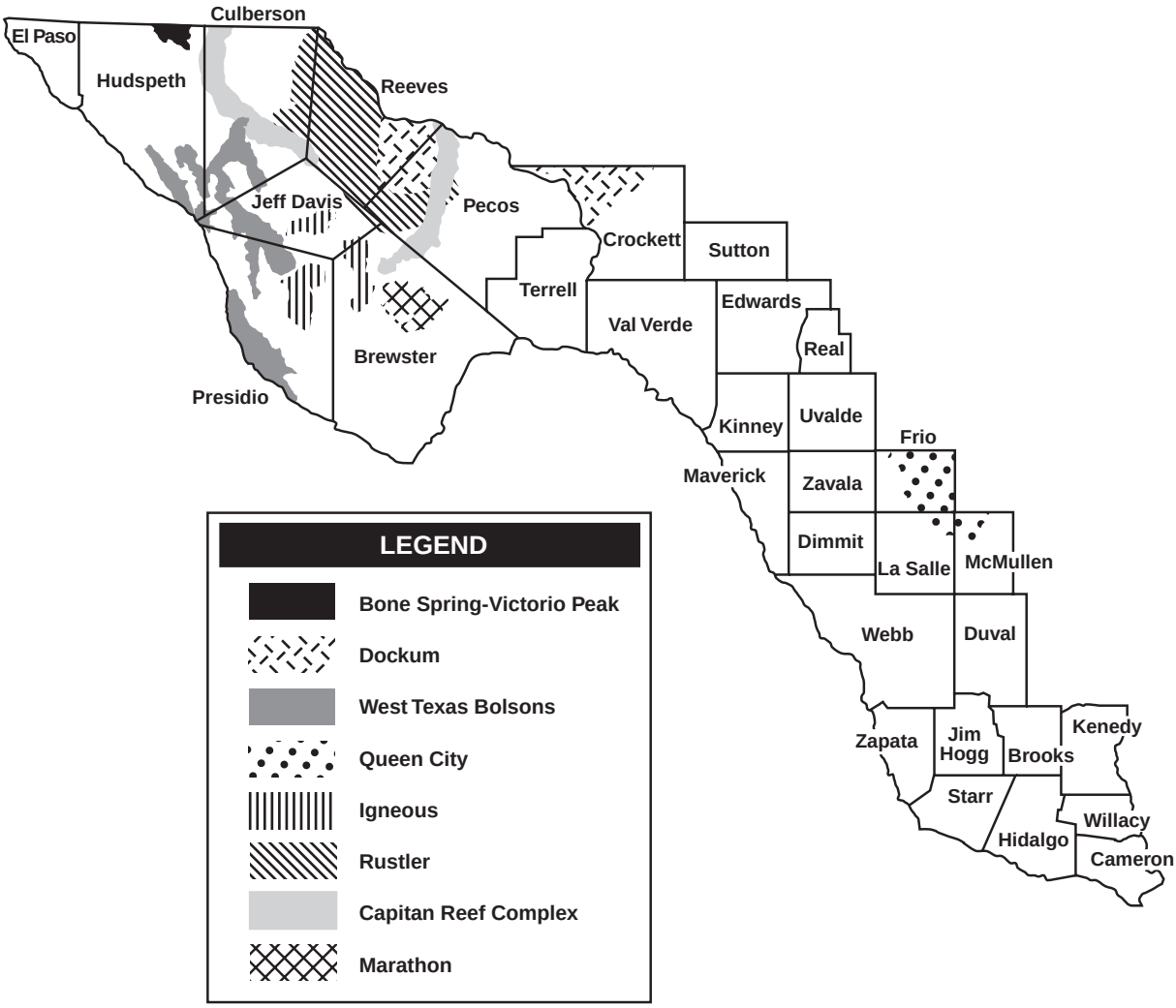
Although this report is about Texas, water use in other states or Mexico will be discussed when such use affects the border region.

**Table 2-3**

### Agencies and Their Roles in Water Quantity Management

| Agency | Role in Water Quantity |
|---|---|
| TNRCC | Oversees water rights in the Rio Grande. Rio Grande watermaster manages water from Fort Quitman downstream to the Gulf of Mexico. From El Paso to Fort Quitman, TNRCC manages the water rights program without the use of a watermaster. |
| Texas Water Development Board (TWDB) | Responsible for developing a State Water Plan through regional water planning groups (RWPGs). Also does major research characterizing aquifers and water availability and environmental flow needs. Conducts periodic surveys of groundwater use. Funds water and wastewater infrastructure. |
| Rio Grande Compact Commission | Oversees delivery of waters of the Rio Grande among the three U.S. states of Colorado, New Mexico, and Texas, upstream of Fort Quitman. |
| International Boundary and Water Commission (IBWC) | Manages international reservoirs (Amistad and Falcon); releases waters to Mexican and U.S. users from reservoirs, as each country requests (U.S. waters are requested by the TNRCC watermaster); maintains gaging stations on Rio Grande; accounts for waters in the Rio Grande and assigns ownership to both nations. Attends RWPG meetings. Participates in environmental studies. |
| U.S. Bureau of Reclamation | Manages Elephant Butte Reservoir in New Mexico. Participates in RWPG meetings. Provides technical assistance and funding for water conservation projects. |
| Regional Water Planning Groups (RWPGs) | Develop plans for meeting water demand in their regions over the 50-year period from 2000-2050. |
| Comisión Nacional del Agua (CNA) | Administers water to Mexican water users. Builds, maintains, and manages reservoirs and water delivery infrastructure in Mexico. Oversees Rio Grande Basin Council in Mexico, composed of stakeholders in Mexican portion of Rio Grande basin. Observer in Lower Rio Grande RWPG meetings. |
| Distritos de Riego | Mexican irrigation districts that are the primary users in Mexico of Rio Grande basin waters for agricultural purposes. |
| Irrigation Districts | In Texas downstream of Fort Quitman, agriculture uses most of the water for irrigation. There are 38 irrigation districts in the LRGV with water rights to most of the Rio Grande water. Some districts transfer water for other uses, such as municipal use or stream generation. Officially represented and participate in RWPG meetings. |
| Cities | Second-largest users of water on both the Mexican and U.S. portion of the Rio Grande basin, after irrigation use. Texas cities are officially represented and participate in RWPG meetings. |
| Mexican States and Water Agencies | Responsible for providing water-use planning, as well as water and wastewater services. Observers in RWPG meetings. |

**Figure 2-5**
## Minor Aquifers of Texas in the Border Region




### Water Quantity Authorities in the Rio Grande Basin

Various entities in Mexico and the U.S. play a role in the management of water quantities in the Rio Grande basin as shown in Table 2-3.

### Groundwater Overview

In West Texas (TWDB Regions E and F, *see* Figure 2-4), the amount of water being recharged to many of the aquifers is minimal. Because of arid conditions and increasing population, concerns about water use in West Texas are increasing. Major aquifers in this part of Texas (*see* Figure 2-2) include the Mesilla and Hueco Bolsons, which are entirely in the Rio Grande basin, and the Edwards-Trinity (Plateau) and the Cenozoic Pecos Alluvium, which are only partially in the Rio Grande basin.

Other major aquifers that partially extend into the Rio Grande basin include the Carrizo-Wilcox Aquifer in the middle portion of the basin and the Carrizo-Wilcox and Gulf Coast Aquifers in the lower portion.

There are many minor aquifers in the Rio Grande basin, including the Bone Spring-Victorio Peak, the Dockum, the West Texas Bolsons, the Queen City, the Igneous, the Rustler, the Capitan Reef Complex, and the Marathon. (See Figure 2-5.)

The right to use aquifer waters that cross political boundaries is an issue, especially in the tri-state area around El Paso-Ciudad Juárez-Doña Ana County, New Mexico, where the Mesilla and Hueco Bolsons are shared aquifers. The Edwards-Trinity Plateau also crosses the border underground into Mexico (Pavón, 2001).

Several counties in the Rio Grande basin rely on groundwater for more than 55 percent of their water needs. These counties include Brewster, Crane, Crockett, Culberson, Hudspeth, Jeff Davis, Kinney, Pecos, Reeves, Terrell, Upton, Ward, and Winkler (TWDB, 2001a).

In many areas of the border, information is lacking about the quantity and quality of groundwater available for domestic, municipal, and irrigation use. Groundwater of poor quality limits its use as a water source.

Groundwater use will be discussed in more detail in each subregion chapter.

## Surface Water Overview

On a map the Rio Grande is one river, but when it comes to dividing the waters of the Rio Grande between the U.S. and Mexico, it falls into two distinct domains: the Rio Grande upstream and downstream of Fort Quitman in Hudspeth County (immediately east of El Paso County). This is because two treaties between the U.S. and Mexico address the allocation of the waters of the Rio Grande, and Fort Quitman represents the endpoint for one treaty and the starting point for the other treaty. (See Figure 2-1 for the location of Fort Quitman.)

### 1906 U.S.-Mexico Water Treaty

The first treaty, which was written at a convention which concluded on May 21, 1906, ("Convention," 2001), allows for the distribution of the waters of the Rio Grande between the U. S. (Colorado, New Mexico, and Texas) and Mexico. It requires the U.S. to provide 60,000 acre-feet of water to Mexico on an annual basis for irrigation purposes, on a specified delivery schedule ("Convention," 2001).

### 1944 U.S.-Mexico Water Treaty

The Treaty of 1944 (State Department, 1944) provides for the distribution of the waters of the Rio Grande, the Colorado River, and the Tijuana River. This report only references the portion of the treaty relating to the Rio Grande.

The 1944 treaty allocates the waters of the Rio Grande between the U.S. and Mexico from Fort Quitman downstream to the Gulf of Mexico. Texas receives all waters allocated to the U.S. Under this treaty, all measured waters originating in the U.S. belong to the U.S. In addition, the treaty obligates Mexico to deliver a minimum amount of water below Fort Quitman to the U.S.—one-third of the inflow of certain Mexican tributaries is allotted to the U.S., not less than 350,000 acre-feet annually, as an average amount, in cycles of five consecutive years. All unmeasured inflows are divided equally between the two countries. The complete text of the treaty can be found on the IBWC web site at **http://www.ibwc.state.gov**.

The IBWC (see Table 2-3) is the binational agency responsible for determining international ownership, operation of international reservoirs, and implementation of other provisions of the two treaties. Besides the two treaties, interstate compacts between the states of Colorado, New Mexico, and Texas apportion the U.S. share to each of the affected states. The Pecos River Compact between Texas and New Mexico addresses a tributary of the Rio Grande.

### 1938 Rio Grande Compact

The Rio Grande Compact (1938) provides for the equitable distribution of the waters of the Rio Grande above Fort Quitman among the three compact states of Colorado, New Mexico, and Texas. Water provided to Texas under the compact comes through releases from Elephant Butte Reservoir in New Mexico. Under the Rio Grande Compact, Texas receives 790,000 acre-feet per year (Texas Water Code, 1994d).

### 1983 Water Rights Adjudication

In Texas, waters in lakes, rivers, and streams belong to the state of Texas (Texas Water Code, 1994a), and can be transferred as water rights to individuals. During the drought of record in the 1950s, the state of Texas filed suit against Hidalgo County Water Control and Improvement District (WCID) No. 18 to assign water rights in the Rio Grande downstream of Fort Quitman through a legal procedure called adjudication. However, more water was defined on paper than was actually avail-

able for use. The lawsuit was finally settled in 1971, and about 800 water rights were recognized out of 3,000 water rights claims filed. The adjudication resulted in over-appropriation of the Rio Grande, so the court created conversion factors for certain water rights, depending on the type of right. This water right system is unique in Texas.

The court also created the position of Rio Grande watermaster, which manages Texas' share of water from Fort Quitman to the Gulf of Mexico. After the IBWC determines international ownership, the watermaster has control of all U.S.-owned water and is charged with allocating the water to Texas water right holders under the TNRCC rules for the Rio Grande Basin (Texas Administrative Code). Water rights holders must ask the watermaster for permission to divert water.

The adjudication process assigned all water rights in the Rio Grande, except for the Rio Grande upstream of Fort Quitman, and was completed in 1983. The remaining part of the Rio Grande upstream of Fort Quitman has yet to be adjudicated.

There is a distinct difference in how surface water and groundwater are managed in the U.S. and Mexico. Surface waters belong to the state in the U.S. In Mexico surface waters and groundwater belong to the nation (CNA, 1992). Water from the Rio Grande for Mexican water users is allocated by concession or assignment by CNA (CNA, 1992). Thus, a federal role in Mexico corresponds to a state role in the U.S. for surface water. In Texas, groundwater is managed through local groundwater districts where they exist. Otherwise, the legal doctrine of the rule of capture applies.

### Reservoirs

The largest U.S. reservoir in the Rio Grande basin is Elephant Butte Reservoir in New Mexico. It was constructed in 1906 by the Bureau of Reclamation. In Mexico major reservoirs include La Boquilla and Luis León on the Río Conchos, Venustiano Carranza on the Río Sabinas, and El Cuchillo and Marte R. Gómez on the Río San Juan. Total storage capacity in U.S. reservoirs in the Rio Grande basin is 5.62 million acre-feet (maf), while total storage capacity in Mexican reservoirs is 8.54 maf (IBWC 1997). Most of the major reservoirs in Mexico have been built since the 1940s (RGRWPG, 2001). The El Cuchillo Dam was completed in 1992, and the Las Blancas Dam on the Río Alamo (capacity of 69,500 acre-feet) was completed in 2000 (Rakestraw, 2001b).

### Rio Grande Downstream of Fort Quitman

Below Fort Quitman there is frequently low flow (IBWC, 1997) because most of the water is diverted at El Paso, and return flows from Ciudad Juárez are often used for irrigation in Chihuahua (TWC, 1992). The next major inflow on the Rio Grande is the Río Conchos. The Río Conchos and the Pecos River provide most of the flow to the combined Amistad-Falcon reservoir system (TWDB, 2001b).

The Río Conchos contributed an average annual flow of 754,703 acre-feet to the Rio Grande over the period 1968-1997, or 85 percent of the combined historical annual flow of 888,901 acre-feet measured at the Johnson Ranch gaging station on the Rio Grande at Castolon (IBWC, 1997) in Big Bend National Park. However, from 1993–2000, the contribution of the Río Conchos has averaged 202,550 acre-feet per year; and from 1994-2000 has averaged 142,900 acre-feet (Rakestraw, 2001a). The Río Conchos has not provided as much water as it has in the past because of impoundments constructed in its watershed for Mexican users and drought conditions.

International Falcon Dam and International Amistad Dam, completed in 1953 and 1968, respectively, have been the major hydrologic modifications on the international stretch of the Rio Grande. They were constructed by the IBWC for water supply, flood control, and conservation under the terms of the 1944 Water Treaty between the United States and Mexico. Their reservoirs have a combined conservation storage capacity of 5.805 maf (IBWC, 1997). The two reservoirs are operated as a system (Texas Administrative Code), with International Amistad Reservoir the upstream reservoir. The U.S. share of the firm annual yield (the amount of water available during drought-of-record conditions in the basin) of the International

Amistad-Falcon system has been estimated at 1.32 maf (TWC, 1992). However, in 2000 it was estimated that the firm annual yield was only 1.17 maf due to sedimentation (TWDB, 2001b). Most of the capacity in the International Amistad-Falcon system is used to meet the water needs in the LRGV. Agriculture comprises 85 percent of the total use of waters from the International Amistad-Falcon system. Municipal use accounts for 14 percent, and other uses make up the remaining 1 percent.

Operated as a system, water is transferred between the two reservoirs as needed. However, because river segments are long, even under ideal conditions it can take days for water to be transferred from the reservoirs to where it is needed. For example, to get from International Falcon Dam to users downstream of Brownsville—some 231 miles—travel time for water can be at least six days, if not more. Water releases over the level of water demand—sometimes as much as 18 percent more—can be needed to move the water downstream to its destination.

### Water Rights

In the Rio Grande basin downstream of Fort Quitman, water rights total 2.196 maf (Rubinstein, 2001), excluding the Pecos and Devils River watersheds. Irrigation water rights in Hidalgo and Cameron Counties alone account for 1.633 maf. The next largest amount of water rights is for municipal use, with 261,500 acre-feet; followed by domestic/livestock, at 22,530 acre-feet; and industrial at 13,828 acre-feet.

Municipal water rights in Cameron and Hidalgo counties, the two most populated counties in the basin downstream of Fort Quitman, total 212,900 acre-feet. Webb County has the third largest municipal rights, at 43,900 acre-feet (TWDB, 2001c). Much of Cameron and Hidalgo Counties lie in the Nueces-Rio Grande coastal basin, but the water rights are from the Rio Grande basin. For more than a century, irrigation district canal distribution systems have been utilizing waters from one basin (Rio Grande) in another (Nueces-Rio Grande Coastal Basin), on a case-by-case basis as allowed by individual permits. This type of water utilization and distribution further highlights the uniqueness of the Rio Grande watermaster program, particularly in the lower Rio Grande.

### Drought

The last time both Amistad and Falcon International Reservoirs were considered full was in October 1992. This condition initiated a cycle for Mexico to provide 1.75 maf over the next five years under the terms of the Treaty of 1944. The water is to be delivered in annual flow volume of 350,000 acre-feet per year as an average in five consecutive years (a total of 1.75 maf over five years). Since the initiation of the 1992–1997 cycle, drought conditions below Amistad and Falcon dams, together with Mexico not delivering water from its internal reservoir system on the Río Conchos, has drastically affected the amount of water available to the users in the Rio Grande downstream of Fort Quitman.

This has affected interests on both the U.S. and Mexican sides of the lower Rio Grande. Conditions were so grave for Mexican municipalities in the Matamoros-Reynosa area in 1995 that, at the request of Mexican officials, the IBWC, with the concurrence of Texas, agreed to provide backup water from U.S. reserves, if necessary, to maintain minimum supplies to Mexican municipalities along the Rio Grande. More detail on this situation is included in Chapter 5.

The combined capacity of the International Amistad-Falcon reservoir system is 5.805 maf. When full, U.S. capacity is 3.323 maf. Since January 1996 there has not been more than 48 percent of U.S. capacity (1.59 maf) and 39 percent of Mexican capacity (968,000 acre-feet) in the International Amistad-Falcon reservoir system at any given time ("Amistad," 2001). Mexico's storage level in the international dams has not exceeded 14 percent since March 2000. It has, however, maintained considerably higher percentages of capacity in its reservoirs upstream on the Río Conchos. As of October 20, 2001, U.S. ownership stood at 30.52 percent of capacity (1.02 maf), the lowest

level for this time of the year since the current drought began in 1992 ("Drought," 2001).

### Water Deficit

The effects of localized drought below the International Amistad-Falcon dams and in the middle reach of the Rio Grande (between International Amistad dam and Fort Quitman) are worsened by Mexico not delivering water from six named tributaries as required under the 1944 Treaty, principally the Río Conchos and the Río Salado. This is a matter of urgency for local water users and state officials in Texas—including Governor Perry and former Governor (now President) Bush— who have expressed concerns that Mexico has been retaining and irrigating with water that it should have released to the U.S. under the treaty. In every treaty year between 1992 and 1999, Mexico provided less than 350,000 acre-feet, even during years when its Luís León dam was storing water in its flood pool.

During the years 1993–2001, Mexico's underdelivery from the six treaty tributaries has accumulated as a water deficit of 1.4 maf. This amount is more than the firm annual yield of the Rio Grande for the U.S. Economists estimate that the water deficit has had a gross **economic impact of at least $400 million per year** on the LRGV economy ("Estimating," 2001).

Mexican officials have stated that Mexican waters in the Río Conchos and Río Salado have not been provided to the U.S. because Mexican municipalities are lacking water and climatic conditions have not allowed it ("Testimony," 2001). However, data from the IBWC and others show that between 1993–2000, Mexico averaged annually 801,000 acre-feet of irrigation water use in District 005 (Delicias) and District 090 (Lower Río Conchos) in the Upper Rio Grande subbasin; 429,000 acre-feet in District 025 (Lower Río Bravo); and 185,000 acre-feet in District 026 (Lower Río San Juan) in the Lower Rio Grande subbasin (Brandes, 2002).

For the 1995–1999 period, Mexico has averaged about 1 million acre-feet of irrigation water use in the Rio Grande basin annually. Senior Mexican officials have alleged that Mexico has not performed because it has experienced "extraordinary drought," pointing out that Article 4 of the 1944 Treaty allows Mexico to postpone delivery of water to the U.S. in case of an extreme drought ("Agua," 2001). However, the relative abundance of runoff upstream on the Mexican tributaries, compared with the drought that has been experienced in the Lower and Middle Rio Grande, seems to contradict this allegation.

The water deficit situation gained attention in February 2001 when President Fox of Mexico and President George W. Bush met in the state of Guanajuato, Mexico. The following month both nations agreed, through IBWC Minute Order 307, that Mexico would repay some 600,000 acre-feet by September 30, 2001, and would negotiate a schedule of additional releases for water. While Mexico did not meet this deadline and only about half of the promised 600,000 acre-feet was delivered, the two countries continue to negotiate concerning the cause of the water deficit—Mexico not using its reservoir system to ensure deliveries under the treaty—as well as the repayment of the resulting current deficit.

The Texas Secretary of State's office co-authored a "White Paper," in preparation for a meeting between U.S. President George W. Bush and Mexican President Fox in March 2002, citing pertinent provisions of the Treaty of 1944, describing the nature of noncompliance, and urging a quick resolution to this critical issue. While the current water deficit continues to be negotiated at a level involving the IBWC and the federal governments of Mexico and the U.S., the possibility of interstate cooperation between Texas and Mexican states on this matter continues to be explored as a potential way to resolve the current crisis.

### Cross-Border Activities

The Office of the Governor, the TNRCC, and the TWDB have worked through the IBWC on water quantity issues in the Rio Grande. The TNRCC also has partnered with Texas border cities to ensure their water needs are met.

State officials met with the governor of Chihuahua on October 29, 2001, in Chihuahua. At-

tending were the then-acting Texas secretary of state, the TNRCC chairman, and representatives of water users in the Lower Rio Grande Valley. After touring reservoirs in the Río Conchos basin in Chihuahua state, they discussed reservoir management and the water deficit, emphasizing the need for continued talks and cooperation on a state-to-state basis.

The U.S. and Mexico have undertaken a number of joint projects to help alleviate drought problems, including partnerships through the IBWC. For example, Mexican entities have participated in the Texas Region M Regional Water Planning Group. In another instance, the TNRCC and the city of Brownsville Public Service Board took the following unprecedented steps to help the city of Matamoros meet short-term water needs in July 2001, when low-flow conditions caused by localized drought, and the growth of aquatic weeds, resulted in the real possibility that Matamoros might not get enough water:

- The Rio Grande watermaster continued to release extra U.S. water for delivery to Texas users. The increased flow, in combination with Mexican releases, provided adequate pressure to move the water past river vegetation.
- The TNRCC and Mexico coordinated water releases from Anzalduas dam near Reynosa to minimize inefficient use of water and move water downstream more quickly, as well as to help Mexico select better locations for water diversions to Matamoros.
- The TNRCC provided emergency funding of $50,000 for mechanical removal of aquatic weeds blocking delivery of downstream water.
- The Rio Grande watermaster continued monitoring diversions on the U.S. side to ensure that only authorized water was being used, while cooperating with the IBWC to identify any unauthorized diversions on the Mexican side ("Texas, Brownsville," 2001).

This type of cooperation is needed for both the U.S. and Mexico to address the pressing water issues caused by the ongoing drought.

### Closure of Mouth of the Rio Grande

In February 2001 it was discovered that a sandbar had completely closed the mouth of the Rio Grande. Low-flow conditions in the river, caused by a combination of drought conditions and aquatic weeds, allowed the natural wave motion of the Gulf of Mexico to dam the river's mouth with sand. In July 2001 the U.S. Section of the IBWC dredged a 20-foot cut in the 400-foot sandbar in half a day, restoring the channel. Within two days the channel was over 100 feet wide (Niemeyer, 2001). Nonetheless, in November 2001 the mouth once again closed. Closure of the river's mouth is an unusual event that will likely continue until regular flow conditions are once again restored.

## Water Quality—Overview of the Border Region

Much of the information on water quality in this report is taken from the Clean Rivers Program report of the U.S. Section of the International Boundary and Water Commission (IBWC), found at **www.ibwc.state.gov/crp/welcome.htm.**

One of the greatest threats to water quality in the Rio Grande is the border population boom, which is straining community water and wastewater treatment plants. Without adequate service, raw or poorly treated wastewater is more likely to enter the river, increasing bacteria levels and perhaps contributing to an increase in levels of waterborne diseases such as hepatitis A and shigellosis. The rate of incidence in 1999 for Hepatitis A in the fourteen Texas counties that touch the border, for instance, was 27.8 per 100,000 population. The rate of incidence statewide in Texas was less than half of that—12.6 (TDH, 2001).

Raw sewage, treated wastewater, and agricultural activities increase the amount of nutrients entering the river, which can encourage excessive algal growth and decrease levels of dissolved oxygen. This in turn can hurt the health of the Rio Grande's aquatic plants and animals. Decreased flows in the Rio Grande also contribute to poorer overall water quality. The less water available, the more concentrated pollutants potentially can become in the river.

Salinity is a very big issue in the upper portion of the river from the New Mexico state line to Amistad Reservoir. Increasing salinity has to do with the arid climate and constant use and reuse of river water for irrigation. The other issue is the introduction of pollutants from industrial discharges (organic chemicals, metals), agricultural runoff (pesticides, metals), and urban runoff (pesticides, metals). Mines and mine tailings are an issue in the Big Bend area.

Distinct from the surface water in the Rio Grande, groundwater in the border region is most threatened by increasing levels of salinity, which are occurring throughout the border region. The reasons are varied, ranging from overuse (thus producing water from zones of poorer quality), to leaching of salts accumulated in the soil from past irrigation, to poorly encased oil field wells that leak brine. In addition, groundwater in the Lower Rio Grande region and in Webb County also has been found to have naturally occurring radioactivity due to the presence of uranium-bearing ore deposits. Public water systems are required to test and treat for elevated radioactivity to meet safe drinking water standards, but residents relying on domestic wells for their water supply who do not test their water may not have adequate treatment.

A variety of state, federal, and local institutions share responsibility for water quality protection and improvement on the Texas side of the border. Most have ties, in one way or another, to the key piece of U.S. water quality legislation, the Clean Water Act (CWA).

## The Clean Water Act (CWA)

The federal CWA is the primary legal protection for the nation's water, including rivers, coastlines, and lakes. It was passed by Congress in 1977 as an amendment to an existing water pollution control law, and has been amended further since then. Its two primary goals are to eliminate pollutant discharges and to attain water quality levels suitable for fishing, swimming, and drinking. Under this law, each state sets its own water quality standards to protect aquatic life and to meet requirements for public water supplies. State standards must be at least as stringent as federal standards, but the EPA must approve any changes made to those state standards ("Clean," 2002).

The CWA created the National Pollutant Discharge Elimination System (NPDES), which requires permitting for any discharge into a water body from a single identifiable (point) source. Authority for administering the NPDES program falls under the EPA, which can delegate authority to a state. Texas received EPA delegation of authority to administer the program in September 1998 ("TMDL," 2002).

Section 303(d) of the CWA requires that states compile and submit to the EPA a list of water bodies that do not meet state water quality standards, the pollutants responsible, and plans for improving the quality of listed waters over the next two fiscal years. This list is commonly known as the 303(d) list after this section of the CWA. As a state water body, the Rio Grande falls under this requirement (TSSWCB, 2000).

Section 305(b) of the CWA requires states to document their monitoring and assessment of water quality in water bodies. This information is part of what each state uses to develop its 303(d) list. The CWA also defines total maximum daily loads (TMDLs) of the specific quantity of a pollutant that can be discharged (or "loaded") into a water body while maintaining water quality standards. Once the pollutant levels are defined, certain amounts are allocated to each point and nonpoint source in the watershed. Each TMDL determination requires an implementation plan that describes actions that will be taken to meet the plan's goal and a schedule for completing those actions (TSSWCB, 2000).

In 1987, Section 319 was added to the CWA to provide for national prevention and control of nonpoint sources of pollution; that is, those sources that cannot be easily traced back to a single, identifiable source. An example is runoff from impervious surfaces such as parking lots. In addition, Section 319 requires that states list the waters that are impaired entirely or in part by nonpoint source (NPS) pollution (TSSWCB, 2000).

## Water Quality Authorities in the Rio Grande Basin

Various entities in the U.S. and Mexico, at both the state and federal level, play a role in protecting water quality in the Rio Grande watershed. (See Table 2-4.)

**Table 2-4**
## Agencies and Their Roles in Water Quality Management

| Federal Agencies | |
|---|---|
| **Agency** | **Role in Water Quality** |
| U.S. EPA | The EPA administers the CWA nationally by providing technical and program guidance and funding support to assist states in complying with their CWA requirements. The EPA, through its regional offices, reviews CWA Section 303(d) lists and TMDLs for approval as submitted by a state. The EPA management of ambient water quality includes both surface and groundwater (aquifers) with emphasis given to water quality, aquatic health, and public health concerns. The EPA Region 6 office (Dallas, TX) manages the EPA's interests in Texas, Oklahoma, Arkansas, Louisiana, and New Mexico (TSSWCB, 2000 and "TMDL," 2002). |
| Natural Resource Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA) | The NRCS is a part of the USDA that focuses on conserving and improving natural resource use on private lands. It plays an active role in managing and mitigating agricultural nonpoint source pollution. The NRCS conservation specialists around the country help individual operators through technical assistance and cost-sharing programs that help users develop best management practices (BMPs) that reduce the water quality impact of their use (TSSWCB, 2000). |
| U.S. Geological Survey (USGS) of the U.S. Department of the Interior | The USGS is the nation's largest resource for water quality monitoring and assessment. The data it gathers on the state of a water body is collected and used by public and private organizations at all levels. In addition to aggregating data, the USGS helps develop methodologies for more accurate, efficient data collection and analysis (TGPC, 2001). |
| **State Agencies** | |
| **Agency** | **Role in Water Quality** |
| Texas Natural Resource Conservation Commission (TNRCC) | The TNRCC sets state water quality standards to protect public health, recreation, and aquatic life, as well as the state's industry and economic development. The TNRCC issues Texas Pollutant Discharge Elimination System (TPDES) permits that limit the amount of pollutants that can be present in wastewater discharge to Texas surface water, except for discharges related to oil, gas, and geothermal exploration which are under the jurisdiction of the Railroad Commission of Texas. The TNRCC promotes the standards through a variety of education and outreach activities, including training and certification programs.<br><br>The TNRCC monitors physical, chemical, and biological elements in the state's water bodies to help establish policies that protect water quality and to address problems and threats to surface water quality. The Texas Clean Rivers Program coordinates monitoring in river basins among state agencies, river authorities, local governments, industry, and the public. The Rio Grande basin is a part of the Clean Rivers Program, managed for the TNRCC by the U.S. Section of the IBWC, and is discussed in more detail under "International Institutions."<br><br>The TNRCC also develops the state's 305(b) report and 303(d) list and TMDLs for water bodies on the 303(d) list. The TNRCC's Section 319 Nonpoint Source (NPS) Management Program plans and implements projects to mitigate and control urban and nonagricultural NPS pollution, and administers Section 319 NPS grants to some of those projects.<br><br>TNRCC also monitors and protects the state's groundwater quality from point source and NPS pollution and works to improve the quality of contaminated sites. Its activities include waste disposal and storage tank permitting, investigation of contaminated sites, and cleanup projects and project funding.<br><br>The TNRCC leads the Texas Groundwater Protection Committee, discussed later in this table, and has the power to initiate the process to study and identify Priority Groundwater Management Areas (PGMAs) in areas facing critical groundwater problems, which include contamination. The TNRCC can also initiate creation of groundwater conservation districts within PGMAs (TNRCC, 2001b). |

**Table 2-4**
## Agencies and Their Roles in Water Quality Management
***(continued)***

| Agency | Role in Water Quality |
|---|---|
| Texas Water Development Board (TWDB) | The TWDB provides technical and financial assistance and leadership to support planning, conservation, and responsible development of state water resources. The TWDB administers the Economically Distressed Areas program (EDAP), which provides grant and loan funding to construct new or to hook into existing water and wastewater treatment facilities, as well as regional and municipal planning grants (“Economically,” 2001 and “About,” 2002).<br><br>Frequently this funding is given in packages that combine both grants and loans. Border communities, particularly colonias, are eligible for these funds, which can come from a variety of sources, including State Revolving Funds (SRFs). The TWDB manages the SRFs, which provide pass-through monies from the EPA for loans for infrastructure, including water and wastewater system improvements. (Pedersen, 2002).<br><br>The TWDB EDAP set up projects for later TEXAS Plan funding through the SOS. It not only provided connection funding; TWDB staff also helped gather the information needed by the SOS, NADBank, and EPA to clear the TEXAS Plan to proceed (Pedersen, 2002).<br><br>The $250 million state funded EDAP is supplemented by the $300 million federal Colonia Wastewater Treatment Assistance Program (CWTAP) for water and sewer infrastructure projects. The Colonia Plumbing Loan Program provides loans to individual colonia residents to install connections from their homes to wastewater systems and for indoor plumbing improvements. The Community Self-Help Program provides grants to communities that will initiate grassroots water and wastewater projects to match the grant with labor (“sweat equity”) or materials donations equal to 40 percent of the project’s total cost. As of December, 2001, the TWDB announced 100,000 hookups by colonia residents to water/wastewater services (“Economically,” 2001; “Colonia Plumbing,” 2001; “About,” 2002; and “Community,” 2001).<br><br>The TWDB also collects water and groundwater quality data, available to the public through several data networks, including the Texas Natural Resource Information Service, the Border Information Center, and the Texas Water Information Network (“About,” 2002).<br><br>The TWDB also provides technical and financial support to groundwater conservation districts to develop and implement management plans, as well as for groundwater data collection and regional water planning. At the request of the TNRCC, TWDB conducts studies on water use and availability for PGMAs (TNRCC, 2001b).<br><br>Studies of the coastal waters of the border region are carried out by the TWDB. These include intensive investigations of salinity dynamics, tidal circulation, and monitoring of water movement and water quality. The TWDB has also contributed, through the Research and Planning Fund, to environmental data collection in the border region by other agencies and universities. |
| Texas State Soil and Water Conservation Board (TSSWCB) | The TSSWCB is responsible for controlling and reducing state agricultural NPS pollution. The TSSWCB helps Soil and Water Conservation Districts and individuals develop and implement water quality management plans (WQMPs) to reduce agricultural nonpoint source pollution and thereby meet state water quality standards. Individuals request assistance through their local Soil and Water Conservation District (“Water,” 2001).<br><br>The individuals then work with the NRCS and the TSSWCB to develop plans that are then certified, implemented, and subject to an annual review. The TSSWCB also is responsible for administering CWA Section 319(h) grants for agricultural NPS control projects (“TSSWCB,” 2002). |

**Table 2-4**
## Agencies and Their Roles in Water Quality Management
***(continued)***

| Agency | Role in Water Quality |
|---|---|
| Texas Secretary of State's Office (SOS) | The SOS Border Colonia Initiatives Program employs seven colonia coordinators in counties along the Texas portion of the border. These coordinators help link colonia residents, local governments, and area utilities to extend basic infrastructure services to the colonias. The coordinators help track work of the TEXAS Plan, an SOS-sponsored initiative that directs funding and activity towards hooking up colonias to water and wastewater treatment service ("The Texas Plan," 2002 and "Texas Border," 2002). The project areas for which the TEXAS Plan was created had already been developed as colonia water and sewer projects through TWDB EDAP (Pedersen, 2002). |
| Texas Department of Housing and Community Affairs (TDHCA) | The TDHCA's Office of Colonia Initiatives improves living and housing conditions in colonias throughout the border region by providing support for water and waste water infrastructure development. The TDHCA also is involved in the SOS-sponsored TEXAS Plan ("Office," 2002). |
| Office of Rural Community Affairs (ORCA) | The 77th Texas Legislature (2001) created the ORCA to develop policy regarding economic and quality-of-life concerns of small and rural communities. Among other things, the ORCA runs the state's Community Development Block Grants (CDBG) program to increase access to housing, sanitary infrastructure, and economic opportunity. Program money can be used for a variety of water and wastewater infrastructure projects, including sewer systems and drinking water treatment ("CDBG," 2002). |
| Texas Parks and Wildlife Department (TPWD) | The TPWD monitors water quality with an emphasis on protecting the health of aquatic life and its habitat. The TPWD also is responsible for wetlands protection and for investigating fish kills or any other instances of pollution that harm or threaten wildlife (TSSWCB, 2000). |
| Texas Department of Health (TDH) | The TDH Seafood Safety Division evaluates the public risk of eating fish caught in state waters. If a health risk exists due to pollutants contaminating fish tissue, the TDH can declare fish advisories and bans on the water body where the fish were found. Eating fish from an area under an advisory is not illegal, though people should not eat more than the amount suggested in the advisory. Eating fish caught in an area where consumption is banned is illegal ("Survey," 2002).<br><br>The TDH also provides "nuisance findings" for colonias in EDAP counties. A nuisance finding determination relating to water supply and sanitation problems in the area to be served by a project is a technical designation that allows the project to be eligible for TWDB funds. |
| Texas Department of Agriculture (TDA) | The TDA leads the state in managing pesticides, including surface and groundwater contamination due to pesticide use. The TDA's responsibilities include enforcing related regulations, providing training resources, and assisting in spill prevention and cleanup (TSSWCB, 2000). |
| Texas Agricultural Experiment Station/ Texas Agricultural Extension Service (TAES/TAEX) | The roles of TAES and TAEX are primarily related to research and outreach for both surface and groundwater quality. Part of the TAES, the Texas Water Resources Institute (TWRI), serves as a major center of water-related research. TAEX develops and promotes educational material on water quality protection and BMPs. Both institutions are allied with Texas A&M University and provide a source of technical advice, expertise, and guidance to the public ("What," 2002 and "Texas Water," 2002). |
| Railroad Commission of Texas (RRC) | The RRC oversees the state's oil, gas, coal, and uranium mining industries. The RRC protects groundwater quality by monitoring areas of past and current mining activity and undertaking cleanup efforts in contaminated areas (TSSWCB, 2000 and "About RRC," 2002). |
| Texas Groundwater Protection Committee (TGPC) | The TGPC is chaired by the TNRCC, the committee's lead agency. It was created by the Texas Legislature in 1989 and coordinates groundwater quality protection activities among state agencies, bridging gaps between individual agency programs. The TGPC also documents groundwater contamination in its annual *Joint Groundwater Monitoring and Contamination Report* (TNRCC, 1999). |

**Table 2-4**
## Agencies and Their Roles in Water Quality Management
***(continued)***

| Mexican Water Quality Institutions | |
|---|---|
| **Agency** | **Role in Water Quality** |
| Comisión Nacional del Agua (CNA) | Management of water quality in Mexico is run largely through the federal government, though some delegation of authority to state and local authorities has begun. The CNA is the major agency responsible for managing Mexico's water resources, including water quality monitoring and protection. CNA is the main funding source for water and wastewater treatment projects. However, these funds are usually matched by grants from Mexican state and local governments (NADBank, 2001). |
| **International Institutions** | |
| International Boundary and Water Commission (IBWC) | The IBWC is a binational entity with a U.S. and a Mexico sections. The IBWC manages the Rio Grande according to the treaties governing the river, to benefit people on both sides of the border. The IBWC has a treaty obligation to work on solutions to border sanitation and other water quality problems. To that end, the IBWC has constructed an international wastewater treatment plant in the city of Nuevo Laredo, Tamaulipas ("About IBWC," 2002 and IBWC, 2001).<br><br>The TNRCC contracted with the U.S. section of the IBWC to implement the agency's Clean Rivers Program in the Rio Grande basin, due to the international nature of the river. Under that contract, the IBWC coordinates monitoring programs, solicits public input through its Basin Advisory Committee, and identifies and ranks surface water quality issues in the basin ("Welcome," 2002). |
| Border Environment Cooperation Commission (BECC) and North American Development Bank (NADBank) | The BECC and the NADBank were created by the U.S. and Mexico under a "side agreement" to NAFTA to provide environmental infrastructure for the border region. The BECC helps communities develop plans for infrastructure and certifies projects, while the NADBank funds those projects. Only projects that receive BECC certification are eligible for NADBank funds, and the projects often receive NADBank funds in conjunction with funding from other programs, such as the TWDB EDAP program.<br><br>Core BECC-NADBank projects include development and construction of facilities for wastewater treatment, drinking water, and solid waste management. The NADBank administers the Border Environment Infrastructure Fund (BEIF), a grant fund from EPA for use on water and wastewater projects.<br><br>In December 2000, the BECC and NADBank expanded the list of projects to be considered for certification and the loan program. The list includes projects related to the following:<br><br>■ industrial and hazardous waste,<br>■ water and wastewater hookups for housing,<br>■ recycling and waste reduction projects,<br>■ improving air quality,<br>■ public transportation projects,<br>■ clean and efficient energy,<br>■ municipal planning and development, and<br>■ water management.<br><br>The BECC and the NADBank's efforts are likely to remain among the more tangible of the cooperative environmental activities in the border region (NADBank, 2001). |

Numerous entities currently work to improve the environment in the border region. These include federal, state, and local governments on both sides of the border. Their efforts have undeniably brought benefits to border residents. However, as with any effort that involves so many entities, duplication of effort and gaps in services may occur. Enhanced coordination is needed.

## Waste Management—Overview of the Border Region

In the border region, many environmental issues are associated with waste management, including municipal solid waste (MSW), hazardous waste, and even radioactive waste management, as well as transportation of hazardous materials.

In addition, a large portion of the border area is rural, so the TNRCC offers assistance to farmers and ranchers through agricultural waste collection programs and workshops on how to make the best use of compost.

Compared to the rest of the state, MSW issues stand out as the principal concern because of the concentration of people and the colonias in rural areas. In those areas, access to and affordability of proper MSW collection and disposal systems are limited, frequently resulting in improper disposal of MSW.

Illegal dumping, a statewide problem, also continues to be a major issue in the border region. A 1997 assessment found illegal dumping to be the most frequently reported border-wide MSW concern (TNRCC, 1997).

Used-tire disposal continues to a major border concern, as it is in the rest of the state. Almost four million scrap tires generated in Texas annually are not finding proper end uses. Problem areas where tires are not disposed of properly include West Texas and the Rio Grande region ("Taking Stock," 2001). More information on used tires can be found in Chapter 6.

Hazardous waste treatment, storage and disposal facilities are few, and the amount of hazardous waste generated in the region is small compared to the rest of the state. Also, there are few Superfund or brownfield sites involving hazardous materials.

**Table 2-5**
**Agencies and Their Roles in Waste Management**

| Agency | Role in Waste Management |
|---|---|
| U.S. EPA | If a hazardous material has been designated as a hazardous waste, the EPA has regulatory jurisdiction. EPA jurisdiction also begins when a transported or stored hazardous material gets released through a spill, and the hazardous material is a listed hazardous waste and presents a danger to human health or the environment.<br>Hazardous waste generators must register with the EPA. Treatment, storage, and disposal facilities (TSDFs) of hazardous waste also must obtain an EPA identification number.<br>The EPA also manages the federal Superfund program to clean up abandoned or inactive sites that pose an unacceptable risk to public health and safety or the environment. |
| U.S. Department of Transportation (USDOT) | The USDOT regulates transportation of hazardous materials. |
| TNRCC | TNRCC has state solid waste regulatory implementation and permitting responsibilities.<br>As with the EPA, if hazardous material is designated a hazardous waste, the TNRCC has regulatory jurisdiction. TNRCC jurisdiction also begins when a transported or stored hazardous material gets released through a spill, and the hazardous material is a listed hazardous waste and presents a danger to human health or the environment.<br>The TNRCC also regulates generators of hazardous waste, and has authority delegated by the EPA to issue permits for treatment, storage, and disposal facilities for hazardous waste. Transporters of hazardous waste also are required to register with the TNRCC.<br>The TNRCC manages a state Superfund program to clean up abandoned or inactive sites that pose an unacceptable risk to public health and safety or the environment, but which do not meet requirements under the federal Superfund program. |

*(continued on next page)*

**Table 2-5**
## Agencies and Their Roles in Waste Management
***(continued)***

| Agency | Role in Waste Management |
|---|---|
| TNRCC *(cont'd)* | The TNRCC partners with the EPA and other federal, state, and local redevelopment agencies and stakeholders to help clean up, transfer, and revitalize brownfields, using regulatory, tax, and technical assistance. Local governments can also apply for assistance from the TNRCC for brownfield redevelopment projects. |
| TDH | The TDH regulates storage of certain quantities of medical and radioactive hazardous materials. |
| Texas Department of Public Safety (DPS) | The DPS has state delegation in Texas to regulate transportation of hazardous materials. |
| TWDB | Provides financial assistance for solid waste management projects. |
| Councils of Governments (COGs) | COGs are designated as the regional municipal solid waste planning entities for the State of Texas, and are responsible for developing Regional Municipal Solid Waste Management Plans. See Figure 2-7, Regional Councils of Governments in the Border Area. |
| Procuraduría Federal para la Protección al Ambiente (PROFEPA) | Mexico's federal environmental enforcement agency. |

### Waste Disposal in the Border Region

Throughout the basin, a perception of the border region as a waste dumping ground remains, fueled in large part by three proposed permit applications in the 1990s: low-level radioactive waste disposal sites in Hudspeth County and Kinney County and a proposed hazardous waste landfill in Terrell County. The permit applications for the first two sites were denied by the TNRCC, while the permit for the last one was withdrawn after the TNRCC raised questions about the geology of the site.

In addition, a large biosolids (wastewater sludge) disposal site in Hudspeth County contributed to the idea of the border as a dumping ground. However, after operating for nearly a decade, the facility's contract between New York City and the operator was not renewed. The site closed in 2001, with the last shipment ending in August 2001 (McMillan, 2001). To place the border region in perspective: only 19 biosolids disposal facilities are located in the 32-county border region, compared with 256 statewide.

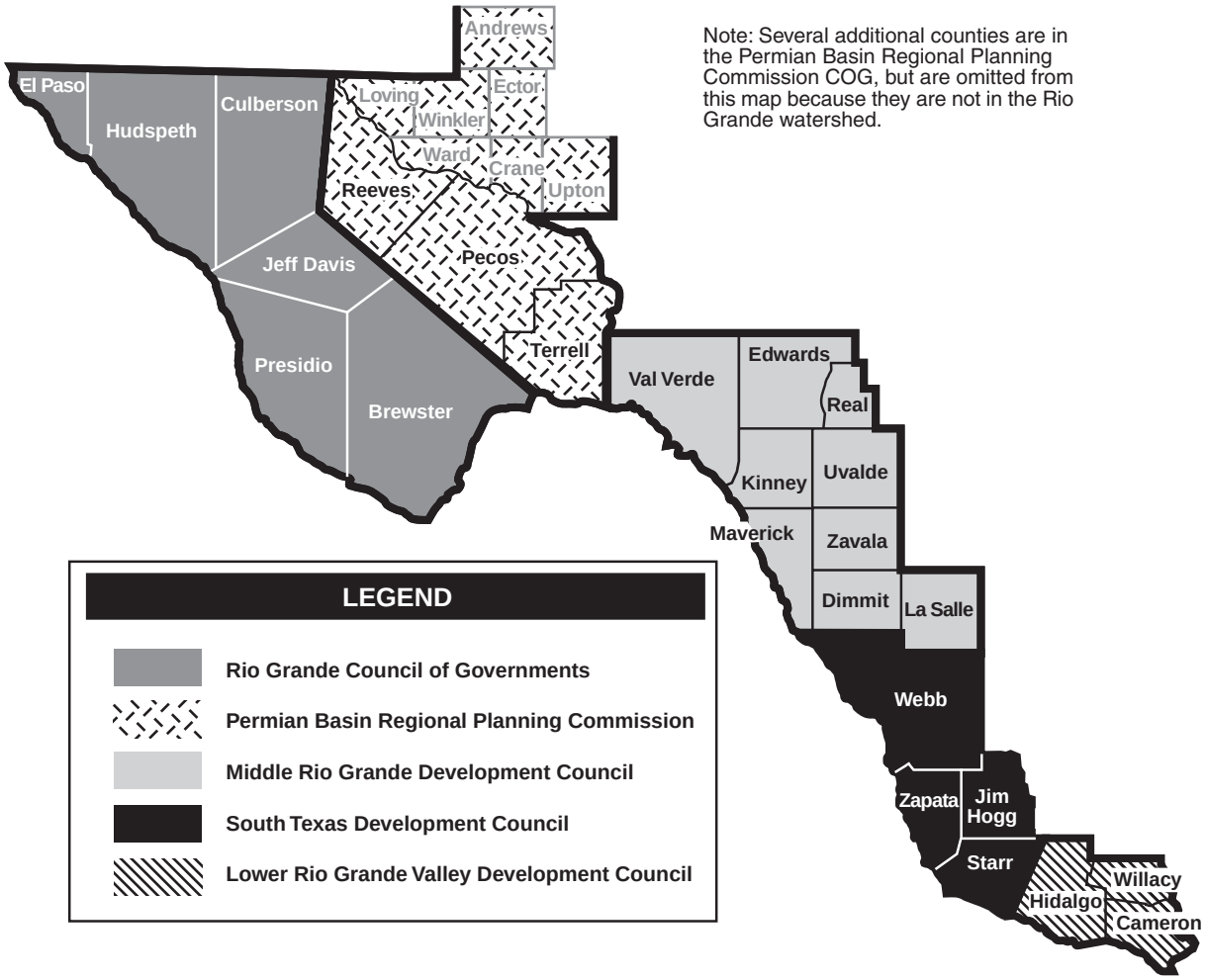
In addition, waste returned to the U.S. from maquiladoras under terms of the La Paz Agreement still concerns border residents. While the amount returned is small in comparison to waste generated in the U.S., most waste either passing through or for disposal in Texas returns primarily through three ports of entry (El Paso's Ysleta Port, Laredo's Colombia Bridge, and Brownsville). In fact, the amount of waste *sent to* Mexico for recycling from the U.S. far exceeds the amount of hazardous waste *returned from* Mexico to the U.S. by maquiladoras. In 1999, the latest year for which figures are available, 12,000 tons of hazardous waste were returned from Mexico to the U.S., while the U.S. shipped 255,000 tons into Mexico for recycling ("Summary," 2001, and HAZTRAKS database). In addition, because the TNRCC requires Class I industrial non-hazardous waste returned from Mexican maquiladoras to be manifested, Texas can capture this waste, and in 1999 7,219 tons were sent to Texas MSW landfills for disposal ("Summary," 2000).

### Councils of Governments

Councils of Governments (COGs ) are designated as the regional municipal solid waste planning entities for the State of Texas, and are responsible for the development of Regional Solid Waste Management Plans. (See Figure 2-6, Regional Councils of Governments (COGs) in the Border Area.) Solid waste management continues to be a major problem due to lack of landfill capacity in some areas.

**Figure 2-6**

## Regional Councils of Governments (COGs) in the Border Area




In Texas at the end of 2000, of the 227 permitted MSW landfills, only 33 were found in Rio Grande basin counties (TNRCC, 2001a). At the same time, while landfills statewide averaged 31.6 years of remaining MSW capacity, only one of the four major border COGs has remaining capacity greater than the statewide average. (See Table 2-6.) Three of the four border COGs have more than 25 years capacity. However, only one of the 24 statewide COGs has less capacity than the Lower Rio Grande Development Council's 9.1 years, although there are landfill permits under consideration in TNRCC's MSW permitting section.

Lack of collection services is a very important concern in the border region despite full capacity. Lack of collection services contributes to illegal dumping. Without the development of resident collection stations or other affordable collection, illegal dumping will continue to exist, even if there is adequate MSW capacity.

In this report, waste management issues will be discussed in each border subregion chapter. Generally, border waste will be discussed in terms of upper,

**Table 2-6**

## Remaining Municipal Solid Waste Capacity by Council of Governments (COG) Regions

| Region | Remaining MSW Capacity in Years |
|---|---|
| Rio Grande Council of Governments | 26.4 |
| Middle Rio Grande Development Council | 34.2 |
| South Texas Development Council | 24.8 |
| Lower Rio Grande Development Council | 9.1 |
| Texas | 31.6 |

**Source:** TNRCC, July 2001.

middle, or lower subregions, based on the geographically relevant COG. The Rio Grande COG serves the upper region, the Middle Rio Grande Development Council and the South Texas Development Council serve the middle region, and the Lower Rio Grande Development Council serves the lower region.

### Regional Solid Waste Grants Program

Under Section 361.014 of the Texas Health and Safety Code, approximately $11 million per year in grants is awarded to regional and local governments for MSW management projects through the state's Regional Solid Waste Grants Program. The TNRCC is directed by the Legislature to dedicate one-half of the revenue generated by state MSW disposal fees at landfills to grants for regional and local MSW projects. More information on the MSW COG grants program can be found in Appendix D, For More Information.

The TNRCC allocates the funds to the state's 24 COGs based on a formula that takes into account population, area, solid waste fee generation, and public health needs. Based on the formula, yearly funding for the state's 24 grants ranges from an annual minimum of $170,000 in the more rural areas of the state, to more than $2.4 million in the most heavily populated metropolitan areas. The COGs use the grant funds to develop an inventory of closed MSW landfills, to conduct regional coordination and planning activities, and to administer pass-through grant programs to provide funding for regional and local MSW projects. A table showing COG funding allocated to the border region appears in Appendix F, Pass-Through Grants for Border Area COGs.

Typically, COGs begin a pass-through grant application process in the spring of each year. The types of projects that may be funded with these grants vary from region to region, depending upon the priorities identified in the regional plans. Before developing the grant priorities, each COG is required to hold public meetings to receive input on the proposed grant categories.

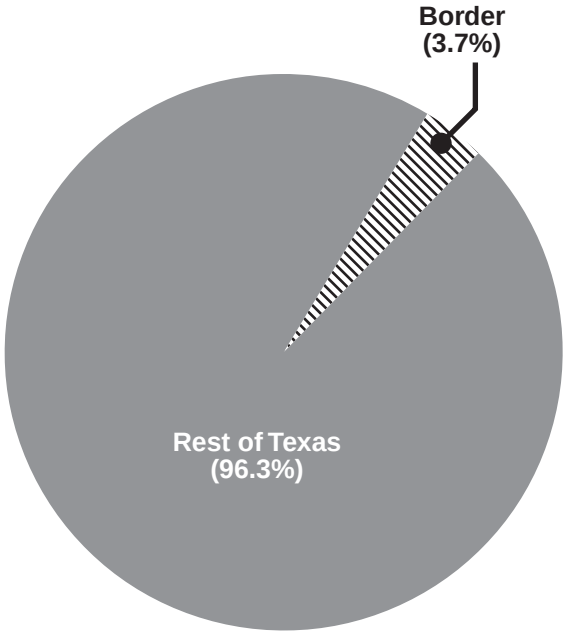
All projects must be consistent with the regional solid waste management plans prepared by the COGs and approved by the TNRCC. Also, projects funded with these grants must promote cooperation between public and private entities and may not be otherwise readily available or create a competitive advantage over a private industry that provides recycling or solid waste services. More information on the COG grant program can be found on the TNRCC's Web site, listed in Appendix E, Web Sites of Interest.

### Hazardous Materials

Of 216 facilities in Texas that treat commercial hazardous waste or provide on-site industrial treatment, only eight are within the 32 counties that are either wholly or partly in the area 100 kilometers from the Texas border with Mexico—an area that comprises 27 percent of the state. Figure 2-7 compares the number of hazardous waste treatment, storage and disposal facilities located on the border with the number of facilities in the rest of the state.

Of the 28 facilities in Texas that recycle, treat, or dispose of commercial hazardous waste (a subset of the previous paragraph), only one is located in the 32 counties in the entire Rio Grande basin (TNRCC, 2000a). This is less than 4 percent of the total.

**Figure 2-7**
**Percentage of Facilities for the Treatment, Storage, and Disposal of Hazardous Waste in the Border Region Compared to Rest of Texas**




Contrary to widespread perception, hazardous waste facilities in the border region are few, and the amount of hazardous waste generated in the region is small compared to the rest of the state.

Border residents continue to be concerned about the transportation of hazardous materials, especially in El Paso, Laredo, and Eagle Pass. Border residents have expressed concern because they often do not know the types and amounts of hazardous materials being transported through or temporarily stored within their communities while awaiting transfer to Mexico.

The TNRCC, in association with federal, state, and local officials, held seminars in early October 2001 in Brownsville, McAllen, Laredo, and El Paso to help companies that transport and store hazardous materials to improve environmental health and safety and to comply with applicable regulations. The workshops also covered warehouse design and construction. More information on these workshops can be found in Chapter 6.

As with solid waste, hazardous waste returned to the U.S. from maquiladoras under terms of the La Paz Agreement still concerns border residents. In 1999, the latest year for which figures are available, about 28,000 tons of waste were returned from Mexico to the U.S.

U.S. and Mexican state and federal agencies participate in binational regional enforcement subgroups under the Border XXI program, whose main focus is hazardous waste enforcement. The TNRCC, the EPA, U.S. Customs, and the USDOT, are among participating U.S. agencies. In Mexico, PROFEPA is the lead agency. Participation includes other federal agencies, as well as state agencies and Protección Civil, the emergency responder for the state of Tamaulipas.

## Border Superfund Sites

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly called Superfund, is the federal law that authorized U.S. states to seek remedies for uncontrolled releases to the environment of hazardous substances from abandoned hazardous waste sites. Texas has a similar law for sites that do not qualify for listing on the federal Superfund list. As of March 2002, 75 active sites were included on the two statewide Superfund lists—21 federal and 54 state. Six of these Superfund sites are in the Texas border region. One is a federal Superfund site at the Crystal City airport in Zavala County. The other five are Texas Superfund sites. They include the Niagara Chemical site in Harlingen, Cameron County; the Muñoz Burrows Pit in Mission, Hidalgo County; the Hayes-Sammons Warehouse in Mission, Hidalgo County; the El Paso Plating Works site; and the Unnamed Plating site in El Paso County ("Texas Map," 2002). Cleanup has been implemented at all sites except Unnamed Plating.

In 2001, a truck bound for Mexico overturned, spilling 8,000 gallons of a chemical used in plastic manufacturing. The spill occurred within the Brownsville city limits. In addition to the cost of emergency actions to contain the spill, about $800,000 will be spent to remove the contamination. The site is being evaluated to determine whether it meets criteria for ranking as a Texas Superfund site (Cedilote, 2002).

## Border Brownfields Sites

Old industrial properties that have been abandoned or underutilized due to liability associated with real or perceived contamination are known as brownfields.

The Texas Voluntary Cleanup Program (VCP) provides administrative, technical, and legal incentives to encourage the cleanup of these contaminated sites in Texas. Companies or individuals who purchase property in an already-contaminated condition (nonresponsible parties), including future lenders and landowners, receive protection from liability to the state of Texas for cleanup of sites under the VCP. This helps eliminate most of the constraints for completing real estate transactions at those sites. As a result, many unused or underused properties may be restored to economically productive or beneficial community use. Also under the VCP, site cleanups follow a streamlined approach to reduce future human and environmental risk to safe levels.

The VCP sites undergo either assessment or remediation, or both, depending on the outcome of the assessment. Since the VCP program began, 35 projects are in various phases in five border counties, compared to 1364 in all of Texas, as shown in Table 2-7. A completed site is one that has been cleaned to a level that allows development to proceed.

The TNRCC publishes a newsletter, *Texas VCP News*, for those interested in following the process of the cleanup programs. The June 2001 issue featured the Rio Vista Farm project in the El

**Table 2-7**
**Sites of Voluntary Cleanup Programs in Border Counties**

| County | Remediation | Investigation | Completed | Total |
|---|---|---|---|---|
| Cameron | 2 | 4 | 4 | 10 |
| El Paso | 0 | 1 | 5 | 6 |
| Hidalgo | 3 | 5 | 7 | 15 |
| Maverick | 0 | 0 | 1 | 1 |
| Webb | 0 | 1 | 2 | 3 |
| Totals | 5 | 11 | 19 | 35 |
| State | 102 | 461 | 593 | 1364 |

Paso area. Information on how to obtain back issues of the newsletter is located in Appendix D, For More Information.

### Agricultural Waste Management Assistance

Texas Country Cleanup collections are offered to rural and agricultural communities in the form of one-day events at temporary collection sites across the state. Originally developed to offer a disposal outlet for pesticide containers, the program has expanded to include waste oil, oil filters, lead-acid batteries, and tires.

The TNRCC implemented agricultural waste pesticide collections to discourage the improper storage or disposal of pesticides that can contaminate groundwater and surface water. The program offers agricultural producers in the state the opportunity to dispose of unusable chemicals safely at no cost. The collections are conducted annually in areas of high agricultural production.

The TNRCC also holds workshops to provide ranchers with information on composting animal waste, current compost regulations, marketing opportunities, and public and private-sector applications for composted materials. Returning organic materials to the land can increase water quality and quantity, reduce nonpoint source pollution, and increase crop production.

Composting manure can play an essential role in bringing many rivers, streams, and lakes up to environmental standards in watersheds where confined animal feeding operations (CAFOs) are concentrated. Composted manure provides a viable and sustainable opportunity to move large volumes of organic material from the concentrated areas to other areas that need organic soil amendments. Soils amended with organic material require less irrigation as well as fewer fertilizers and pesticides than do depleted soils, to achieve optimum crop production.

Texas has more than 20 million acres under cultivation for crops. More than 6 million of those acres are irrigated, 70 percent from water wells. Application of compost enhances soil stability, reducing erosion and preventing the loss of nutrients into streams. Every year an average of five tons of soil is lost through erosion for every acre of cultivated cropland.

## Air Quality—Overview of the Border Region

Through the federal Clean Air Act (FCAA), the U.S. Congress established a number of laws and guidelines pertaining to air quality. The FCAA gives the EPA authority to determine which air pollutants present the greatest problem for public health or welfare and to establish standards for those pollutants. Additionally, the FCAA delegates to the states the job of monitoring for the pollutants and implementing programs to attain or maintain the standards, which includes the issuance of permits that take into consideration emissions limits. Under the Texas Clean Air Act, the TNRCC is responsible for enforcing the federal and state air quality laws and generating locally specific rules.

The TNRCC operates an extensive monitoring network to assess air quality in Texas. More information about this monitoring network, including data, can be found at the TNRCC's Web site listed in Appendix E, Web Sites of Interest.

## Air Quality Authorities in the Border Region

The most important entities whose actions affect Texas air quality are shown in Table 2-8.

**Table 2-8**
**Agencies and Their Roles in Air Quality Management**

| Agency | Role in Air Quality |
|---|---|
| EPA | Under the Federal Clean Air Act (FCAA), establishes laws and standards pertaining to air quality and enforces them. |
| TNRCC | Implements the Texas Clean Air Act, which provides authority for both federally delegated programs under the FCAA, and state-only air quality requirements. Enforces both federal and state clean air requirements. Maintains an air quality monitoring network in Texas. |
| New Mexico Environment Department (NMED) | Has responsibilities in New Mexico equal to those of the TNRCC in Texas. Cooperates with the TNRCC in Paso del Norte Air Basin. |
| Cities and Counties | Cooperate with TNRCC (and in New Mexico, the NMED) in operating some of the monitoring stations and implementing some of the action programs. |
| Joint Advisory Committee for Improvement of Air Quality in the Cuidad Juárez, Chihuahua-El Paso, Texas-Doña Ana County, New Mexico Air Basin (JAC) | Comprising public and private members from the U.S. and Mexico, serves as avenue of collaboration and as advisory body to multiple jurisdictions. |
| Central States Regional Air Planning Association (CENRAP) | One of five regional air quality associations supported by the EPA to provide a forum for strategic planning related to visibility issues; comprises the states of Texas, Louisiana, Arkansas, Oklahoma, Missouri, Kansas, Nebraska, Iowa, and Minnesota. |
| Mexican Secretariat for Environment and Natural Resources (SEMARNAT in Spanish) | In the Mexican federal system, similar to the EPA, but with some of the powers exercised by the states in the U.S. Promulgates and enforces air quality standards. |

## Important Terminology under the Federal Clean Air Act (FCAA)

The FCAA tasked the EPA to determine which air pollutants were most dangerous to public health and welfare, and to establish for these *criteria pollutants* two kinds of standards: ambient standards governing the concentrations of those pollutants in outdoor air; and emissions limits for technologies that are sources of those pollutants.

The EPA identified six criteria pollutants—ozone, nitrogen dioxide, sulfur dioxide, particulate matter, carbon monoxide, and lead. The EPA established the National Ambient Air Quality Standards (NAAQS) for those pollutants (40 *CFR* 50.2-50.12) and emissions limits for a wide range of source technologies (40 *CFR* 60).

If a geographical area is not in compliance with one of the NAAQS, then the EPA may designate it a *nonattainment area*. One of four nonattainment areas in Texas with respect to the ozone standard is in the border region—El Paso. El Paso is also the only area in Texas designated nonattainment for two additional pollutants, particulate matter and carbon monoxide. Neither El Paso nor any other area along the border is in violation of the NAAQS for the other criteria pollutants.

The FCAA also created special protection for visibility in national parks and wilderness areas, termed *Class I areas*. Two national parks in west Texas, Big Bend and Guadalupe Mountains, have visibility impairment problems that are being addressed under this program (40 *CFR* 51 P).

In addition to the criteria pollutants, the FCAA established a list of pollutants also potentially harmful to public health and the environment, called *hazardous air pollutants* (HAPs) (40 *CFR* 61 and 63). The HAPs are also referred to as *air toxics*.

To maintain or attain compliance with the NAAQS and meet visibility requirements, each state must prepare a State Implementation Plan (SIP) (40 *CFR* 51 F and G). The SIP lays out the rules and programs that local governments, citizens, and businesses must follow with respect to the generation of air pollution from both stationary and mobile sources. The SIP's rules and programs differ

based on whether or not an area is meeting the NAAQS. Involvement in the SIP development process and SIP revisions by local governments and residents is welcome.

## Air Pollutants Important to the Border

As previously explained, El Paso County has been designated nonattainment for ozone, particulate matter, and carbon monoxide. Local residents have also expressed concern about possible negative impacts of selected air toxics that have been deposited in soils in a particular area of the city. Two national parks in west Texas have problems with regional haze, which is largely related to particulate matter. Citizens in the Laredo area have expressed concern about carbon monoxide, although the area is in compliance. Those specific pollutants, therefore, merit further explanation in this report. Additional background information about each of these problems is offered in the following five subchapters.

### Ozone

Ozone (chemically $O_3$) is actually a "secondary" pollutant, because it is formed by the action of sunlight and warm temperatures on nitrogen oxides ($NO_x$) and volatile organic compounds (VOCs). Typically a problem in the summer, high levels of ozone can affect the respiratory system and aggravate respiratory disease such as asthma. Ozone also can reduce agricultural and forest yields.

Any process that combusts fuels in the presence of air will create $NO_x$. Common sources of $NO_x$ are motor vehicles and boats, construction equipment, power generation, industrial processes, and natural gas furnaces. VOCs include many organic chemicals that vaporize easily, such as those found in gasoline and solvents. Common sources are oil refineries, organic chemical plants, gasoline stations, petroleum storage tanks, paint shops, dry cleaners, gas-fired lawn and garden equipment, and plants and trees (the latter sources, called biogenics, play an important role.)

The NAAQS for ozone are based on hourly average concentrations. An area is not in compliance if any one monitor in the area registers an hourly averaged concentration of 125 parts per billion (ppb) or more of ozone on more than three different days over a three-year period. The EPA is developing a new standard based on eight-hour averages that is anticipated to replace the one-hour standard in 2003 or 2004. Areas currently in nonattainment under the one-hour standard will still have to attain that standard; the EPA has not yet decided whether those areas will have to meet the new standard simultaneously.

### Particulate Matter

Particulate matter (PM) includes dirt, dust, smoke, and certain types of chemical compounds, such as particles formed when gases emitted by combustion activities are transformed by chemical reactions in the air. Such gases include sulfur dioxide, nitrogen oxides, and volatile organic compounds. These materials form small particles that stay suspended in the air and can be inhaled. They reduce lung function and aggravate respiratory problems.

Over the past two decades, the NAAQS have regulated particles with a diameter no larger than 10 microns (a micron is one millionth of a meter), referred to as $PM_{10}$. By comparison, the diameter of a human hair ranges from 30 to 200 microns.

Particulate matter can come from dust storms, be kicked up by traffic on unpaved roads, or be emitted from any combustion activities, refining facilities, or even cutting of softwood veneer and plywood.

The first $PM_{10}$ standards were promulgated by the EPA in 1987—a maximum 24-hour standard and the annual average standard. In 1997, the EPA preliminarily announced standards for "fine" particles, $PM_{2.5,}$ but implementation has been delayed pending further review of the standard in 2002 due to litigation. This new standard is being established as a result of research demonstrating health effects associated with exposure to fine particles, as well as their contribution to regional haze (see the subchapter on visibility and regional haze).

### Carbon Monoxide

Carbon monoxide (CO) can be created any time fossil fuels are burned, whether in vehicle engines, manufacturing processes, or household heating and cooking. CO tends to be more of a problem in the winter due to incomplete combustion of heating fuels and the greater likelihood that CO emissions will be trapped by temperature inversions.

Carbon monoxide impedes the blood's ability to deliver oxygen to the body's organs, including the heart and the brain. Low levels of CO can affect persons with heart disease, and higher levels can create vision problems, reduced ability to work or learn, and reduced manual dexterity. Extremely high levels, especially in a contained environment, can cause death.

The NAAQS include both a 1-hour standard and an 8-hour standard for CO. The average concentration of CO cannot equal or exceed 35.5 parts per million (ppm) over a 1-hour period, or 9.5 ppm over an 8-hour period. An area is in violation if any one monitoring site records a concentration at or above those levels more than one time in a calendar year.

### Visibility and Regional Haze

Visibility is defined as the ability to see the color, shape, contrast, and texture of a landscape or city skyline. In 1980 Congress added language to the FCAA to protect Class I areas (national parks and wilderness areas). Preserving visibility was made a priority for those areas, which include Big Bend and Guadalupe Mountains National Parks in West Texas.

The EPA issued the Visibility Protection Rule in 1980, and then enhanced that regulation with the Regional Haze Rule that was adopted in 1999. In the evolution of requirements on this subject, those relevant to the first rule are referred to as Phase I, and those relevant to the second rule as Phase II.

Phase I addresses sources of pollution within 100 kilometers. Phase II recognized the increasing evidence concerning long-distance transport of pollution. It put no distance limits on identifying and controlling sources and encouraged states to work cooperatively. In addition, the EPA originally proposed the Regional Haze Rule at the same time as the new $PM_{2.5}$ standards and explicitly recognized $PM_{2.5}$ emissions as an important factor in producing haze.

The Regional Haze Rule required states to conduct certain analyses and to set a goal of reaching so-called "natural visibility conditions" by 2064. In working toward that goal, each state must aim to improve visibility on the haziest days and ensure that no degradation occurs on the clearest days.

Haze can be caused by natural factors such as wildfires and by man-made pollution transported from urban or industrial sources. With regard to the man-made pollution, some particles are emitted directly into the atmosphere and others are formed when gaseous pollutants react in the atmosphere. For this reason, it is critical to understand the specific components of the pollutants affecting visibility in individual areas. The understanding of the chemistry and physics of these processes, as well as tools to measure them, are still evolving. The most recent information indicates that sulfates are a significant contributor to haze in Big Bend National Park. Sulfur dioxide is formed when fuel containing sulfur (mainly coal and oil) is burned, and during metal smelting and other industrial processes. A major source of sulfur in the air is the combustion of coal for electricity production.

### HAPs, or Air Toxics

The hazardous air pollutants (HAPs, or air toxics) include volatile organic compounds (VOCs), semivolatile organic compounds, polycyclic aromatic hydrocarbons (PAHs), metals, and metal compounds. This category of pollutants overlaps somewhat with the criteria pollutants covered by the NAAQS, because many VOCs (which serve as precursors to ozone, one of the criteria pollutants) are also HAPs. The FCAA gave authority to the EPA to establish emission limits for technologies that generate air toxics, but not to establish ambient standards (like the NAAQS) for air toxics. TNRCC has developed health-based guidelines used to evaluate the monitored air toxics.

The principal concerns in the border region are related to deposition in soil involving historical emissions of cadmium, arsenic, and lead in El Paso. More recent air monitoring of these metals does not indicate a need for concern. The named air toxics would have come from facilities such as smelters, battery plants, and metal recyclers. This is discussed more completely in Chapter 3 under Waste Management.

The TNRCC currently conducts air monitoring of a range of VOCs, carbonyls, PAHs, and metals in El Paso. As in other large urban areas of Texas, benzene and formaldehyde have been measured at levels of concern and continue to be evaluated.

### Interaction with Other Jurisdictions

The EPA establishes air quality standards and regulations to implement the FCAA and the latter delegates the enforcement of those regulations to the TNRCC. The TNRCC must submit all revisions

to its State Implementation Plan (SIP) to the EPA for approval and then must report on progress. The EPA provides a significant amount of funding to the TNRCC for some of its work on air quality, including a specific grant targeting border air quality.

The TNRCC, in turn, works closely with local governments in establishing monitoring sites, often contracting with those governments to operate and maintain the monitors. If an area is not in compliance with one or more of the NAAQS, such as in El Paso, the TNRCC works with the local officials and citizens in designing appropriate regulations and programs to be included in the SIP.

El Paso shares an air basin with nearby cities in New Mexico and with Ciudad Juárez across the Rio Grande in Mexico, which means that pollution generated in one city quickly affects citizens in two other states. For this reason, the TNRCC actively participates in a binational committee that includes members from all affected areas and the two national governments.

Mexico has federal ambient standards that are quite similar to the U.S. NAAQS, but the Mexican government, both at the national and state level, but generally does not have as many resources to address problems.

## The Toxics Release Inventory

Certain facilities that use or produce toxic chemicals above specific thresholds are required to report annually under the Emergency Planning and Community Right-to-Know Act (EPCRA, also known as Title III of the Superfund Amendment and Reauthorization Act, Section 313). Toxics Release Inventory (TRI) reports must be sent to both the EPA and the TNRCC. TRI reports are used to inform the public and government officials of on-site releases, off-site transfers, and other waste management activities at each facility.

In 1989, the Texas Legislature passed the Texas Toxic Chemical Release Reporting Act, Texas Health and Safety Code (THSC) Chapter 370. It is the state complement to the federal EPCRA legislation, with additional authorization to administer a fee associated with submission of TRI reports. The original purpose of TRI reporting was to inform local communities of potential hazards associated with TRI chemicals and facilities. By having readily available information about chemicals in their communities, citizens, businesses, and government officials can make informed decisions regarding regulations, guidelines, and standards. The TRI data are also used nationally to track pollution prevention progress by industry.

The foundation of the TRI is a common set of "core chemicals" that have been reported since 1988. Yet, there have been many changes to the TRI chemical list over the years: chemicals were added or subtracted, and some chemicals had modifications in their release-reporting calculation methods. To generate an annual long-term trend, these types of reporting changes were eliminated so the data can be compared consistently over a period of years.

These 12 years of TRI data, collected since the 1989 state law was enacted, were recorded during a period of unprecedented economic growth in Texas. Because of the magnitude of the state's manufacturing sector, particularly in petrochemicals, Texas consistently leads other states in total reported toxic releases and disposal. At the same time, Texas also leads the nation in overall reductions. Ozone-reduction plans first implemented in the early 1990s in a number of cities, including El Paso, also contributed to long-term reductions of toxic air emissions. The most recent TRI data for El Paso, the border area, and Texas are shown in Table 2-9 for comparison purposes.

**Table 2-9**
**1999 Toxics Release Inventory Data**

| | Total Air Emissions, lbs. | Total On-and Off-site Releases, lbs. | Total Waste Managed, lbs. |
|---|---|---|---|
| El Paso County | 445,238 | 737,113 | 18,466,344 |
| Texas Border Region | 1,434,845 | 1,822,571 | 21,820,931 |
| Texas | 111,214,898 | 313,499,111 | 4,731,753,006 |

Source: TRI Waste Quantity and Release Report Query Results, 2001 (using August 2000 data).

CHAPTER 3

# UPPER RIO GRANDE SUBREGION

STATE OF THE RIO GRANDE AND THE ENVIRONMENT OF THE BORDER REGION

## Characteristics and Concerns

For this report, the Upper Rio Grande subregion includes the stretch of the Rio Grande River extending from the Texas-New Mexico state line to Amistad International Dam just north of Del Rio (see Figure 3-1). Most of this area encompasses TNRCC Region 6, whose office is located in El Paso. (See Appendix B, Texas Border Environmental Offices, for a list of border offices and their locations.)

The Upper Rio Grande also includes a stretch of the river east of Big Bend National Park that includes Terrell County (TNRCC Region 7, Midland) and Val Verde County (TNRCC Region 16, Laredo). When it is necessary to specify a different area—for example, in discussing water quantity—the change will be noted.

The Upper Rio Grande subregion is home to the Ysleta del Sur Pueblo, or Tigua, Indian tribe. The state of Texas recognized the Tiguas in the late 1960s, and their chartered reservation is considered a sovereign nation.

In addition, the Upper Rio Grande subregion includes diverse rural communities in the West Texas counties of Brewster, Culberson, Jeff Davis, Hudspeth, Presidio, Terrell, and Val Verde. The economy in this portion of the region is characterized by ranching and agriculture. Livestock include cattle, sheep, and goats. Agricultural crops include cantaloupes, cotton, pecans, melons, and onions. Other economic activities are hunting and mining.

According to the 2000 census, El Paso had a population of about 680,000, making it the largest city in this region. In Texas, the Upper Rio Grande subregion did not experience the same high growth rates characteristic of the Middle and Lower regions.

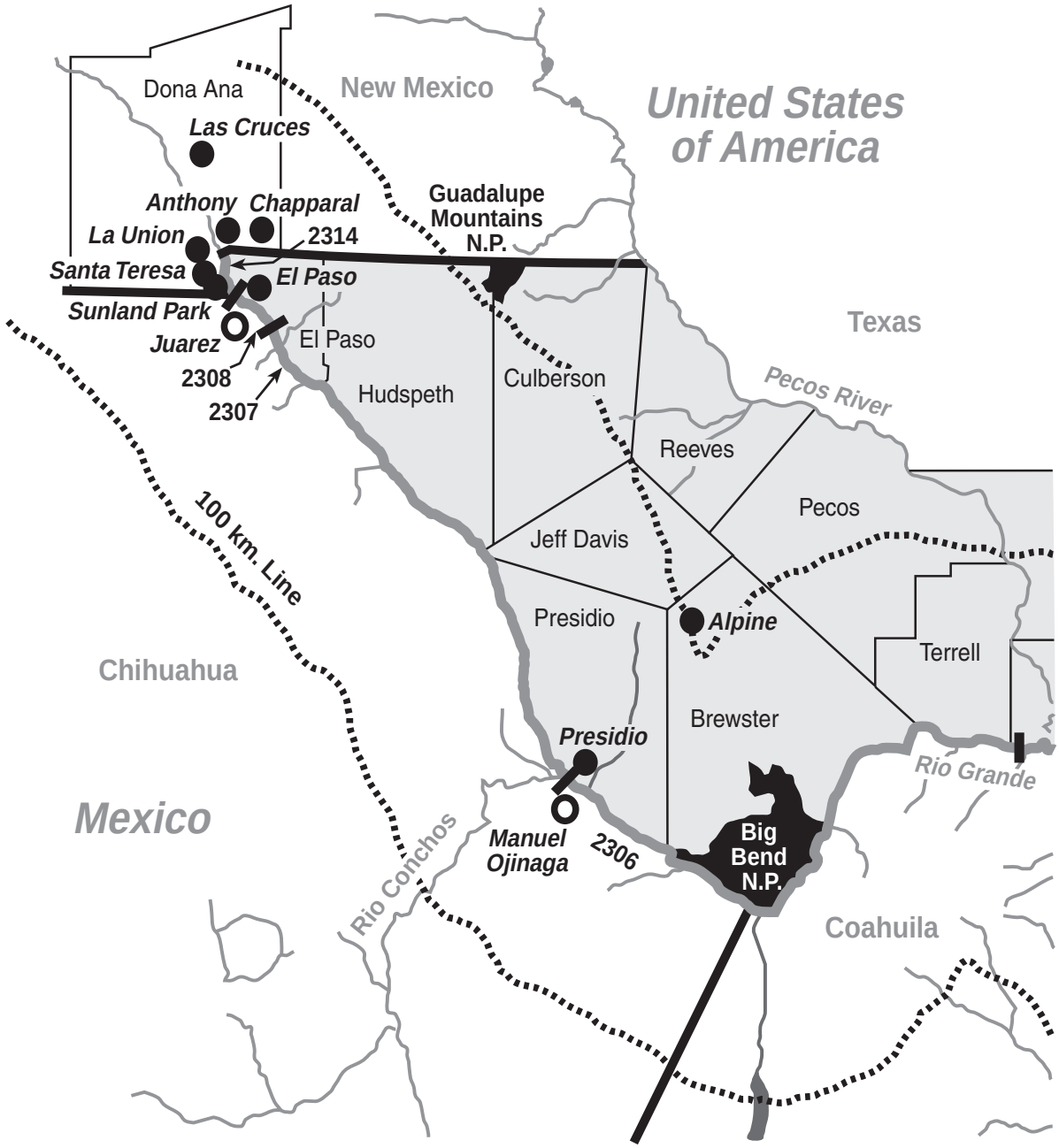
However, across the border in Chihuahua, Mexico, Ciudad Juárez—El Paso's Mexican sister city—has experienced approximately 4 percent growth annually and has a current population of 1.2 million. The Upper Rio Grande subregion also shares a border with the Mexican states of Coahuila and Chihuahua.

Average annual rainfall throughout this area is approximately 8.90 inches. The average summer temperature in El Paso is 95 degrees Fahrenheit; the average winter temperature is 58 degrees. The growing season is about 248 days, with the first freeze usually occurring in mid-November.

Economic activity in the subregion's more urban areas includes multinational manufacturing, industrial support services, telemarketing, and transportation. The large number of automobiles characteristic of these cities has a significant effect on local air quality. El Paso County has the second largest colonia (economically distressed area) population in Texas.

This subregion also includes Big Bend National Park, a 1.5-million-acre wilderness parkland, Guadalupe Mountains National Park, and Big Bend Ranch State Park. All three serve as important recreational and ecological areas for the state. The Rio Grande is protected as a Wild and Scenic River through part of the Upper Rio Grande subregion. The designation begins halfway through Big Bend National Park at the Coahuila-Chihuahua border and runs through Brewster, Terrell, and Val Verde Counties to just above International Amistad Reservoir at Del Rio.

**Figure 3-1**
## Upper Rio Grande Subregion




**River Segments for Water Quality Monitoring:**
**2306 Rio Grande above Amistad**
**2307 Rio Grande below Riverside Diversion Dam**
**2308 Rio Grande below International Dam**
**2314 Rio Grande above International Dam**

**LEGEND**

- State Boundary
- 100 Kilometers from Border (La Paz Definition of Border Region)
- Lake/Water Body
- Major Stream
- Segment Boundary
- City-Mexico
- City-United States
- County Boundary
- Counties Included as Part of Border Region under U.S.- Mexico La Paz Agreement

The Mexican States and New Mexico data were taken from the 1999 ESRI Data & Maps CD. The counties and parks were derived from the U.S. Census Bureau 1998 TIGER/Line dataset. The cities of Mexico are noncertified public sector data (for general reference only). The Rio Grande and its tributaries were from the TNRCC 1994 Rio Grande Hydro layer. The remaining streams were derived from the U.S. Census Bureau 1992 TIGER/Line dataset.

## Regional Priorities

Residents in the Upper Rio Grande subregion indicated the top three priorities are:

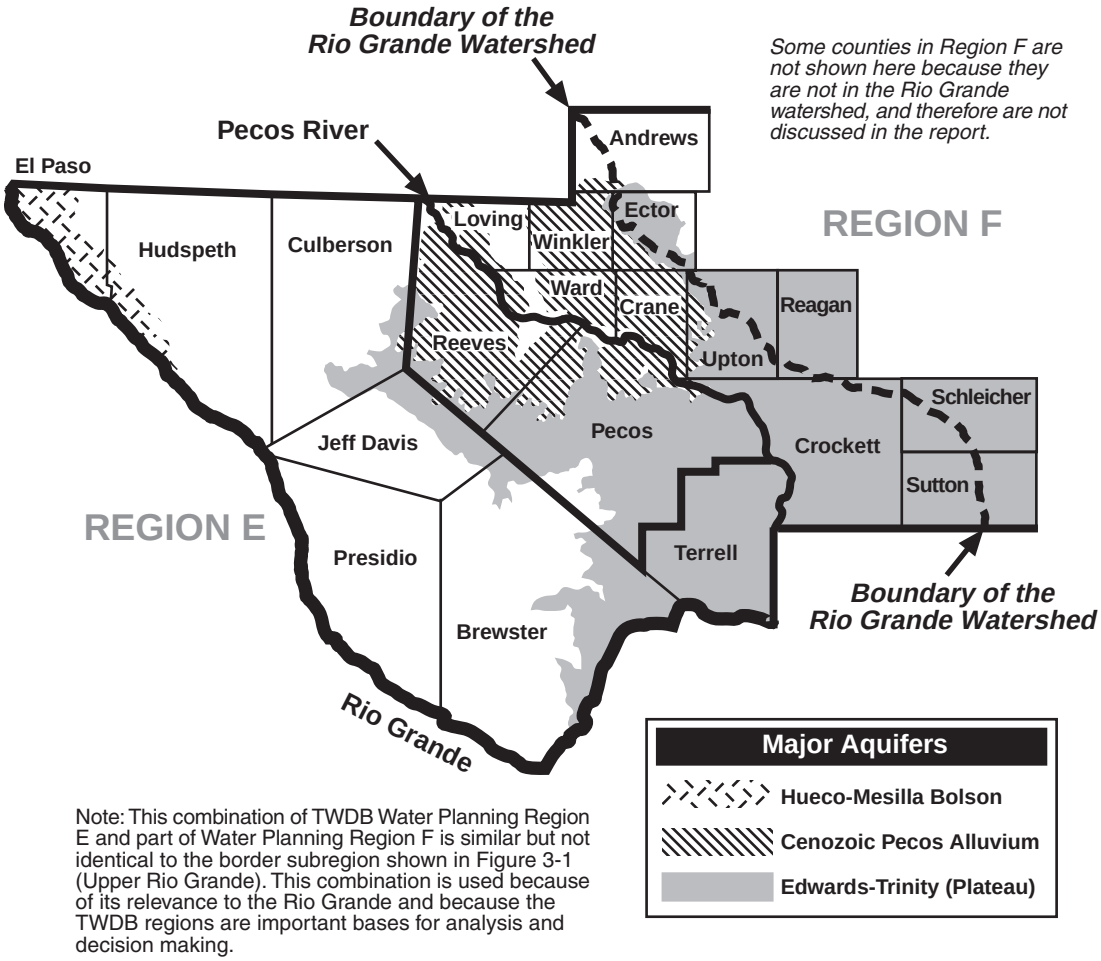
1. water quantity,
2. water quality, and
3. air quality.

Local citizens also expressed the following environmental concerns:

- need for long-range, strategic water quality and quantity planning;
- quality and quantity of the current drinking water supply;
- need for institutional water initiatives, data sharing, and conservation initiatives;
- need for wetlands preservation and protection;
- need for a watershed approach to environmental management;
- lack of wastewater management in small and rural communities;
- poor air quality in the subregion;
- effects of air pollution on quality of life, health, and infrastructure;
- need for incentives for alternative fuels and other technologies;
- need for improvements in the air quality emissions inventory;
- presence of respiratory ailments, especially those linked to diesel exhaust;
- problems with visibility in Big Bend National Park;
- illegal dumping of municipal solid waste;
- need for expansion of liquid and municipal waste storage, treatment, disposal, and transportation management options;
- need to resolve problems caused by waste tires;

**Figure 3-2**

**Water Planning Regions E and F of the Texas Water Development Board**




Note: This combination of TWDB Water Planning Region E and part of Water Planning Region F is similar but not identical to the border subregion shown in Figure 3-1 (Upper Rio Grande). This combination is used because of its relevance to the Rio Grande and because the TWDB regions are important bases for analysis and decision making.

*Source: Texas Water Development Board Planning Group maps.*

- need for improved emergency preparedness and response;
- problems posed by population growth;
- need for adequate sanitation;
- need to address environmental health problems, including communicable diseases; and
- need for community outreach and education on environmental issues.

## Water Quantity Issues

An explanation of the TWDB regional water planning process is provided in Chapter 2.

### Region E Water Planning Area of the Texas Water Development Board

The Upper Rio Grande Subregion as defined in this report includes all of the TWDB's Water Planning Region E and a large portion of Water Planning Region F. (See Figure 3-2.)

#### Land Use

This region is characterized by diverse plains and valleys intermixed with mountains. The area is further characterized by sparse rainfall. The Texas Water Development Board Region E Water Planning Area is the most arid portion of Texas, with parts in the Chihuahuan desert (See Figure 3-1). Ranching and farming have been and continue to be important economic contributors. Because of the limited rainfall, all farming is irrigated, with cotton and some vegetables being the primary crops. On rangeland, vegetative cover is short grasses and shrubs in the basins and valleys and a mixture of mid and short grasses with species of oak, juniper, and shrubs on the rough and mountainous areas. In the region as a whole, tourism, outdoor recreation, and hunting continue to increase. In El Paso County—the largest population center in the region—the economy is based on trade (international, retail, and wholesale), manufacturing, military bases, and educational services.

#### Water Demand—Present and Future

For the seven counties in Region E, total water demand in 2000 was 509,000 acre-feet. Of this amount, 27 percent went to meet municipal needs; 68 percent to agricultural users (irrigation and livestock); and 4 percent to industrial demand, including manufacturing, power generation, and mining. By 2050 demand is expected to increase to nearly 600,000 acre-feet (TWDB, 2001a).

#### Water Sources

Major water sources for the counties in this region include the Rio Grande and various aquifers, including the Hueco-Mesilla Bolsons aquifers. Other important aquifers include alluvial deposits along the Rio Grande and the Edwards-Trinity (Plateau) aquifer, which runs through Jeff Davis, Brewster, and Terrell Counties (Texas Water Commission, 1992).

The city of El Paso draws 57 percent of its water from the Hueco Bolson (U.S. Congress, 2001); across the Rio Grande in Chihuahua, Ciudad Juárez depends wholly on the Hueco Bolson as the drinking water source for its 1.2 million inhabitants. Between 1990 and 1997, El Paso's use of Hueco Bolson water decreased by 21,400 acre-feet. On the other hand, Ciudad Juárez' use of Hueco Bolson water increased by 15,700 acre-feet over the same time period (TWDB, 2001a).

Several minor aquifers in the region also provide groundwater, including the Igneous aquifer and the West Texas Bolson aquifers. Alpine, Marfa, and Fort Davis rely on the Igneous aquifer for their municipal supplies, while Sierra Blanca, Van Horn, Valentine, and Presidio depend entirely on the West Texas Bolson aquifers for their municipal supplies (TWDB, 2001a).

#### Planning to Meet Future Water Needs

The Mesilla and Hueco Bolson aquifers may be depleted by 2030, so El Paso prefers to reserve the aquifers for use during droughts-of-record conditions (when surface water is lacking). Although current plans for El Paso's future water needs do not incorporate the Hueco Bolson, other approaches are being studied to meet El Paso's needs, including construction of desalinization plants for brackish groundwater and groundwater transfer from rural counties (TWDB, 2001d).

Water planners estimate that Ciudad Juárez will run out of fresh water from the Hueco Bolson by 2005. City officials have developed a plan to provide water to the city that includes development of the Conejos-Medano aquifer; treatment of Rio Grande water for reuse; desalinization of

Juárez valley water; and use of Bismark mine water (Terrazas, 2001).

### Region F Water Planning Area of the Texas Water Development Board

#### Land Use

Of the 32 counties in the Region F Water Planning Area, 12 lie wholly or partly in the Rio Grande basin (the Pecos River basin portion). (See Figure 3-1). The area is mostly rural, with the population concentrated in cities and towns. Ranching, irrigated agriculture, and mining (of oil and gas) are among the principal land uses in this area.

#### Water Sources

The Pecos River, including Red Bluff Reservoir in Loving and Reeves Counties, provides most of the surface water for Pecos and Reeves Counties. Groundwater sources are numerous, but the principal sources for Rio Grande basin counties are the Edwards-Trinity (Plateau) and the Cenozoic Pecos Alluvium aquifers. The Cenozoic Pecos Alluvium aquifer supplies most irrigation water in Reeves and northwest Pecos Counties, while the Edwards-Trinity (Plateau) aquifer supplies water for Crockett, Pecos, and Reeves Counties (TWDB, 2001b).

#### Water Demand—Present and Future

The two Rio Grande basin counties in this region with the greatest water demand are Pecos and Reeves Counties.

Water demand for the Rio Grande Basin counties in Region F was estimated in 2000 at 245,900 acre-feet. Municipal and irrigation demand make up the two largest water uses, at 8 percent and 83 percent, respectively. Demand in 2050 for the Rio Grande basin in Region F is projected to drop to 242,100 acre-feet, due largely to a projected drop of 2,500 acre-feet in mining demand (TWDB, 2001b).

#### Plans to Meet Future Water Needs

Strategies outlined by the Region F Water Planning Group to meet future demand include water conservation, brush control, weather modification, wastewater reuse, desalinization, and improved irrigation practices, especially in Reeves County. Fort Stockton already relies on desalinization for some of its water supply (TWDB, 2001d).

## Water Quality Issues

### Surface Water Quality and Influences

This section covers water quality in the Rio Grande from the New Mexico-Texas state line to just upstream of International Amistad Reservoir. Under the Texas Surface Water Quality Standards, this region of the river can be broken down into four segments: from the New Mexico state line to International Dam, from International Dam to Riverside Diversion Dam, from Riverside Diversion Dam to the cities of Presidio and Ojinaga, and from Presidio and Ojinaga to just above International Amistad Reservoir.

#### Rio Grande from New Mexico to International Dam, El Paso County

Segment 2314 (see Figure 3-1) covers a 21-mile stretch from the New Mexico-Texas state line to just above International Dam in El Paso County. Water entering this segment is released initially from Elephant Butte Dam in New Mexico. Before it reaches Texas, this water is used by irrigation districts in New Mexico. When return flows reach the river, river water becomes higher in both salts and nutrients, making the water reaching both El Paso County and the state of Chihuahua, Mexico, of less than optimal quality (Settemeyer, 2001).

During the latest review of its water quality standards in late 2001, New Mexico revised the fecal coliform standard for its segment (New Mexico Segment 2101) upstream of TNRCC Segment 2314. This change should result in improved water quality in segment 2314.

Once the river enters the state and begins to pass through the greater metropolitan areas of El Paso, Texas, and Ciudad Juárez, Mexico, levels of bacteria in the river exceed the standard for contact recreation. However, the water in the river meets standards for public water supply and irrigation after treatment, and it meets standards to support aquatic life (IBWC, 2001).

## *Taking Action*

Projects are under way at the local level to protect and improve water quality along the Rio Grande from New Mexico to International Dam, including tri-state initiatives.

### *Watershed Council*

In the Paso del Norte Area—which includes south central New Mexico, far west Texas, and northern Chihuahua—local governments have jointly created a Watershed Council. The council's goal is to cooperate and to coordinate efforts dealing with water-related concerns at a watershed level (IBWC, 2001). The council also works with the IBWC's Rio Grande Citizen's Forum and the Paso Del Norte Water Quality Task Force to share water-related data (Castillo, 2001a).

### *Binational Water Festival*

Established in 1990, WERC—the Waste-Management, Education, and Research Consortium for environmental education and technology development—has sponsored a tri-city, tri-state, binational Water Festival for the last three years for the cities of Las Cruces, El Paso, and Ciudad Juárez. Among other activities, the festival encourages local participation in water conservation and pollution protection programs (Castillo, 2001a).

### *EDAP Projects*

The EDAP program has been active in this Rio Grande segment, providing funding through grants and loans to three joint water-wastewater treatment projects and one water treatment project. In Vinton, EDAP has funded a $39,100 planning grant to help develop plans for new or improved wastewater service to over 600 colonia residents. Just to the south, in Canutillo, over 4,000 people will benefit from a water-wastewater plant currently under construction that has received $11.06 million in EDAP funds. In Westway, EDAP contributed a total of $7.91 million to a water treatment plant and a water-wastewater facility that together benefit over 5,500 people (TWDB, 2001a).

### *The TEXAS Plan*

Through the TEXAS Plan, mentioned in the Overview chapter, the Texas Secretary of State's Office (SOS) is directing approximately $35 million to installing water and wastewater connections in colonias along the border. The SOS identifies El Paso County as one of two counties where work will be focused. It began with a funding package in 1999 to connect 25,000 residents to water and wastewater plants. All of the TEXAS Plan projects were planned, designed, and constructed with TWDB technical and financial assistance (Pedersen, 2002). As another part of the effort, colonia coordinators have been hired. Among other duties, the El Paso coordinator has worked with Colonia Las Palmas to obtain access to water and wastewater services ("Texas Plan," 2001 and "Texas Border," 2001).

### *Tri-State Water Treatment Action Plan and Identification of Infrastructure Need*

International organizations also work in the area. The Border Environment Cooperation Commission (BECC) is working on developing a tri-state water treatment action plan. It will provide regional service with implementation to begin sometime after 2002 (NADBank, 2001a and BECC, 2001a).

### *El Paso County*

The BECC approved a technical assistance grant for El Paso County to develop a regional master plan that will provide water and wastewater services to existing areas of the county without service or with inadequate service. The $500,000 grant will be administered by El Paso Water Utilities Service.

## Rio Grande from International Dam to Riverside Diversion Dam, El Paso County

Beyond International Dam, Segment 2308 continues on to Riverside Diversion Dam, also in El Paso County (see Figure 3-1). The area's largest problem is a need for wastewater and sewage treatment plants. The border population in this region is growing quickly, and wastewater services are not keeping pace, so levels of bacteria along the river are increasing (IBWC, 2001). Consequently, the river is only designated for noncontact recreation, meaning conditions are not expected to allow more direct uses such as swimming, wading, or similar contact with the water.

A lack of sufficient wastewater and sewage plants on both sides of the border also contributes to elevated levels of ammonia, but state and local efforts are beginning to help control the problem. Upgrades at the Haskell Street wastewater treatment plant have improved processes that help remove ammonia from the water (IBWC, 2001).

However, recent studies have detected ambient toxicity in some river sediments that could be harmful to aquatic life. More research is under way, and data thus far do not indicate a situation that is dangerous to life and human health (TNRCC, 2001b). Currently, this portion of the Rio Grande also meets public water supply standards (IBWC, 2001).

Some of these water quality concerns can be attributed to channelization of the river in this area, where the riverbed has been lined with cement and made deeper. This change has several effects: dissolved oxygen decreases, the amount of sediment on the riverbed decreases, and the speed of the water increases. The first two effects decrease the health of plants and animals in the river, while the latter effect increases the amount of salt and sediment suspended in the water. Water quality also decreases because much of the water in this segment is diverted to the nearby All-American Canal, concentrating the quantity of salts and other substances in the remaining water.

## Taking Action

In the Rio Grande from International Dam to Riverside Diversion Dam, progress has been made in meeting the challenges posed to water quality by population growth. In addition to the local initiatives described in other sections, various projects in the area have received state funding to further their progress.

### Developing Infrastructure

The Texas Water Development Board has taken the lead in water supply and wastewater management activities in the El Paso area for many years. Its sponsored projects are listed in detail in Appendix G, Water and Wastewater Projects in the Upper Rio Grande Subregion. It has financed the upgrades to the Haskell Street wastewater treatment plant discussed above, as well as initial construction and current upgrades and expansion of the Roberto Bustamante wastewater treatment plant. Along with USDA-Rural Development, the TWDB has funded the purchase of private water systems, rehabilitation of existing substandard water systems, and extensions of water systems in the East Montana area. The TWDB brokered these activities through a project sponsored by El Paso County to use El Paso Water Utilities to serve several colonias and one non-colonia residential community (Pedersen ,2002).

USDA-Rural Development has funded a few small El Paso area water and sewer projects, and the U.S. Bureau of Reclamation has been actively involved in on-going water supply and water delivery issues, providing technical assistance and funding for improvements to the All American Canal. The Bureau has also contributed funding for wastewater reuse projects now being implemented by the El Paso PSB (Pedersen, 2002).

As of 2001, BECC had certified five projects in the region: three wastewater plants (one project in Ciudad Juárez and two in El Paso), a water treatment plant in El Paso, and a water-wastewater facility in El Paso. The two El Paso wastewater plants are now operating. Their construction costs totaled $11.84 million, and both were financed without additional funding from the North American Development Bank (NADBank) (BECC, 2001b and NADBank, 2001b).

Of the remaining projects, the El Paso water treatment plant expansion, which will increase service to 47,000 residents in area colonias, is 80 percent complete and should be finished in January 2002. NADBank has provided $14.91 million in grants toward the project thus far and has provided another $17.5 million in grants toward construction of the water-wastewater plant. As of October 2001, the plant was approximately 73 percent complete. It will eventually serve 40,000 people (NADBank, 2001b).

Across the border in Ciudad Juárez, the wastewater treatment plant project has received $15.66 million from NADBank as a supplement to Mexican government funds to build two plants and supplemental infrastructure that eventually will provide wastewater service to over 1.1 million people. Both plants are operating, and the supplemental structures have been completed. However, operational problems are being experienced and investigated. BECC is also working in the Juárez Valley to certify another wastewater plant sometime after 2002 (NADBank, 2001a and BECC, 2001a). The BECC is providing $190,000 in technical assistance to provide a treatment process for Anapra, which is part of the municipality of Ciudad Juárez.

### Rio Grande from Riverside Diversion Dam to Presidio and Ojinaga

After Riverside Dam, Segment 2307 flows down to the sister cities of Presidio, Texas, and Ojinaga, Chihuahua (see Figure 3-1). This segment of the river has low flow, which concentrates levels of pollutants in the river. Besides limited flow, the overwhelming problem in this particular region is high salinity, which can reduce the river's ability to provide water for irrigation, livestock use, drinking water, and aquatic plants and animals. Return flows from the U.S. and Mexico result in the increase of salts.

Salinity is high enough that this section has been placed on the state's 303(d) list for cleanup, and the 305(b) report indicates that salinity levels could decrease the segment's suitability for use as a public water supply. Despite rising salinity, the segment meets standards designed to protect aquatic life, according to the latest draft of the TNRCC's 2002 305(b) report (TNRCC, 2001b and TNRCC, 2001c).

Levels of bacteria in this stretch of river are also rising, largely due to high population growth on both sides of the border that has not been matched by similar growth in the number of wastewater and sewage treatment plants. Though bacteria may become a problem in the future, the segment generally meets standards for contact recreation. The one exception where bacteria levels exceed the standard occurs near the Guadalupe Bridge, close to the rural community of Fabens (TNRCC, 2001c).

Most of these trends in river stressors are linked to three main influences: increasing population growth, lack of adequate municipal wastewater treatment plants, and agricultural runoff (IBWC, 2001). Additionally, in the lower portion of the segment, nutrients and algae growth are increasing, which may further reflect the influence of agricultural runoff (TNRCC, 2001b). High levels of nutrients and high algal growth decrease levels of oxygen in the river, harming the health of aquatic wildlife. The IBWC notes that this segment needs more monitoring and data collection to fully evaluate water quality and water quality influences.

## *Taking Action*

Much is being done to improve and protect water quality along the Rio Grande from Riverside Diversion Dam to Presidio and Ojinaga, particularly in developing water and wastewater infrastructure that keeps pace with the recent population boom.

### *EDAP Water and Wastewater Treatment Projects*

The TWDB is funding a variety of projects through its EDAP program with a combination of grants and loans. EDAP has already contributed almost $65 million to the construction of water and wastewater water plants in Socorro, in El Paso County, that will eventually serve more than 65,000 colonia residents. Two of the three projects are already completed; the last is slated to finish construction in September 2002 (TWDB, 2001a).

In southeastern El Paso County, Tornillo Water Supply Corporation has received $24,750 in EDAP planning grants to help with the development of wastewater service for 1,247 people. In southeastern Hudspeth County, Sierra Blanca received over $2.2 million in grants to provide wastewater service for 1,100 colonia residents (TWDB, 2001a).

### *Developing Infrastructure Projects*

In Texas in 2002, BECC expects to certify two projects in this region—a water-wastewater plant in Fabens and a wastewater plant in Tornillo. Together they will have received $1.5 million in technical assistance from BECC to help develop these projects. Horizon City is preparing a water-wastewater plant for future BECC certification, which will require $500,000 in technical assistance (BECC, 2001a and BECC, 2001c).

### Rio Grande from Presidio and Ojinaga to International Amistad Dam

The final segment of the Rio Grande in this region, Segment 2306, runs all the way from the junction of the Río Conchos with the Rio Grande near Presidio, through Big Bend National Park, to just above International Amistad Reservoir in Val Verde County (see Figure 3-1).

The Río Conchos, which flows mostly through the Mexican state of Chihuahua, is one of the major influences on water quality in this region, since it provides a large amount of the streamflow (IBWC, 2001). Quality in the Río Conchos can be difficult to evaluate, since data for the basin are lacking. The Comisión Nacional de Agua, which is

responsible for managing Mexico's water resources, acknowledges this deficiency, according to a 2001 Texas Center for Policy Studies (TCPS) report on the Río Conchos (TCPS, 2001).

According to the same TCPS report, major problems in the Río Conchos include a lack of municipal wastewater treatment plants for both cities and rural communities, as well as high levels of nutrients from fertilizer runoff. Among other things, these two factors are likely to damage the health of aquatic life and to increase bacteria in the river, which affects the water supply for drinking water, irrigation, and other uses.

The segment meets standards for salinity, but increasing salinity is apparent in the upper portion, making the water less useful for irrigation and drinking, since it must be more heavily treated before use. The lower portion of the segment below Big Bend has freshwater inflows to decrease salinity (TNRCC, 2001b).

Parts of the segment do not meet contact recreation standards due to high levels of bacteria. Downstream of Presidio and Ojinaga, bacteria levels are elevated enough to cause the segment to be placed on the state's current 303(d) list for water bodies that do not meet state water quality standards, developed in 2000 (TNRCC, 2001b and TNRCC, 2001c).

The upper portion of this segment also is on the current 303(d) list because of ambient water toxicity that may hurt the health of aquatic plants and animals in the segment. The TNRCC does not have enough data to evaluate any change in toxicity, so the segment will remain on the 303(d) list issued in 2002 for further study and possible cleanup (TNRCC, 2001c). Agriculturally-linked levels of nutrients and algal growth are a concern; they may damage the health of aquatic life in the system, though the segment currently meets standards designed to protect ecosystems (IBWC, 2001).

Big Bend National Park lies in the middle area of this segment. At this location, the river water suffers from high levels of salinity exacerbated by low-flow conditions. However, in the lower canyons, springs contribute fresh water that dilutes levels of salinity farther down the river. Bacteria levels are generally low, except in the case of a runoff event, when rainwater can wash bacteria into the river. Elevated levels of mercury have been observed in some bird species and are thought to be linked to mine tailings from two of the world's largest mercury mines that may be contaminating the river. One mine is near the park at Terlingua, and the other is located inside the park. Research is currently under way to examine this possible connection (Purchase, 2002).

## *Taking Action*

The following projects were undertaken along the Rio Grande from Presidio and Ojinaga to International Amistad Dam.

### *Developing Infrastructure Projects*

In Sanderson, BECC, NADBank, and the TWDB are helping Terrell County construct its first centralized wastewater collection and treatment system. The $4.3 million project is receiving most of its funding through EDAP in a combination of grants and loans, complemented by a $350,000 grant from NADBank. Before construction, BECC provided the community with $16,000 in technical assistance to help the county prepare the project for certification. The system, which will serve more than 1,000 residents, should be finished in June 2002 (TWDB, 2001a; NADBank, 2001a; NADBank, 2001b; and BECC, 2001b).

In 2002, BECC also expects to certify two wastewater plants in this region—one in Marathon and one in Presidio. The Presidio plant already has received $330,000 in technical assistance from BECC. The BECC also provided $395,000 in technical assistance for a wastewater system in Ojinaga to be certified in 2002, expected to cost $4 million (NADBank, 2001a; BECC, 2001a; and BECC, 2001c). In the future, BECC anticipates certification of a water treatment plant in Alpine and water-wastewater plants in Marfa and Sheffield.

### Groundwater Quality and Influences

Three major aquifers extend through the Upper Rio Grande subregion: the Hueco and Mesilla Bolson aquifers, the Cenozoic Pecos Alluvium aquifer, and the Edwards-Trinity (Plateau) (see Figure 2-1). In addition, numerous smaller aquifers are scattered throughout the region, providing an important supplement to water supplies (see Figure 2-2).

This section relied heavily on the TWDB Report 356, *Aquifers of West Texas*, edited by Mace, Mullican, and Angle.

### The Hueco-Mesilla Bolson Aquifers

The westernmost of the major aquifers is the Hueco and Mesilla Bolson, shared by the border cities of El Paso, Texas, and Ciudad Juárez, Chihuahua. The aquifer is composed of two bolsons: the Mesilla, which extends into the westernmost tip of El Paso County; and the Hueco, in El Paso and Hudspeth Counties. Salinity represents the largest groundwater quality problem for the area. As the amount of salts dissolved in the groundwater increases, the water becomes less and less useable for drinking, irrigation, or livestock use. The standards for these uses vary. The standard for drinking water is lower than that for livestock because livestock can tolerate higher levels of salinity in drinking water, and the usefulness of water for irrigation depends in part on the type of crop being produced (TWDB, 2001c).

In the Hueco-Mesilla Bolson aquifers, salinity varies widely, but generally increases moving from east to west. East of the El Paso-Hudspeth County line, the aquifer can be considered almost unused north of the Rio Grande, due to low population in the area. Water from wells in this area meant for domestic or livestock use is moderately poor in quality and must undergo desalinization before use (TWDB, 2001c).

Under El Paso and Ciudad Juárez the salinity is borderline. Salinity has been increasing over time in municipal wells, and those wells that have been in use for long periods of time are decreasing significantly in quality. The degradation of water quality in the Hueco Bolson is associated with declining water levels, which causes an inflow of more saline water from other areas.

### The Cenozoic Pecos Alluvium Aquifer

To the east of the Hueco and Mesilla Bolson aquifers, the Cenozoic Pecos Alluvium aquifer runs through almost all of Reeves County and much of northern Pecos County. The water quality varies greatly due to natural causes, and the quality tends to deteriorate with depth and from east to west. Geology, particularly the presence of natural salt beds, increases the aquifer's salinity along the Pecos River. Human activity also affects the quality of the aquifer, especially through leaching of residual salts and nutrients from irrigation into the aquifer (TWDB, 2001c).

Overdrawing the aquifer also adds to salinity problems because it increases the amount of poorer quality inflow from the depths of the Cenozoic Pecos Alluvium or from surrounding aquifers. In some localized areas, elevated salinity comes from leakage of brine from oil-field operations into the groundwater due to unlined brine-disposal pits or improperly encased wells (the extremely salty brine often accompanies oil deposits) (TWDB, 2001c).

### The Edwards-Trinity (Plateau) Aquifer

To the south and the east of the Cenozoic Pecos and extending to the west, the Edwards-Trinity (Plateau) aquifer underlies pieces of Culberson and Jeff Davis Counties, eastern Brewster County, and the majority of Pecos and Terrell Counties, extending on into the Middle Rio Grande region. The water in the aquifer is generally fresh, but to the east of the Pecos River, oil-field brines and irrigation waters have increased salinity in the northern portion of the aquifer. Near the Pecos, natural salt deposits also raise levels of dissolved salts. Most of the water meets standards for use as irrigation and municipal water supplies. Uranium deposits in the western parts of the aquifer naturally elevate radioactivity levels, particularly in Pecos County (TWDB, 2001c and Parmer, 2001). Public water systems are required to test and treat for elevated radioactivity to meet safe drinking water standards. Residents relying on domestic wells for their water supply may not always test their wells and have adequate treatment.

### The Rio Grande Alluvium

Though not a major aquifer, the groundwater deposits in the alluvium of the Rio Grande have been an important water source for colonia residents in El Paso County. They drill shallow wells to reach the groundwater, which is generally poor in quality due to high salinity. In Chihuahua, Mexico, water quality is slightly better due to runoff that recharges the aquifer and dilutes the concentration of salts. Over time the Alluvium has become significantly saltier due to return flows of poor-quality water previously used for irrigation (TWDB, 2001c).

### Other Minor Aquifers

Many minor aquifers can be found throughout the Upper Rio Grande subregion. (See Figure 2-5.) They are important water sources for both agricultural and municipal use. In the West Texas Bolson aquifers, water quality varies widely. Along the Rio Grande, water quality tends to be moderately poor without treatment due to elevated salinity. This makes the water unfit for human consumption, though it can be used for livestock, which can tolerate drinking water with elevated salinity. In other portions of the Bolson aquifers—including the cities of Presidio, Sierra Blanca, Valentine, and Van Horn—the water quality meets the standards for a municipal water supply source (TWDB, 2001c).

East of the Bolson aquifers lies the Igneous aquifer, which is generally of excellent quality and suitable for use as drinking water. It is a major water source for the cities of Alpine, Marfa, and Fort Davis. Marathon aquifer, east of the Igneous, has generally good quality water, though the salinity is somewhat elevated (TWDB, 2001c).

The Bone Spring-Victorio Peak aquifer extends south into Hudspeth County, Texas, from New Mexico. In the Texas portion, salinity is very high to the east and southeast, and the entire aquifer is at least slightly saline. Part of the salinity is naturally occurring. Salinity increases due to seepage of irrigation water into the aquifer in an important agricultural area near Dell City. This process also elevates nutrient levels in some areas. Near Dell City, the quality is such that the city can use water from the aquifer as a public water supply after desalinization. However, the primary use is irrigation, because particular properties of the soil in the region help crops tolerate the increased salinity (TWDB, 2001c).

Two parts of the Capitan Reef Complex descend into Texas from New Mexico. The water quality in both segments is generally too poor for use for drinking water or irrigation. Small areas in Pecos and Culberson Counties, where water reaches the surface and is recharged by freshwater inflow, can be used for small amounts of irrigation of salt-tolerant crops (TWDB, 2001c).

In the Rustler aquifer, which lies between the two arms of the Capitan Reef, the water is moderately saline, largely due to natural salt deposits. Thus, it is used primarily for irrigation and livestock. Deeper regions of the aquifer show elevated levels of radioactivity. Public water systems are required to test and treat for elevated radioactivity to meet safe drinking water standards. Residents relying on domestic wells for their water supply may not always test their wells and have adequate treatment. The Dockum aquifer (in eastern Reeves and northern Pecos Counties) also has higher radioactivity due to natural radium deposits. The aquifer's water is generally poor, though salinity near the city of Pecos is low enough that the aquifer provides the city's municipal supply. Scattered portions of the aquifer are of high enough quality for irrigation (TWDB, 2001c and Parmer, 2001).

## *Taking Action*

While many local efforts are being made to protect and restore surface water quality, the state of Texas is also working to manage groundwater quality.

### *Priority Groundwater Management Areas*

Designation as a priority groundwater management area (PGMA) helps the management of groundwater resources in areas that are experiencing or expected to experience critical groundwater problems, including contamination. In December 1998, the El Paso County area was designated as one of the state's five PGMAs. At that time, the TNRCC highlighted the need for multinational and multistate strategies, since the aquifer at issue—the Hueco-Mesilla Bolson—is heavily used by Texas, New Mexico, and Chihuahua. Counties in the region of the Cenozoic Pecos Alluvium aquifer, including Reeves and a portion of Pecos, were not designated as a PGMA, but are currently undergoing a required reevaluation (TNRCC, 2001d).

### *Groundwater Conservation Districts*

A groundwater conservation district was created in Pecos County during the 76th Texas Legislature in 1999. Other districts also exist or are being created in Culberson, Hudspeth, Jeff Davis, and Presidio Counties. District activities include water quality monitoring and protection, data collection and sharing, education and public outreach, waste oil recycling, and coordinating with programs that address related surface water problems (TNRCC, 2001d).

## Waste Management Issues

Of the many waste management issues in the Upper Region of the Rio Grande basin, municipal solid waste (MSW) is the most serious. Illegal dumping has been a major concern, particularly in eastern El Paso County. Hazardous waste generation in the Texas portion of the Rio Grande basin is greatest in the Upper Region, from El Paso County to Terrell County and the corresponding Mexican region. Other issues of concern, especially in El Paso, include potential spills or releases of hazardous materials during transportation.

### Municipal Solid Waste and Illegal Dumping

There are 14 MSW landfills in this region, three of them in El Paso County. For the six-county area covered by the Rio Grande Council of Government (COG) (see Figure 2-6), there are eight landfills. The COG area has a remaining landfill capacity of 26.4 years—five years less than the statewide average of 31.6 years (TNRCC, 2001a).

Illegal dumping also is a serious problem, especially in El Paso County. The most current estimate indicates that there are 1,542 illegal dump sites in El Paso County: 1,500 small, 35 medium, and 7 large illegal dump sites. This compares to 1,758 illegal dump sites in the entire Rio Grande COG (TNRCC, 1997).

While much illegal dumping occurs outside of urban areas, the problem also may be due to inadequate or unaffordable collection services for residents of colonias, as well as a lack of adequate education regarding proper disposal. The El Paso Lower Valley Water District Authority has been working on this problem and is trying to address the gaps in collection.

A permit application for a landfill that would handle only grease and grit-trap waste raised concerns among colonias residents in El Paso County who live near the proposed facility. In October 2001, the application was dismissed at the request of the applicant.

### Hazardous Materials and Emergency Response

Transportation of hazardous materials is a concern in El Paso, where rail cars of hydrofluoric acid are transported regularly through the downtown area after production at the Norfluor plant outside of Ciudad Juárez. El Paso and Ciudad Juárez residents renewed their concerns over the potential for hazardous materials releases after nearly a metric ton of ammonia was released from this facility in September 1999 ("Norfluor," 2001).

In February 2001, the EPA declared an emergency situation relating to the transport and use of methyl parathion, a pesticide and powerful poison listed by EPA as an acute toxic waste. Colonia residents in El Paso County were crossing into Ciudad Juárez to purchase the methyl parathion (Polvo de Avión), which they used to kill pests (Walton, 2001). The City of El Paso City/County Health Department is currently working with Consejo Binacional de Salud through the U.S. Mexico Border Health Association to begin a public awareness campaign in Ciudad Juárez, El Paso, and Las Cruces, New Mexico (Binational, 2001) to educate residents about the dangers of this chemical.

### Hazardous Waste Management

Located in the Upper Rio Grande subregion are a total of six active commercial facilities for treatment, storage, and disposal of hazardous and industrial waste (each of the other two border subregions has one such facility). Four of these sites are in El Paso County. One is a storage facility, one stores waste on site, and two dispose of waste on site ("U.S. Facilities," 2001). The other two commercial disposal facilities in the border region are located in Pecos County (an underground injection well) and in Reeves County (a battery recycling facility).

Ciudad Juárez has about 350 maquiladoras. The Ciudad Juárez maquiladoras generally are large plants that create more products, and a significant volume of waste. Many maquiladoras are uncertain about the requirements to return the waste they generate to the country of origin, as required under Article 153 of Mexico's General Ecological Law. El Paso residents also have expressed concern about hazardous waste returned to the U.S. from Mexico under both Article 153 and Annex III of the La Paz Agreement.

## *Taking Action*

### *BECC and NADBank Projects*

A task force currently is seeking ways to provide solid waste services to colonia residents in East El Paso County. Members include representatives

of state elected officials, nongovernmental organizations, local officials, and the TNRCC Region 6 office. A proposal to address these needs is being developed for submission to BECC.

Ojinaga is developing a solid waste landfill through the BECC/NADBank process, becoming the first Mexican project to receive funding through NADBank's Solid Waste Environmental Program (NADBank, 2001b).

### *EPA Soil Sampling Project*

In the El Paso area, the EPA recently began soil sampling for heavy metals, mainly arsenic and lead. Soil sampling was undertaken after recent sampling by New Mexico State University students showed elevated levels of heavy metals in soil. Additional sampling was conducted in December 2001 and January 2002 within a three-mile radius centered at the ASARCO smelter in El Paso ("EPA," 2001). Results of this sampling are being studied.

### *Binational Regional Enforcement*

U.S. and Mexican state and federal agencies also participate in the Chihuahua/Texas/New Mexico binational regional enforcement subgroup of the binational Enforcement Work Group, created under the La Paz Agreement. The activities of this subgroup include:

- planning exercises,
- border inspections, and
- joint enforcement actions.

## Air Quality Issues

The Upper Rio Grande portion of the border has three different subregions, where concerns exist about various problems with air quality. This subsection is divided into discussions of those three subregions: El Paso, Presidio, and the two national parks—Big Bend and Guadalupe Mountains.

### El Paso

El Paso has the most serious air quality challenges in the border area. El Paso County is one of four areas in Texas that have not been in compliance with the federal standards, or NAAQS, for ozone. El Paso is the only Texas city that also has not been in compliance for two additional pollutants: particulate matter and carbon monoxide. Current data indicate a significant downward trend in these pollutants over the last eight to ten years, as described in more detail under the specific pollutants listed in this subsection.

These pollutants have various negative effects on the respiratory system (especially among young children, the elderly, and asthmatics) and, in the case of carbon monoxide, effects on the heart and the brain. Ozone also can impair agricultural productivity.

The TNRCC has made a significant commitment to reducing the sources of these problems with staff and other resources. In El Paso, the TNRCC's regional office has nine full-time staff members dedicated to air quality activities, backed up by additional staff in various divisions at agency headquarters in Austin, who devote a portion of their time to El Paso air quality. The EPA provides significant funding for the agency's air quality work in El Paso. In addition, the El Paso City-County Health and Environmental District's air quality program conducts air monitoring in El Paso and Ciudad Juárez and works closely with the TNRCC regional office on numerous binational activities.

#### The Paso del Norte Air Basin—Multiple Jurisdictions

Although the TNRCC and El Paso officials engage in numerous actions to address the air quality problems, the challenge is complicated by the fact that the city shares an air basin (referred to as the Paso del Norte air basin) with several cities in New Mexico and with Ciudad Juárez in Chihuahua, Mexico (see Figure 3-1). This basin is formed by surrounding mountains that can trap air under certain meteorological conditions, including the absence of wind. Pollution generated in any one of the cities thus becomes interspersed with pollution generated in the others.

#### New Mexico

Fortunately, the cities in Doña Ana County, New Mexico, located in the air basin are relatively small. Air quality problems are addressed by that state's environmental authority (the New Mexico Environment Department, or NMED) and fall under the same federal air quality regulations as Texas.

A small portion of this region of New Mexico was declared to be in nonattainment for ozone in

the mid-1990s. A larger portion of this region has had serious $PM_{10}$ problems, but circumstances have gained the area special consideration under EPA regulations, as discussed in the ozone and particulate matter subsections.

### Ciudad Juárez and the Joint Advisory Committee

More daunting is the challenge of cooperation across the international border. Mexico and the U.S. have similar air quality standards, but Mexico generally has fewer resources to address air quality issues. Nonetheless, an impressive degree of binational collaboration has gradually developed.

In 1996, under the binational La Paz Agreement, the U.S. and Mexico created the Joint Advisory Committee for the Improvement of Air Quality in the Ciudad Juárez, Chihuahua-El Paso, Texas-Doña Ana County, New Mexico Air Basin. This group is known simply as the JAC.

The JAC meets four times each year, alternating the venue among the three states. Its mission is to develop, promote, and recommend air quality planning and management strategies to ensure a reduction in air pollution concentrations for the public health and welfare of the residents of the Paso del Norte air basin. Recommendations are communicated to the La Paz Air Workgroup.

The JAC has 20 official members—10 each from the U.S. and Mexico, who serve on a volunteer basis. Both the U.S. and Mexican contingents are divided equally between representatives of the government sector (federal, state, and local) and those outside of government. The representative for the state of Texas is the director of the El Paso regional office of the TNRCC. In addition, a TNRCC staff person from the regional office is funded by an EPA grant. This person serves as the administrative liaison for the JAC, preparing the meeting agendas, maintaining the records, tracking the work of the subcommittees, and providing valuable continuity and consistency of effort.

The JAC makes recommendations that promote a multidisciplinary approach to air quality improvement and that support activities and organizations endorsing JAC objectives. The JAC members have discretion to finance and pursue activities to accomplish these priorities. Major accomplishments of the JAC are discussed in the subsections on specific pollutants.

### Monitoring Air Quality in the Basin

Texas has had air quality monitoring stations in El Paso since the 1970s to measure the ambient concentrations of the various pollutants. Not all stations measure every pollutant. The network currently includes monitors at 12 sites. In Doña Ana County, the NMED has established 11 monitoring sites in seven different cities. For information on how to obtain air quality monitoring data, please see Appendix D, For More Information.

Monitoring in Ciudad Juárez started in 1994, with help from the TNRCC and the El Paso City-County Health and Environmental District. The latter continues to provide maintenance and training for the Ciudad Juárez monitoring, although the *municipio* is responsible for day-to-day operations. The data from these stations are available to Texas and New Mexico agencies.

### Ozone

El Paso was originally found to be in violation of the first federal ozone standard—the 1-hour average concentration—in the 1970s. As a result, the Texas Air Control Board (TACB), a predecessor agency of the TNRCC, worked with El Paso officials and citizens to develop an action plan. In 1979 the TACB submitted that plan to the EPA as revisions to the Texas SIP, which is required under federal law.

As in most nonattainment areas in the country, the problems proved to be more difficult to solve than originally anticipated. Progress has been accompanied by several revisions of the action plan. The most recent of these was submitted to the EPA in 1996. The revisions have been developed in consultation with local stakeholders.

Under the classification system established by the 1990 FCAA Amendments, El Paso was ranked as a "serious" nonattainment area for ozone. Another provision in the Amendments, Section 179B, stated that if an area is not in compliance by the target date, the EPA cannot increase the severity of the area's nonattainment status as long as the area can demonstrate that its program would bring the region into compliance "but for emissions emanat-

ing from outside the U.S." (FCAA, 1990). Under Section 179B, the TNRCC submitted an "attainment demonstration" in 1994, revised in 1996 (TNRCC, 1996), showing that El Paso would be in compliance with the ozone standard by the end of 1996 as a result of its efforts to comply, "but for" emissions originating in Ciudad Juárez.

Simultaneously with the attainment demonstration submitted in those two packages in the mid-1990s, the TNRCC submitted its revised set of rules and programs intended to reduce $NO_x$ and VOCs and attain compliance. Those rules and programs were implemented immediately and the EPA has approved them, but the EPA has not yet approved the attainment demonstration.

Although Section 179B protects El Paso from certain legal requirements, it does not protect El Paso residents from the health effects of pollution originating in Mexico. It is in the interest of El Paso and the TNRCC to collaborate with Ciudad Juárez and other Mexican authorities to assure that progress is made in the total El Paso airshed.

Although very few $NO_x$ and VOC emissions originate in the New Mexico portion of the air basin, monitoring stations at two New Mexico sites began showing ozone exceedances in the early 1990s as a result of cumulative basin pollution. The number of exceedances was sufficient to create the designation of a subregion in violation of the NAAQS in 1995. The New Mexico Environment Department, with the EPA's approval, designated a small area in Doña Ana County, New Mexico, as a "marginal" nonattainment area (NMED, 1997). It includes the cities of Sunland Park, Santa Teresa, and La Union.

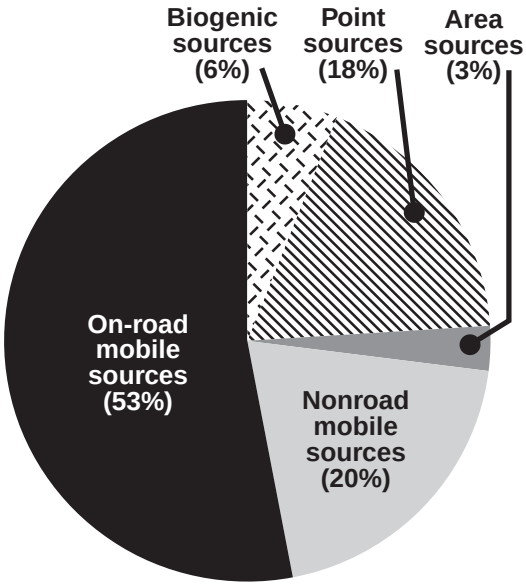
# *Taking Action*

## *Developing Emissions Inventories*

Because ozone is formed from $NO_x$ and VOCs, one of the first necessary steps is to develop an emissions inventory for each of those categories of primary pollutants. TNRCC analysts have analyzed raw data from 1999 for the most recent inventories. Figure 3-3 summarizes the estimations of various source categories for $NO_x$ emissions originating in El Paso, and Figure 3-4 offers a similar summary for VOC emissions.

Because of the relative size of the cities and economic activity in the neighboring portions of New Mexico, the TNRCC assumes that virtually none of the $NO_x$ and VOCs affecting ozone formation in El Paso comes from that part of the basin. However, Ciudad Juárez clearly is a major contributor of these emissions in the air basin. For this reason, the EPA and the Western Governors' Association provided funding during the 1990s to help Ciudad Juárez develop a preliminary emissions inventory. Similarly, the EPA has provided funding for basin-wide modeling, with significant TNRCC technical involvement.

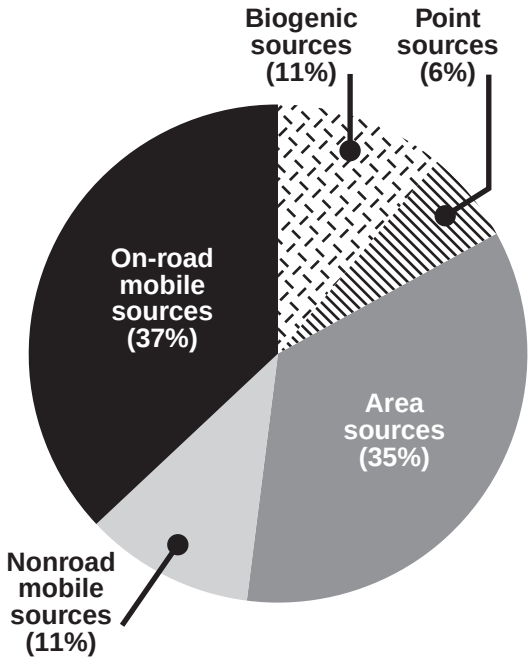
**Figure 3-3**
**Sources of Nitrogen Oxide ($NO_x$) Emissions Originating in El Paso**




**LEGEND**

- **On-road mobile sources** include automobiles, trucks, motorcycles, and other vehicles traveling on roadways.
- **Nonroad (or off-road) mobile sources** include commercial and general aviation operations, marine vessels, recreational boats, railroad locomotives, and a broad category of engines on construction equipment, lawn mowers, chain saws, and leaf blowers.
- **Point sources** are industrial, commercial, or institutional plants or operations that (1) emit large quantities of air emissions and (2) are individually quantified.
- **Area sources** are small sources of air emissions that are quantified and evaluated as a group rather than individually, such as dry cleaners, gasoline stations, print shops, and restaurants.
- **Biogenic sources** are plant life, including crops, trees, grass, and other vegetation.

**Figure 3-4**
**Sources of Volatile Organic Compound (VOC) Emissions Originating in El Paso**




**LEGEND**

- **On-road mobile sources** include automobiles, trucks, motorcycles, and other vehicles traveling on roadways.
- **Nonroad (or off-road) mobile sources** include commercial and general aviation operations, marine vessels, recreational boats, railroad locomotives, and a broad category of engines on construction equipment, lawn mowers, chain saws, and leaf blowers.
- **Point sources** are industrial, commercial, or institutional plants or operations that (1) emit large quantities of air emissions and (2) are individually quantified.
- **Area sources** are small sources of air emissions that are quantified and evaluated as a group rather than individually, such as dry cleaners, gasoline stations, print shops, and restaurants.
- **Biogenic sources** are plant life, including crops, trees, grass, and other vegetation.

## *Reducing VOCs*

The portions of the SIP related to ozone in El Paso include numerous programs to reduce $NO_x$ and VOC emissions, including detailed rules for various categories of sources. Based on conclusions from modeling performed in 1994, a greater emphasis has been placed on reducing VOCs rather than $NO_x$.

The most significant VOC-reduction programs focus on the permitting process for major stationary sources, vehicle inspection and maintenance programs, gasoline vapor recovery systems, and summertime use of less volatile gasoline.

## *Reducing $NO_x$*

The Texas Legislature passed a law in 1999 that imposed $NO_x$ reduction requirements on older facilities that were considered to be grandfathered from the permitting requirements of the Texas Clean Air Act (TCAA) (Texas Senate, 1999). In El Paso this imposes $NO_x$ reductions on generating plants operated by El Paso Electric. In 2001, new Texas legislation allowed "trading" of emissions across international borders within an air basin (Texas Senate, 2001c). The El Paso utility has been reviewing options for meeting the requirements of the 1999 law by using the method enabled by the 2001 law (see the paragraph on brick kilns in Ciudad Juárez in the following subsection on $PM_{10}$).

## *Clean Cities Program*

The U.S. Department of Energy provides funding for a "clean cities coordinator" in any city where local government and stakeholders are willing to collaborate in promoting the use of alternative fuel vehicles by companies or institutions that own fleets of vehicles. A program was initiated in El Paso in 1995. The current focus is on helping the El Paso airport authorities develop a plan for purchasing alternative fuel vehicles for on-site uses at the airport.

## *Mexico's Vehicle Inspection Program*

Mexico has not yet developed regulations on VOC emissions from specific point and area sources, so industrial firms in Ciudad Juárez are not required to install any controls. Mobile sources are undoubtedly generating a significant amount of several types of pollution, because vehicles in Mexico tend to be older and less maintained, and the population density of Ciudad Juárez results in greater traffic congestion. To address these issues, Mexico is implementing a vehicle inspection program. However, the government has been hesitant to impose too strict and costly a program. The current program allows a vehicle owner to make a good-faith effort to tune his or her vehicle and still generate emissions above allowable levels. Mexico also is revising its standards on volatility and specific contents of gasoline.

### *New Mexico's State Implementation Plan*

To address the small nonattainment area in New Mexico, the NMED developed SIP revisions that included a requirement for increased reporting of emissions of the ozone precursors from large sources, along with a requirement that major sources proposing modifications at their facilities install control equipment to reduce VOC emissions (NMED, 1997).

## *Results and Looking Ahead*

For the region to reach attainment, no single monitor can record more than three exceedances of the 1-hour ozone standard in a three-year period. Exceedances (violation of federal standard) in El Paso have dropped significantly since the late 1980s. (See Figure 3-5). In 1990, the 1-hour standard was exceeded on eight different days. Since the three-year period ending in 1997, the fourth-highest 1-hour concentration (in any three years) has been below the threshold of 125 ppb that constitutes a violation (Lambeth, 2001). For the most recent period (1999-2001) that fourth-highest value was 120 ppb.

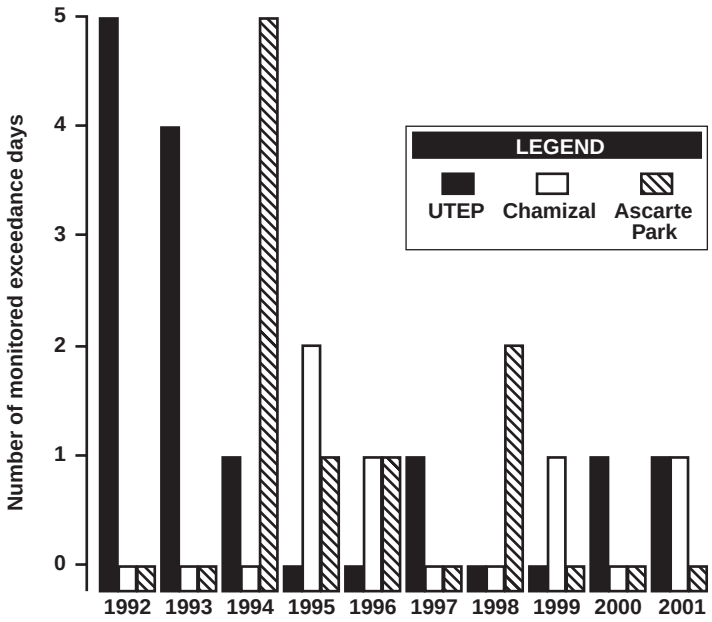
Because 2001 was the fourth year in a row in which the area was in compliance with the ozone standard, the TNRCC is discussing with local stakeholders the desirability of requesting that EPA redesignate El Paso from nonattainment to attainment for ozone. The positive and negative implications of such a request are being considered. Three important considerations are the following:

- If El Paso is designated as attainment, the EPA must decide whether the provisions of Section 179B of the FCAA (concerning emissions from outside the U.S.) would still apply, and thus protect El Paso from being designated nonattainment again if pollution from Ciudad Juárez became worse.
- The margin by which the area is under the standard is small; one exceedance at a particular monitor in 2002 would put El Paso out of compliance again.
- If redesignation is requested and approved, El Paso would lose about one-third, or approximately $2 million, of what it currently receives from the federal Congestion Mitigation for Air Quality fund.

If redesignation is requested, the request must be accompanied by a proposed "maintenance plan." To prevent a reversal of the improvements, the TNRCC must work with local stakeholders to decide which requirements and programs currently in the SIP should be included in such a plan. The plan must include indicators that would automatically cause contingency control measures to be adopted under certain circumstances. Finally, the EPA would have to take positive action on the attainment demonstration related to ozone that was submitted by the TNRCC in 1996 but not yet approved.

Regardless of redesignation decisions, monitoring, analysis, and modeling of ozone levels will continue. U.S. participants must maintain their full involvement in the JAC. As a foundation for setting local priorities and evaluating alternative control strategies, efforts to improve the Ciudad Juárez emissions inventory and to

**Figure 3-5**
**Ozone Exceedance Days at Trend Sites in El Paso**




*This graph shows the annual number of exceedance days at the three ozone monitors in El Paso that each have ten years of complete data. That number has dropped since 1992 at UTEP, since 1994 at Ascarte Park, and since 1995 at Chamizal.*

implement control strategies that reduce ozone must continue with both EPA and TNRCC assistance.

In Ciudad Juárez, data indicate that the number of exceedance days has dropped over the past 10 years, but the average daily maximum concentrations are increasing. With the rapid growth of the city, this latter trend could result in increased numbers of exceedances in the future (Valenzuela, 2001).

In New Mexico the first ozone monitor in Doña Ana County was installed in 1987, and several others have been installed in subsequent years. From 1992 to 1996, at least one exceedance was recorded each year in the area (during that period, two monitors existed). From 1997 through the first half of 2001, the area experienced a total of three exceedances (NMED, 2001). This reduction appears to mirror the experience in El Paso.

The EPA soon will be issuing final guidance for implementation of a new 8-hour standard for ozone concentrations. That agency has not decided yet whether an area that is in nonattainment for the old 1-hour standard and working toward attainment will be held accountable under this new standard. Fortunately, data from El Paso monitors indicate that the area is meeting the new 8-hour standard.

### Particulate Matter

Initial preliminary monitoring in El Paso in the late 1980s indicated that the area would not be in attainment for either the 24-hour or the annual particulate matter standard, and under the existing rules the TACB submitted an Interim SIP. After the 1990 FCAA Amendments, El Paso fell under the "moderate" category for both of the PM standards.

The TACB worked with El Paso officials and citizens to develop SIP revisions related to $PM_{10}$ and submitted those revisions to the EPA in 1991, along with an attainment demonstration (TACB, 1991). As with the ozone demonstration, this was under the terms of Section 179B of the FCAA. The EPA subsequently approved that plan.

Monitors in Doña Ana County, New Mexico, measured a significant number of exceedances of the 24-hour $PM_{10}$ standard during the 1990s. However, the NMED was able to demonstrate the following (NMED, 2000):

- In a very small number of cases, exceedances resulted from industrial accidents or temporary construction activities near a monitoring site, either of which qualified as exceptions to the federal standards.
- In all the remaining cases, $PM_{10}$ exceedance was related to dust storms, not uncommon in arid areas such as New Mexico.

The EPA's natural events policy allows a state to submit a natural events action plan (NEAP) as part of its SIP instead of invoking the more stringent regulations that official nonattainment designation would bring, if the state can demonstrate circumstances such as those in New Mexico. The NMED submitted a NEAP in 1997 and revised it in 2000 (NMED, 2000).

## *Taking Action*

### *Developing Emissions Inventories*

Emissions inventories have been difficult to develop for $PM_{10}$ because of the large and hard-to-quantify roles played both by emissions originating in Ciudad Juárez and by natural dust storms originating in the surrounding agricultural and undeveloped lands. Recent estimates from New Mexico suggest that 80 percent of the particulate matter may come from agriculture operations in Doña Ana County ("Strategic," 2002).

### *Addressing Unpaved Roads and Open Burning*

Unpaved roads are believed to be a significant part of the remaining problem. About 1 percent of El Paso's roads are unpaved (Cole, 2002), and about 50 percent of the roads in Ciudad Juárez are unpaved (Gonzalez, 2000). Particulates also are dispersed through open burning in both cities, particularly in Ciudad Juárez. The burning of several kinds of fuels—including sawdust, pallets, pecan shells, and used tires—for process heat in brick-making kilns is a particular concern in Ciudad Juárez. Another problem in Ciudad Juárez is the proportion of older and less maintained vehicles, which contribute to PM problems.

Part of the control strategy in the SIP is a set of fugitive dust control measures. Under these measures, El Paso must do the following: pave its unpaved roads at a rate of 15 miles per year, pave or otherwise

stabilize construction and demolition access roads, and prohibit the use of heating devices (including fireplaces and barbecues in the residential sector) burning wood or other solid fuels during windless periods.

Across the border, Ciudad Juárez is paving main thoroughfares and has a program for maintenance and regular sweeping of those roads, but extremely limited revenues have prevented the city from making much headway on residential roads.

Ciudad Juárez has an estimated 400 brick-making kilns that engage in relatively open burning of a variety of fuels. Research on brick kilns begun in 1996 resulted in a new technology called the environmental brick kiln (EBK), which substantially cuts PM emissions by reducing firing time and fuel consumption (Valenzuela, 2001). The JAC has strongly encouraged continuing research and pilot projects on this subject.

### *Implementing JAC Recommendations*

The Texas Legislature also adopted two additional JAC ideas, incorporating them into law in 2001. One (SB 749) calls for the TNRCC to prepare by 2003 a study on emissions from brick kilns in the border region (Texas Senate, 2001b). A second (SB 1561) enacts cross-border "trading" of emissions reductions (Texas Senate, 2001c).

For several years before passage of SB 1561, the federal government and the state of Texas allowed companies that needed to reduce their emissions of a particular pollutant to pay for a reduction in the same pollutant somewhere else in the same air quality region, which effectively allowed the company to produce the desired emissions levels at a lower cost. SB 1561 allows Texas companies to do the same across the Mexican border, and by paying for the reduction of a *different* pollutant. As a result, El Paso Electric is considering subsidizing the construction of numerous EBKs as a more cost-effective way to reduce pollution in the airshed, by trading $NO_x$ for particulate matter.

### *Efforts by New Mexico*

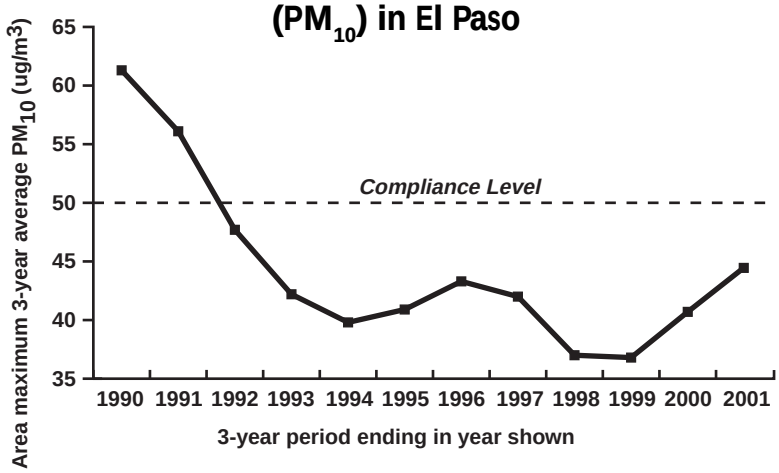
Following the requirements for a NEAP, New Mexico has educated the public about particulates, issued advisories when $PM_{10}$ levels are unhealthy, and implemented measures to control human activities that contribute significantly to the problem. The NMED has determined that no industrial facilities are contributing particulates at an illegal level. Therefore, efforts have focused on issuing guidelines for activities that contribute to dust problems, such as construction work, disturbed vacant land, military exercises, and unpaved roads (NMED, 2000).

## *Results and Looking Ahead*

Monitors at six different sites tracked concentrations of $PM_{10}$ in El Paso in the late 1980s and early 1990s. Two more were added since 1992. The measured concentrations declined significantly in that first period, and since then have leveled off (see Figure 3-6). All of the monitoring sites except for one have registered compliance since 1992. The site that recorded exceedances was the closest site to Ciudad Juárez and was located next to a bus terminal and freeway. It was used as a "special purpose" site, not as part of the EPA-approved network of monitors. Because it was not considered representative of ambient air quality, that $PM_{10}$ monitor was discontinued in 2000 (Lambeth, 2001).

**Figure 3-6**

**Trend in Concentrations of Particulate Matter ($PM_{10}$) in El Paso**




Measurements from monitoring sites in El Paso that each have at least 10 years of data show that $PM_{10}$ concentrations in recent years have been significantly lower than in 1990. In this figure, the data point shown in each year is the 3-year average for the period ending that year, at whichever site had the highest average over that period. A site with a 3-year average concentration of 51 micrograms per cubic meter (ug/m$^3$) or above is in violation of the federal standard, indicated by the "Compliance Level."

The remaining monitors in the area have shown concentrations below the standard, though only slightly. If this trend continues, the TNRCC could consider available options for the redesignation of El Paso as being in attainment for $PM_{10}$.

Five monitoring sites in Ciudad Juárez have been measuring $PM_{10}$. The University of Texas at El Paso transfered in 2001 another eight monitors to the *municipio*. The TNRCC is investigating whether supplies can be provided and has proposed that the EPA integrate all Ciudad Juárez monitors into the U.S. data collection network.

### $PM_{2.5}$

The TNRCC has installed $PM_{2.5}$ monitors at five locations in the El Paso area. After more than a year of measurements, El Paso appears to have no immediate problem with the imminent new standards ("Data," 2002). The state of New Mexico has placed $PM_{2.5}$ monitors in four cities in Doña Ana County. There are currently no $PM_{2.5}$ monitors located in Ciudad Juárez.

### Carbon Monoxide (CO)

In 1970, El Paso recorded enough exceedances of the 8-hour NAAQS for carbon monoxide (CO) (9 ppm) to be categorized as nonattainment. The TACB submitted the first SIP revisions related to CO in 1979.

As with ozone, the problem proved more difficult to overcome than anticipated. In 1987 the second highest 8-hour concentration was 15.5 ppm; and in 1990 the highest was 14.0 ppm. In 1995 the TNRCC submitted SIP revisions for CO and a new attainment demonstration to the EPA (TNRCC, 1995a), and—as with ozone— under the terms of Section 179B of the FCAA. The TNRCC has implemented the plan included in those revisions, but the EPA has not yet approved the plan.

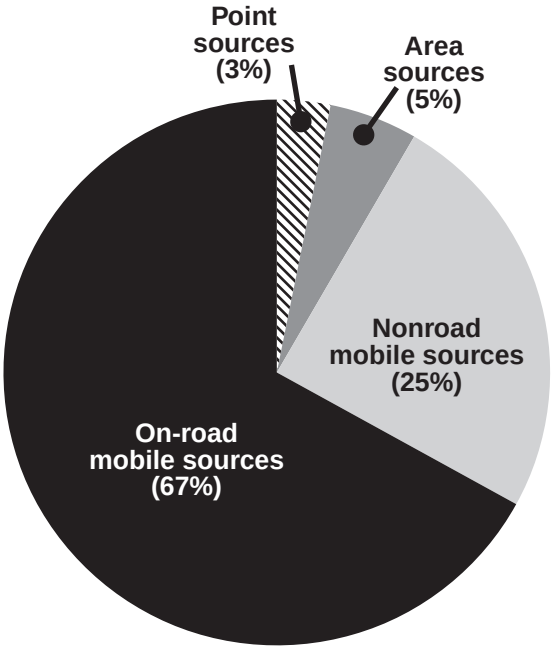
Meanwhile, monitors in Ciudad Juárez indicated that the *municipio* was seriously in violation of the Mexican 8-hour standard (11 ppm). As recently as 1997, Ciudad Juárez monitors recorded 24 readings above the Mexico standard ("Strategic," 2002). Doña Ana County in New Mexico has not had a problem with carbon monoxide. EPA's data base, which reflects concentrations in that county since 1996 (when the most recent monitor was installed), shows no exceedances through 2001 ("AIRData," 2002).

## *Taking Action*

### *Developing Emissions Inventories*

Vehicles account for the overwhelming majority of CO emissions in the Paso del Norte air basin. Most of these emissions are believed to originate in Ciudad Juárez (Valenzuela, 2002), but data from Juárez are under development. Figure 3-7 shows the summary results of the most recent inventory in El Paso.

**Figure 3-7**
**Sources of Carbon Monoxide (CO) Emissions in El Paso**




**LEGEND**

- **On-road mobile sources** include automobiles, trucks, motorcycles, and other vehicles traveling on roadways.
- **Nonroad (or off-road) mobile sources** include commercial and general aviation operations, marine vessels, recreational boats, railroad locomotives, and a broad category of engines on construction equipment, lawn mowers, chain saws, and leaf blowers.
- **Point sources** are industrial, commercial, or institutional plants or operations that (1) emit large quantities of air emissions and (2) are individually quantified.
- **Area sources** are small sources of air emissions that are quantified and evaluated as a group rather than individually, such as dry cleaners, gasoline stations, print shops, and restaurants.

### *Addressing Vehicle Emissions*

The principal actions taken to control CO under the CO state implementation plan for El Paso all relate to vehicles: a requirement to use oxygenated fuels during the prime CO season of October to March (in effect since 1992), stricter auto emission standards, and a vehicle inspection and maintenance program.

To address emissions originating in Ciudad Juárez, the JAC in 1997 recommended that PEMEX (the Mexican national oil company and a monopoly) distribute oxygenated gasoline in Ciudad Juárez during the winter months. PEMEX agreed to do so beginning in October 1999 (Valenzuela, 2001).

## *Results and Looking Ahead*

Figure 3-8 shows the trends of atmospheric concentrations of CO in El Paso over the past dozen years. Since 1990, all monitors have shown a downward trend in 8-hour averages, and since 1993 only one monitor has recorded a violation. The data show compliance since 1997. If this trend continues, the TNRCC could consider available options for the redesignation of El Paso as being in attainment for CO.

In Ciudad Juárez, the use of oxygenated fuel contributed to a decrease from 24 violations in 1997 to two violations in 2000.

### Air Toxics

The EPA and the Texas Department of Health (TDH) are currently conducting independent investigations of possible problems associated with previous emissions of heavy metals in El Paso. In partnership with the TNRCC and several other agencies, the EPA initiated a study in 2001 of heavy metals in the soils in El Paso's west side industrial area near the New Mexico-Chihuahua-Texas convergence. A summary of the initial results of that study is offered in the waste subchapter of this chapter.

An initial investigation was conducted by TDH regarding an apparent cluster of multiple sclerosis (MS) cases among people who lived in certain El Paso neighborhoods. As a result of this investigation, TDH examined the health records of people who attended two elementary schools in the vicinity of a metals smelter between 1948 and 1970.

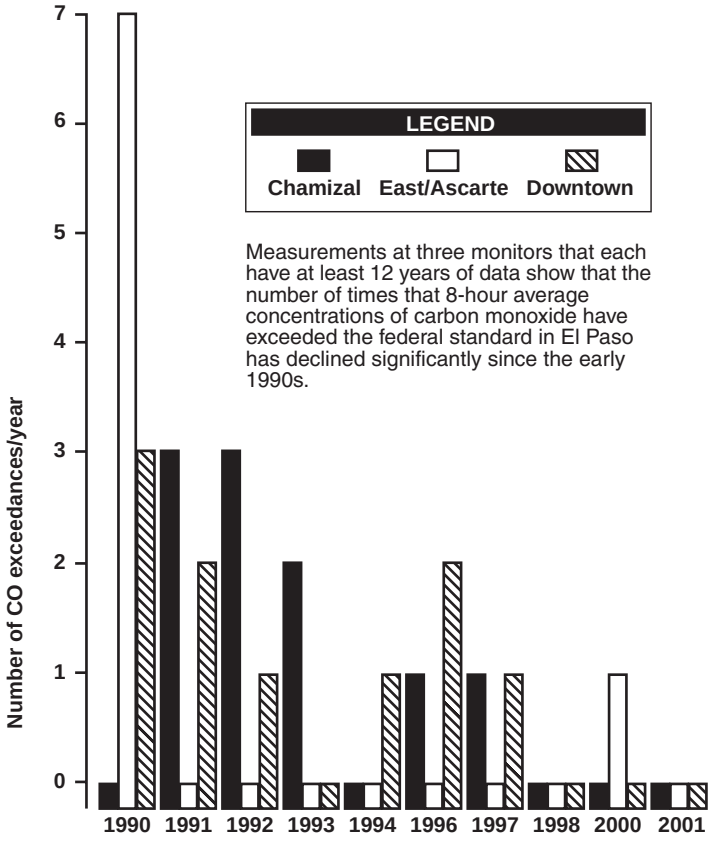
The TDH published the results in 2001 (TDH, 2001). Based on national estimates of prevalence, the results from the second school indicate that the number of former students with MS was twice as high as expected. The TDH intends to follow up with annual surveys for at least two years to learn if any additional former students are diagnosed with MS. In addition, the TDH is developing current MS prevalence estimates for Texas and will compare those to the El Paso results. The TDH also plans to conduct a national multisite study aimed at examining the risk of metals exposure and possible association with developing MS.

### Particulate Matter ($PM_{10}$) in Presidio

The sister cities of Presidio and Ojinaga formed a Binational Health Council under the U.S.-Mexico

**Figure 3-8**

**Exceedances of the Carbon Monoxide (CO) 8-Hour Standard at Trend Sites in El Paso**




*This graph shows the number of exceedances of the 8-hour carbon monoxide standard at the three carbon monoxide monitors in El Paso that each have 12 years of complete data.*

Border Health Association several years ago. In 1995 the council sponsored a survey of citizens in Presidio. The majority of responses expressed concern over the dust caused by traffic on unpaved streets, but paving streets is expensive, and the city has extremely limited resources. Since the survey, the council has been investigating alternative methods for addressing the dust problem and the costs of these alternatives (Castillo, 2001b).

Believing that scientific evidence of significant levels of particulate matter might help attract funding, the council approached several parties for assistance on measuring the problem, including the TNRCC regional office in El Paso, the city of Presidio, and the Presidio Independent School District (ISD). The TNRCC loaned the city a $PM_{10}$ monitor, the ISD volunteered a site and offered the electricity necessary to run the monitor, the city built a platform for the monitor out of recycled materials, volunteers were found to maintain the monitor, and the TNRCC provided training for the volunteers (Castillo, 2001b).

Samples were taken over a 90-day period, and the TNRCC arranged for analysis by a certified laboratory. The average of the readings was 40 micrograms per cubic meter ($\mu g/m^3$), as compared to an average of 50 $\mu g/m^3$ over the same period in El Paso (which has had PM problems in the past), and the national standard of 150 $\mu g/m^3$. The TNRCC reported that the PM measurements themselves did not indicate a health risk, though the agency urged the council and the city to continue investigating ways of reducing the problem of the unpaved streets (Castillo, 2001b).

## Visibility Issues in Big Bend and Guadalupe Mountains National Parks

Texas has two areas in the western part of the state where the TNRCC is required to give attention to impaired visibility under federal Class I guidelines—Big Bend National Park and Guadalupe Mountains National Park (see Figure 1-1). Class I guidelines are described under air quality issues in Chapter 2.

The EPA issued the visibility protection rule in1980, and then enhanced that regulation with the regional haze rule that was finalized in 1999 (40 *CFR* 51 P). In the evolution of requirements on this subject, those relevant to the first rule are referred to as Phase I; those relevant to the second rule as Phase II.

### Phase I of Visibility Protection Rule

In the 1980s, tourists and National Park Service (NPS) officials began noticing that the panoramic vistas at the two parks were no longer as consistently glamorous on sunny days. In response to the visibility protection rule, the TACB adopted revisions to the state implementation plan in September 1987 that addressed visibility concerns that likely resulted from an existing stationary source or a small group of stationary sources within 100 kilometers of either park.

Following federal requirements, those revisions committed the state to conduct a periodic review and to submit a report every three years to the NPS and to the EPA that outlines a strategy and identifies implementation actions. As required, the TACB and later the TNRCC have evaluated possible existing sources of pollution within 100 kilometers of each Class I area and determined that there are none. They also have implemented a smoke management program and consulted with the NPS and the public.

In the mid-1990s a binational workgroup was created to investigate long-distance sources of haze in Texas and Mexico. This process led to a larger U.S.-funded study still under way and discussed in the following section. The next Phase I report is due in February 2004. The Phase I process will continue until the first SIP revisions under Phase II are submitted.

### Phase II of Visibility Protection Rule

#### Multistate Collaboration

Texas is committed to working with other states, tribes, federal agencies, and stakeholders on regional haze. To do so, as previously described in Chapter 2, the TNRCC participates in one of the five regional planning organizations supported by EPA—the Central States Regional Air Planning Association (CENRAP). This group includes the states of Arkansas, Louisiana, Oklahoma, Missouri, Kansas, Nebraska, Iowa, Minnesota, and Texas, and all the tribes located in these states. CENRAP identifies regional haze and visibility issues and develops strategies to address them.

For states like Texas that are committed to joint collaboration, the first plan due to the EPA under Phase II commits the state to the regional

process. This plan (the committal SIP) is due one year after the EPA first designates attainment and nonattainment areas for $PM_{2.5}$. The EPA currently plans to make those designations in the 2004–2006 timeframe. The plan must explain how emissions from Texas contribute to visibility problems in other states, and vice versa. The plan must include a detailed description of the agreed-upon joint planning process and a commitment to submit a coordinated control strategy under the SIP.

CENRAP has no regulatory authority; each member state has the option to commit voluntarily to each joint decision as the planning process continues. Each state is responsible for its own SIP, although there is an option for consolidating SIP submissions. Texas and the other CENRAP member states must submit a full set of appropriate SIP revisions three years after the committal SIP is due (in 2008–2010, under current expectations). Subsequent SIP revisions, comprising modification of strategies due to fresh data or an unanticipated pace of progress, are then due every 10 years.

### Emission Control Requirements

The FCAA and EPA regulations require states to determine whether certain large facilities built between 1962 and 1977 (many of which have been exempt from requirements under the FCAA) are contributing to visibility impairment in Class I areas, and if so, to impose a requirement to install best available retrofit technology (BART).

The full set of SIP revisions must identify BART-eligible sources, the facility-specific emission limitations that would be required in each such application, and an analysis of the cumulative emission reductions and changes in visibility that will occur. The regulations allow for the use of alternative measures, such as emissions trading programs, if the net result would be greater progress than would occur under the implementation of source-by-source BART. The TNRCC has begun this process.

### The Big Bend Regional Aerosol Visibility Observational (BRAVO) Study

The ongoing Big Bend Regional Aerosol Visibility Observational (BRAVO) study hopes to determine how emissions from a variety of regional sources are transported and the effects on visibility in Big Bend National Park. The EPA and the NPS are funding the study, which is managed by staff from the EPA and the National Oceanic and Atmospheric Administration (NOAA). The TNRCC participates as a partner. Mexico participated in a preliminary study in the mid-1990s, but then chose to drop out of the project when the full BRAVO study was launched.

Collection of field data under the BRAVO study took place in 1999. Ambient air measurements were recorded for aerosol particles, meteorology, and gases. Researchers released chemical compounds, called tracers, from Eagle Pass along the Mexican border and the northern and eastern edges of Texas, to document transport from Mexico, other U.S. states, and the Gulf of Mexico. The study also sampled specific industry and vehicle emissions to help detect their presence in the ambient monitoring. As a contribution to data collection, the TNRCC contracted with Baylor University for a specially outfitted aircraft to sample atmospheric data.

Preliminary results from the study indicate that the sources of visibility impairment in Big Bend are even more complex than anticipated. The cause may involve sources east of the CENRAP states, sources in Mexico, and a mix of wind patterns flowing south through eastern Texas and continuing into Mexico. Those winds may combine regional, out-of-state, and Mexican pollution into a mix that then travels west and north into Big Bend.

The EPA expects to release the final BRAVO report in fall 2002. Results from the report will help the TNRCC develop the SIP revisions required under the regional haze rule.

The EPA, the NPS, and the TNRCC jointly have conducted two public meetings in Alpine to provide local residents with an update on the progress of the study. The most recent meeting was held in October 2001. Another meeting will be scheduled after the final report is issued.

## Toxics Release Inventory Data

A description of the EPA's Toxics Release Inventory (TRI) is provided in Chapter 2. According to the most recent data from the TRI reports, the greatest amount of toxic waste managed in the Rio Grande border region is in El Paso County. In 1999, the county accounted for 18.5 million of the

21.8 million pounds managed in the 32 counties of the border region (See Table 2-10) ("TRI Release," 2001 and "TRI Waste," 2001).

## Innovative Programs

The following programs and projects are unique to the El Paso border region. Except for the TNRCC's VISTA project, all were created and implemented at the initiative of El Paso citizens, who identified problems in their community and set out to solve them using new ideas or combining existing resources in an innovative way. However, even the VISTA project will not succeed without the hard work of El Paso agencies and volunteers.

### TNRCC's AmeriCorps VISTA Border Environmental Awareness Project

The TNRCC is one of many participants in the AmeriCorps VISTA Program, which has been meeting the needs of low-income communities since 1965, when it was established as Volunteers in Service to America (VISTA). Since 1999, a VISTA volunteer in the El Paso TNRCC regional office has helped empower local citizens to take actions on environmental issues that affect their way of life (Cash, 2001). These include illegal dumping, outdoor burning, lead poisoning, recycling, and choosing alternatives to pesticides.

With help from the TNRCC VISTA coordinator, a local organizing committee developed "Soluciones," an outreach program that has held three environmental fairs—one each in Horizon City, Tornillo, and San Elizario. Participants included colonias residents, school children, teachers, and senior citizens. As many as 15 government agencies participated in these fairs by bringing materials to the communities and helping residents understand how to use their services.

The VISTA coordinator also works with the Paso del Norte against Illegal Dumping Coalition to provide educational materials and assist in finding funds for long-term community solutions to illegal dumping problems. The coalition has held six community cleanups in the past three years, all involving local volunteers. The six events have resulted in more than 182,000 tons of trash being collected. In addition, some residents who did not participate in residential solid waste collection elected to do so after becoming involved in the community cleanup events. To contact the VISTA coordinator, please see Appendix D, For More Information.

### EPA's Wire the Border Project

Under the EPA's Border XXI program, nine workgroups were created and assigned various tasks. The Environmental Information Resources Workgroup developed a variety of projects intended to disseminate environmental information to border citizens. One project was a partnership between the EPA and the U.S.-Mexico Chamber of Commerce. The goal was to install computers in communities to provide access to electronic resources (Martel, 2001).

The AYUDA Community Center, a colonia outside of El Paso, received computers, printers, software, training manuals, a draft Web page, and training. AYUDA is a bilingual, grassroots, nonprofit community group founded in 1992 to advocate for quality health care, better housing, environmental protection standards, education, and economic development. Among the many communities AYUDA serves are San Elizario, Hueco Tanks, Montana Vista, Las Colonias, College Park, and Cuadrill.

A major objective of the Wire the Border Project is to help border communities investigate specific environmental issues. AYUDA asked for information on pesticides, air (trash burning), lead, and water availability. In addition to providing AYUDA with Spanish and English copies of existing EPA information on these topics, the Chamber and the EPA helped the group learn how to use the Internet to access EPA and other environmental web sites. The AYUDA Web page contains several links to the EPA's environmental information in Spanish.

In October 2001 the EPA Administrator visited AYUDA during her trip to the El Paso area. To find out more, please see Appendix D, For More Information.

### El Paso Retired Senior Volunteers Program (RSVP)

RSVP stands for the Retired Senior Volunteer Program (TNRCC, 1993). These volunteers identified nearly 2,000 potential sources of groundwater contamination around El Paso's 138 drinking water wells, such as septic systems, abandoned wells, and

abandoned gasoline storage tanks. The RSVP Environmental Task Force volunteers also work with the El Paso City-County Health and Environmental District to survey water supplies and septic facilities in the colonia areas outside the city of El Paso. In addition, volunteers help to alert residents of potential contamination. The El Paso program is used as a model by as many as 30 states and 160 Texas communities. The program received the TNRCC's Texas Environmental Excellence Award in the civic organization category.

### TSM Television and Radio Campaign

TSM Television produced a 20-part public education campaign that aired on the station's 10 p.m. news each weeknight for a month (TNRCC, 1993). Each week was devoted to one of the following topics—air, water, land, and energy—and featured a brochure listing practical things citizens could do to solve environmental problems. Of the 60,000 brochures printed, almost 45,000 were given to area school districts. Teachers incorporated them into the science curriculum at their schools, reaching almost 100,000 students. The remaining brochures were distributed to El Paso citizens through area restaurants and utilities. This program received the TNRCC's Texas Environmental Excellence Award in the media category.

### El Paso Water Utilities

El Paso Water Utilities strives to ensure that the water needs of El Paso will be met for the next 50 years. El Paso's plan emphasizes an aggressive water conservation program and a gradual shift from groundwater to surface water, and when feasible, reclaimed water. El Paso's Fred Hervey Water Reclamation Plant was described as "the cutting edge of wastewater processing technology" (TNRCC, 1998), one of only a few in the world that treat wastewater to the level of drinking water and then inject it back into the aquifer. It is the only wastewater treatment plant in Texas that uses the water reinjection process. For every 10 years this plant performs at capacity, the life of the Hueco Bolson is extended for one year. The program received the TNRCC's Texas Environmental Excellence Award in the government category.

### Hal Flanders, Alpine

Hal Flanders launched a municipal recycling program in Alpine and succeeded in finding buyers for the material (TNRCC, 1998). His first targets were glass and aluminum cans collected at two sites in town. After only one year, nearly 46,000 pounds of crushed glass were diverted from the landfill through his efforts. Flanders' goal was to get a recycling program up and running so well that the city of Alpine could not resist taking over, which he accomplished about five years after proposing the initial program strategy. His organization also established recycling programs in Marfa, Marathon, and Fort Davis. For his achievements, he received the TNRCC's Texas Environmental Excellence Award for individuals (TNRCC, 1995b).

CHAPTER 4

# MIDDLE RIO GRANDE SUBREGION

STATE OF THE RIO GRANDE AND THE ENVIRONMENT OF THE BORDER REGION

## Characteristics and Concerns

In this report, the Middle Rio Grande subregion is defined by the stretch of the Rio Grande that starts at the western edge of Val Verde County upstream from Amistad International Dam and flows to International Falcon Dam, approximately 250 miles to the southeast (see Figure 4-1). This area generally coincides with the TNRCC Region 16. The regional office is in Laredo. (See Appendix B, Texas Border Environmental Offices, for a list of border offices and their locations.)

With relatively low population density, the land area of this subregion is largely dedicated to livestock. Cattle predominate, but goats are also raised in the Maverick County area. In the Winter Garden region in Zavala and Dimmit Counties, agriculture is important. Crystal City bills itself as the "Spinach Capital of the World." Pockets of agriculture flourish elsewhere as well, including producers of onions, honeydews, and cantaloupes in Webb and Zapata Counties, and pecan groves several miles northwest of Eagle Pass in Maverick County.

Oil and gas companies also are important players in Webb and Zapata Counties, where they produce about 20 percent of all the natural gas in Texas. Major pipelines lead from this area to both Corpus Christi and Houston.

Laredo is by far the largest city in this subregion of south Texas. According to the 2000 census, the Laredo area had a population of about 193,000, which was 45 percent higher than in 1990. Directly across the Rio Grande from Laredo is its sister city, Nuevo Laredo, in the Mexican state of Tamaulipas, with a population of approximately 310,000. Colonias exist around the city of Laredo, with a smaller number around Eagle Pass and Del Rio.

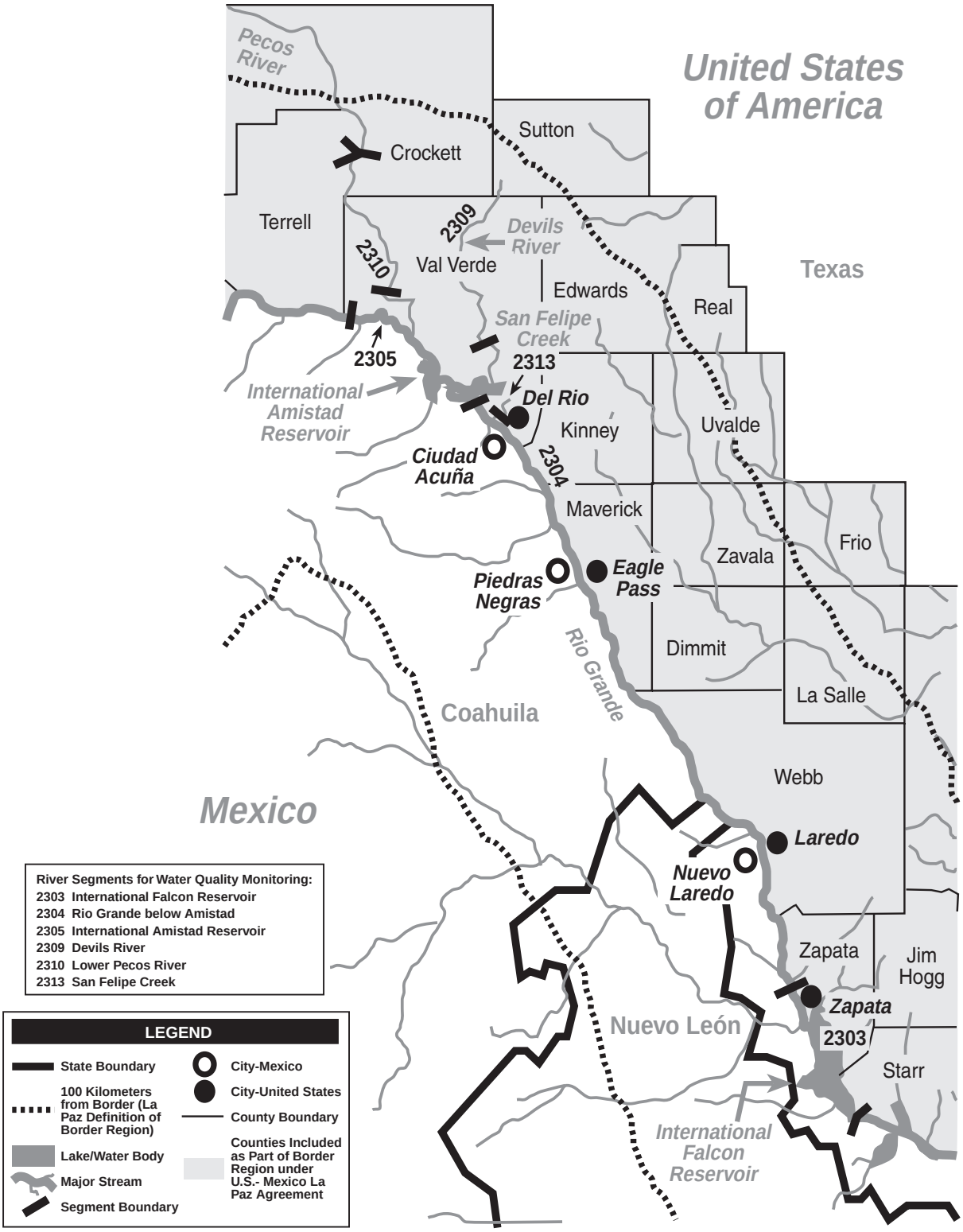
Laredo not only sits on the international border, but also is the beginning of north-south Interstate Highway 35, the busiest traffic route for U.S.-Mexico-Canada commerce in the entire U.S. Approximately 8,000 commercial truck crossings (northbound and southbound) occur on the Laredo bridges every day, making Laredo the largest inland U.S. Customs port of entry.

Del Rio and Eagle Pass are the next largest Texas cities in this subregion, and also on the Rio Grande, with populations of about 34,000 and 22,000, respectively. Del Rio's sister city in Mexico is Ciudad Acuña, while Piedras Negras lies across the river from Eagle Pass. Each of these Mexican cities has a population of more than 100,000. Several other Texas towns in the subregion have populations of under 20,000. The city of Zapata, once a haven for bass fishermen because of its location near the International Falcon Reservoir, has been impacted by the ongoing drought. Depleted reservoir levels have diminished Zapata's fishing and tourism industries.

The Kickapoo Nation reservation, with a population of approximately 700, is in this subregion near Eagle Pass. There is significant interaction between that reservation and a larger Kickapoo Nation reservation that includes the town of Nacimiento in the neighboring Mexican state of Coahuila.

Average annual rainfall throughout this area is approximately 19 inches, ranging from a quarter to twice that amount in specific years. The average summer maximum and minimum temperatures in Laredo, which is typical of the subregion, are 98

**Figure 4-1**
## Middle Rio Grande Subregion




The Mexican States and New Mexico data were taken from the 1999 ESRI Data & Maps CD. The counties and parks were derived from the U.S. Census Bureau 1998 TIGER/Line dataset. The cities of Mexico are noncertified public sector data (for general reference only). The Rio Grande and its tributaries were from the TNRCC 1994 Rio Grande Hydro layer. The remaining streams were derived from the U.S. Census Bureau 1992 TIGER/Line dataset.

degrees and 73 degrees Fahrenheit. The average winter maximum and minimum temperatures are 71 degrees and 46 degrees Fahrenheit.

## Regional Priorities

Residents in the Middle Rio Grande subregion indicated the top three priorities are:

1. water quantity,
2. water quality, and
3. transportation of hazardous waste.

Local citizens also expressed the following environmental concerns:

- water quantity and quality problems due to upstream use;
- supply of water, both from the Rio Grande and from groundwater;
- need to provide domestic water supply for colonias;
- need to identify sources of Rio Grande pollution;
- need to address the impact of illegal dumping on water quality, particularly in Manadas Creek;
- need to address raw wastewater discharges from the city of Nuevo Laredo;
- need to solve odor and sewage plant concerns, particularly in the Azteca neighborhood;
- need for current real-time water quality data to update reports from previous years;
- need to address the international aspects of water quality protection;
- need for wetlands protection;
- need for better regulation and enforcement regarding solid waste and illegal dumping of municipal solid waste;
- need for warehouse inspections in the Laredo area of facilities storing hazardous substances, particularly to identify possible abandoned hazardous waste;
- need for expansion of liquid and municipal waste storage, treatment, disposal, and transportation management options, particularly the need for more landfills to enhance the current estimated 20-year municipal solid waste landfill capacity;
- need for harmonization of international waste management standards;
- need for affordable waste collection in rural areas;
- lack of long-term historical data on air quality factors;
- evaluation of the location of air quality monitors to determine if their readings are truly representative of local conditions;
- impact of pollution caused by vehicles, including trucks involved in international commerce; and
- need to investigate possible pollution-related causes of neural tube defects.

## Water Quantity Issues

In this report, the water quantity subsection will focus on the Rio Grande basin counties in the TWDB Region J Regional Water Planning area, Val Verde and Kinney Counties. (See Figure 4-2.) More information on Eagle Pass, Maverick County, Laredo, Webb County, and Zapata County can be found in the water quantity discussion in Chapter Five, The Lower Rio Grande Subregion.

### Region J Water Planning Area of the Texas Water Development Board

#### Land Use

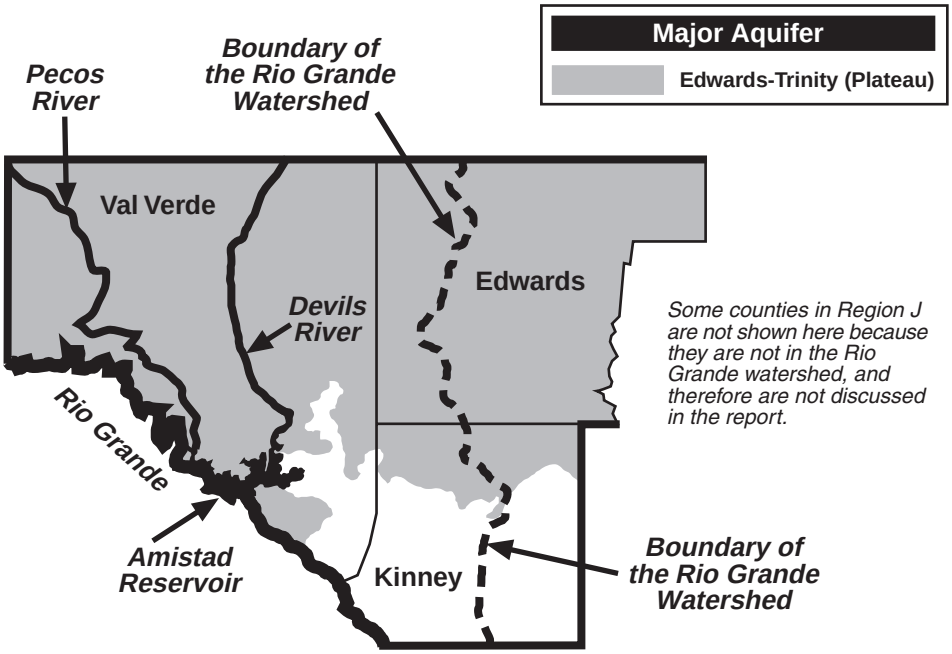
Like much of the Rio Grande basin, ranching is a primary land use in the Middle Rio Grande subregion. The major type of livestock is beef cattle. However, goats and sheep also are raised. Ranch income is supplemented by hunting leases for deer, turkey, quail, and dove. Irrigated farming, particularly along the Rio Grande, also is important to the economy of the area. The major crops are cotton, corn, grain sorghum, and truck crops.

#### Water Demand—Present and Future

Groundwater is the primary water source for most of this subregion, but only two counties in Region J lie mostly in the Rio Grande basin—Val Verde and Kinney. Water demand in 2000 for these two counties was estimated at 27,560 acre-feet, of which 61 percent went to municipal use (TWDB, 2001b). The next largest use was irrigation, accounting for about 34 percent of estimated water demand. Del Rio is the largest municipal user in the six Region J counties.

By 2050 Val Verde County's total water demand is expected to increase by 4,800 acre-feet (TWDB, 2001b).

**Figure 4-2**
**Water Planning Region J of the Texas Water Development Board**




Note: TWDB Water Planning Region J corresponds to only a portion of the border subregion (Middle Rio Grande) represented in Figure 4-1 and otherwise discussed in this chapter. Water Planning Region M includes a significant portion of the Middle Rio Grande, but because Region M also includes all of the Lower Rio Grande, the map and discussion of Region M are included in Chapter 5 of this report.

*Source: Texas Water Development Board Planning Group maps.*

### Water Sources

Val Verde County relies on groundwater for about 41 percent of its water needs, while Kinney County relies on groundwater for 92 percent of its needs (TWDB, 2001b). The major aquifer in these two counties is the Edwards-Trinity (Plateau) (TWC, 1992). The city of Del Rio relies entirely on San Felipe Springs, the fourth largest spring in Texas, for its water supply.

### Planning to Meet Future Water Needs

By 2050 the drilling of new wells in addition to those currently in existence should satisfy water demand in Kinney County.

## Water Quality Issues

### Surface Water Quality and Influences

#### Tributaries Entering at International Amistad Reservoir: the Pecos River

The first major segment of the river in the Middle Rio Grande subregion is International Amistad Reservoir, Segment 2305, located in Val Verde County (see Figure 4-1). Two tributaries join the river, influencing water quality—the Pecos and the Devils Rivers. The Pecos begins at Red Bluff Reservoir, Segment 2312, at the Texas-New Mexico border in northwest Loving County. Water in the Red Bluff Reservoir meets contact recreation standards, as well as standards meant to protect the health of aquatic plants and animals (IBWC, 2001). However, slightly high nitrate levels could be a concern. If these levels become too high, they could depress dissolved oxygen levels, an important criteria for aquatic life use (TNRCC, 2001b).

The next segment on the tributary is the Upper Pecos, Segment 2311, which runs from the Red Bluff Reservoir down through Reeves, Crockett, and Terrell Counties (see Figure 4-1). Salinity in this region is high, due in part to natural geologic salt deposits. As a result, water quality standards are not as high as those for the Canadian and Red Rivers (IBWC, 2001).

Compounding the salinity problem is the invasion of the salt cedar, an exotic species originally brought to the region to help control soil erosion.

The plant increases salinity in two ways: first, it consumes more water than native species, increasing the concentration of salt in the water that does reach the river; and second, it concentrates salt in its leaves, which increase the salinity of the surrounding soil as they decay. Water flowing over or through that soil will pick up some of that salt and carry it into the river (TNC, 1998). In some locations, salinity is occasionally above even the elevated standards. In addition, the health of aquatic species may be affected by current trends in declining dissolved oxygen and increasing nutrients. The U.S. Section of the IBWC also indicates that bacteria levels show an increasing trend and may begin to exceed standards for contact recreation (IBWC, 2001).

The Lower Pecos, Segment 2310, runs to Amistad Reservoir through Crockett, Terrell, and Val Verde Counties (see Figure 4-1). Quality in the segment is improved by the inflow of high-quality water from Independence Creek. The segment supports public water supply use (IBWC, 2001).

## *Taking Action*

In the Pecos River area, several projects are helping to meet the challenges posed to water quality

### *Pecos River Projects*

On the Upper Pecos, projects are being undertaken in both Texas and New Mexico to find a solution to the salt cedar problems. The Pecos River Ecosystem Project in Texas is examining the success of aerial application of different kinds and quantities of herbicides to see which is the most successful (IBWC, 2001). As a project partner, the Upper Pecos Soil and Water Conservation District is monitoring the river to examine the effect of the herbicides on water quality. The Lower Pecos is scheduled to have a final TMDL for salinity submitted to the EPA for approval in 2005 (see Chapter 2 for information on TMDLs) (TNRCC, 2001c).

### *City of Pecos Projects*

In Reeves County, the TWDB's EDAP program is helping the city of Pecos target the growing need for water and wastewater infrastructure with $63,000 in grant money. The TWDB supplied the funds to create plans for a $365,000 water service project that will provide first time service to 91 colonia residents (Pedersen, 2002 and TWDB, 2001a). A major effort is also underway to establish a new South Worsham well field and associated groundwater transmission lines and storage facilities, using funds from the TWDB's Drinking Water State Revolving Fund (DWSRF) (Pedersen, 2002).

### Tributaries Entering at International Amistad Reservoir: the Devils River

The second major tributary that feeds into Amistad Reservoir is the Devils River, Segment 2309, which runs through Crockett and Val Verde Counties (see Figure 4-1). Water in the Devils River is very high in quality. The river itself runs through an area with very few industrial or municipal users whose discharge could cause degradation (Niemeyer, 2001). The water meets standards designed to protect the health of aquatic life, as well as contact recreation, and is suitable for use as a public water supply (IBWC, 2001).

### International Amistad Reservoir

Both the Pecos and the Devils Rivers drain into International Amistad Reservoir in Val Verde County, Segment 2305, just to the northwest of Del Rio and Ciudad Acuña (see Figure 4-1). The Pecos tends to increase salinity in the Pecos River arm of Amistad. Near the international boundary, nutrient levels are elevated. Nonetheless, the water meets standards for public water supplies and contact recreation, as well as for protection of aquatic life (IBWC, 2001).

Amistad plays an important storage role, which helps improve the downstream environment in the Rio Grande. This provides time for pollutants, nutrients, and salts either to decay or to settle out of the water, becoming trapped in the sediment. High-quality inflow from the Devils River also helps improve quality by diluting high concentrations of pollutants, nutrients, and salts flowing in from the Rio Grande and the Pecos (IBWC, 2001).

### San Felipe Creek and the City of Del Rio

Just below International Amistad Dam, San Felipe Creek, Segment 2313, flows into the Rio Grande from East and West Springs east of the city of Del Rio (see Figure 4-1). The springs provide the city with its water supply. However, the groundwa-

ter of the springs can be influenced by surface water contamination, so Del Rio is building a drinking water plant to provide treatment to drinking water quality standards.

As San Felipe Creek flows through Del Rio, bacteria levels occasionally exceed state standards. Elevated bacteria levels may be due to an unplanned event at a wastewater treatment plant, leaking septic systems, animal waste, or urban runoff. Some small ranches and farms are located in the upper San Felipe Creek basin. Colonias in the area also are placing pressure on the city's wastewater and water treatment systems. More information is needed to better assess the cause of the elevated bacteria levels, however. The creek meets contact recreation standards and standards for protection of aquatic life, and the presence of the endangered Devils River minnow is encouraging the city to more closely manage the springs and the creek system (IBWC, 2001 and Pedersen, 2002).

## Taking Action

In the Del Rio area, progress has been made in meeting the challenges posed to water quality.

### Texas Water Development Board EDAP Water and Wastewater Projects

The Texas Water Development Board has taken the lead in water supply and wastewater management activities in the Middle Rio Grande subregion for many years. Its sponsored projects are listed in detail in Appendix H, Water and Wastewater Projects in the Middle Rio Grande Subregion.

This new microfiltration drinking water plant discussed previously is being financed using funds from the TWDB's DWSRF as well as with NADBank funding as described in the next section on "The Texas Plan and NADBank Projects." Del Rio has a second major DWSRF loan that is being used to improve the current water distribution system. The TWDB has also financed improvements to the Silver Lake wastewater treatment plant, and is considering funding both improvements to the San Felipe Creek wastewater treatment plant and the extension of the city sewer system into currently unserviced subdivisions upstream of the San Felipe Springs Golf Course (Pedersen, 2002).

The EDAP program has funded two projects near Del Rio. Completed in 1996, the first project provided water and wastewater services to the over 1,400 residents of the Cienegas Terrace colonia through more than $3.5 million in grants and loans. The second project, also funded through grants and loans, is currently under construction. Scheduled for completion in 2002, the $12 million project will extend water and wastewater treatment to over 2,000 colonia residents in Val Verde Park Estates (TWDB, 2001a).

### The TEXAS Plan and NADBank Projects

Through the TEXAS Plan, sponsored by the Texas Secretary of State's Office and mentioned in the Overview chapter, various state and federal agencies are working cooperatively with the EDAP program to direct approximately $35 million to install water and wastewater connections in colonias along the border ("Texas Plan," 2002 and "Texas Border," 2002). All of the TEXAS Plan projects were planned, designed, and constructed with TWDB technical and financial assistance (Pedersen, 2002). The NADBank also is providing funding for these projects in the form of a $6.36 million grant to help meet water and wastewater needs in Cameron, Hidalgo, and Val Verde Counties (NADBank, 2001b). In Val Verde County, the money will provide for over 1,200 wastewater and 400 water connections to colonias near Del Rio (NADBank, 2001a).

In addition to the TEXAS Plan grant, as mentioned in the previous section, NADBank is providing over $14 million in grants to Del Rio toward the construction and expansion of the water treatment plant that will serve 42,000 residents. The treatment plant began construction in April 2001, and was 28 percent complete as of October 2001. Across the border in Ciudad Acuña, a $16.73 million NADBank grant is contributing to the construction of infrastructure that will provide wastewater coverage for the city—over 113,000 residents. Mexico's Comisión Nacional de Agua (CNA) will match funds from the NADBank grant (NADBank, 2001b). During the Border Environment Cooperation Commission's (BECC) certification process the project received $252,224 in

technical assistance (BECC, 2001a). The BECC also expects to certify a water treatment plant for Ciudad Acuña in 2002 (BECC, 2001b).

### Rio Grande from International Amistad Dam to International Falcon Reservoir

The main segment of the river in the Middle Rio Grande subregion, Segment 2304, flows from immediately downstream of International Amistad Dam, between the sister cities of Del Rio and Ciudad Acuña, and past Eagle Pass and Piedras Negras (see Figure 4-1). It then continues along the border of Webb County between the cities of Laredo and Nuevo Laredo, ending just above International Falcon Reservoir in Zapata County.

Bacteria levels are the major concern in the segment, particularly in the river at or downstream of the three pairs of sister cities. The primary cause seems to be raw sewage discharges into the river from these major population centers (IBWC, 2001).

According to the chief of the Nuevo Laredo water and wastewater utility, the Comisión Municipal de Agua Potable y Alcantarillado (COMAPA), 52 percent of the industries in Nuevo Laredo do not use water in their processes. Of the 31 industries that do use water in the industrial process, 21 are required to pretreat their wastewater discharges before releasing to the wastewater collection system. COMAPA was established in 1994 to control Nuevo Laredo wastewater discharges into the wastewater collection system and the completed International Wastewater Treatment Plant serving Nuevo Laredo (Rathmell, 2001a).

Almost 500 businesses in Nuevo Laredo generate grease as part of their business enterprise. The control of grease discharge into the wastewater collection system is one of the main contamination issues facing the wastewater collection and treatment system in Nuevo Laredo.

Colonias in the area lack access to water and wastewater treatment plants, and some of their wastewater enters the river without treatment. Runoff from cropland and other agricultural lands also contributes to the problem (IBWC, 2001). Since bacteria levels are high, the river does not meet standards for contact recreation in this segment of the Rio Grande (TNRCC, 2001b).

Increasing levels of nutrients in the segment are also related to wastewater discharges and runoff. Ammonia and phosphorus levels are particularly elevated near the three sets of sister cities (IBWC, 2001). Nutrients could be contributing to depressed levels of dissolved oxygen in the subregion (TNRCC, 2001b).

The river meets standards designed to protect aquatic life and for public water supply. A fish tissue study issued in December 2001 by the TDH and approved by the Agency for Toxic Substances and Disease Registry indicated "no apparent health hazard" from consumption of fish caught from the Rio Grande near Laredo (USDHS, 2001). However, ambient sediment toxicity could harm aquatic life and, along with the high levels of bacteria, has caused the segment to be placed on the state's 303(d) list for water bodies that do not meet state water quality standards (Rothe, 2001 and TNRCC, 2001c).

## *Taking Action*

A great deal of activity is occurring from International Amistad Dam to International Falcon Reservoir to protect and improve water quality, particularly to meet the subregion's water and wastewater needs. The work is not limited to the U.S. side of the border in Texas. The Texas Water Development Board has taken the lead in water supply and wastewater management activities in the region for many years. Its sponsored projects are listed in detail in Appendix H, Water and Wastewater Projects in the Middle Rio Grande Subregion. Construction, operation, and expansion of Laredo's three wastewater treatment plants have received technical and financial assistance from the TWDB over the past 23 years (Pedersen, 2002).

### *Nuevo Laredo Infrastructure Projects*

A wastewater treatment plant built in Nuevo Laredo has improved water quality in the Rio Grande tremendously. The wastewater treatment plant, lift station, and several collectors were designed and constructed under the IBWC Minute Order 279, with funding from the U.S. Section of the IBWC, state of Texas, and Mexican agencies. The project received $22 million in funding from Mexico, $22 million from the IBWC, and $2 million from the State of Texas through the TWDB, which also provided assistance to the project (Pedersen, 2002). The treatment plant has a rated

capacity of 31 million gallons per day (mgd) and currently treats an average of 25 mgd (Rathmell, 2001a). The plant wastewater discharges are better than U.S. national standards.

An engineering master plan for the drinking water distribution and treatment and the wastewater collection and treatment systems in Nuevo Laredo is scheduled to be completed in mid 2002 by a U.S. firm. The master plan is part of a $20 million EPA grant to plan improvements to water and wastewater systems in several designated Mexican cities along the border, including Nuevo Laredo. Currently, there are several discharges of raw wastewater into the Rio Grande from Nuevo Laredo. This occurs due to combined sewer and storm drainage systems that discharge directly into the river. The master plan will address the necessary infrastructure improvements to eliminate these direct wastewater discharges.

After the master plan is completed, COMAPA will apply for project certification from the BECC to obtain additional project funding to complete improvements to the drinking water and wastewater infrastructure systems in Nuevo Laredo.

COMAPA classifies and monitors industrial discharges into the wastewater collection system. Samples collected at strategic locations of the collection system are tested for contaminants. Industry waste discharge characteristics are conducted yearly and evaluated for compliance with state requirements. Industry inspections are coordinated with the Tamaulipas state agency, Secretaría de Desarrollo Urbano y Ecología del Gobierno del Estado (SEDUE), and are promoted by COMAPA. Their records indicate that industrial waste discharges have not created contamination problems for the collection and wastewater treatment system.

Enforcement actions and corrective measures are referred to and conducted by SEDUE and the Nuevo Laredo Environmental Section as part of the Mexican state environmental enforcement program.

## *Sampling Water in Manadas Creek*

On the Texas side, Laredo citizens have been concerned about pollution in Manadas Creek. The Laredo Environmental Services Department (ESD) monitors and conducts quarterly sampling of Manadas Creek as part of the Texas Clean Rivers Program. The ESD monitors 500 storm drainage discharges into the Rio Grande watershed. Of the 30 discharges that have continuous flow, 18 have shown a presence of sewage contamination. No chemical dumping has been found being discharged through the storm drainage system into the Rio Grande watershed or from Manadas Creek (Rathmell, 2001b).

The Anzon Plant in the Manadas Creek watershed is closed and currently completing final closure measures and remediation under TNRCC regulations. The facility processed antimony ore into antimony trioxide. Two slag sites with antimony byproducts remain at the site for remediation.

The Manadas Creek watershed contains many of the warehouses used by freight carriers in the Laredo area. A potential pollution threat from chemical spills and runoff from warehouse facilities into Manadas Creek requires constant vigilance of this area by the Laredo ESD.

## *Reducing Zacate Creek Wastewater Treatment Plant Odors*

Another issue in Laredo concerns odors from the Zacate Creek Wastewater Treatment Plant. It operates in compliance with TNRCC operation and discharge requirements. The treatment plant has a rated treatment capacity of 14 million gallons per day and is operated at a treatment capacity averaging 10 million gallons per day (Rathmell, 2001b).

Engineering plans were projected for completion by January 2002 on improvements that would significantly reduce odors at the wastewater treatment plant. The project construction is scheduled to be completed by the summer of 2003. Three main sources of odor at the facility will be fitted with scrubbers to reduce the smell by more than 90 percent. Financing has already been secured for the improvements through municipal bonds.

## *Improving Colonias Infrastructure*

The city of Laredo Utilities Department provides two water points for colonia residents to obtain drinking water to haul to their residences. One of the water points is at the Santa Isabel Treatment Plant off Mines Road. The other is off Highway 359 at a site by the flea market. At these locations, residents can purchase 125 gallons for twenty-five cents (Rathmell, 2001b).

Webb County operates water points for colonias at South Laredo off of Masterson Road; off Lake Casa Blanca Road in Northeast Laredo; and at Las Lomas Subdivision off Highway 59, located 18 miles east of Laredo. Cost of water is the same as for the city of Laredo sites (Rathmell, 2001b).

Two separate cooperatives operated by colonia residents for the Highway 359 Colonias and La Presa Subdivision off Mangana Hein Road haul drinking water to colonia residents at a cost of $2.00 per 100 gallons delivered.

EDAP funds for water and wastewater projects near Laredo have been targeted at an area known as "the forgotten colonias." About $17 million has been invested to bring infrastructure to this area, one of the largest colonia improvement efforts. Plans are underway to connect area residents to the wastewater collection system which will serve about 900 individual households from five colonias in the Mines Road area and 10 colonias in the Highway 359 area of Webb County. Costs to oversize the system for future development in the project area will be paid by participating developers. The project is a joint effort between the city of Laredo and Webb County and is in the final period of the engineering design phase. Certified by the BECC, it has received technical assistance from the TWDB and financial assistance from the TWDB, Webb County, ORCA, BECC, and NADBank. Construction is scheduled to be completed by April of 2003 (Rathmell, 2001b).

A list of water and wastewater EDAP projects in the Middle Rio Grande subregion can be found in Appendix H, Water and Wastewater Projects in the Middle Rio Grande Subregion.

### International Falcon Reservoir

The last segment of the river in the Middle Rio Grande subregion is International Falcon Reservoir, Segment 2303, in Zapata County (see Figure 4-1). At the moment, salinity levels in the reservoir are sufficiently elevated that it has been placed on the state's 303(d) list for cleanup (TNRCC, 2001c). Both the U.S. Section of the IBWC and the TNRCC note that more data must be collected to determine whether water quality is improving or declining, which is critical to removing the reservoir from the 303(d) list (IBWC, 2001 and TNRCC, 2001c). Bacteria levels also are elevated, but not enough data were available to fully evaluate the impact of increased bacteria on the use of the reservoir for contact recreation (TNRCC, 2001b).

Low water levels cause some of the water quality concerns in Falcon Reservoir. As of December 29, 2001, the reservoir is only at 14 percent of the normal conservation capacity of 3.28 maf.

## *Taking Action*

The Texas Water Development Board has taken a major role in water supply and wastewater management activities in the region for many years. Its sponsored projects are listed in detail in Appendix H, Water and Wastewater Projects in the Middle Rio Grande Subregion. Texas Water Development Board funds were used in Zapata County, where the Siesta Shores WCID received an $810,000 EDAP grant to extend water service to 1,200 residents, and completed the project in March 1999 (TWDB, 2001a).

## Groundwater Quality and Influences

### The Carrizo-Wilcox Aquifer

The Carrizo-Wilcox aquifer runs through a large part of the Middle Rio Grande subregion, underneath portions of Uvalde, Maverick, Zavala, Frio, Dimmit, La Salle, McMullen, and Webb Counties. Though the water in the aquifer is suitable for all uses, salinity increases to the southeast, particularly near Laredo, and the water may require extra treatment before use as a public water supply. Natural deposits of uranium make radioactivity levels higher than normal in some areas of the aquifer. Public water systems are required to test and treat for elevated radioactivity to meet safe drinking water standards. Residents relying on domestic wells for their water supply may not always test their wells and have adequate treatment. In Zavala and Dimmit Counties, iron and manganese levels are high. This is less of a health risk and more of a nuisance, since the metals produce an unpleasant taste and odor and make the water more likely to stain (USGS, 1999 and TWDB, 1995).

The city of Laredo maintains a groundwater well from this aquifer that provides 105 gallons per minute. Colonias residents in the Laredo area get their water from the well, but there is no direct connection to the city's water service lines.

### Other Aquifers in the Middle Rio Grande subregion

In the northwest, the Edwards-Trinity (Plateau) aquifer extends into Val Verde, Edwards, Real, Kinney, and Uvalde Counties from the Upper Rio Grande subregion. The water in this portion is of higher quality than that to the north and west. It is some of the best quality groundwater in the entire Middle Rio Grande subregion as well. Despite this, salinity levels in some locations are above state standards for a public water supply (TWDB, 1995).

To the southeast, the groundwater in the Rio Grande alluvium in Maverick County is generally too high in salinity to be used as a public water supply without additional treatment. There is a pocket of high quality water in the area between International Amistad Dam and the city of Del Rio.

The Queen City aquifer runs through Frio, La Salle, and McMullen Counties. Water from that aquifer is generally saline, suitable mostly for livestock use. The same is true for the Jackson and Yegua aquifers in Webb County (TWDB, 1995 and USGS, 1999).

The Laredo formation runs through Zapata and Webb Counties and on into the Lower Rio Grande subregion. Salinity levels increase moving to the east and to the south, especially near the city of Laredo and again near International Falcon Dam. Boron levels are high enough that the water could damage certain crops if used for irrigation. In spite of this, wells at a local hospital, country clubs, and cemeteries are used to pump water from the aquifer for irrigation.

A portion of the Gulf Coast aquifer runs through McMullen, Duval, Webb, and Zapata Counties—the rest runs through the Lower Rio Grande subregion and will be discussed in that section. The quality of the water is rather poor. Natural uranium deposits elevate radioactivity and contribute to higher levels of radon, particularly near Bruni in the Catahoula and Goliad formations in the Gulf Coast aquifer. Public water systems are required to test and treat for elevated radioactivity to meet safe drinking water standards. Residents relying on domestic wells for their water supply may not always test their wells and have adequate treatment. Natural arsenic deposits also decrease groundwater quality. As in the Laredo formation, boron levels in some areas are high enough to cause damage to crops. High levels of iron and manganese can detract from taste and smell. Salinity in the aquifer varies. In some regions it has been elevated due to seepage from brine associated with oil fields (TWDB, 1991).

## *Taking Action*

### *Priority Groundwater Management Area (PGMA)*

The TNRCC studied what is known as the Winter Garden area over the Carrizo-Wilcox aquifer to determine if it should be designated a PGMA as an area experiencing or expected to experience significant groundwater problems, including contamination. The study concluded that the area—which covers Zavala, La Salle, and Dimmit Counties, along with portions of Maverick, McMullen, and Webb Counties—should not receive PGMA designation and does not require reevaluation (TNRCC, 2001d).

### *Groundwater Conservation Districts*

The Winter Garden area already has a groundwater conservation district (GCD) that includes Dimmit, La Salle, and Zavala Counties. That GCD is a member of the Western Carrizo Aquifer Alliance, which coordinates groundwater management planning among several districts, particularly by maintaining uniform rules and regulations throughout the region. Uvalde County has an underground water conservation district, and Real and Edwards counties share a conservation and reclamation district. In 1999, the Texas Legislature created a new conservation district in McMullen County. All districts share the common goal of conserving and protecting groundwater resources within their boundaries (TNRCC, 2001d).

## Waste Management Issues

As with the rest of the border, illegal dumping of municipal solid waste also is a major problem in the Middle Rio Grande subregion, along with hazardous materials transportation and storage. Nearly 2,000 warehouses store a variety of materials. Hazardous waste generation, while a concern, is greatly overshadowed by other waste management issues.

In this section, the Middle Rio Grande subregion is defined by the two Councils of Government (COGs) in the area, the Middle Rio Grande Development Council (MRGDC) and the South Texas Development Council (STDC).

### Municipal Solid Waste and Illegal Dumping

The two COGs in this area contain 12 MSW landfills. As of August 2000, an estimated 34.16 and 24.78 years of landfill capacity remained for the MRGDC and the STDC, respectively—close to the state-wide average of 31.6 years of landfill capacity (TNRCC, 2001a). While these averages seem adequate in terms of the ability to handle the anticipated future waste volume, the figures don't address landfill location. Some counties in these COGs have no landfills, increasing solid waste fees to residents because of the cost to haul their waste great distances to the nearest landfill.

Illegal dumping is a problem in the two COGs. Most illegal dumping occurs outside of city limits. A 1997 survey found a total of 2,322 illegal dumps, of which 2,222 were small; 81 medium; and 19 large (TNRCC, 1997). Small dumps range from 1 cubic meter to 1 acre; medium from 1 to 10 acres; and large dumps, 10 acres or more. The total population of these two COGs is smaller than that of the Rio Grande COG, yet the number of illegal dumps in the survey is 32 percent greater.

Illegal dumping is caused by many factors, including:

- inadequate or unaffordable collection services for residents of colonias,
- lack of adequate education regarding proper disposal, and
- unaffordable landfill disposal rates.

These factors limit landfill access to people who live in rural areas, including colonia residents.

An expansion of the Laredo municipal landfill is under discussion, and a pending permit for the proposed Ponderosa Regional Landfill east of Laredo has raised concerns among local residents, including those in colonias ("Landowners," 2001). Public meetings about the proposed landfill were held in February and July 2001 in the Laredo area. The Ponderosa project is undergoing technical review.

### Storage and Transportation of Hazardous Materials

Transportation of hazardous materials is a major concern to residents in the region, due to the potential for spills. This is especially important to Laredo residents. Laredo has a large volume of international trade and commerce. To that end, the city of Laredo has developed an ordinance to ensure that hazardous materials are stored and managed correctly. The Laredo ESD has a team of inspectors to provide compliance assistance for the 500 registered warehouses that store hazardous materials (Mia, 2001). The Laredo Development Foundation delivers training for compliance with U.S. Department of Transportation hazardous materials requirements (Adams, 2001).

In December 2001, the Laredo Citizens Environmental Advisory Committee (CEAC) was asked to review a draft ordinance to regulate mobile fueling stations by the Laredo Fire and Environmental Services Departments ("Fuel Spills," 2001). Unlike fixed fuel stations, these mobile tankers can travel to provide fuel to diesel trucks. The proposed ordinance was prompted by a spill of several hundred gallons of diesel fuel by a mobile tanker into a Laredo creek earlier in 2001. The tanker was owned by a company using the mobile unit to avoid building a permanent storage facility, which would require a permit for an underground storage tank. The CEAC voted for more stringent regulations for all mobile fueling stations, as well as an investigation of the company by the city attorney for the specific spill.

Laredo-Nuevo Laredo and Eagle Pass-Piedras Negras are among the four sister cities along the border region of Texas with Mexico to have signed sister-city agreements on emergency response ("International," 2001). The sister-city plans that accompany these agreements cover preparedness for, and response to, environmental emergencies and have been in effect since 1998.

### Hazardous Waste Management

One treatment, storage, or disposal facility (TSDF) of hazardous waste is located in the subregion—a storage facility at Laughlin Air Force Base near Del Rio that handles only Air Force wastes ("U.S. Facilities," 2001). The nearest commercial TSDF to this subregion is in San Antonio.

A separate waste management problem in the border region is "sham" recycling, which can occur when hazardous waste is being labeled as material for recycling, but is instead being sent to Mexico for final disposal. Under EPA regulations, hazardous waste can be recycled, but must be managed as hazardous waste unless the waste meets the solid waste exemption (40 *CFR* 261).

In other cases, materials being exported or imported are sometimes abandoned in warehouses in Laredo and other border ports of entry. Since warehouse managers may not know what kind of abandoned materials are stored in their facilities, they may not be in compliance with rules and regulations for safe handling and management of the materials. If the material is abandoned, then the material meets the solid waste definition. If this solid waste material is hazardous, then it would be subject to TNRCC hazardous waste regulations. This situation places the responsibility on warehouse managers to be liable for proper storage and disposal of the hazardous waste.

U.S. and Mexican state and federal agencies also participate in the Coahuila/Texas binational regional enforcement subgroup of the binational Enforcement Work Group, created under the La Paz Agreement. The activities of this subgroup include:

- planning exercises,
- border inspections, and
- joint enforcement actions.

# Taking Action

## Fighting Illegal Dumping

Because illegal dumping is described by residents as the highest priority issue in the Middle Rio Grande subregion, TNRCC Region 16 staff are helping cities and counties in the subregion develop litter abatement programs. In February 2002, the TNRCC provided training on program implementation, how to conduct environmental investigations, and how to develop enforcement cases. Assistance also includes identifying funding mechanisms for local governments in their efforts against illegal dumping and littering. More information on TNRCC technical assistance training is provided in Chapter 6.

The Laredo ESD patrols the city in search of illegal dumping activities. The majority of citations that have been issued started as anonymous tips from concerned citizens. In 2001, the ESD investigated 400 illegal dumping complaints and issued 65 citations to violators (LESD, 2002).

## Household Hazardous Waste Collection

The Laredo ESD runs a permanent household hazardous waste (HHW) collection facility that is open once a week for citizens to bring in their materials. In addition, twice a year HHW events are held to collect additional items. To date the program has collected 140,000 pounds of HHW, of which 40,000 were collected in 2001 (LESD, 2002).

Until recently, the ESD has only been able to accept household hazardous waste because of regulations preventing the city from accepting commercial waste. This situation changed with a $34,000 grant from the EPA in 2001, which provided funding for the ESD to offer hazardous waste disposal assistance to small businesses. This new program, known as the Conditionally Exempt Small Quantity Generator (CESQG) Hazardous Waste Collection Program, applies to small businesses that produce less than 220 pounds of hazardous waste, or 2.2 pounds of extremely hazardous waste per month. To identify and educate eligible businesses, the ESD hosted a seminar in Spring 2002. A request for proposals (RFP) was published in early 2002 to secure a hazardous waste disposal contractor for this program (LESD, 2002).

## Inspecting Warehouses

Laredo residents were concerned about the great number of warehouses storing hazardous materials and the potential for spills and associated problems. The city of Laredo obtained EPA funding through the TNRCC to develop an ordinance in 1997. Under the ordinance, as previously mentioned, the Laredo ESD has a program with full-time inspectors to ensure that warehouses comply with hazardous materials guidelines. The program is considered a model for addressing hazardous materials storage in the approximately 1,500 warehouses in the Laredo area.

Under an EPA program called EXODUS, the TNRCC and the EPA conduct unannounced inspections of warehouse facilities in the Laredo area han-

dling or storing hazardous substances. Some 500 warehouses are registered as facilities handling hazardous substances.

In September 2000 the TNRCC and EPA conducted 216 unannounced warehouse inspections under the EXODUS project. Violations were found in 32 facilities, a 15 percent rate. In September 2001 the TNRCC and the EPA conducted 255 unannounced warehouse inspections and found violations in 21 facilities, a 14 percent rate. EPA pursued and finalized an enforcement action on one noncompliant facility in 2001. An additional four noncompliant facilities are being pursued for enforcement action during 2002.

### *Workshops on Hazardous Substance Regulations*

Workshops to provide information on the rules and regulations for handling, storing, and transporting hazardous substances were conducted by the TNRCC, EPA, TDH's Hazardous Communication Branch, TxDOT, and the City of Laredo Fire Department. A workshop was held in Laredo on October 10, 2001, for an audience of about 75 people ("Hazardous," 2001 and Rathmell, 2001a).

### *Adding Landfill Capacity*

In Uvalde, a landfill expansion (Stage B) is complete, and the new cell is in the testing phase. This BECC/NADBank project also includes equipment purchase, with $500,000 of NADBank financing provided through the Solid Waste Environment Program (SWEP) (NADBank, 2001b). The Uvalde project, which will benefit 26,000 residents, was also the first SWEP project undertaken in the U.S. by NADBank, which held a ceremonial signing at the NADBank annual meeting on December 13, 2001. (NADBank, 2001b).

Several other solid waste projects in the area are being developed. Del Rio and Ciudad Acuña are requesting separate funding for solid waste projects to be certified in 2002. The Región Carbonífera in Coahuila has two solid waste projects slated for certification after 2002 (NADBank, 2001b).

The Cinco Manantiales solid waste project in Coahuila will create a paper recycling facility and provide partial funding for the construction of a landfill, which will benefit 34,000 residents. As of September 30, 2001, construction had not yet begun ("BECC," 2001).

At its January 30, 2002 agenda, the TNRCC commissioners voted to adopt the Administrative Law Judge's proposal for decision granting summary disposition and denying an application for a Type I municipal solid waste permit near Spofford in Kinney County, Texas. The permit application also would have allowed the facility to accept Class 1 nonhazardous industrial waste.

## Air Quality Issues

Air monitoring stations have been established at two sites in this region of the border, both in Laredo. A third site recently was approved to monitor particulates at the World Trade Bridge. The TNRCC manages a contract with the Laredo Health Department to operate the sites. These monitors collect data on ozone, $PM_{10}$ and $PM_{2.5}$ (large and small particulate matter), carbon monoxide (CO), polynuclear aromatic hydrocarbons (PAH), volatile organic compounds (VOCs), lead, arsenic, and several meteorological conditions.

Neither of the two existing monitoring sites has registered exceedances for any of the pollutants. The CO monitor at the Laredo Bridge site registered an exceedance of the 8-hour average of 9.0 ppm on one day in 1999 (Lambeth, 2001). Therefore, the TNRCC has looked carefully at all the CO measurements over the past half-dozen years to determine whether there is reason for concern. The following observations have led the agency to conclude that there is little threat of an imminent violation:

- The high reading at the Laredo Bridge occurred the year before the completion of the World Trade Bridge. After it opened and the traffic began to disperse, measurements of CO at the Laredo Bridge declined. The highest 8-hour average in 2000 was 6.3, and the second-highest average that year was 5.5 (Lambeth, 2001).
- At the other monitor in Laredo, the highest 8-hour average has been 6.8, which occurred in 1997. The next-highest level was 6.3 in 2000, and there is no evidence of a long-term upward trend (Lambeth, 2001).

Most of the time, strong prevailing winds quickly carry away and disperse locally produced air pollution. Episodes of air stagnation are infrequent, and regionally transported air pollution levels are not high enough to cause a problem in conjunction with locally generated air pollution.

### Specific Issues and Programs

Local citizens have expressed some concern that the large volume of truck traffic could create an air quality problem. For this reason, the TNRCC contracted with the Center for Energy and Environmental Resources (CEER) at The University of Texas for data gathering and analysis specific to commercial trucks. CEER submitted a report in late 2001 that analyzed data collected in 1999. The report indicated that commercial trucks accounted for less than 4 percent of the area's $NO_x$, approximately 1.4 percent of the VOCs, and less than 1 percent of the CO (CEER, 2000). While CEER concluded that these figures represented a "significant" environmental impact, the TNRCC believes that these small proportions do not merit special attention or programs, considering that ambient monitors are not measuring ambient levels above the NAAQS for any pollutants.

The TNRCC held a workshop called "Reduction of Upset/Maintenance Emissions" in Laredo in December 2001 to ensure that companies report upset emissions accurately. Regulations taking effect in February 2002 were explained. Many representatives from oil and gas companies attended. Participants came from not only Laredo but also other towns in south and east Texas—and even Lafayette, Louisiana.

### International Efforts

Across the Rio Grande from Laredo and the cities in the Lower Rio Grande Valley is the Mexican state of Tamaulipas. At least two initiatives in the past 15 months—one a joint effort with Texas and one an internal Tamaulipas regulatory action—could result in air quality benefits for both sides of the border.

First, the Tamaulipas Secretaria de Desarrollo Urbano y Ecología and the TNRCC are jointly sponsoring a cross-border industrial recognition program described in further detail in Chapter 6. Second, in late 2001 the Tamaulipas legislature passed a new transportation law requiring all taxis and minibuses to undergo regular mechanical inspection and to be removed from service when they reach eight years of age ("New," 2001). These actions will help maintain good air quality in the region.

## Toxics Release Inventory Data

The EPA requires the reporting of emissions of certain toxic chemicals as part of its Toxics Release Inventory (TRI), described in Chapter 2. Val Verde and Webb are the only counties in this subregion reporting emissions or managed waste under the TRI program. Although these counties reported air, on- and off-site emissions, and managed wastes, their emission levels are low compared to the rest of the border and the state. Generally, these emissions and managed waste figures are in the range of 5 to10 percent of the total border emissions and wastes, which in turn are less than 1 percent of state-wide figures ("TRI Release," 2001 and "TRI Waste," 2001).

## Innovative Programs

The following projects are unique to the Middle Rio Grande border subregion. They were created and implemented at the initiative of Laredo citizens who identified problems in the community and set out to solve them, using new ideas or combining existing resources in an innovative way.

### Rio Grande International Study Center (RGISC)

Community interest in Laredo and across the border led to the formation of the RGISC at Laredo Community College. The center is a binational research and environmental education foundation dedicated to the study of pollution along the Rio Grande. It has established a central collection point to track pollution sources in the Rio Grande near Laredo and to provide data and proposed solutions to policy makers in the U.S. and Mexico. The center's headquarters is constructed of hay bales stuccoed over with gunnite and features wind generators for electricity and a rain water harvesting system. This program received the TNRCC's Texas Environmental Excellence Award in the education category (TNRCC, 1995).

## City of Laredo Environmental Service Department Programs

The city of Laredo has various environmental programs including tire buybacks, storm drain stenciling, beautification, Día del Rio, and quality of life improvement.

The Laredo ESD has successfully implemented a used tire buyback program that pays citizens 50 cents per used tire (limits apply) that they bring in. In addition to cleaning up the thousands of illegally dumped tires found throughout the city, this program has become a popular source of funding for nonprofit organizations that are paid for all of the tires that they can bring in. The ESD collected over 6,000 used tires in 2001. At this time, the ESD shreds the tires and uses them as landfill cover, but is investigating ways to recycle them (LESD, 2002).

Storm drain stenciling involves labeling storm drain inlets with painted messages warning citizens not to dump pollutants into the storm inlets. This program is designed to remind citizens that Laredo's Municipal Separate Storm Sewer System drains directly to creeks and river without being treated. The ESD stenciled over 1,000 storm drain inlets in 2001 (LESD, 2002).

The ESD, in conjunction with a contractor, is developing a master plan for the development and beautification of Chacon Creek. The multiobjective master plan focuses on improving the channel to prevent flooding, maintaining the natural character of the waterway, and identifying areas for the addition of both passive and active recreation facilities (LESD, 2002).

The city of Laredo participates each year in the Día del Río public awareness and cleanup event sponsored by the Rio Grande/Río Bravo Basin Coalition. In 2001, hundreds of volunteers gathered at Las Palmas Park to improve the area by building a nature trail at the park (Porter, 2002). More information on Día del Río is described in Chapter 6.

The city of Laredo also has initiated a community project called El Portal to improve the quality of life by increasing the number and assortment of recreational activities available to residents and tourists. Through a series of nature trails along the entire Rio Grande river bank within the city limits of Laredo, citizens are developing green space to enhance hiking, biking, bird watching, canoeing, kayaking, and fishing (LESD, 2002).

## Laredo Respira Pilot Study and Continuing Research

The Laredo area Interagency Environmental Health Workgroup received a grant from The University of Texas Health Science Center at San Antonio (UTHSCSA) to research the connection between local air quality problems and the occurrence of asthma in children. In February 2002, a study of 1,000 Laredo students was begun (LIEH Workgroup, 1997).

This study is a follow-up to a 1997 Laredo Respira Pilot Study of 95 fifth-grade students at Ryan Elementary in the Laredo Independent School District, also relating to asthma symptoms. According to the UTHSCSA pilot study report, asthma is the most common chronic disease of childhood and accounts for more hospitalizations than any other chronic illness. Asthma can be triggered by a number of indoor and outdoor pollutants. Some of these include industrial solvents, pet dander, pollen, cockroaches, and dust mites (LIEH Workgroup, 1997).

The goals of the pilot study were to:

- determine the prevalence of asthma in fifth graders at Ryan Elementary School;
- identify risk factors associated with asthma;
- assess the impact on the quality of life of children;
- initiate asthma education in the school for the students, teachers, and parents; and
- assess the feasibility of undertaking a larger study using the instruments and design of the pilot study.

The 1997 pilot study showed that 11.6 percent of students had physician-diagnosed asthma, and 26.3 percent had symptoms suggestive of asthma. The prevalence of asthma and/or wheezing in the research population was 1.4 times above figures reported in a national comparison study. Two questionnaires were used, one for parents and one for students. In addition, students completed a daily diary of symptoms for eight weeks and performed a peak expiratory flow rate measurement once a day during the same eight weeks (LIEH, 1997).

Volunteers from a local high school chapter of the Health Occupations Students of America provided one-on-one instruction to students on how to use the equipment and record the results. Doctors

trained teachers, administrators, school nurses, principals, and a librarian on causes, effects, and treatment of asthma, as well as how to administer questionnaires and the peak flow tests. Teachers also learned about classroom resources such as the "Tools for Schools" air quality education program (LIEH, 1997).

The pilot project revealed the value of community collaboration in health research and education. It also demonstrated the ability of the community to complete successfully an asthma prevalence study and identified the strengths and weaknesses of the methods and materials used, which will refine the techniques for future studies, including the 2002 study (LIEH, 1997).

CHAPTER 5

# LOWER RIO GRANDE SUBREGION

STATE OF THE RIO GRANDE AND THE ENVIRONMENT OF THE BORDER REGION

## Characteristics and Concerns

In this report, the Lower Rio Grande subregion is defined largely by the stretch of the Rio Grande downstream of International Falcon Dam to the Gulf of Mexico (see Figure 5-1). For the most part, this area follows the boundaries of TNRCC Region 15, whose regional office is in Harlingen. (See Appendix B, Texas Border Environmental Offices, for a list of border offices and their locations.) When it is necessary to specify a different area—for example, for purposes of water quantity—the change will be noted.

Ranching and agriculture are the main land uses in the subregion. Agriculture is synonymous with the subregion and plays an especially important part in the economy. The famous Ruby Red grapefruit was created here. Other crops raised in the Lower Rio Grande Valley (LRGV) include oranges, kale, aloe vera, sugarcane, sorghum, and vegetables.

Tourism, especially ecotourism, constitutes an ever-increasing component of the local economy. Santa Ana and Laguna Atascosa National Wildlife Refuges are important hubs for birding in the LRGV, and a World Birding Center is being built in McAllen. International and retail trade, as well as the government and service sectors, are also important contributors to the subregion's economy. South Padre Island is famous for its beaches, and the Laguna Madre and the Gulf of Mexico attract many sport fishermen. The subregion is also known as a home for many "Winter Texans," residents from northern states and Canada who migrate to the warmer climate in winter.

Brownsville, with a population of 140,000, is the largest city in this area of south Texas. The region has two metropolitan statistical areas (MSAs): the Edinburg-McAllen-Mission MSA in Hidalgo County, with a population of about 569,000; and the Harlingen-San Benito-Brownsville MSA in Cameron County, with a population of about 335,000. The subregion also contains many small towns with populations under 15,000.

The major Mexican cities in this area—Reynosa (approximate population 420,000) and Matamoros (approximate population 416,000)—are across the Rio Grande from Hidalgo and Brownsville, respectively.

More than half of all colonia residents in Texas live in the lower border subregion. There are more colonias in Hidalgo County than in any other Texas county: approximately one in every four residents lives in a colonia. Cameron and Starr Counties rank third and fourth among Texas counties based on colonia residents, after Hidalgo and El Paso Counties.

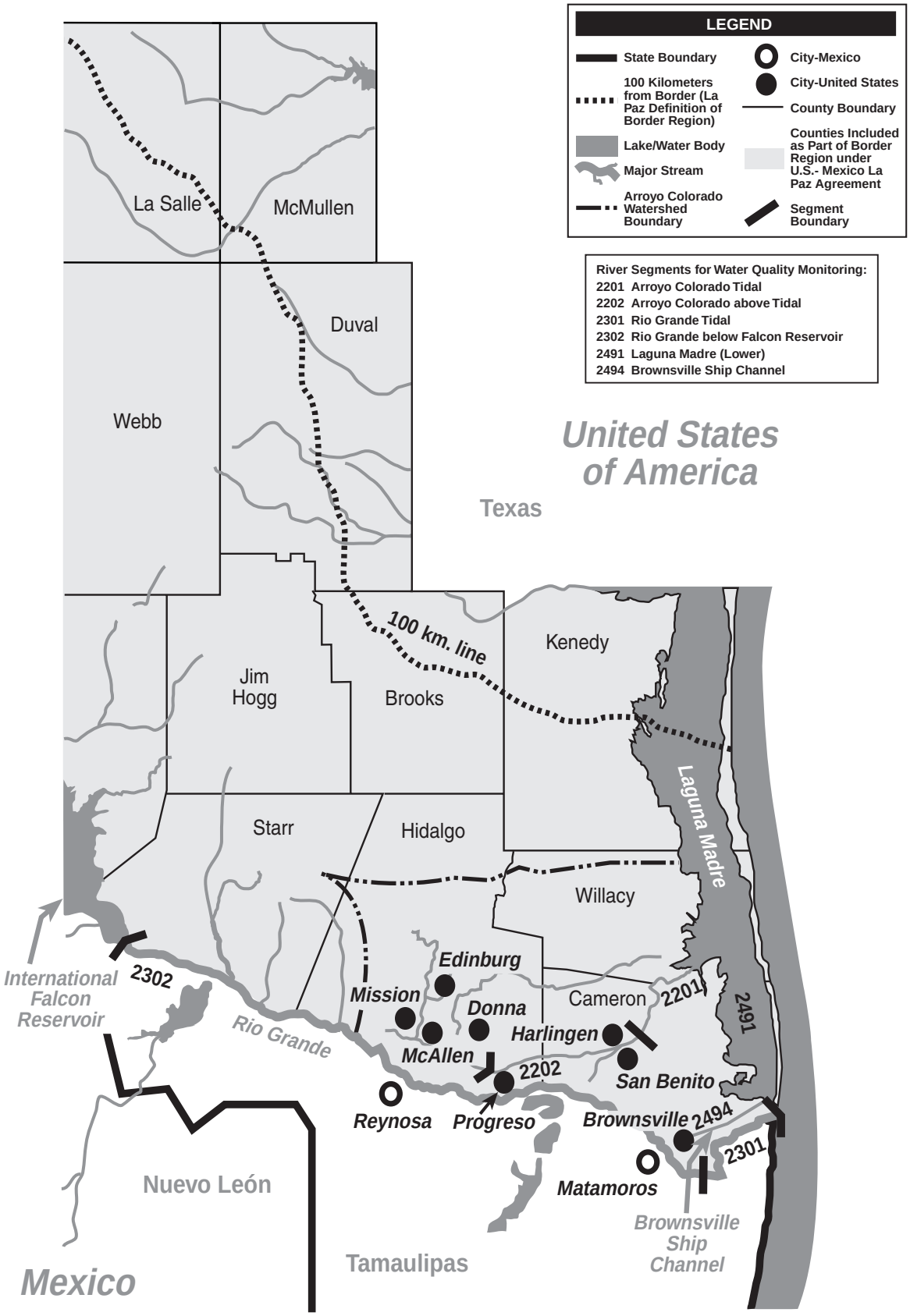
Rainfall in the area ranges from 22.3 inches in Rio Grande City, to 27.5 inches in Harlingen, and 26.6 inches in Brownsville. However, these numbers have varied from one-half to twice that amount in specific years. Average summer maximum and minimum temperatures in McAllen are 96.5 degrees Fahrenheit and 73.9 degrees. The average winter maximum and minimum temperatures are 72.9 degrees and 48.5 degrees.

## Regional Priorities

Residents in the Lower Rio Grande subregion indicated the top three priorities are:

1. water quantity,
2. water quality, and
3. illegal dumping of municipal solid waste.

**Figure 5-1**
## Lower Rio Grande Subregion




The Mexican States and New Mexico data were taken from the 1999 ESRI Data & Maps CD. The counties and parks were derived from the U.S. Census Bureau 1998 TIGER/Line dataset. The cities of Mexico are noncertified public sector data (for general reference only). The Rio Grande and its tributaries were from the TNRCC 1994 Rio Grande Hydro layer. The remaining streams were derived from the U.S. Census Bureau 1992 TIGER/Line dataset.

Local citizens also expressed the following environmental concerns:

- the lack of availability of good quality water, both from the Rio Grande and from groundwater;
- need for Mexican compliance with the terms of the1944 treaty providing water to the United States;
- increasing demand for good quality drinking water;
- quality of water in the region;
- need for water conservation and water conservation techniques;
- quality of air in the region;
- need for expanded options for liquid and municipal waste storage, treatment, disposal and transport;
- need to address shrinking landfill capacity;
- need to improve the safety of transporting hazardous waste and materials, as well as emergency preparedness and response;
- providing services to colonias;
- need for affordable waste collection in rural areas; and,
- need for community development of local and sister-city plans.

# Water Quantity Issues

## Region M Water Planning Area of the Texas Water Development Board

### Land Use

Ranching and highly intensified and specialized farming account for much of the land use in the eight counties of this subregion. Much of the farming is irrigated, with water supplied from the Rio Grande through water control and improvement districts. Citrus, cool season vegetables, cotton, grain sorghum, and sugarcane are the main crops. Ranching remains the dominant land use on upland soils away from the Rio Grande. The vegetation is predominantly mid and short grasses with low thorny brush and cacti.

Oil and gas explorations also play an important role. Three major MSAs are located in Region M—Laredo, Edinburg-McAllen-Pharr, and Harlingen-San Benito-Brownsville. (See Figure 5-2.)

### Water Demand—Present and Future

In the eight counties of TWDB's Region M, the estimated water use in 2000 was 1.8 million acre-feet. Of this amount, irrigation and municipal demands combine to account for 99 percent of all water use (TWDB, 2001b). Irrigation alone made up 85 percent of use, or 1.53 million acre-feet. Municipal demand was estimated to be 253,000 acre-feet, or 14 percent of demand (TWDB, 2001b). By 2050 annual water demand is expected to have decreased by 65,000 acre-feet (TWDB, 2001b). Irrigation districts typically supply most of the water to domestic, municipal, and industrial (DMI) users in the LRGV.

### Water Sources

The Rio Grande is the primary water source for the counties in this subregion. Low-flow conditions currently exist in the Rio Grande, in large part a result of drought, Mexico not providing water under the 1944 treaty, and aquatic weeds. Natural wave motion, combined with low flow, has allowed the mouth of the river to silt up, ceasing flow to the Gulf of Mexico. Although the IBWC dredged the resultant sand bar in early 2001 to restore flow, by November of the same year the mouth had closed again. North of the Rio Grande, the Arroyo Colorado in the LRGV provides freshwater inflow to the Laguna Madre estuary, but is not a public water supply.

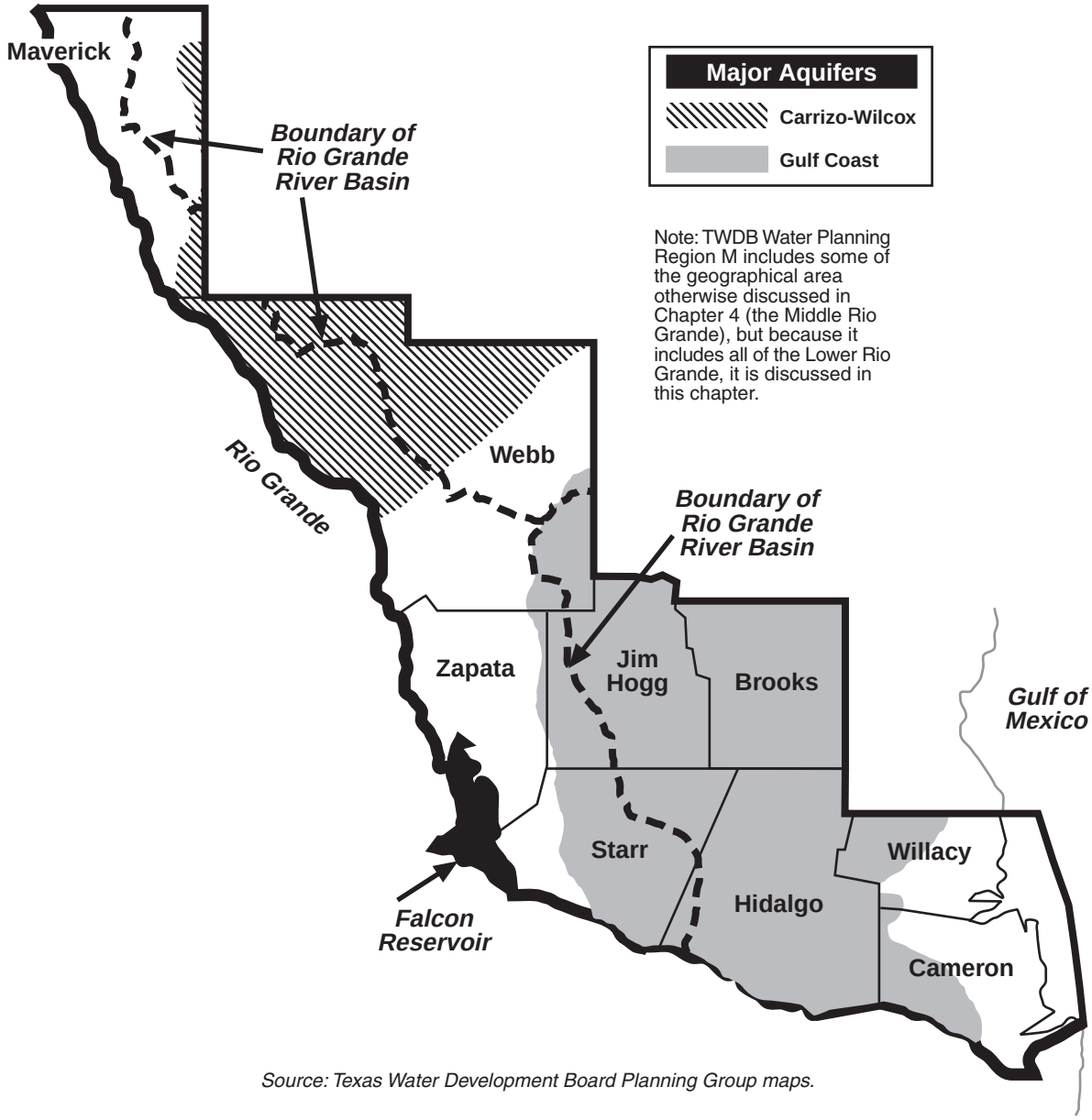
Major aquifers that supply water in the area include the Gulf Coast aquifer and the Carrizo-Wilcox aquifer. The minor aquifers of the Rio Grande Alluvium and the Laredo formation also supply significant water in some areas.

### Plans to Meet Future Water Needs

The Rio Grande Regional Water Planning Group (RWPG) has five basic goals for meeting water needs by 2050:

- optimizing the supply of water available from the Rio Grande;
- reducing municipal demand through water conservation;
- diversifying water supply sources, including reuse and desalinization;
- implementing agricultural conservation practices; and
- acquiring additional Rio Grande water supplies (TWDB, 2001b).

**Figure 5-2**
## Water Planning Region M of the Texas Water Development Board




*Source: Texas Water Development Board Planning Group maps.*

The population in the area is expected to triple by 2050, reaching nearly 3 million. As a part of the regional water plan, the RWPG has included construction of a channel dam just downstream of Brownsville. In separate multimillion-dollar projects, the city of Laredo and Webb County are seeking secondary water sources to meet future needs.

Valley agricultural interests have recognized that additional efficiencies are needed for several thousand miles of canals, many of which are unlined. Current studies have confirmed the findings of previous investigations—there are significant opportunities to reduce irrigation water demands through the implementation of measures to reduce water losses in irrigation district conveyance and distribution facilities, and through the implementation of measures to improve on-farm distribution efficiency. A total of 552 miles of lined canals, 614 miles of unlined canals, and 294 miles of canals with unknown lining status exist in the Lower Rio Grande Valley (Fipps, 2001).

In addition to losses from unlined canals, high seepage losses are occurring in lined canals for a variety of reasons. These include improper construction methods and materials and inflexible pipeline joints.

### Aquatic Vegetation

As described in Chapter 2, the growth of exotic weeds has worsened the flow-related water shortages downstream of Falcon Reservoir, especially downstream of Progreso and in the Matamoros-Brownsville area (see Figure 5-3).

**Figure 5-3**
**Water Hyacinth in the Rio Grande at Matamoros, Tamaulipas**

Can you find where the hyacinth and river bank meet?

For the past several years, two species in particular—hydrilla and water hyacinth—have grown rapidly and in great abundance. In places, the water hyacinth completely chokes the river from bank to bank, sometimes for more than a mile. The plants block the flow of water to downstream users, impede recreational use of the river, and take water out of the river that is required for downstream use. In fact, additional water has to be released—known as "push water"—just to ensure that requested water reaches downstream users.

The problem of aquatic weeds in the Rio Grande is so acute that the Rio Grande RWPG has created a subcommittee strictly to address the issue.

Besides the U.S. members (which include state and local officials, irrigation districts, the U.S. Section of the IBWC, the Bureau of Reclamation, and the Army Corps of Engineers), the subcommittee has had Mexican observers from the Mexican Water Technology Institute (IMTA), the Comisión Nacional del Agua (CNA), and the Mexico Section of the IBWC.

Controls under consideration by the Aquatic Weed Subcommittee include mechanical, biological, and herbicidal removal. In 2001, $50,000 from the TNRCC was dedicated to mechanical removal of water hyacinth, which was only partially effective ("Mexican," 2001). As a biological control, grass carp have been introduced on a pilot basis to attack the hydrilla. Mayflies also recently have been introduced to control water hyacinth, but require several years to be effective. However, biological and mechanical removal alone have not cleared the weeds from the river.

The Texas Parks and Wildlife Department is responsible for approving any use of aquatic herbicides to help remove the vegetation. The Aquatic Weed Subcommittee is working with Mexican officials on a pilot program to apply herbicides to aquatic weeds downstream of the Matamoros intake ("Mexican," 2002).

## Water Quality Issues

### Surface Water Quality and Influences

After leaving International Falcon Reservoir in Zapata County, the river enters the Lower Rio Grande subregion. Segment 2302 runs through Starr, Hidalgo, and Cameron Counties to Segment 2301, the tidal region, where under normal conditions it enters the Gulf of Mexico (see Figure 5-1).

### The Rio Grande below Falcon Reservoir

The LRGV has undergone a tremendous population explosion in recent years on both sides of the border, so it is not surprising that the major problem in Segment 2302 is high bacteria levels. These levels are most acute near major cities in the region, particularly the sister cities of McAllen and Reynosa (IBWC, 2001). For example, a December 3, 2001, article from the Associated Press called attention to the discharge of raw sewage from a prison in Reynosa into the Rio Grande,

and to the inadequacy of the existing treatment system in the city ("Wastewater," 2001).

The TNRCC has placed the segment on its 303(d) list for cleanup due to elevated levels of bacteria, which violate the state standards for contact recreation (TNRCC, 2001c). Elevated levels of salinity may also start to decrease the water's usefulness as a public water supply (TNRCC, 2001b). Thus far, water in this segment meets standards designed to protect aquatic life.

## Taking Action

The Texas Water Development Board has undertaken a key role in water supply and wastewater management activities in the Lower Rio Grande subregion for many years. In order to fully reflect the effort and funding it has invested in a long list of large, small, and colonia communities, further detailed information on its EDAP projects is provided in Appendix I, Water and Wastewater Projects in the Lower Rio Grande Subregion.

Some of these projects, including La Joya Water Supply Corporation and City of Roma colonias projects, which have also received assistance from the Border Environment Cooperation Commission (BECC) and NADBank, will extend first time sewer service to hundreds of colonia residents in Starr and Hidalgo Counties (Pedersen, 2002). Hundreds more are now receiving and soon will be receiving water and sewer services in numerous urban and rural colonias throughout the Lower Valley. The TWDB is also working in cooperation with the U.S. Bureau of Reclamation to finance planning and design work for improvements to the water conveyance systems of irrigation districts in the LRGV, using funds from the State Energy Conservation Office (Pedersen, 2002).

Self-help organizations are organizing a few small colonia communities so that they can construct their own water and sewer systems. The following projects are also underway to project water quality in the Rio Grande below Falcon Reservoir.

### The TEXAS Plan

Through the TEXAS Plan, which is sponsored by the Texas Secretary of State's Office and mentioned in the Overview chapter, various state and federal agencies are working cooperatively with the EDAP program to direct approximately $35 million to install water and wastewater connections in colonias along the border ("Texas Plan," 2002 and "Texas Border," 2002). All of the TEXAS Plan projects were planned, designed, and constructed with TWDB technical and financial assistance (Pedersen, 2002). The NADBank also is providing funding for these projects in the form of a $6.36 million grant to help meet water and wastewater needs in Cameron, Hidalgo, and Val Verde Counties (NADBank, 2001b). In Hidalgo County, the project will provide 2,108 wastewater connections and 53 water connections. In Cameron county, the project will provide 1,029 wastewater connections and 150 water connections (NADBank, 2001a).

### Building Infrastructure for the City of Mission

The city of Mission approved a $9.2 million bond issue in late 2001 to pay for a water treatment project. At the same time, it agreed to take on an additional $11.6 million in debt to provide wastewater services to 13,000 residents (Shireman, 2001a and Shireman, 2001b).

### Citizens Taking Action to Protect Drinking Water

Work is not limited to the Texas portion of the U.S.-Mexico border. Residents in Río Bravo, a city of 100,000 people in Tamaulipas, Mexico, have been concerned about discharges of untreated wastewater into the canal that channels their public water supply from the Rio Grande. In January of 2002, local citizens asked for meetings with Mexican state and federal agencies to investigate this matter ("Water," 2002).

### Water and Wastewater Projects

In 2002, the BECC approved $1 million in technical assistance to La Joya for a wastewater system. Additional work focusing on meeting the pressing need for water and wastewater infrastructure is described in Appendix I, Water and Wastewater Projects in the Lower Rio Grande Subregion.

#### The Rio Grande Tidal Region and the Brownsville Ship Channel

The last portion of the Rio Grande, Segment 2301, runs through Cameron County on its way to

the Gulf of Mexico (see Figure 5-1). This section of the river supports the contact recreation, aquatic life, and general uses. Nutrient levels are increasing, along with invasive plant species and high levels of algae growth, and may begin to violate standards designed to protect aquatic life (IBWC, 2001).

Brownsville and Matamoros are the last two major cities before the river reaches the Gulf. Brownsville is a major port, with a ship channel (Segment 2494) extending out into the Gulf of Mexico to the north of the mouth of the Rio Grande. The primary problem in the channel is low levels of dissolved oxygen that may begin to harm the health of aquatic life (TNRCC, 2001b and TNRCC, 2001c).

## *Taking Action*

Projects in the Rio Grand Tidal Basin and the Brownsville Ship Channel follow.

### *Brownsville Water and Wastewater Projects*

Two TWDB Brownsville projects have received $6.94 million in EDAP grants and loans. One was a joint water-wastewater project serving 4,398 colonia residents in Cameron Park; the second brought wastewater service to 308 residents in Hacienda Gardens (TWDB, 2001a).

### *Building Colonias Infrastructure*

The TWDB is managing an $89,250 planning grant for the Brownsville Public Utilities Board to develop a wastewater project for 800 colonia residents in Valle Hermoso, Valle Escondido, and El Salado (TWDB, 2001a). A water treatment project that will require $100,000 in technical assistance is going through the BECC certification process (BECC, 2001a and BECC, 2001b).

### *Developing Infrastructure Projects in Mexico*

Across the border in Matamoros, a BECC-certified wastewater plant is in operation at Parque FINSA, and a water and wastewater project is slated for certification sometime after 2002 (BECC, 2001a and BECC, 2001b). The BECC also approved technical assistance for the Matamoros plants in the amount of $1 million in March 2002.

### The Arroyo Colorado

The Arroyo Colorado is an ancient channel of the Rio Grande and roughly parallels the Rio Grande through Hidalgo and Cameron Counties to the Laguna Madre. It drains most of the municipal wastewater discharges and irrigation return flows for these two counties, including water originally removed from the Rio Grande itself (Niemeyer, 2001).

### The Arroyo Colorado above the Tidal Zone

The Upper Arroyo Colorado, Segment 2202, runs through Hidalgo and Cameron Counties to just downstream of the Port of Harlingen (see Figure 5-1). Levels of bacteria in the region are sufficiently elevated that the water does not meet standards for contact recreation, and the presence of toxic organic chemicals in fish tissue caused the segment to be placed on the state's 303(d) cleanup list (TNRCC, 2001c).

In 1993, the Texas Department of Health (TDH) issued a consumption advisory for all fish from the Arroyo upstream of the Port of Harlingen, due to high levels of chlorinated organic pesticides and herbicides (such as DDT) in the fish tissue ("Arroyo," 2002). Conditions since then have improved to the point that on June 13, 2001, the TDH announced that it was relaxing the consumption advisory on all fish except the smallmouth buffalo. The TDH recommends that adults limit consumption of smallmouth buffalo to two 8-ounce portions per month. TDH advises that children eat no more than two 4-ounce portions per month of smallmouth buffalo (TDH, 2002).

The TNRCC has developed a TMDL to help control several legacy pollutants in the Upper Arroyo Colorado. These pollutants, all organic, are chemicals whose use has been banned or severely restricted, but still remain in the environment (TSSWCB, 2000). The TMDL itself was adopted, and the implementation plan approved, by the TNRCC commissioners in August 2001(Miranda, 2001).

As a part of efforts to reduce the amount of nutrients in the water contributing to low levels of dissolved oxygen, the Texas Soil and Water Conservation Board has been helping individuals develop water quality management plans for their properties. Many of these focus on changing irrigation practices and controlling nutrients in runoff (TSSWCB, 2000).

### The Upper Arroyo Colorado and the Donna Reservoir

On the Upper Arroyo Colorado near the city of Donna and its reservoir, a small segment of the river has received a great deal of attention, Segment 2202A (see Figure 5-1). Consumption of all fish in this segment, including the reservoir's canal, is banned due to high levels of PCBs, and the segment has been placed on the 303(d) cleanup list ("Donna," 2002 and TNRCC, 2001c).

## *Taking Action—Donna*

The TNRCC has adopted a TMDL to address high levels of PCBs in the Donna Reservoir, and the implementation plan was approved by the TNRCC commissioners (Miranda, 2001). In addition, the TNRCC's Superfund Cleanup Program is developing a remediation plan for the reservoir and canal (TSSWCB, 2000).

The city of Donna is also working to meet wastewater and water infrastructure needs. A $19.65 million EDAP grant is helping to fund a joint water-wastewater project that will serve 4,344 colonia residents by October 2002 (TWDB, 2001a). NADBank is also providing a $3.49 million grant that will provide 20,000 residents with water and wastewater services (NADBank, 2001b). An additional $80,000 in technical assistance is being provided by BECC towards the development of a wastewater project (BECC, 2001a and BECC, 2001b).

### The Tidal Region of the Arroyo Colorado

The tidal region of the Arroyo Colorado, Segment 2201, runs through Cameron County to the Laguna Madre (see Figure 5-1). Nutrient levels are somewhat elevated, at times lowering levels of dissolved oxygen and harming aquatic life—though at the moment the area supports standards designed to protect the health of aquatic life. The 305(b) report for 2002 indicates that the region meets contact recreation standards (TNRCC, 2001b). The tidal Arroyo had been placed on the 303(d) list for low dissolved oxygen and elevated levels of toxic substances in sediment that may be harming aquatic life. Both will remain on the 303(d) cleanup list in 2002 due to a lack of data that makes it impossible to fully evaluate changes in water quality (TNRCC, 2001c).

## *Taking Action—The Tidal Arroyo*

A TMDL for dissolved oxygen is currently being developed by the TNRCC. It is mostly complete, and final submission to the EPA should occur in 2002 (Miranda, 2001).

### The Laguna Madre

The Arroyo Colorado drains to the Laguna Madre, Segment 2491, an estuary extending north and south along the coast and divided from the rest of the Gulf of Mexico by a thin strip of barrier islands (see Figure 5-1). The Laguna is one of only a very few hypersaline lagoons in the world and provides important nurseries for the Gulf of Mexico's fisheries (Niemeyer, 2001).

The Laguna has been placed on the state's 303(d) list, due to low levels of dissolved oxygen and high levels of bacteria. Both occur at least in part near the mouth of the Arroyo Colorado, and both threaten the health of aquatic life in the area (TNRCC, 2001c).

## Groundwater Quality and Influences

### The Gulf Coast Aquifer

The Gulf Coast aquifer runs through Jim Hogg, Brooks, Kennedy, Willacy, Starr, Hidalgo, and Cameron Counties. As with the majority of the groundwater available in the Lower Rio Grande subregion, the quantity is limited and of generally poor quality (IBWC, 2001). For the most part, salinity is low enough that the water can be used for drinking water after desalinization and treatment, but it is more suited for livestock, irrigation, or industrial needs. However, in Starr, Hidalgo, and Cameron Counties, boron levels are naturally high, which make the water unsuitable for irrigation, since excessive boron can harm plants. In those same counties, natural uranium deposits make for higher levels of radioactivity. Public water systems are required to test and treat for elevated radioactivity to meet safe drinking water standards. Residents relying on domestic wells for their water supply may not always test their water and have adequate treatment. In Hidalgo County near the Rio Grande, iron and manganese levels in the water are high, creating an unpleasant taste and smell (TWDB, 1995).

### Other Aquifers in the Lower Rio Grande Subregion

The Laredo formation runs down into Starr County from Webb and Zapata Counties in the Middle Rio Grande subregion. It is generally salty and, like the Gulf Coast aquifer, can have high levels of boron, making it unsuitable for irrigation. In Cameron County, the Rio Grande Alluvium, deposits of groundwater in the river's alluvium also make the water of poor quality and suitable mostly for livestock use. A portion of the Carrizo-Wilcox aquifer extends into the Lower Rio Grande subregion, though it is saline and may require extra treatment before use as a public water supply. Natural deposits of uranium make radioactivity levels higher than normal in some areas (TWDB, 1995). Public water systems are required to test and treat for elevated radioactivity to meet safe drinking water standards. Residents relying on domestic wells for their water supply may not always test their water and have adequate treatment.

## *Taking Action*

The TNRCC studied whether the Lower Rio Grande area should be designated as a priority groundwater management area (PGMA), a designation for aquifers experiencing critical groundwater problems including contamination. Following the study, the TNRCC concluded that the PGMA designation was not appropriate for the Lower Rio Grande area. This decision affects Starr, Hidalgo, Willacy, and Cameron Counties. The TNRCC further indicated that the area would not require future reevaluation. In 1999, the Texas Legislature created the Red Sands Groundwater Conservation District in Hidalgo County (TNRCC, 2001d).

## Waste Management Issues

As in the rest of the border, municipal solid waste and illegal dumping are among the most serious concerns expressed by local residents. However, hazardous substances are also a concern. There are concerns about hazardous waste management, but they rank lower in comparison to the rest of the border and the state. In this section, the Lower Rio Grande subregion is considered to be Cameron, Willacy, and Hidalgo Counties and the corresponding region in Mexico.

### Municipal Solid Waste and Illegal Dumping

Municipal solid waste management is a major issue in the LRGV. Although there are seven landfills in the three counties (Hidalgo, Cameron, and Willacy) of the Lower Rio Grande Development Council (LRGDC), landfill capacity for this subregion is only 9.1 years, compared to 31.6 years statewide (TNRCC, 2001a).

As with other areas of the border, illegal dumping is often caused by the large population in colonias and rural areas where access to proper MSW collection and disposal systems is limited. This area of the border had the highest number of illegal dumps reported by local government officials in a 1997 survey. This survey, the most recent illegal dumping survey conducted, found a total of 14,547 illegal dumps in these three counties. The total includes 12,510 small, 2,005 medium, and 32 large illegal dump sites.

Small dumps range from 1 cubic meter to 1 acre; medium, from 1 to 10 acres; and large dumps, 10 acres or more. The illegal dump sites in the three counties accounted for more than 72 percent of the 20,073 illegal dump sites found in the entire 32-county border area (TNRCC, 1997a).

Across the border in Matamoros, a BECC/NADBank solid waste project benefits 410,000 residents. It was completed in1999 and includes the improvement of solid waste collection and disposal ("BECC," 2001).

### Hazardous Materials and Emergency Response

In May 1997 Brownsville and Matamoros were the first sister cities along the entire U.S.-Mexico border to sign an agreement and develop an environmental emergency response plan. The sister-city plan was put to use in June 1998, when Brownsville and San Benito firefighters, at the request of Matamoros officials, helped put out a fire at a recycling facility in Matamoros (Borunda and Caskey, 2001). More recently, a joint emergency-response exercise featuring federal, state, and local officials was conducted in September 2000 in Brownsville-Matamoros ("Issue #1," 2001).

In addition, Reynosa and McAllen signed a sister-city plan in February 2000 ("Issue #5," 2001).

Under the plan Texas firefighters operating in Mexico are recognized as performing official Texas duty under Texas law and the Texas Constitution. In October 2000 an emergency response exercise was performed in Reynosa-McAllen under their sister-city plan ("Issue #7," 2001).

As described in Chapter 6, the TNRCC has been holding compliance courses on hazardous materials in McAllen and Brownsville for the past several years, often with Mexican officials. Maquiladora representatives often attend. The need for hazardous materials and response courses was highlighted by a warehouse fire in Brownsville on October 1, 2001 ("Brownsville," 2001).

### Hazardous Waste Management

One hazardous waste facility is located in the Lower Rio Grande subregion, a transfer and storage facility for recycling in Hidalgo County ("U.S. Facilities," 2001).

In this subregion, U.S. and Mexican state and federal agencies participate in the Nuevo León/Tamaulipas/Texas binational regional enforcement subgroup of the binational Enforcement Work Group, created under the La Paz Agreement. The activities of this subgroup include:

- planning exercises,
- border inspections, and
- joint enforcement actions.

## *Taking Action*

The city of Brownsville recently filed an application for a permit amendment to its existing landfill and is requesting a permit for a new MSW landfill ("Municipal," 2002). Hidalgo County has submitted a proposal to the BECC for a solid waste project ("BECC," 2001). The county would develop a solid waste management plan, including transfer stations and recommendations on how best to manage solid waste.

In the Mexican state of Nuevo León, MSW projects proposed for certification in 2002 are scheduled for Anáhuac, Sabinas Hidalgo, and Vallecillo. Solid waste projects are also planned for certification in 2002 for Gustavo Diaz Ordaz, Nuevo Ciudad Guerrero, Reynosa, and Valle Hermosa (BECC, 2001a).

Numerous antilitter campaigns are under way. Hidalgo County Precinct 1 and the Donna Irrigation District undertook a general litter clean-up along the Donna Canal in summer 2001 (Scheidler, 2001). In addition, Hidalgo County opened a citizen's waste collection site as part of a county-wide campaign to curb illegal dumping along roadways in rural areas. The waste collection site will provide an option for colonias and rural residents to stop dumping trash illegally. Precinct 1 spent $130,000 picking up used tires, furniture, and trash from roadsides in 2000. The project cost was almost $40,000, funded in part with a $25,000 grant from the Lower Rio Grande Development Council. The city of Alamo provided land for a transfer station (Garrison, 2001).

## Air Quality

The TNRCC has placed one air quality monitor in each of four cities: San Benito in 1983, Brownsville in 1993, Edinburg in 1995, and Mission in 1995 (see Figure 5-1). All the sites monitor small particulate matter ($PM_{2.5}$). All sites except Edinburg monitor large particulate matter ($PM_{10}$), and all the sites except San Benito also monitor ozone and volatile organic compounds (VOCs). The Brownsville site also monitors carbon monoxide and lead.

None of the sites has shown concentrations that are in violation of any of the NAAQS. The large population of the LRGV is spread out over a much larger area than that of the El Paso-Ciudad Juárez area, and therefore sources are more dispersed and accumulation of pollutants is generally lower. In addition, the topography does not allow for as much capture and possible stagnation of air as in far west Texas, which has mountains on several sides.

Valley residents have occasionally inquired about the seasonal burning of organic residue (referred to as field trash) on fields where sugarcane is grown. These burns occur before and after harvest and are authorized and carried out under rules established by the TNRCC. The rules allow burning only when wind conditions will move the smoke and ash away from populated areas. If property owners complain about fly ash landing on their property, a mill owner must take action to clean up the ash (Franco, 2001).

### Potential Ozone Problems

As discussed in Chapter 2, a new 8-hour standard for ozone may be proposed in the next few

years. An exceedance will occur if the 8-hour average of 85 parts per billion (ppb) or greater is registered by any monitor. The TNRCC already has begun to analyze records with an eye for potential future problems under that standard.

The monitor at Mission registered an 8-hour average concentration of 85 ppb for ozone in September 2001, followed three days later by an 8-hour average of 78 ppb. The 8-hour ozone area design value (rolling average of ozone concentration) has increased slightly from 71 ppb for 1997–99 to 75 ppb for 1999–2001 (Lambeth, 2001). So far these numbers do not indicate a violation of the proposed 8-hour standard.

TNRCC analysts believe that the locally generated ozone in the LRGV creates concentrations of no more than 20 ppb. However, because of the prevailing winds and because it takes time for ozone precursors to produce ozone, the TNRCC estimates that these locally produced peaks usually occur 20 to 40 miles to the southwest, in a relatively unpopulated area of the Mexican state of Tamaulipas where there are no monitors. Only a portion of that local ozone production occurs immediately in the LRGV and contributes to local background levels. Pollution imported from other areas could contribute to these unexpectedly high ozone levels.

### Actions on the Mexican Side

Across the Rio Grande from the Lower Rio Grande Valley is the Mexican state of Tamaulipas. As mentioned in Chapter 4, the Tamaulipas legislature passed a law in late 2001 intended to reduce air pollution from taxis and minibuses ("New," 2001). The TNRCC has collaborated with its counterpart in Tamaulipas in initiating a program aimed at encouraging companies to reduce their generation of pollution. Both these measures are designed to benefit air quality in the overall area.

## Toxics Release Inventory Data

Only two counties, Hidalgo and Cameron, have any release information captured in the EPA's TRI database. The most recent TRI report indicates that toxic air emissions in 1999 totaled 757,295 pounds for Cameron County, and 189,042 for Hidalgo County (see Table 2-10). In Cameron County 719,000 pounds of n-hexane, a flammable hydrocarbon solvent, were released from one facility, accounting for almost 95 percent of all toxic air emissions in Cameron County ("TRI Release," 2001).

TRI air emissions from the two counties comprised nearly 65 percent of total air emissions for the 32 border counties in Texas. Total on- and off-site releases were about 52 percent of total border releases, while total waste managed for the two counties was less than 10 percent of all waste managed in the border area ("TRI Release," 2001 and "TRI Waste," 2001).

## Innovative Programs

The following projects are unique to the Lower Rio Grande border subregion. Except for the Teaching Environmental Sciences (TES) course, they were created and implemented at the initiative of local citizens who identified problems in the community and set out to solve them, using new ideas or combining existing resources in an innovative way. However, even the TES course relies on a local advisory committee to identify the most relevant issues to be covered in the course. Its success depends on the support of local organizations that provide speakers and field trips.

### Starr County

Starr County has submitted a proposal to BECC for a solid waste project. The county has developed the Starr County Local Solid Waste Management Plan, including transfer stations and recommendations on how best to manage solid waste ("BECC," 2001).

### The TNRCC's Teaching Environmental Sciences Courses on the Border

The TNRCC's Small Business and Environmental Assistance (SBEA) office provided university graduate-level courses on teaching environmental sciences (TES) for teachers at two locations along the border in 2000 and 2001: The University of Texas at Brownsville and The University of Texas Pan-American at Edinburg (Hefty, 2001).

The TES course has been presented at over 15 Texas universities since 1994. More than 2,000 teachers have participated statewide, with hundreds

of thousands of students receiving instruction from TES teachers (Hefty, 2001).

The TES course supports curriculum objectives mandated by the Texas Education Agency in the Texas Assessment of Knowledge and Skills (TAKS) test and Texas Essential Knowledge and Skills (TEKS). Teachers who complete the TES course receive three university credit hours, 45 hours professional development credit from the State Board for Educator Certification professional development credit for classroom teachers, and full certification from Texas Environmental Education Advisory Committee (Hefty, 2001).

As a group, TES teachers are multigenerational, multiethnic, and multicultural. They often serve under-represented populations, particularly in border university courses. The TES program includes partnerships with federal, state, and municipal agencies; industries; nonprofits; and other experts who address air, water, and waste issues. A pretest indicates that teachers have limited knowledge of environmental issues before taking the TES course, but a posttest shows that the TES program broadens their experience through field-based, hands-on learning (Hefty, 2001).

Focusing on local environmental issues, the TES border courses encourage teachers to employ a multidisciplinary approach in their classroom instruction. Some highlights from the TES 2001 border courses include:

- a TDH doctor speaking on border environmental health issues;
- the U.S. Border Patrol discussing immigration issues;
- a Port of Brownsville tour of shipping and related environmental issues;
- a five-day trip to Mexico's Rancho del Cielo to study a cloud forest environment;
- a boat tour of the estuary hosted by the oil spill division of the Texas General Land Office and the U.S. Coast Guard;
- tours of the local landfill (leachate and methane recovery); and
- visits to a power plant, water treatment plants, and air monitoring stations.

Other topics included nonpoint source pollution, colonias, NAFTA, agricultural best management practices, illegal dumping, recycling, composting, water testing, and endangered species (Hefty, 2001). To find out more about the TES courses, please see Appendix D, For More Information.

### TEACHERS AFFIRM SUCCESS OF ENVIRONMENTAL SCIENCE COURSES

To gain a better understanding of the effectiveness of the TES classes held throughout the state, the TNRCC administered an anonymous final survey and evaluation at each TES university course held during the summer 2001. Survey items included both objective and subjective responses. The following information was self-reported by 115 teachers completing the TES course at nine Texas universities, including the two border region courses:

- ONLY 9% agree: "Elementary teachers generally have a strong science background."
- 93% agree: "TES has made me more aware of air pollution issues in my community."
- 94% agree: "TES industry field trips helped me understand TNRCC pollution controls."
- 95% agree: "TES provided a real world view of water issues in my area."
- 97% agree: "TES has helped me see the application of environmental science in life."
- 63% report: "*TES is my first environmental science course*." (TNRCC, 2001e)

In the 2001 survey, TES teachers reported the following information about their teaching experience:

- Total number of students taught annually by TES participants: 6,357, of whom 4,674 (73 percent) are minority students.
- Hispanic students in relation to their total minority student population: 73 percent.
- Most critical time for students to receive science instruction: 78 percent indicate grades K-6 (TNRCC, 2001e).

TES teachers described their efforts to teach science as follows:

- Reported having *inadequate* science lab equipment: 34 percent.
- Describe their efforts with hands-on labs as "very motivating for *most* students": 48 percent.
- Characterize "hands-on labs as a vital part of their curriculum": 31 percent (TNRCC, 2001e).

### Valley Proud Environmental Council

Residents in over 25 communities from both sides of the border work to fight litter and illegal dumping in the LRGV. Their efforts enhance economic development and tourism, help preserve natural resources, and raise public awareness about environmental issues. Business leaders join in an effort to conduct an all-Valley "trash bash" each year, using thousands of volunteers to clear area alleys, streets, roads, and highways of thousands of tons of trash. Volunteers also plant trees on both sides of the border in their beautification efforts. This program received the TNRCC's Texas Environmental Excellence award in the civic organization category (TNRCC, 1994).

### Chem-Pruf Door Company, Brownsville

Chem-Pruf is a small manufacturing firm with just over 50 employees. During the production process, scrap material largely in the form of dust was created and sent to a landfill. The company decided to capture the scrap material and find a productive way to use it instead of throwing it away. Chem-Pruf devised a process to recover and reuse 90 percent of its waste fiberglass in the production of specialty doors, door frames, and louvers for industrial facilities with highly corrosive environments. The product withstands the most hostile industrial environment, reducing the number of rusted doors that end up in the landfill and must be replaced. Chem-Pruf now recycles nearly all its waste, monitoring waste and recovery rates each week to analyze its success. This program received the TNRCC's Texas Environmental Excellence award in the small business category (TNRCC, 1994).

### Color Cats Recycle Club, Austin Elementary School, Harlingen

Every Friday, the fifth graders at Austin Elementary School in Harlingen trek to each classroom in the school to collect and sort more than 1 ton of recyclables brought in from students' homes each week. To give their schoolmates an extra incentive to recycle, the fifth-graders known as the Color Cats Recycle Club award a golden trophy to the class that contributes the most recyclables. The Color Cats' commitment to recycling is year-round, and includes Texas Recycles Day activities, marching in Harlingen's Christmas parade with signs urging the community to recycle Christmas trees, and planting a garden that includes a compost pile. This program received the TNRCC's Texas Environmental Excellence Award in the youth category (TNRCC, 1996).

### South Texas AmeriCorps, Weslaco

AmeriCorps teams work in colonias and neighborhoods in 11 South Texas counties, reaching more than 40,000 young people and 15,000 adults in a single year. Economically disadvantaged residents want to be helped, not studied. Strong, trusting relationships were built over time, with persistence and caring on the part of AmeriCorps volunteers. Some of their accomplishments are:

- fighting groundwater waste and runoff at the Las Palmas colonia by helping 80 families switch from septic systems to on-line sewage service;
- assisting 300 Hidalgo County residents and farmers in the proper use, storage, and recordkeeping of pesticides and agricultural chemicals;
- coordinating with the Willacy County government and Wackenhut Correctional Facility inmates to clear thousands of pounds of illegally dumped trash and to unclog drainage ditches;
- helping beautify five parks and build ten gardens in schools, colonias, and other neighborhoods; and
- educating thousands of residents in waste management, water quality, and conservation through formal presentations, informational materials, and exhibits.

This program received the TNRCC's Texas Environmental Excellence Award in the education category (TNRCC, 1997b).

### Colonias Unidas, Starr County

Colonias Unidas initiated a community-based program to tackle the illegal dumping of trash and to clean up the waste pollution around the Las Lomas Colonia. This area lacked a municipal garbage collection program and was a 30-mile round trip from the nearest legal landfill. Colonias Unidas educated residents about the health and environmental dangers of illegal dumping and provided

residents with a practical alternative by convincing a private company to provide garbage service to the community, despite a lack of paved roads. Colonias Unidas succeeded in signing up 70 percent of the local residents, a significant accomplishment given that the $10 monthly fee represents considerable sacrifice to the average family in Las Lomas, where annual income hovers around $5,000. Colonias Unidas also sponsored a community cleanup that netted more than 200 tons of garbage, using 150 local volunteers. This program received the TNRCC's Texas Environmental Excellence Award in the civic organization category (TNRCC, 1998).

### McAllen International Museum, McAllen

The museum created a mobile, interactive, bilingual exhibition—"Our Watershed"—with nine stations exploring the Rio Grande-Río Bravo River. As part of its major public awareness campaign, the museum has toured the display to a number of rural and urban U.S. border communities, including Harlingen, Mercedes, Mission, Roma, and Weslaco, in addition to Reynosa, Tamaulipas, Mexico. The goal of the project is to increase understanding in the community about the need for water conservation, pollution prevention, and how the river shapes geography and influences local economic and cultural development. In the first 16 months, more than 60,350 people from the community visited the exhibit including 30 schools in the U.S. and 30 schools in Mexico. This program received the TNRCC's Texas Environmental Excellence Award in the education category ("Governor," 2002).

CHAPTER 6

# BORDER-WIDE ENVIRONMENTAL INITIATIVES

STATE OF THE RIO GRANDE AND THE ENVIRONMENT OF THE BORDER REGION

The programs described in this section cross traditionally defined categories or borders in some ways. They may be multijurisdictional, multiregional, or binational. These programs capture the real spirit of environmental management along the border, making full use of opportunities and resources.

Some of these efforts are in specific air, water, or waste areas, but many others cut across environmental media subjects. These are known as "multimedia" efforts: they combine two or more of these, such as an air-water project.

Six different types of environmental programs are featured in this section:

- scrap tire management
- technical assistance
- supplemental environmental projects (SEPs)
- voluntary environmental leadership
- environmental education
- public awareness

Programs and projects specific to one of the three regions are listed under the subheading "Innovative Programs" in the individual regional sections.

## Scrap Tire Management

For several years, the TNRCC has partnered with the Texas Department of Transportation (TxDOT) to find end uses for used tires in road projects (TxDOT, 2001). In addition, in 2001 the Texas Legislature directed the TNRCC to award grants to reduce stockpiles of scrap tires. ("Taking," 2001) The Legislature also directed the TNRCC to encourage electric utilities in Bexar, Cameron, Comal, El Paso, and Hidalgo Counties to use tire-derived fuel, as well as to enforce statutory requirements related to waste, scrap, or used tires (Texas House 1, 2001).

## Technical Assistance

### The TNRCC's Compliance and Assistance Plan

Compliance assistance is any customer service activity that facilitates improvement of public health and the environment, including informal communication, on-site assistance visits, workshops, seminars, conferences, publications, Web sites, and other initiatives.

The TNRCC compliance and assistance process was created by the Office of Compliance and Enforcement (OCE), along with the Small Business and Environmental Assistance (SBEA) Division. The process allows the agency to address nonmandated environmental issues through the following agency activities:

- compliance inspections and investigations of complaints that could involve violations of agency rules;
- ambient monitoring of air and surface water; and
- compliance assistance to regulated entities.

Many of the agency's compliance assistance efforts are developed and implemented by SBEA. Its work is coordinated with the TNRCC's Field Operations' inspection strategies, allowing small businesses and local governments to become educated on TNRCC requirements before compliance inspections. Twenty SBEA positions are located in the TNRCC's 16 regional offices to support this technical education effort (TNRCC, 2000).

Based on the direction of the Sunset Advisory Commission, the Fiscal Year 2002 compliance and

assistance plan includes five initiatives concerning the U.S.-Mexico border region (TNRCC, 2001). They are described in the following sections.

### Border Transporters and Warehouses

The TNRCC—partnering with federal, state and local officials—held free seminars in late October 2001 in Laredo, McAllen, El Paso, and Brownsville. The meetings were designed to help companies on both sides of the border that transport and store hazardous materials to improve environmental health and safety and comply with applicable regulations ("Hazardous," 2001). Mexico's federal environmental enforcement agency (PROFEPA) and heads of the maquiladora associations in these regions provided training at the 2001 seminars. The workshops covered warehouse design and construction, regulations on storage and transboundary movement of hazardous materials, and handling chemical spills in a variety of settings. Also featured were presentations by SBEA staff on pollution prevention, energy, and water conservation. The TNRCC has been holding hazardous materials compliance courses in El Paso for the past several years, often with Mexican officials. The agency hopes to continue to attract maquiladora representatives (Zarker, 2002).

### Litter Abatement Assistance to Municipalities and Counties on the Border (Laredo)

To assist cities and counties in the Laredo region that do not have litter abatement programs in place, the TNRCC Region 16 office meets with local officials to encourage development of a litter abatement plan. TNRCC staff members provide training on plan implementation, perform environmental investigations, and develop enforcement cases. A training session was held in February 2002 by the TNRCC's Special Investigations Division. Assistance also includes identifying funding mechanisms for local governments in their efforts against illegal dumping and littering.

### Wastewater and Water Treatment Operators (Harlingen)

Many small wastewater and water treatment plants in the Lower Rio Grande Valley have chronic, recurring violations. SBEA staff, working with plant operators, will develop solutions to address the violations, including hands-on technical assistance for plant operators, workshops, and other types of training.

### Assistance to Local Governments with Warehouse Construction

The TNRCC hosted workshops which included construction and design of warehouses in October 2001 in several border cities. The workshops also covered development of local building codes, including those that mandate minimum design specifications for the construction of warehouses where hazardous materials are stored.

### Technical Assistance to Mexico

The TNRCC currently provides direct technical assistance to Mexico through workshops on pollution prevention and industrial pretreatment of wastewater. Additional workshops are planned, and topics on nonpoint source pollution will be added.

## Site Assistance Visits (SAVs)

Since 1993, the TNRCC's SBEA Division, working with Mexican state delegates from PROFEPA, has conducted more than 30 site assistance visits (SAVs) to maquiladoras in Chihuahua, Coahuila, Nuevo León, and Tamaulipas ("Site," 2001).

During these visits, SBEA staff analyze the facility's waste streams, process operations, and water and energy use. They then make recommendations on activities that the maquiladoras could undertake to reduce the volume and toxicity of waste, as well as to reduce energy and water consumption.

PROFEPA officials participate in these SAVs to enhance their knowledge of pollution prevention techniques and the use of pollution prevention as an environmental management strategy. To date the program has had phenomenal success (Zarker, 2002). By December 2001, participating maquiladoras had reported the following annual changes:

- reduced hazardous waste generation by 11,104 tons;
- reduced nonhazardous waste generation by 74,188 tons;
- reduced VOC emissions by 90,078 pounds;

- conserved 296 million gallons of water;
- conserved 357 million kilowatt hours of electricity; and
- saved $60 million ("Appendix," 2001).

## Assistance to Mexican State and Federal Environmental Agencies

For the past several years, SBEA's Pollution Prevention and Industry Assistance section (PPIA) has helped Mexican federal and border-state governments, universities, and other institutions develop pollution prevention and waste minimization capability. To optimize resources and assist Mexican partners, they developed the Permanent Pollution Prevention Program (P4). An environmental management system tool, complemented by plant visits to local maquiladoras, P4 is also a training tool.

The P4 training is enhanced by including PPIA's environmental cost accounting software, which allows the industry to compare the total cost of an existing process to a new process that incorporates pollution prevention technology or practices. Recently, the training has emphasized water and energy conservation techniques and technologies.

As a part of this program, more than 12 training events have been held (Zarker, 2002). Information about these training activities follows.

### Permanent Pollution Prevention Program Trainings

Mexican state ecology directors, university officials, local officials, and maquiladora and local industry managers have attended Permanent Pollution Prevention Program (P4) training, which includes problem-solving exercises and industrial plant site visits. After the plant visits, participants exchange ideas about ways to address pollution prevention, energy, and water conservation. More than 1,200 participants have attended the P4 training.

### Interactive Satellite Video Conference

A four-hour interactive satellite video conference on pollution prevention was aired in eight Mexican cities. It was a joint effort between PPIA staff and faculty from the Center for Environmental Quality of the Monterrey Institute of Technology and Higher Studies (ITESM). More than 330 maquiladora and environmental managers discussed development of pollution prevention programs through industrial wastewater reduction, water conservation, and waste reduction case studies, emphasizing environmental efficiency and cost-saving practices. Since this initial effort with the TNRCC, the North American Commission for Environmental Cooperation (CEC) and the ITESM have offered similar training in Mexico based on these educational materials.

### Trinational Pollution Prevention Engineering Workshop

A trinational (U.S.-Mexico-Canada) pollution prevention engineering workshop was sponsored by PPIA and the Department of Engineering of The University of Texas-Pan American. The goal was to produce basic reference materials for undergraduate engineering courses that will incorporate pollution prevention concepts and case studies highlighting the EPA's Common Sense Initiative, a four-year experimental program launched in the mid-1990s. A handbook for faculty members at universities in the three countries was developed from the workshop.

### Transboundary Hazardous Waste Workshops

A series of workshops on the movement of transboundary hazardous waste for importers-of-record and maquiladoras was held in major border cities. The workshops drew more than 600 participants from both sides of the border. PPIA and other TNRCC staff assisted the EPA and other US federal and state agencies, as well as Mexican federal and state agencies, in presenting these workshops.

### Sister-City Workshops

Five major sister-city workshops on recycling were attended by educators, local government officials, private citizens and groups, and maquiladora managers in four border cities. More than 600 participants attended these workshops, which featured the adoption of a number of action items by state and local officials, including commitments to develop municipal recycling facilities along with solid waste facilities, and to develop voluntary recycling programs in these cities. The workshops were given by PPIA, the TNRCC regional offices, and state, municipal, and city officials from Mexican bordering states.

To encourage water conservation on the border, SBEA staff coordinated with the Texas Department of Transportation to conduct two composting workshops in McAllen and Pharr for Mexican government and industry representatives (Zarker, 2002).

### Partnerships and Roundtables through the U.S.-Mexico Border XXI Program

As described in the 1996–2000 U.S.-Mexico Border XXI program report, the Pollution Prevention (P2) Workgroup promoted practical methods of achieving economic growth and environmental protection along the U.S.-Mexico border. Rather than leaving costly remediation for future generations, the P2 Workgroup tries to achieve its goals through the prevention of environmental problems.

A P2 Workgroup partner, the Mexican National Ecology Institute (INE) has established a P2 office within the agency. Partnerships have been initiated among the INE, the EPA, the states, industries and educational institutions along the border. EPA and SBEA representatives in this P2 Workgroup have worked with PROFEPA to promote pollution prevention as a means of achieving regulatory compliance.

The P2 Workgroup has held three roundtables to promote pollution prevention, energy, and water conservation. Roundtable members consider the concerns and needs of the maquiladora industry and view local academic institutions as a way to address those needs through the establishment of sustainable cooperative programs.

### North American Pollution Prevention Partnership

The three North American Pollution Prevention Roundtables recently have formed an international partnership to promote pollution prevention. The three partners are:

- U.S. National Pollution Prevention Roundtable
- Canadian Pollution Prevention Roundtable
- Mexican Pollution Prevention Roundtable

Funding support is provided by the CEC. All three organizations agreed to develop a formal working group of experts to develop a joint policy to promote P2 and environmental innovation in North America.

Three roundtables were held in 1998 and 1999 to further advance this partnership to link North American environmental efforts. Attending were TNRCC's SBEA Division, the U.S.-Mexico Foundation for Science (FUMEC), the EPA Region 6, SEMARNAT, PROFEPA, INE, and the maquiladora association. Current activity includes monthly conference calls under the Border XXI P2 Workgroup to continue promotion of the program (Zarker, 2002).

### Partnerships with Universities

American manufacturers have learned that high quality manufacturing is critical and that environmental issues should be considered strategic opportunities, not overhead costs. Engineers play an important role in the development and application of pollution prevention-oriented environmental technologies. However, engineering curricula at most universities provide little or no education in the areas of environmental impact and pollution prevention.

Using the train-the-trainer concept, the TNRCC's PPIA has partnered with three universities in Chihuahua in major P4 training programs, which are now part of their environmental studies programs (TNRCC, 2001). The three universities are:

- Universidad Autónoma de Chihuahua
- Universidad Autónoma de Ciudad Juárez
- Universidad Autónoma de Tamaulipas, Reynosa

The Universidad Autónoma de Nuevo León has also worked with PPIA on a similar program for its curriculum.

### WEAT/WEF Training

Founded in 1928, the Water Environment Federation (WEF) is a not-for-profit technical and educational organization with members from varied disciplines who work toward the WEF vision of preservation and enhancement of the global water environment. The WEF network includes more than 100,000 water quality professionals from 79 member associations in 34 countries, including the Water Environment Association of Texas (WEAT). WEAT members include water environment professionals, practitioners, operations specialists, and public officials working together to:

- assist members with professional growth and development,
- educate the public about water environmental issues, and
- benefit society through protection and enhancement of the water environment.

In 1995, the EPA provided WEAT a grant to complement the EPA Region 6 Border Initiative Program. The Binational Operator Training Program was funded by a five-year, $150,000 grant to provide training sessions for wastewater operators along the Texas-Mexico border and to translate EPA publications from English to Spanish.

WEAT coordinated and sponsored a total of 14 training sessions, translated the three manuals required by the grant, and in addition, translated and/or edited four other publications used for operator training. Eleven Mexican professionals participated in train-the-trainer workshops and are now able to share their experience with other operators and to teach training courses in Mexico. Approximately 500 wastewater operators, engineers, and managers have attended and benefitted from these seminars.

In 2001, WEAT activities included sponsorship of the Sociedad Mexicana de Aguas, A.C. (SMAAC) Third Annual Operator Training School in Monterrey, Mexico, from September 7 to 9, 2001. Approximately 64 water and wastewater professionals attended the Unit I Basic Wastewater, Chlorination, and Unit II Wastewater Treatment courses. Manuals were reproduced at no cost by EPA.

WEAT also has been working together with the American Water Works Association on the Water for People Program. This program envisions a world where all people have access to safe drinking water. The program helps the most impoverished people worldwide improve their quality of life by supporting sustainable drinking water, sanitation, and hygiene projects.

Activities by WEAT in 2002 will include continued support of the Water for People Program and cosponsorship of SMAAC's Environmental Conference scheduled for May 2002 in Monterrey (Fung, 2001).

### The Frank M. Tejeda Center

The U.S. Congress designated $1 million for the Frank M. Tejeda Center for Excellence in Environmental Operations (Tejeda Center) in 1999 to target water and wastewater issues in the U.S.-Mexico border region. Headquartered in San Antonio, the center is under the direction of the Texas Engineering Extension Service (TEEX), with Texas border offices in El Paso, Laredo, and the LRGV.

The Tejeda Center champions the development and operation of effective, efficient, and sustainable environmental infrastructure systems. The center provides focused training, coordinated leadership, and strategic planning that promote responsible stewardship of the environment. Center efforts support operators, communities, and decision-makers with high levels of technical, managerial, and financial competency.

Tejeda Center staff living and working in border communities bring assistance needed to the lo-

**THE TEJEDA CENTER: ONE TOWN'S SUCCESS**

Although the Tejeda Center only officially began providing services in Spring 2001, it already has made a difference for a number of communities.

One example is Asherton, a town of 1,610 in south Texas, which wanted to apply for funding from the Texas Water Development Board to build a new wastewater treatment plant. The town's existing treatment plant was built in the 1970s and was inadequate for current needs. In addition, its management systems had become overburdened and outdated. Consequently, Asherton failed a qualifying assessment by the TNRCC and was considered ineligible for funding.

After a referral from the Texas Secretary of State, the Tejeda Center director worked with Asherton for several weeks to provide financial, managerial, and technical assistance. With this help, the town was able to organize information electronically, create its first-ever management reports, provide real-time financial and operational data to the city council, and address all the deficiencies noted in the state's assessment report.

After demonstrating that it is a capable steward of its current wastewater system, Asherton is ready to apply to the TWDB again for funding.

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cation, on either side of the border. Because they live and work in the region full time, center staff can capitalize on local resources to develop and nurture regional and cross-border answers to environmental questions. Through their efforts, local governments in the U.S. and in Mexico receive on-site, focused, tailored assistance with water and wastewater service issues at no cost.

Residents on both sides of the border benefit from improvements in basic services and reduced threat to human health. State governments, funding agencies, and regulatory agencies in Mexico and in the U.S. can call on the center for assistance in identifying and removing barriers to the successful completion of projects (Eby, 2001).

### Need for Ongoing Cross-Border Technical Training

Technical training and assistance is needed because of the advent of new systems in communities, especially operator and technician training. The training must be available in a timely manner and consider the level of employee turnover. Many technical employees begin their environmental careers with limited experience or require continuing education to keep up with changing trends to ensure accurate data collection and system maintenance. Such technical employees include water and wastewater operators, landfill operators, people who maintain air quality monitors, and laboratory employees who analyze environmental test results.

## Supplemental Environmental Projects (SEPs)

Supplemental Environmental Projects (SEPs) provide an opportunity for entities who are involved with TNRCC enforcement proceedings to invest their penalty dollars in environmental projects within local communities. These funds in turn benefit local residents through such projects as cleanups of illegal dump sites, recycling programs, and establishment of clean and reliable sources of water and wastewater service. The SEP_program has been a successful initiative for the agency, for communities affected by environmental violations, and for the entities that find themselves in the enforcement process.

In fiscal year 2001, 13 SEPs were approved in the border counties. Entities in enforcement invested over $81,000 in environmentally beneficial projects in the border counties. Projects included cleaning illegal dump sites, extending wastewater services to low-income homeowners with inadequate wastewater services, implementing a household hazardous waste program, and restoring habitat (Toliver, 2002).

## Voluntary Environmental Leadership

The TNRCC's Clean Texas Partnership program supports members who voluntarily commit to improving the environment and sustaining a quality of life for future generations. The program embraces a broad range of initiatives, offers flexible membership requirements, and stimulates networking among its members. The program is open to businesses, organizations, and communities of all sizes and offers three membership levels: Advocate, Partner, and Leader. Members include utilities in West Texas and the cities of El Paso, Eagle Pass, Roma, and Edinburg ("Clean," 2002).

As described in Chapter 2, the TNRCC has developed state-to-state strategic environmental plans with counterpart agencies in its neighboring Mexican states. Under the state-to-state plan with Tamaulipas, in partnership with the Secretariat of Urban Development and Ecology (SEDUE), the TNRCC has initiated a joint recognition program for industry in the Texas-Tamaulipas border region.

Companies that commit to both internal improvement programs—such as a reduction in waste or water use, and support for community programs— are eligible for recognition by both the TNRCC and SEDUE. The program combines the success of the TNRCC's Clean Texas and its Texas Environmental Excellence Awards programs.

In early 2002, in response to an expression of interest from SEDUE of Chihuahua, TNRCC began discussions about establishing a similar program with that Mexican state (Pumfrey, 2001).

## Environmental Education (EE)

The TNRCC and other organizations offer a variety of voluntary programs and projects for environmental professionals and individual citizens who

wish to learn more about the environment of their local community and become involved in improving their quality of life and work.

As defined at an international conference of environmental education professionals in 1978, environmental education (EE) is a learning process that increases people's knowledge and awareness about the environment and associated challenges; develops the necessary skills and expertise to address these challenges; and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (Tblisi, 1978).

Through EE, students and adults learn "how to think, not what to think"—a common phrase used to describe EE programs. EE enhances critical thinking, problem solving, and effective decision-making skills, and helps people weigh various sides of an environmental issue to make informed and responsible decisions.

To promote environmental education, the North American Association for Environmental Education (NAAEE) was established in 1971. A professional association with members in more than 55 countries, NAAEE recognizes the need for a coherent body of information about environmental issues. Its members also recognize that information and analysis are only part of an education program: to be truly effective, EE must be integrated into all aspects of curriculum and all types of educational institutions for the widest array of audiences (NAAEE, 2001). The annual NAAEE conference provides common ground where environmental educators from Mexico and Texas can meet to share ideas with each other, as well as with other states and nations.

The information in this subchapter provides a sampling of programs and projects designed to increase EE along the border between the U.S. and Mexico. Additional EE programs are featured under subchapter "Innovative Programs" in the three regionally based chapters. Many programs are not featured here due to lack of space, and more information can be found in the EPA's *Border Environmental Education Resource Guide*, discussed in the next subsection.

### EPA Border Environmental Education Resource Guide

The *Border Environmental Education Resource Guide* was created to empower educators in program planning and development. It helps them locate existing programs that can be adapted for their own use. Educators are found not only in the classroom; they are members of city governments, state and local agencies, and private organizations ("Border," 2001).

Available in both printed and electronic formats, the guide is a dynamic document that can be updated to reflect new environmental education providers.

Providers submit information describing their mission, service area, audiences, program themes, available materials (including whether these are offered in English, Spanish, or both), and titles or brief descriptions of EE programs. Each guide also includes a set of thematic indices by state, with such headings as agriculture, water, wildlife, and many others.

The guide builds capacity in U.S.-Mexico border communities. It serves as an initial needs assessment and action plan to help identify gaps in border EE resources. The guide is the first step in implementing a U.S.-Mexico binational environmental education plan. Information on how to obtain the guide can be found in Appendix D, For More Information.

### EPA Environmental Education Grant Program

The grant program sponsored by the EPA's Office of Environmental Education supports environmental education projects that enhance the public's awareness, knowledge, and skills to make informed decisions on matters affecting environmental quality. Since 1992, the EPA has received between $2 and $3 million in grant funding per year and has awarded about 1,700 grants ("Environmental," 2001).

Project BASURA is an example of an EPA Region 6 grant for border education. (Basura is Spanish for "trash.") The University of Texas at Brownsville's Cross-Border Institute for Regional Development partners with various entities (city of Brownsville, Cameron County, Brownsville Community Health Center, Brownsville Independent School District, and Brownsville's sister city of Matamoros in Tamaulipas) to educate and empower school children. Children are taught to be aware of environmental and public health issues involved in inappropriate disposal of solid waste material. The partnering entities produced profes-

sional curricular and multimedia material to distribute to other school districts and communities on both sides of the border ("Project BASURA," 2001).

Additional border recipients of EPA environmental education grants include the South Texas Youth Ranch nature trail and plant identification project in Pharr, and a summer internship program at Texas A&M University at Kingsville aimed at recruiting students in the Rio Grande Valley to pursue careers in environmental science and environmental engineering. ("EPA," 2001)

## Cyberways and Waterways® on the Mexican Border

Cyberways and Waterways®, found online at **www.CyberwaysandWaterways.com**, is a learning environment built from the ground up with input from teachers. The Web site integrates technology and education through an environmentally based interdisciplinary curriculum centered on watersheds, streams, rivers, coastlines, and coral reefs.

The program presently is used in classroom activities in more than 22 school districts in Texas, involving 152 teachers, and over 50,000 students. The goal is to engage students, teachers, and communities around the globe. With Cyberways and Waterways®, students become empowered to take ownership of their education and become active learners.

The bilingual Web site currently is accessed by 10 schools in El Paso, Presidio, Eagle Pass, Del Rio, Brownsville, and Laredo. They use the program in unique ways. For example, a Cyberways and Waterways® teacher in Presidio gave her students an assignment to survey drinking water uses and then correlated that with people in their families being sick with diarrhea and dysentery during the year. Results were significant enough to prompt the Mexican government to investigate sewage plant operation in Ojinaga.

Another teacher from Del Rio used the Cyberways and Waterways® Web site as the basis for her first online final exam with great results; students loved integrating technology and testing (Galaway, 2001). This program received a TNRCC Texas Environmental Excellence Award in the special award category (TNRCC, 2001).

## Project Del Rio (PdR)

Project Del Rio (PdR) works with high school students from both sides of the border, including 24 Texas schools. Schools partner with agencies, businesses, and community organizations to investigate real-world water issues through the collection and analysis of water quality data from the Rio Grande. Students get hands-on experiences with water quality problems and their causes. (See Figure 6-1.) On three designated days in the school year, students from participating schools travel to specific sites along the river where they take samples of river water to test for fecal coliform, dissolved oxygen, and other water quality parameters. Each school shares its findings with other schools via a bilingual computer network, resulting in a water quality profile for the river on those days. As problems are identified, causes are investigated and students are encouraged to list actions that can be taken to address the sources of the problems. This program received the TNRCC's Texas Environmental Excellence Award in the special award category (TNRCC, 1994).

**Figure 6-1**

Students in the Project Del Rio program get hands-on experience with water quality problems and their causes.
*Photo courtesy of Lisa LaRocque, Project Del Rio*

### South Texas Environmental Conference (STEC) Series

The South Texas Environmental Conference (STEC) series originally was organized by the Environmental Engineering department at Texas A&M University at Kingsville in March 1993 as a service to the region. STEC provides South Texas with a forum for the discussion and dissemination of regionally relevant environmental issues. Participation by academia, industry, government, special interest groups, and the general public is encouraged.

Currently, there are two annual conferences in the series. The first is the Coastal Bend Environmental Conference (CBEC) held in the fall in Corpus Christi. The second is the Rio Bravo/Rio Grande Environmental Conference (REC) held in the spring in the LRGV. Two additional conferences are planned in 2002 in San Antonio and in Laredo in 2003 ("South," 2001).

### Need for Statewide Coordination of Environmental Education

As the previous examples indicate, many opportunities to improve an individual's environmental literacy are available in the border region. Unfortunately, these programs are not coordinated, and overlaps or gaps in crucial environmental subjects can occur. In addition, various organizations compete among each other for funding to establish and continue environmental education programs. As a result, teachers, students, and the public are limited in their access to opportunities to learn more about how the environment affects their daily lives.

## Public Awareness

Public awareness campaigns seek to involve average citizens in learning more about their environment and taking action to prevent pollution and reduce resource use. The following is a sampling of such activities along the border between Texas and its neighboring Mexican states.

### Volunteer Cleanup and Recognition

The TNRCC coordinates the Adopt-a-River program, including a pilot project implemented in 2001 in the El Paso area. Under the program, civic groups such as Boy Scout troops and churches volunteer to clean up a four- to five-mile stretch of the river. The Rio Grande Citizens Forum supports the groups. Eventually, the U.S. Section of the IBWC plans to have signs along the river recognizing the contribution of each group—similar to the signs in the more familiar Adopt-a-Highway project (McMillion, 2001).

### Border Recycles Day

Border Recycles Day involves a variety of environmental events in communities and schools as part of the statewide Texas Recycles Day (and national America Recycles Day) on November 15. (See Figure 6-2.) The first Border Recycles Day was celebrated in November 1998. Events initially were staged in Texas border cities by the TNRCC, but local communities have since taken ownership and created their own initiatives. Now Border Recycles Day has been formally incorporated in the State-to-State Strategic Environmental Plans that the TNRCC has developed with counterpart agencies

**Figure 6-2**

During Border Recycles Day in November 1999 in Brownsville, TNRCC Commissioner Ralph Marquez competed with officials from the neighboring state of Tamaulipas to see who could fill their shopping carts with the most recycled-content or recyclable products from grocery store shelves. Each year, local governments, nonprofit organizations, businesses, and industries sponsor such events on both sides of the border to educate consumers on how recycling helps the environment.

in the neighboring states of Chihuahua, New Mexico, Coahuila, Nuevo León, and Tamaulipas. As a result, some Texas border communities host sister-city events with their Mexican counterparts.

For example, in 2001, children from Ciudad Juárez and El Paso participated in a recycling game hosted by TNRCC Commissioner Ralph Marquez. A similar game was held in Del Río and Ciudad Acuña (Drogolewicz, 2000). Laredo children from over 30 schools participated in a Laredo Recycles Day contest to collect office paper, computer paper, newspaper and cardboard. Their efforts saved over 500 trees, 109 cubic yards of landfill space, and over 135,000 kilowatt hours of energy (Martinez, 2002).

### WaterSmart

Beginning in 1998, the TNRCC and the TWDB revived and expanded the WaterSmart campaign to help residents along the border cope with drought through simple, easy-to-use water conservation techniques. Many water conservation techniques cost little or nothing to implement. Others can have tremendous paybacks in lower water and wastewater fees and reduced energy costs. All offer considerable benefits to local communities.

WaterSmart '98 kicked off in July in the Lower Rio Grande Valley, one of the areas in the state hit hardest by the drought. The campaign on the international border provided a model for the targeted public awareness efforts that followed in other thirsty regions in August and September. The South Texas campaign was crowned as WaterSmart Week (July 27—August 2, 1998) and so proclaimed by then-Governor George W. Bush ("Outlook," 2002)

WaterSmart campaign materials continue to be distributed by the TNRCC each summer as conditions warrant, although water conservation efforts certainly are a good idea year-round.

### Border Water Conservation Day

During the XIX U.S.-Mexico Border Governors' Conference at Tampico, Mexico, in 2001, the joint declaration by the governors included creation of a Border Water Conservation Day.

March 22, 2002, was set as the date for the first Border Water Conservation Day. Each border state promoted water conservation in different ways. As part of the events, some states distributed bilingual water conservation coloring books to elementary school children.

In Texas, the TNRCC worked with local water utilities and other agencies to promote water conservation during the week of March 18-22, 2002. On March 19, the TNRCC Border Affairs staff coordinated a tour of the McAllen International Museum (MIM) in conjunction with the Comisión Municipal de Agua Potable y Alcantarillado (COMAPA) of Reynosa, Tamaulipas, and students from the Escuela Primaria Federal Felipe Carrillo Puerto of Reynosa. The students visited MIM's *Our Watershed* interactive exhibit and RioScape. The group also visited the Texas A&M Extension Service office in Edinburg and toured a low-water-use butterfly garden.

The TNRCC also participated in Nuevo Laredo's Feria Del Agua held on March 22 at the Centro Cívico. (See Figure 6-3.) The Feria included about 30 exhibitors, activities for youth, and numerous presentations. Participants from the U.S. included the city of Laredo, the TNRCC's Border Affairs staff, and the Frank Tejeda Center. The state of Tamaulipas' Cultura del Agua and Nuevo Laredo's Comisión Municipal de Agua Potable y Alcantarillado (COMAPA) cosponsored the event.

In Ciudad Acuña, Coahuila, the Instituto Coahuilense de Ecología coordinated a youth parade and forum. In Ciudad Juárez, Agua 21 sponsored an international water forum. In Matamoros, Tamaulipas, the Junta de Agua y Drenaje, the state of Tamaulipas, Kemet Industries, and Desarollo Integral Infantil (DIF) are sponsoring an interactive exhibit, on loan from the Papalote Museum in Mexico City, that will run until July 2002 (Castillo, 2002).

### The Rio Grande/Río Bravo Basin Coalition and Día del Rio

The Rio Grande/Río Bravo Basin Coalition is a multinational, multicultural organization with leadership from the U.S., Mexico, and the Pueblo Nation. Its purpose is to help local communities restore and sustain the environment, economies, and social well-being of the Rio Grande/Río Bravo Basin.

The coalition has 50 partner organizations from around the watershed who share a commitment to the health and long-term sustainability of

the Río Grande/Río Bravo Basin. They believe that building coalitions across borders is the best way to solve international environmental problems, and that their organization is a model for such cooperation.

Día del Río is a citizen-led event organized by the coalition. The event is both a call to action and a celebration of the basin's rich diversity, and it draws public attention to the critical state of the basin's rivers, groundwater, and wildlife.

The seventh annual Día del Río occurred throughout the basin on October 20, 2001, under the theme *The Rio Grande/Río Bravo Basin: A Confluence of Cultures*. Activities focused on raising awareness and included public talks, tree planting, and river cleanups, as well as the three cultures (American, Mexican, and Native American) on which the river depends for protection, conservation, and preservation. Each of the participating communities implements at least one volunteer activity for Día del Río ("2001," 2001).

### Future of the Region, Inc.

Spearheaded by the South Texas Conference Coordinating Committee out of the Center for Economic Development at The University of Texas at San Antonio, the Future of the Region initiative is building a South Texas action agenda and strategic vision. The committee's vision focuses on the development of a quality workforce, sustainable economic growth, the protection of the environment, quality health care for all citizens, and infrastructure needs to ensure that the region becomes a major player in the global economy of the 21st century. The organization's geographic scope includes the areas of six Councils of Governments:

- Golden Crescent Regional Planning Commission
- Coastal Bend Council of Governments
- Lower Rio Grande Valley Council of Governments
- Alamo Area Council of Governments

**Figure 6-3**

The first Border Water Conservation Day was celebrated on both sides of the border with numerous events during the week of March 18-22, 2002. This photo shows a student and teacher at Nuevo Laredo's Feria Del Agua in that city's Centro Civico. Participants from the U.S. included the city of Laredo, the TNRCC Border Affairs office, and the Frank Tejeda Center. The state of Tamaulipas' Cultura del Agua and Nuevo Laredo's Comisión Municipal de Agua Potable y Alcantarillado (COMAPA) cosponsored the event.

- South Texas Development Council
- Middle Rio Grande Development Council

Future of the Region conferences have been held in 1994 in San Antonio, 1996 in Laredo, 1998 in Corpus Christi, and in two cities in 2000. During June and October 2000, over 250 leaders from South Texas met on South Padre Island and in San Antonio, respectively, to form an action agenda for the future of the region. The South Texas Conference Coordinating Committee issued a report in November 2000 summarizing its recommendations, including seven regional environmental goals. Additional meetings were planned in 2002, beginning with an April meeting in Laredo. As this *State of the Rio Grande and the Environment of the Border Region* report went to press, additional meetings were scheduled for May 2002 in Eagle Pass and June 2002 in the Lower Rio Grande Valley.

Following the regional forums, the group will gather in October to write a white paper that will be provided to legislators as the Texas Legislature convenes in January 2003.

CHAPTER 7

# SYNOPSIS AND RECOMMENDATIONS

STATE OF THE RIO GRANDE AND THE ENVIRONMENT OF THE BORDER REGION

The Rio Grande often is perceived as a single entity with similar characteristics. Differences occur due to economic conditions, population density, geography and climate. Differences also can be seen in water quality data.

Throughout the length of the river, water quantity and water quality were identified by local residents as priorities. The single challenge the entire border region has in common is the inability of infrastructure to keep pace with growth. The growth of the region is primarily because it is an international border—it is the first contact for the flow of goods and products entering and exiting the country.

A major problem for the Rio Grande is lack of water flow, which has many causes, including retention of water in Mexican reservoirs, drought, and aquatic weeds—especially downstream of International Falcon Dam—that soak up water and impede flow. Some areas still require significant binational actions to ensure the river meets water quality standards. While Texas has made progress, not all colonias have the needed water and wastewater services, or solid waste collection. In some areas, hazardous materials transportation and storage are key concerns. Air quality concerns are mostly limited to the El Paso and Big Bend areas.

Small communities face enormous challenges, such as difficulties in upgrading water and wastewater infrastructure and securing adequate disposal options for solid waste. These problems have not been sufficiently addressed.

In certain cases, actions being taken by a number of agencies and organizations with respect to environmental problems are producing results. To continue improving the environment, the TNRCC recommends these agencies and organizations collaborate on the following next steps:

## Recommendations

### Multimedia

1. Create a **formal process** for the enhanced coordination of activities related to the environment in the Texas border region. The formal process should work to reduce duplication and identify gaps. The process also should provide for the participation of all appropriate U.S. and Mexico federal, state, and local governments. The goal of this process would be to address environmental problems through the development of a **border environmental action plan and annual updates**.
2. Encourage the development and maintenance of programs focused on **small communities and rural areas** with emphasis on **outreach, coordination, and technical assistance** through appropriate state agencies, such as the Office of Rural Community Affairs, the Texas Department of Housing and Community Affairs, and the Texas Water Development Board.
3. Promote the sharing of **best management practices** among border communities to foster creative solutions for environmental problems, including the replication of the Laredo Warehouse Ordinance, El Paso's Water Conservation Program, and Hidalgo County's Pilot Program for Solid Waste Collection.

4. Support increased federal, state, private, and local funding of **cross-border technical training** for operators of water, wastewater, and solid waste treatment systems; persons who maintain air quality monitors; and laboratory employees who analyze environmental test results.
5. Support cooperative efforts to **increase the environmental literacy** of teachers, students, and the public through funding for development and implementation of opportunities to learn more about how the environment affects their daily lives.

### Water Quantity

6. Make all possible efforts to resolve the **outstanding water debt** under the 1944 Treaty.
7. Work with appropriate state and federal agencies on both sides of the border to improve the **characterization of groundwater quality** and availability in the border region, because groundwater quality can limit the amount available for drinking water and other purposes.
8. Support a high-level cross-border dialogue aimed at developing a consensus on **methods for controlling aquatic weeds**, particularly the use of herbicides.
9. Work with federal and state funding agencies and private entities to improve the efficiency and reduce water loss of **irrigation canals that convey and distribute water** in the Lower Rio Grande Valley.

### Water Quality

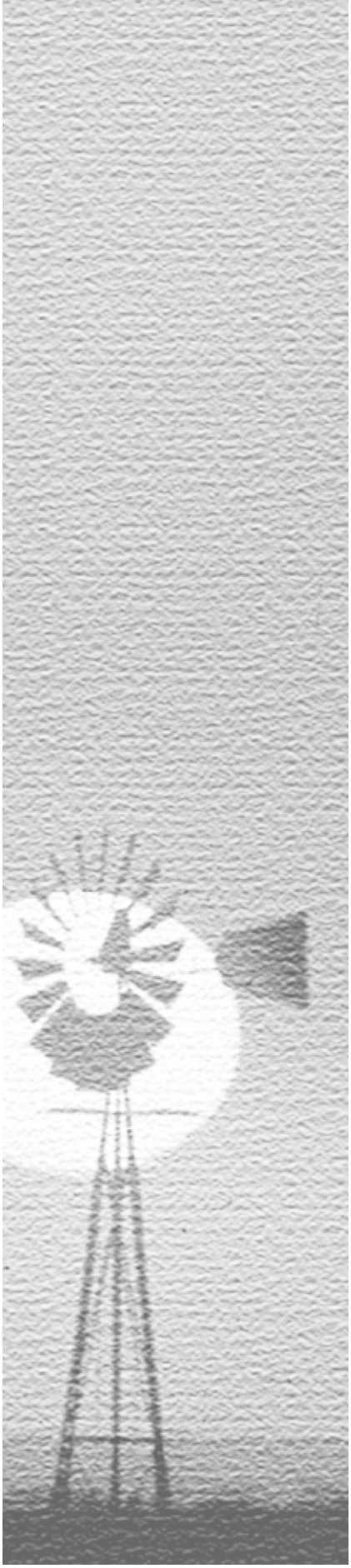
10. Encourage a federal increase in the **Border Environment Infrastructure Fund (BEIF)** administered by the North American Development Bank (NADBank).
11. Encourage the U.S. and Mexico to **agree on funds to support the BECC and NADBank and to increase funding levels** to allow the two institutions to carry out their responsibilities, as described in the Agreement between the U.S. and Mexico.
12. Encourage the BECC and NADBank to expedite the provision of **water and wastewater services** in communities currently lacking such services, especially colonias.

### Solid Waste

13. Work with local governments in developing strategies to **improve solid waste service and provide alternatives to illegal dumping**.

### Air

14. Work with the EPA, SEMARNAT, and the Joint Advisory Committee for the Improvement of Air Quality in the Ciudad Juárez, Chihuahua-El Paso, Texas-Doña Ana County, New Mexico Air Basin (JAC) to **improve air quality monitoring, emissions inventories, and ozone modeling on both sides of the border**.



# APPENDIXES

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **μg/m³** | micrograms per cubic meter |
| **BART** | best available retrofit technology |
| **BECC** | Border Environment Cooperation Commission |
| **BEIF** | NADBank's Border Environmental Infrastructure Fund |
| **BMP** | best management practice |
| **BRAVO** | Big Bend Regional Aerosol Visibility Observational Study |
| **CBEC** | Coastal Bend Environmental Conference in the STEC series |
| **CDBG** | Texas' Community Development Block Grants program |
| **CEAC** | Laredo Citizens' Environment Advisory Committee |
| **CEC** | North American Commission for Environmental Cooperation |
| **CEER** | The Center for Energy and Environmental Resources at the University of Texas |
| **CENRAP** | Central States Regional Air Planning Association |
| **CERCLA** | The U.S. Comprehensive Environmental Response, Compensation, and Liability Act |
| **CESQG** | conditionally exempt small quantity generator |
| **CNA** | Comisión Nacional del Agua (National Water Commission) in Mexico |
| **CO** | carbon monoxide |
| **COG** | Council of Governments |
| **COMAPA** | The Comisión Municipal de Agua Potable y Alcantarillado (Drinking Water and Wastewater Management Agency) of Nuevo Laredo, Tamaulipas |
| **CWA** | The U.S. federal Clean Water Act |
| **DDT** | dichloro-diphenyl-trichloroethane |
| **DMI** | domestic, municipal, and industrial water use or users |
| **DPS** | Texas Department of Public Safety |
| **DWSRF** | Drinking Water State Revolving Fund |
| **EBK** | environmental brick kiln |
| **EDAP** | Economically Distressed Areas program |
| **EE** | environmental education |
| **EPA** | United States Environmental Protection Agency |
| **EPCRA** | The U.S. Emergency Planning and Community Right-to-Know Act |
| **EPISO** | El Paso Interreligious Sponsoring Organization |
| **ESD** | Laredo Environmental Services Department |
| **FCAA** | The U.S. federal Clean Air Act |
| **FUMEC** | The U.S.-Mexico Science Foundation |
| **FY** | fiscal year |
| **GCD** | Texas Groundwater Conservation District |
| **GNEB** | Good Neighbor Environmental Board |
| **HAP** | hazardous air pollutant |
| **HHW** | household hazardous waste |
| **IBWC** | International Boundary and Water Commission |
| **IMTA** | Instituto Mexicano de Tecnología del Agua (the Mexican Institute of Water Technology) |
| **INE** | Mexico's Instituto Nacional de Ecología (National Institute of Ecology) |

| | |
|---|---|
| **INEGI** | Mexico's Instituto Nacional de Estadística Geografía e Informática (National Institute of Statistics, Geography, and Informatics) |
| **ISD** | independent school district |
| **ITESM** | The Monterrey Institute of Technology and Higher Studies (Instituto Tecnológico de Estudios Superiores de Monterrey) in Mexico |
| **JAC** | Joint Advisory Committee for the Improvement of Air Quality in the Ciudad Juárez, Chihuahua-El Paso, Texas-Doña Ana County, New Mexico Air Basin |
| **km** | kilometer |
| **LRGDC** | Lower Rio Grande Development Council |
| **LRGV** | Lower Rio Grande Valley |
| **maf** | million acre-feet |
| **mgd** | million gallons per day |
| **MLRA** | NRCS major land resource areas |
| **MRGDC** | Middle Rio Grande Development Council |
| **MS** | multiple sclerosis |
| **MSA** | metropolitan statistical area |
| **MSW** | municipal solid waste |
| **MUD** | municipal utility district |
| **NAAEE** | North American Association for Environmental Education |
| **NAAQS** | The U.S.'s National Ambient Air Quality Standards |
| **NADBank** | North American Development Bank |
| **NAFTA** | North American Free Trade Agreement |
| **NEAP** | natural events action plan |
| **NMED** | New Mexico Environment Department |
| **NOAA** | United States National Oceanic and Atmospheric Administration |
| **NPDES** | The U.S.'s National Pollutant Discharge Elimination System |
| **NPS** | nonpoint source pollution |
| **$NO_x$** | nitrogen oxides |
| **NPS** | United States National Park Service |
| **NRCS** | The USDA's Natural Resource Conservation Service |
| **$O_3$** | Ozone |
| **OCE** | TNRCC's Office of Compliance and Enforcement |
| **OAG** | Texas Office of the Attorney General |
| **OPA** | TNRCC's Office of Public Assistance |
| **ORCA** | Texas Office of Rural Community Affairs |
| **P2** | pollution prevention |
| **P4** | Permanent Pollution Prevention program |
| **PAH** | polycyclic aromatic hydrocarbon |
| **PCB** | polychlorinated biphenyls |
| **PdR** | Project del Río |
| **PGMA** | Priority Groundwater Management Area |
| **PM** | particulate matter (subscript numerals indicate size of particle) |
| **ppb** | parts per billion |
| **PPIA** | TNRCC's Pollution Prevention and Industry Assistance Section of the SBEA Division |
| **ppm** | parts per million |
| **PROFEPA** | Mexico's Procuraduría Federal de Protección al Ambiente (Attorney General for Environmental Protection) |
| **PSB** | Public Service Board |
| **RC&D** | Resource Conservation and Development Program of the USDA's NRCS |
| **REC** | Río Bravo/Rio Grande Environmental Conference in the STEC series |
| **RFP** | request for proposals |
| **RGISC** | The Rio Grande International Study Center at Laredo Community College |
| **RRC** | Texas Railroad Commission |
| **RSVP** | El Paso Retired Senior Volunteer Program |
| **RWPG** | Texas Water Development Board Regional Water Planning Group |
| **SAV** | site assistance visit |
| **SB** | Texas Senate bill |

| | |
|---|---|
| **SBEA** | TNRCC's Small Business and Environmental Assistance Division |
| **SEDUE** | The Secretaría de Desarrollo Urbano y Ecología (Secretariat of Urban Development and Ecology) of the state of Tamaulipas, Mexico or the state of Chihuahua |
| **SEMARNAT** | Secretaría de Medio Ambiente y Recursos Naturales (Secretariat of the Environment and Natural Resources) in Mexico |
| **SEP** | supplemental environmental project |
| **SIP** | U.S. State Implementation Plan |
| **SMAAC** | The Sociedad Mexicana de Aguas, A.C. (Mexican Water Society) |
| **SOS** | Texas Secretary of State's Office |
| **SRF** | state revolving funds |
| **SWEP** | The NADBank's Solid Waste Environment Program |
| **STDC** | South Texas Development Council |
| **STEC** | South Texas Environmental Conference organized by the Texas A&M University at Kingsville's Environmental Engineering Department |
| **Superfund** | The U.S. Comprehensive Environmental Response, Compensation, and Liability Act |
| **TACB** | Texas Air Control Board (one of the predecessor agencies to the TNRCC) |
| **TAES** | Texas Agricultural Experiment Station |
| **TAEX** | Texas Agricultural Extension Service |
| **TAKS** | Texas Assessment of Knowledge and Skills test |
| **TCPS** | Texas Center for Policy Studies |
| **TDA** | Texas Department of Agriculture |
| **TDH** | Texas Department of Health |
| **TDHCA** | Texas Department of Housing and Community Affairs |
| **TEEX** | Texas Engineering Extension Service |
| **Tejeda Center** | The Frank M. Tejeda Center for Excellence in Environmental Operations |
| **TEKS** | Texas Essential Knowledge and Skills |
| **TES** | Teaching Environmental Sciences courses offered by the TNRCC's SBEA Division |
| **TGPC** | Texas Groundwater Protection Committee |
| **TMDL** | total maximum daily load |
| **TNRCC** | Texas Natural Resource Conservation Commission |
| **TPDES** | Texas Pollutant Discharge Elimination System |
| **TPWD** | Texas Parks and Wildlife Department |
| **TRI** | The EPA's Toxics Release Inventory |
| **TSDF** | treatment, storage, or disposal facility |
| **TSSWCB** | Texas State Soil and Water Conservation Board |
| **TWDB** | Texas Water Development Board |
| **TWRI** | Texas Water Resources Institute |
| **TxDOT** | Texas Department of Transportation |
| **U.S.** | United States |
| **USDA** | United States Department of Agriculture |
| **USDOT** | United States Department of Transportation |
| **USGS** | United States Geological Survey |
| **UTHSCSA** | The University of Texas Health Science Center at San Antonio |
| **VCP** | Texas' Voluntary Cleanup Program |
| **VISTA** | The AmeriCorps' Volunteers in Service to America program |
| **VOCs** | volatile organic compounds |
| **WCID** | Water Control and Improvement District |
| **WEAT** | Water Environment Association of Texas |
| **WEF** | Water Environment Federation |
| **WERC** | Waste-Management, Education, and Research Consortium |
| **WSC** | Water Supply Corporation |
| **WQMP** | water quality management plan |

# TEXAS BORDER ENVIRONMENTAL OFFICES

## Texas Natural Resource Conservation Commission

Some of these TNRCC regions contain more counties, but for this report, only border counties are listed.

**Region 6**
*Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio Counties*
401 E. Franklin Ave., Suite 560
El Paso, TX 79901-1206
Phone: 915/834-4949
Fax: 915/834-4940

**Region 7**
*Pecos, Reeves, and Terrell Counties*
3300 North A St., Building 4, Suite 107
Midland, TX 79705-5404
Phone: 915/570-1359
Fax: 915/570-4795

**Region 8**
*Crockett County*
622 S. Oakes, Suite K,
San Angelo, TX 76903-7013
Phone: 915/655-9479
Fax: 915/658-5431

**Region 13**
*Edwards, Frio, Real, and Uvalde Counties*
14250 Judson Rd.
San Antonio, TX 78233-4480
Phone: 210/490-3096
Fax: 210/545-4329

**Region 15**
*Brooks, Cameron, Hidalgo, Jim Hogg, Kenedy, Starr, and Willacy Counties*
*Includes the Office of the Rio Grande Watermaster*
1804 West Jefferson Avenue
Harlingen, TX 78550-5247
Phone: 956/425-6010
Fax: 956/412-5059

*Region 15 Eagle Pass Office*
1152 Ferry St. Suite H
Eagle Pass TX 78852
Phone: 830/773-5059
Fax: 830/773-4103

**Region 16**
*Dimmit, Duval, Kinney, La Salle, Maverick, McMullen, Val Verde, Webb, Zapata, and Zavala Counties*
1403 Seymour, Suite 2
Laredo, TX 78040-8752
Phone: 956/791-6611
Fax: 956/791-6716

## U.S. Environmental Protection Agency

*Toll-free number for all U.S.-Mexico border questions*: 1-800-334-0741

**EPA Region 6**
U.S. Mexico Border Coordinator
1445 Ross Avenue
Dallas TX 75202
Phone: 214/665-8188
Fax: 214/665-7263

**EPA El Paso Regional Office**
4050 Rio Bravo, Suite 100
El Paso, TX 79902
Phone: 915/533-7273

**EPA Brownsville Satellite Office**
International Building
3505 Boca Chica, Suite 200
Brownsville, TX 78521
Phone: 956/548-0989

# GLOSSARY OF TERMS

The following brief explanations of terms are provided as a convenience for readers of this document, especially for nonspecialists. The explanations here do not take the place of any full, formal definition in state or federal laws and regulations.

**acre-foot** The amount of water required to cover one acre to a depth of one foot. An acre-foot equals 325,851 gallons, or 43,560 cubic feet. A flow of 1 cubic foot per second produces 1.98 acre-feet per day.

**acute toxic waste** Waste which is very toxic and can be fatal to humans in small amounts.

**air basin** A geographical region all of whose surface features determine a common atmospheric interaction for that region.

**air toxics** Generally defined as those pollutants that are known or suspected to cause serious heath problems, see *hazardous air pollutants*.

**alluvium** Deposits of clay, silt, sand, gravel, or other particulate material that have been deposited by a river in a riverbed.

**ambient toxicity** The degree to which in-stream water or sediment has a harmful effect on aquatic life.

**aquifer** A stratum or zone below the surface of the earth capable of producing water from wells.

**best management practices (BMPs)** Those practices determined to be the most efficient, practical, and cost-efficient measures identified to guide a particular activity or address a particular problem.

**biosolids** Nutrient-rich organic materials that are produced by wastewater treatment processes and that can be beneficially recycled. Biosolids contain nitrogen and phosphorus along with other supplementary nutrients in smaller doses, such as potassium, sulfur, magnesium, calcium, copper, and zinc.

**bolson** A basin, depression, or valley having no outlet and which, geographically, is a closed basin that has received a great thickness of sediments.

**border region** For the purposes of this report, the TNRCC uses the definition in the La Paz Agreement between the U.S. and Mexico, which defines the border region as extending 100 kilometers (62.5 miles) on either side of the boundary between the two countries. On the Texas side, this includes all or parts of 32 counties.

**brine** Highly salty and heavily mineralized water sometimes containing heavy metal and organic contaminants.

**brownfield** An old industrial property that has been abandoned or underutilized due to liability associated with real or perceived contamination.

**carbon monoxide (CO)** A product of burning fossil fuels that impedes the blood's ability to deliver oxygen.

**Class I Areas** Geographic areas receiving special protection for visibility, particularly national parks and wilderness areas.

**Ciudad** Spanish term for "city."

**colonia** An unincorporated community that lacks one or all basic services such as electricity, water, and sewers.

**compliance assistance** Any customer service activity that facilitates improvement of public health and the environment.

**contact recreation** Activities involving a significant risk of ingestion of water, such as wading by children, swimming, water skiing, diving, and surfing.

**conversion factor** A conversion factor is a ratio of one unit to another. It is used to convert between units.

**criteria pollutants** The six pollutants that the EPA, as tasked under the FCAA, determined to be the most dangerous to public health and welfare: ozone, nitrogen dioxide, sulfur dioxide, particulate matter, carbon monoxide, and lead.

**dissolved oxygen** The amount of oxygen gas dissolved in a given quantity of water at a given temperature and atmospheric pressure, important for maintaining the health of aquatic life.

**emissions inventory** A listing, by source, of the amounts of pollutants actually or potentially discharged. Such an inventory is used to establish and put forth emission standards.

**environmental education (EE)** A learning process that increases people's knowledge and awareness about the environment and associated challenges; develops the necessary skills and expertise to address these challenges; and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action.

**exceedance** Violation of environmental protection standards by exceeding allowable limits or concentration levels for certain pollutants.

**fecal coliform** The portion of the coliform bacteria group which is present in the intestinal tracts and feces of warm-blooded animals. A common pollutant in water.

**hazardous air pollutants (HAPs)** Those pollutants that may cause death or serious illness as defined by the U.S. federal Clean Air Act (FCAA).

**hazardous material** A substance or material that has been determined to be capable of posing unreasonable risk to health, safety, and property when transported in commerce.

**hazardous waste** A solid waste that poses a substantial present or potential hazard to human health or the environment when improperly managed, because of quantity, concentration, or physical, chemical, or infectious characteristics.

**household hazardous waste (HHW)** Household products that require special disposal given the dangers they pose to human health and the environment because they are corrosive, explosive/reactive, flammable, or toxic.

**La Paz Agreement** Agreement signed in 1983 by both countries and known formally as the Agreement on Cooperation for the Protection and Improvement of the Environment in the Border Area. Defines the border region as extending 100 km. (62.5 miles) on either side of the U.S.-Mexico boundary.

**leaching** The process by which soluble materials in the soil, such as salts, nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

**legacy pollutants** Chemicals that have been banned or severely restricted, but persist in the environment.

**maquiladora** Foreign-owned plants set up in Mexico under a program that allows raw material or components to be imported tariff-free for processing or assembly. Most finished products must be exported to the country where their constituents originated. Wastes may also be required to be shipped back to the country of origin.

**metropolitan statistical area (MSA)** A large, freestanding population nucleus and those adjacent communities with which it shares a high degree of economic and social integration, all of which is typically surrounded by nonmetropolitan areas.

**million gallons per day (mgd)** A rate of flow of water equal to 133,680.56 cubic feet per day, or 1.5472 cubic feet per second, or 3.0689 acre-feet per day. A flow of one million gallons per day for one year equals 1,120 acre-feet (365 million gallons).

**mine tailings** Rock residue left over from the extraction process. Heavy metals and pollutants in these residues can leach into surface and groundwater.

**multimedia** Cutting across two or more environmental media (air, water, and land resources).

**municipio** The level of Mexican government that corresponds to a U.S. county.

**nonattainment area** A geographical area within the U.S. not in compliance with the National Ambient Air Quality Standards.

**noncontact recreation** Recreational pursuits not involving a significant risk of water ingestion, including fishing, commercial and recreational boating, and limited body contact incidental to shoreline activity.

**nonpoint source (NPS)** Pollution discharged over a wide land area, not from one specific location. These are forms of diffuse pollution caused by sediment, nutrients, organic and toxic substances originating from land-use activities, which are carried to lakes and streams by surface runoff.

**nitrogen oxides ($NO_x$)** Products of combustion by mobile and stationary sources and a major contributor to the formation of harmful ozone.

**nutrient** As a pollutant, any element or compound, such as phosphorous or nitrogen, that fuels abnormally high organic growth in aquatic ecosystems.

**ozone ($O_3$)** In the lower atmosphere ozone is a major component of photochemical smog and is formed through a chemical reaction between volatile organic compounds and nitrogen oxides in the presence of heat and sunlight.

**particulate matter (PM)** Very fine solid or liquid particles in the air or in an emission. Particulate matter includes dust, smoke, fumes, mist, spray, and fog.

**polychlorinated biphenyls (PCBs)** A group of synthetic, toxic industrial chemical compounds once used in making paint and electrical transformers, which are chemically inert and not biodegradable. PCBs were frequently found in industrial wastes, and subsequently found their way into surface and groundwater. As a result of their persistence, they tend to accumulate in the environment.

**precursor** A chemical compound that reacts in the atmosphere to form a different compound that is considered a pollutant.

**public water supply** Water withdrawn by public governments and agencies, such as a county water department, and by private companies that is then delivered to users. Public suppliers provide water for domestic, commercial, thermoelectric power, industrial, and public water users.

**push water** There are two definitions of "push water," depending on circumstances.

a) Push water in the Rio Grande is the amount of water released over demand to convey the demand water downstream at the appropriate rate and within travel time for all users. This is charged against the operating reserve and is a justifiable (although unwelcome) in-system loss.

b) The other push water, more importantly now, is what is needed when an irrigation district runs out of irrigation water. Municipal water "rides" on top of irrigation water. As irrigation water runs out on a per district basis, the canals would go dry and the municipal water would have nothing to "ride" on top of. The Rio Grande watermaster must "lend" water from the system that is not owned by the district and not intended to cover their losses, but still needed to charge the canals and convey the municipal water. This push water will increase overall system losses that will affect Amistad/Falcon reserves and other water right holders.

**rule of capture** Doctrine in groundwater law that permits land owners to undertake unrestricted pumping of groundwater from an aquifer beneath their property.

**salinity** The amount of dissolved salts in a given volume of water. Water with higher salinity requires more treatment prior to human consumption.

**"sham" recycling** Hazardous waste that is labeled for recycling, but destined for illegal disposal.

**sister-city plan** Cross-border agreements, required by the La Paz Agreement, that specify how Brownsville-Matamoros, Laredo-Nuevo Laredo, and other sister cities will respond to chemical spills and related emergencies.

**site assistance visits (SAVs)** Visits by the TNRCC's Small Business and Environmental Assistance staff to maquiladoras in the U.S. and Mexico to analyze and make recommendations on activities which will help conserve resources and prevent pollution.

**state implementation plan (SIP)** An EPA-approved plan that details how a state will establish, regulate, and enforce the Clean Air Act's ambient air quality standards.

**State Revolving Funds (SRF)** Through State Revolving Loan Funds, or SRFs, the state makes loans to communities for high-priority water quality activities. As money is paid back into the revolving fund, new loans are made to other recipients that need help in maintaining the quality of their water.

**total maximum daily loads (TMDLs)** The maximum amount of a pollutant that can be discharged into a water segment by all sources without violating a water quality standard.

**visibility** The ability to see the color, shape, contrast, and texture of a landscape or city skyline.

**volatile organic compounds (VOCs)** Carbon-containing precursor compounds that undergo chemical reactions in sunlight and help create smog.

# FOR MORE INFORMATION

Details on how to obtain more detailed information about some of the topics discussed in this report can be found below. For a listing of all TNRCC publications, visit **www.tnrcc.state.tx.us/admin/topdoc/index.html**.

## Chapter 2

Information on how to apply for Texas MSW COG grants can be found on the TNRCC Web site at **www.tnrcc.state.tx.us/oprd/wasteplan/grants.html**.

Prior issues of the *Texas VCP News* can be found on the TNRCC Web site at **www.tnrcc.state.tx.us/admin/topdoc/pd/021/**.

## Chapter 3

A variety of information concerning air quality monitoring site locations, historical data, and daily concentration measurements is available on the TNRCC Web site. As an entry point for the relevant web pages, go to **www.tnrcc.state.tx.us/air/monops/index.html** and scroll down the full page to review the choices. All the data from the Texas and New Mexico monitors not only go to the state agencies but also to the EPA, and can also be found on the Web.

For more information on the TNRCC AmeriCorps*VISTA Project, please contact Brenda Cash, VISTA Supervisor, **bcash@tnrcc.state.tx.us**, 512/239-4744.

More information on EPA's Wire-the-Border project can be found at **www.usmcoc.org/pro/env3.html**.

## Chapter 5

For more information on the Teaching Environmental Sciences courses, contact Dr. Eunice Hefty, **ehefty@tnrcc.state.tx.us**, 512/239-0043.

## Chapter 6

The EPA Border Environmental Education Resource Guide can be obtained from the EE Exchange, 738 North 5th Avenue, Suite 100, Tucson, AZ, Phone: 520/670-1442, Fax: 520/670-1443.

# WEB SITES OF INTEREST

The Web sites listed on these two pages offer readers a wealth of information about the U.S.-Mexico border region. Many are organizational home pages that have links to more detailed sites.

## General Information

### Federal (U.S.)

The United States Environmental Protection Agency (EPA) ..... **www.epa.gov**

EPA's Office of International Activities Country and Regional Programs ..... **www.epa.gov/oia/crp.htm**

U.S.-Mexico Border XXI Program ..... **www.epa.gov/usmexicoborder**

U.S. Census ..... **www.census.gov**

### Federal (Mexico)

Mexican National Institute of Statistics, Geography, and Informatics (INEGI) ..... **www.inegi.gob.mx**

Mexico's Secretary of the Environment and Natural Resources (SEMARNAT) ..... **www.semarnat.gob.mx**

### State

Texas Natural Resource Conservation Commission (TNRCC) ..... **www.tnrcc.state.tx.us**

TNRCC's Border Issues ..... **www.tnrcc.state.tx.us/exec/ba/index.html**

Texas Secretary of State's Office ..... **www.sos.state.tx.us**

Texas State Comptroller's Office ..... **www.cpa.state.tx.us**

Texas State Data Center ..... **www.txsdc.tamu.edu**

## Multimedia Environmental Programs

TNRCC's Border Pollution Prevention ..... **www.tnrcc.state.tx.us/exec/oppr/border/border.html**

### Water Quantity and Water Quality

International Boundary and Water Commission ..... **www.ibwc.state.gov**

Texas Water Development Board ..... **www.twdb.state.tx.us**

Cyberways and Waterways on-line learning environment ..... **www.CyberwaysandWaterways.com**

## Air Quality

Federal Clean Air Act (U.S.) ..... **www.epa.gov/oar/oaq_caa.html**

EPA Air Quality ..... **www.epa.gov/ebtpages/air.html**

TNRCC Air Quality Monitoring ..... **www.tnrcc.state.tx.us/air/monops/index.html**

Joint Advisory Committee for the Improvement of Air Quality in the Ciudad Juárez, Chihuahua-El Paso, Texas-Doña Ana County, New Mexico Air Basin (JAC) ..... **http://air.utep.edu/bca/jac/**

Western Governor's Association Border Energy Program ..... **www.borderenergy.org**

"An Introduction to Visibility with Animated Figures" - a summary of air quality issues related to visibility ..... **www.vista.cira.colostate.edu/IMPROVE/Education/IntroToVisinstr.htm**

# PASS-THROUGH GRANTS FOR BORDER AREA COGS

## Regional Solid Waste Grants Program, FY2000-20001

**Lower Rio Grande Valley Development Council**
**Middle Rio Grande Development Council**
**Rio Grande Council of Governments**
**South Texas Development Council**

| Recipient | Total | FY | Purpose | COG | County |
|---|---|---|---|---|---|
| City of El Paso | $19,320.00 | 2000 | Recycling Trailers | 8 | El Paso |
| City of El Paso | $53,830.00 | 2000 | Anti-Dumping Ad Campaign | 8 | El Paso |
| City of Socorro | $59,079.00 | 2000 | Recycling Center Improvements | 8 | El Paso |
| Socorro ISD | $42,939.12 | 2000 | Expand Recycling Program | 8 | El Paso |
| Jeff Davis County | $15,000.00 | 2000 | Recycling Transport Truck | 8 | Jeff Davis |
| City of Presidio | $50,000.00 | 2000 | Landfill Scales | 8 | Presidio |
| Jim Hogg County | $15,000.00 | 2000 | Chipper | 19 | Jim Hogg |
| City of Roma | $42,348.00 | 2000 | Landfill Scales | 19 | Starr |
| Webb County | $25,098.00 | 2000 | Local Enforcement Officer | 19 | Webb |
| Cameron County | $9,855.00 | 2000 | Anti-Dumping Ad Campaign | 21 | Cameron |
| Cameron County | $40,219.00 | 2000 | Local Enforcement Officer | 21 | Cameron |
| City of Brownsville | $9,119.99 | 2000 | Solid Waste Education Program | 21 | Cameron |
| City of Brownsville | $21,236.99 | 2000 | School Composting Program | 21 | Cameron |
| City of Brownsville | $25,000.00 | 2000 | Recycling Program at Zoo | 21 | Cameron |
| City of McAllen | $25,000.00 | 2000 | Apartment Recycling Program | 21 | Hidalgo |
| Hidalgo County | $25,000.00 | 2000 | Citizens' Collection Station | 21 | Hidalgo |
| Hidalgo County | $50,000.00 | 2000 | Local Enforcement Officer | 21 | Hidalgo |
| Willacy County | $47,771.58 | 2000 | Local Enforcement Officer | 21 | Willacy |
| City of Carrizo Springs | $19,008.00 | 2000 | Recycling Center Equipment | 24 | Dimmit |
| Dimmit County | $2,522.00 | 2000 | Texas County Cleanup Event | 24 | Dimmit |
| City of Encinal | $18,603.69 | 2000 | Chipper | 24 | La Salle |
| City of Eagle Pass | $18,999.93 | 2000 | Recycling Center Equipment | 24 | Maverick |
| City of Uvalde | $11,000.00 | 2000 | Recycling Center Expansion | 24 | Uvalde |
| Culberson County | $28,000.00 | 2001 | Chipper | 8 | Culberson |
| City of El Paso | $34,595.00 | 2001 | Recycling Education/Ads | 8 | El Paso |
| City of El Paso | $58,588.80 | 2001 | HHW Facility | 8 | El Paso |
| Socorro ISD | $70,266.18 | 2001 | Expand Recycling Program | 8 | El Paso |
| Town of Anthony | $11,023.69 | 2001 | HHW Collection Event | 8 | El Paso |
| City of Presidio | $14,944.98 | 2001 | Local Enforcement Equipment | 8 | Presidio |
| City of Marfa | $20,894.68 | 2001 | Community Cleanup Events | 8 | Presidio |

## Appendix F: COG Grants *(continued)*

| Recipient | Total | FY | Purpose | COG | County |
|---|---|---|---|---|---|
| Rio Grande COG | $10,384.68 | 2001 | Local Enforcement Training | 8 | Regional |
| City of Rio Bravo | $21,940.55 | 2001 | Local Enforcement Officer | 19 | Webb |
| City of Laredo | $40,312.99 | 2001 | Community Recycling Center | 19 | Webb |
| United ISD | $24,597.90 | 2001 | School Recycling Program | 19 | Webb |
| Zapata County | $26,108.77 | 2001 | Local Enforcement Officer | 19 | Zapata |
| Cameron County | $10,000.00 | 2001 | Illegal Dumping Prevention Education | 21 | Cameron |
| Cameron County | $50,000.00 | 2001 | Local Enforcement Officer | 21 | Cameron |
| City of Brownsville | $10,000.00 | 2001 | Recycling Education | 21 | Cameron |
| City of Brownsville | $22,993.00 | 2001 | Recycling Baler/Containers | 21 | Cameron |
| City of Port Isabel | $25,000.00 | 2001 | Backhoe for Composting Program | 21 | Cameron |
| City of McAllen | $10,000.00 | 2001 | Anti-Litter/Recycling Educ. Campaign | 21 | Hidalgo |
| City of McAllen | $11,480.00 | 2001 | Yard Waste Diversion Program | 21 | Hidalgo |
| City of McAllen | $25,000.00 | 2001 | Recycling Equipment | 21 | Hidalgo |
| Hidalgo County | $21,732.00 | 2001 | Recycling Trailer/Containers | 21 | Hidalgo |
| Hidalgo County | $25,000.00 | 2001 | Chipper | 21 | Hidalgo |
| Hidalgo County | $50,000.00 | 2001 | Local Enforcement Officer | 21 | Hidalgo |
| Willacy County | $40,219.00 | 2001 | Local Enforcement Officer | 21 | Willacy |
| City of Carrizo Springs | $10,500.00 | 2001 | Forklift for Recycling | 24 | Dimmit |
| City of Rocksprings | $14,570.00 | 2001 | Chipper Purchase | 24 | Edwards |
| City of Encinal | $13,985.00 | 2001 | Citizens' Collection Station | 24 | La Salle |
| La Salle County | $12,202.05 | 2001 | Chipper | 24 | La Salle |
| City of Eagle Pass | $12,000.00 | 2001 | Illegal Dumping Prevention Education | 24 | Maverick |
| Maverick County | $11,650.00 | 2001 | Local Enforcement Equipment | 24 | Maverick |
| City of Uvalde | $14,000.00 | 2001 | Truck for Recycling | 24 | Uvalde |
| Val Verde County | $15,000.00 | 2001 | Citizens' Collection Station | 24 | Val Verde |

# WATER AND WASTEWATER PROJECTS IN THE UPPER RIO GRANDE SUBREGION

| Agency or Program | Location | Type of Project and Project Status | Residents Benefitted | Cost of Grants and Loans (U.S. dollars) |
|---|---|---|---|---|
| Colonias Coordinator, TX Secretary of State | Colonias coordination | Water, wastewater, solid waste | Several counties | Provides assistance to local residents |
| EDAP | Canutillo, (City of El Paso), El Paso County | Water/wastewater—under construction | 4,080 | $11.06 million, grants and loans |
| EDAP | East Montana, El Paso County | Water—completed | 5,767 | $13.73 million, grants and loans |
| EDAP | Eastside Montana, Homestead MUD, El Paso County | Water—completed | 5,029 | $9.24 million, grant |
| EDAP | Socorro-Bauman Water Project, Lower Valley Water District Authority, El Paso County | Water—completed | 3,588 | $1.80 million, grants and loans |
| EDAP | Socorro Phase II, Lower Valley Water District Authority, El Paso County | Water/wastewater—completed | 8,708 | $14.74 million, grants and loans |
| EDAP | Tornillo Water Supply Corporation, El Paso County | Wastewater—planning stages | 1,247 | $24,750 planning grant |
| EDAP | Vinton, El Paso County | Wastewater—planning stages | 633 | $39,100 planning grant |
| EDAP | Westway, El Paso County WCID, El Paso County | Water—completed | 2,412 | $1.44 million, grants and loans |

## Appendix G: Water and Wastewater Projects in the Upper Rio Grande Subregion *(continued)*

| Agency or Program | Location | Type of Project and Project Status | Residents Benefitted | Cost of Grants and Loans (U.S. dollars) |
|---|---|---|---|---|
| EDAP | Westway II, City of El Paso, El Paso County | Water/wastewater—completed | 3,322 | $5.75 million, grants and loans |
| EDAP | Sierra Blanca, Hudspeth WCID #1, Hudspeth County | Wastewater—completed | 1,100 | $2.23 million, grant |
| EDAP | Pecos City, Reeves County | Water—planning stages | 91 | $63,600 planning grant |
| EDAP and NADBank | Socorro/San Elizario Phase III, Lower Valley Water District Authority, El Paso County | Water/wastewater—under construction | 40,000 | $55.43 million in EDAP grants and loan, $17.5 in NADBank BEIF grants |
| EDAP, BECC, and NADBank | Sanderson, Terrell County WCID, Terrell County | Wastewater—under construction | 1,143 | $4.43 million in EPA grants and loans; $16,00 in BECC technical assistance; $352,042 in NADBank BEIF grants |
| BECC | Alpine, Brewster County | Water—pending certification | | |
| BECC | Marathon, Brewster County | Wastewater—pending certification | | |
| BECC | Clint and San Elizario, El Paso County | Water—pending certification | | |
| BECC | El Paso County Colonias, El Paso County | Waster/wastewater—pending certification | | $200,000 in BECC technical assistance |
| BECC | El Paso County; Doña Ana County, NM; and Ciudad Juárez, Chihuahua | Water—pending certification | | |
| BECC | EPISO On-Site Wastewater Treatment System, El Paso County | Wastewater—completed | | BECC-certified project |
| BECC | Fabens, El Paso County | Water/wastewater—pending certification | | $550,000 in BECC technical assistance |
| BECC | Horizon City, El Paso County | Water/wastewater—pending certification | | $80,000 in BECC technical assistance |

## Appendix G: Water and Wastewater Projects in the Upper Rio Grande Subregion *(continued)*

| Agency or Program | Location | Type of Project and Project Status | Residents Benefitted | Cost of Grants and Loans (U.S. dollars) |
|---|---|---|---|---|
| BECC | Northwest Reclaimed Water Systems Phase I and II, El Paso County | Wastewater—completed | | BECC-certified project |
| BECC | Tornillo, El Paso County | Wastewater—pending certification | | |
| BECC | Vinton, El Paso County | Water/wastewater—pending certification | | |
| BECC | Sheffield, Pecos County | Water/wastewater—pending certification | | $50,000 in BECC technical assistance |
| BECC | Marfa, Presidio County | Water/wastewater—pending certification | | $125,000 in BECC technical assistance |
| BECC | Presidio, Presidio County | Wastewater—pending certification | | $30,000 in BECC technical assistance |
| BECC | Coyame, Chihuahua | Wastewater—pending certification | | |
| BECC | Ojinaga, Chihuahua | Wastewater—pending certification | | |
| BECC | Valle de Juárez, Chihuahua | Wastewater—pending certification | | |
| NADBank | Jonathan Rogers Water Treatment Plant Expansion, El Paso County | Water—under construction | 47,000 | $14.9 million in NADBank BEIF grants |
| NADBank | Ciudad Juárez, Chihuahua | Wastewater—completed | 1,100,250 | $4.58 million in loans, $11.08 million in NADBank BEIF grants |

# WATER AND WASTEWATER PROJECTS IN THE MIDDLE RIO GRANDE SUBREGION

| Agency or Program | Location | Type of Project and Project Status | Residents Benefitted | Cost of Grants and Loans (U.S. dollars) |
|---|---|---|---|---|
| Colonias Coordinator, TX Secretary of State | Colonias coordination | Water, wastewater, solid waste | Several counties | Provides assistance to local residents |
| EDAP | Carrizo Hills, Dimmit County | Water/wastewater—completed | 872 | $2.94 million in grants and loans |
| EDAP | Catarina WSC, Dimmit County | Water/wastewater—completed | 239 | $1.11 million |
| EDAP | Moore WSC, Frio County | Wastewater—planning stage | 579 | $1.66 million estimated construction costs |
| EDAP | Encinal, La Salle County | Water/wastewater—planning stage | 917 | $25,700 planning grant |
| EDAP | Eagle Pass, Edison Road and Quintas Fronterizas, Maverick County | Wastewater—completed | 7,467 | $12.07 million, grants and loans |
| EDAP | Eagle Pass, Maverick County | Water and wastewater—planning stage | 7,180 | Planning grant to develop $39.6 project |
| BECC | Eagle Pass, Maverick County | Pending certification | | $1 million in technical assistance |
| EDAP | Spofford, Kinney County | Water—completed | 66 | $400,000 grant |
| EDAP | Windmill WSC, Uvalde County | Water—completed | 1,264 | $2.53 million, grants and loans |
| EDAP | Larga Vista, Webb County | Wastewater—completed | 469 | $1.57 million |

## Appendix H: Water and Wastewater Projects in the Middle Rio Grande Subregion *(continued)*

| Agency or Program | Location | Type of Project and Project Status | Residents Benefitted | Cost of Grants and Loans (U.S. dollars) |
|---|---|---|---|---|
| EDAP BECC/ NADBank | Laredo and Webb County–Mines Road, SH 59 | Water/wastewater—planning stage; certified by BECC, NADBank grants given | 3,525 | $16.77 million in EDAP grants and loans; $182,000 in BECC technical assistance and $6.23 million in NADBank funds |
| EDAP | Laredo and Webb County–El Cenizo and Rio Bravo | Water/Wastewater—planning stage | 8,912 | $20.1 million in EDAP grants and loans |
| EDAP | Laredo and Webb County | Water/wastewater—planning stage | 1,291 | $71,250 planning grant; $4.5 million estimated cost |
| EDAP | Crystal City, Zavala County | Wastewater—completed | 428 | $650,000 |
| EDAP | Batesville WSC, Zavala County | Water/wastewater—planning stage | 1,476 | $2.65 million estimated construction costs |
| EDAP | Zavala County WCID #1 | Water/wastewater—planning stage | 2,072 | $4.18 million |
| EDAP, Tejeda Center for Environ-mental Excellence | Asherton, Dimmit County | Water/wastewater—planning stage | 1,076 | $24,750 planning grant |
| BECC/ NADBank | Nuevo Laredo | Water/wastewater—scheduled for certification in 2002 | 500,000 | BECC Step one submitted; estimated $100,000,000 |
| BECC/ NADBank | Piedras Negras | Wastewater—under construction | 128,000 | $263,000 in BECC technical assistance, $8.5 million grant from NADBank, matched by $8.5 million from CNA |

# WATER AND WASTEWATER PROJECTS IN THE LOWER RIO GRANDE SUBREGION

| Agency or Program | Location | Type of Project and Project Status | Residents Benefitted | Cost of Grants and Loans (U.S. dollars) |
|---|---|---|---|---|
| Colonias Coordinator, TX Secretary of State | Colonias coordination | Water, wastewater, solid waste | Several counties | Provides assistance to local residents |
| TWDB Self-Help Program | North Alamo WSC, San Carlos, Hidalgo County | Water/wastewater—planning stage | 969 | Will provide planning assistance. Community must match 10% of costs directly, 40% of construction cost in volunteer labor (sweat equity) |
| TWDB Self-Help Program | Weslaco, Hidalgo County | Wastewater—completed | 348 | $40,000 Self-Help grant. Community must match 10% of costs directly, 40% of construction cost in volunteer labor (sweat equity) |
| EDAP | Olmito WSC, Cameron County | Wastewater—completed | 4,044 | $7.08 million, grant |
| EDAP | La Feria, Cameron County | Wastewater—planning stages | 1,076 | $43,311 planning grant for project with $4,335,819 estimated construction cost |
| EDAP | Rio Hondo, Cameron County | Water/wastewater—completed | 324 | $55,000, grants and loans |
| EDAP | Los Fresnos, Cameron County | Wastewater—under construction | 2,775 | $9.91 million grant |
| EDAP | Arroyo Colorado Estates and Bishop-Leal Subdivision, Harlingen, Cameron County | Wastewater—completed | 947 | $1.37 million, grants and loans |

## Appendix I: Water and Wastewater Projects in the Lower Rio Grande Subregion *(continued)*

| Agency or Program | Location | Type of Project and Project Status | Residents Benefitted | Cost of Grants and Loans (U.S. dollars) |
|---|---|---|---|---|
| EDAP | San Benito, Cameron County | Water/wastewater—under construction | 636 | $2.04 million grant |
| EDAP | Combes, Cameron County | Water/wastewater—under construction | 2,692 | $12.84 million grant |
| EDAP | Primera, Cameron County | Water/wastewater—under construction | 4,051 | $10.27 million, grants and loans |
| EDAP | Regional Planning Groups A-E Hidalgo County | Wastewater—planning stage | 9,808 | Five planning grants (one per group) totaling $310,391. |
| EDAP | Rural Planning, Hidalgo County | Wastewater—planning stage | 747 | $450,000 planning grant for project with $890,137 estimated construction cost |
| EDAP | Military Highway WSC, South Tower Estates, Hidalgo County | Wastewater—completed | 1,290 | $77,000, grants and loans |
| EDAP | North Alamo WSC, Doolittle, Hidalgo County | Water—completed | 2,365 | $2.38 million, grants and loans |
| EDAP | North Alamo WSC, San Juan, Hidalgo County | Water—completed | 4,158 | $3.36 million, grants and loans |
| EDAP | Faysville, Edinburg, Hidalgo County | Water/wastewater—completed | 4,472 | $10.69 million, grants and loans |
| EDAP | Lull, Edinburg, Hidalgo County | Water/wastewater—completed | 1,296 | $1.45 million, grants and loans |
| EDAP | Northwest, Edinburg, Hidalgo County | Water/wastewater—planning stage | 521 | $46,286 planning grant for project with $1,103,977 estimated construction cost |
| EDAP | Madero and Granejo communities, Mission, Hidalgo County | Water/wastewater—completed | 1,361 | $4.48 million, grants and loans |

## Appendix I: Water and Wastewater Projects in the Lower Rio Grande Subregion *(continued)*

| Agency or Program | Location | Type of Project and Project Status | Residents Benefitted | Cost of Grants and Loans (U.S. dollars) |
|---|---|---|---|---|
| EDAP | Mission, Hidalgo County | Water/wastewater—planning stages | 7,115 | $48,750 planning grant for project with $12,274,480 estimated construction cost |
| EDAP | Elsa, Hidalgo County | Water/wastewater—planning stages | 2,579 | $37,500 planning grant for project with $5,212,801 estimated construction cost |
| EDAP | McAllen Public Utility Board, Hidalgo County | Water/wastewater—planning stages | 5,031 | $46,125 planning grant for project with $5,207,895 estimated construction cost |
| EDAP | Edcouch, Hidalgo County | Wastewater—planning stages | 300 | $21,000 planning grant for project with $1,103,977 estimated construction cost |
| EDAP | Alton, Hidalgo County | Water/wastewater—planning stages | 2,020 | $46,181 planning grant for project with $4,141,517 estimated construction cost |
| EDAP | Eastern Half, La Joya WSC, Hidalgo County | Water/wastewater—planning stages | 37,624 | $81,750 planning grant for project with $47,874,878 estimated construction cost |
| EDAP | Mercedes, Hidalgo County | Water/wastewater—under construction | 3,885 | $6.03 million, grants and loans; $90,000 innovative/alternative technologies grant |
| EDAP | Las Milpas, Pharr, Hidalgo County | Water/wastewater—substantially complete | 9,918 | $10.17 million, grants and loans |
| EDAP | Las Milpas II, Pharr, Hidalgo County | Water/wastewater—under construction | 2,648 | $19.96 million, grants and loans |
| EDAP | Weslaco, Hidalgo County | Wastewater—under construction | 4,127 | $8.73 million, grants and loans |
| EDAP | San Juan, Hidalgo County | Wastewater—under construction | 5,522 | $7.73 million, grants and loans |

## Appendix I: Water and Wastewater Projects in the Lower Rio Grande Subregion *(continued)*

| Agency or Program | Location | Type of Project and Project Status | Residents Benefitted | Cost of Grants and Loans (U.S. dollars) |
|---|---|---|---|---|
| EDAP | Rincon WSC, Starr County | Water/wastewater—completed | 2,146 | $1.15 million, grants and loans |
| EDAP | La Sara, North Alamo WSC, Willacy County | Wastewater—completed | 824 | $1.69 million grant |
| EDAP | Sebastian WSC, Willacy County | Wastewater—completed | 1,904 | $3.02 million, grants and loans |
| EDAP, BECC | Western Half, La Joya WSC, Hidalgo County | Water/wastewater—planning stages, pending certification | 6,563 | $79,500 in EDAP planning grants, $70,000 in BECC technical assistance |
| EDAP, BECC | Rio Grande WSC, Starr County | Water/wastewater—planning stage | 2,293 | $52,131 EDAP planning grant, $300,000 in BECC technical assistance |
| EDAP, NADBank | Roma, Starr County | Water/wastewater—under construction | 16,234 | $28.98 million in EDAP grants, $99,000 in NADBank grants for wastewater portion |
| EDAP, NADBank | Alton, Hidalgo County | Wastewater—phase one complete, hookups substantially complete | 8,063 | $12.62 in EDAP grants and loans, $259,396 in NADBank grants |
| BECC | Los Fresnos, Cameron County | Water/wastewater—pending certification | | $200,000 in technical assistance |
| BECC | San Benito, Cameron County | Wastewater—pending certification | | $300,000 in technical assistance |
| BECC | Santa Rosa, Cameron County | Water/wastewater—pending certification | | $500,000 in technical assistance |
| BECC | Mercedes, Hidalgo County | Wastewater—pending certification | | $80,000 in technical assistance |
| BECC | San Juan, Hidalgo County | Water—pending certification | | |
| BECC | Pharr, Hidalgo County | Water/wastewater—pending certification | | $30,000 in technical assistance |
| BECC | Weslaco, Hidalgo County | Wastewater—pending certification | | $250,000 in technical assistance |
| BECC | La Grulla, Starr County | Water/wastewater—pending certification | | $250,000 in technical assistance |

## Appendix I: Water and Wastewater Projects in the Lower Rio Grande Subregion *(continued)*

| Agency or Program | Location | Type of Project and Project Status | Residents Benefitted | Cost of Grants and Loans (U.S. dollars) |
|---|---|---|---|---|
| BECC | Miguel Alemán, Tamaulipas | Wastewater—pending certification | | |
| BECC | Reynosa, Tamaulipas | Water—pending certification | | |
| BECC | Matamoros, Tamaulipas | Water/wastewater—pending certification | | |
| NADBank | Comber, Primera, and San Benito, Cameron County | Water/wastewater—under construction | | $6,356,000 grant for communities in three TX counties |
| NADBank | Mercedes, Hidalgo County | Water/wastewater—completed | 15,000 | $1.87 million loan, $896,075 grant |
| NADBank | Mercedes and San Juan, Hidalgo County | Water/wastewater—under construction | | $6,356,000 grant for communities in three TX counties |
| NADBank | Reynosa, Tamaulipas | Wastewater—under construction | 473,500 | $33.5 million in grants |

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