Infrastructure

An area's infrastructure – its water and energy supplies, parks and transportation systems – can determine its economic viability. This is certainly the case in the Upper Rio Grande region, with an arid landscape that provides unique challenges and advantages for its inhabitants.

The Upper Rio Grande is part of an important trade corridor between Mexico and the U.S. While it has little traditional energy production, it has a strong potential for alternative energy sources such as solar, wind and geothermal energy. And its impressive array of parks and recreational facilities attract visitors from around the world. All of these resources give the economy of the Upper Rio Grande region a unique dimension.

The six-county Upper Rio Grande region, from Brewster County and Big Bend National Park in the Southeast to El Paso County in the Northwest, is a land of stark beauty situated on the northeastern edges of the mountainous Chihuahuan Desert (**Exhibit 15**).

While primarily desert, the region also has the state's seven highest peaks, all rising above 8,000 feet, giving the area the widest climatological variety in Texas (**Exhibit 16**). The lower desert elevations receive an average of 10 to 15 inches of rainfall annually with average maximum daily temperatures up to 80 degrees Fahrenheit, while the mountainous areas can average 20 inches annually with average maximum daily temperatures of 72 degrees.[1]

The Upper Rio Grande is part of an important trade corridor between Mexico and the U.S.

PHOTO: Texas Transportation Institute at Texas A&M University

Paso del Norte International Bridge border crossing in El Paso, TX

Water

Water is an extremely precious commodity in any desert. The Rio Grande River is the region's only source of surface water, providing 56.6 percent of all the water it consumes. El Paso County is the largest consumer of water from the Rio Grande, using it primarily for municipal and irrigation consumption. Because the region has no lakes, its citizens rely primarily on groundwater for all uses except irrigation (**Exhibit 17**).

Of the region's total water usage, irrigation accounts for 71 percent, with municipal use at 26.2 percent. Manufacturing uses 1.7 percent, slightly more than half of the remainder, while steam electric generation, livestock and mining uses account for the last 1.2 percent (**Exhibit 18**).

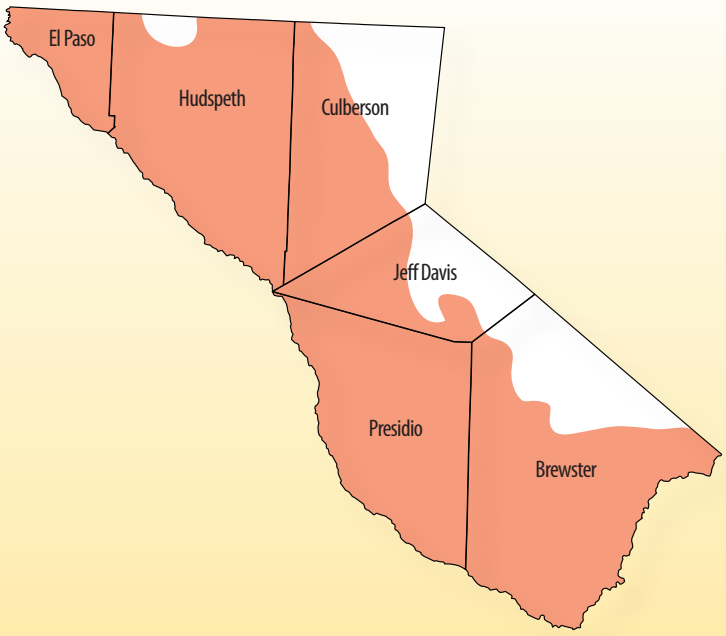
The Upper Rio Grande's only significant crop, as reported by the U.S. Department of Agriculture's National Agricultural Statistics Service, is irrigated cotton, both upland and American pima varieties. Since 2000, the region has averaged 2.8 percent of the state's planted acreage of irrigated cotton, 3.1 percent of the acres harvested and 4.2 percent of the state's production of both varieties combined.[2]

Every county in the Upper Rio Grande region produces cattle, although herd numbers for beef and dairy cattle combined have

(text continued on Page 46)

Exhibit 15

Chihuahuan Desert, Upper Rio Grande Region



Source: The University of Texas at El Paso.

Exhibit 16

Texas' Highest Mountain Peaks

Name	County	Elevation
Guadalupe Peak	Culberson	8,749
Bush Mountain	Culberson	8,631
Shumard Peak	Culberson	8,615
Bartlett Peak	Culberson	8,508
Mount Livermore (also called Baldy Peak)	Jeff Davis	8,378
Hunter Peak (also called Pine Top Mountain)	Culberson	8,368
El Capitan	Culberson	8,085

Source: Texas Almanac 2008-2009.

Air Quality

The Texas Commission on Environmental Quality (TCEQ) monitors air quality in the El Paso/Juarez metropolitan areas, as well as at sites in Big Bend National Park and in the Davis Mountains at the McDonald Observatory. Each location's Air Quality Index (AQI) is calculated on a daily basis. According to TCEQ, the area's AQI scores typically fall in the "good" to "moderate" range; an AQI between 0 and 50 is good, and between 51 and 100 is considered moderate.

El Paso and Juarez air quality, however, occasionally deteriorates, especially in hot weather that exacerbates ozone problems. The AQIs for these neighboring cities can climb into the "unhealthy for sensitive groups" range (101 – 150) and, in Juarez, the "unhealthy" range (151 – 200). Naturally, the monitors in the park and mountains are more likely to find good air quality on a consistent basis, although Big Bend does experience ozone pollution.[3]

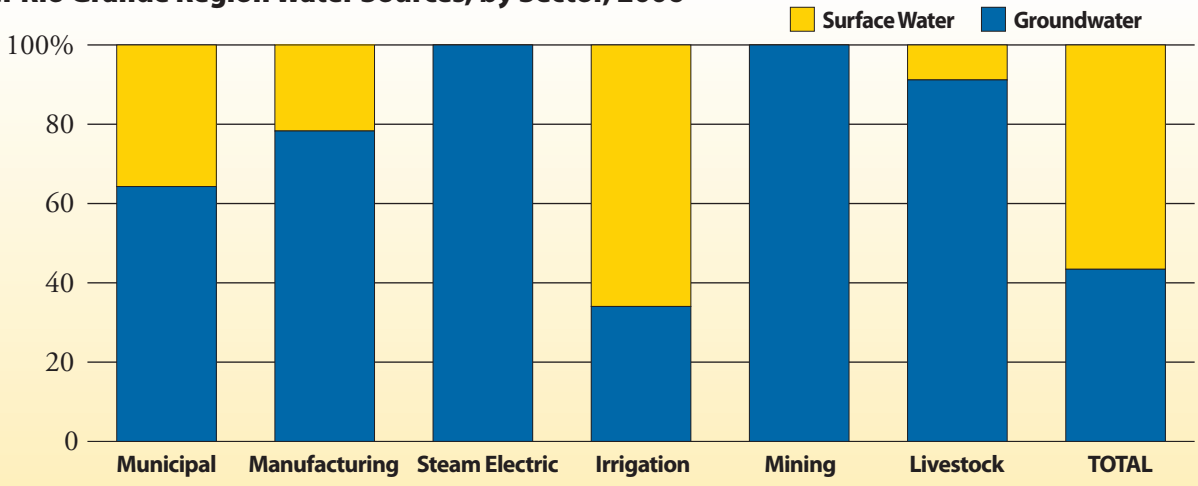
Climate

The Upper Rio Grande region has some of the nation's most distinctive landscapes, vegetation and geology. Mountains, desert, canyons, salt lakes and a fertile river valley all spread beneath the intense sun and brilliant stars of far West Texas. The region typically experiences its first freeze around November 16th with freezes departing in most of the counties by March 16th on average. Culberson and Jeff Davis counties, with their higher elevations, have an average last freeze date of March 31.

Average lows in January range from 25.1°F in Hudspeth County (and slightly lower in Marfa) to the mid-thirties in parts of Brewster County (Big Bend) and Presidio County (Presidio). July average maximums range from 94.5°F in El Paso County (with the average in the city of Presidio topping that at nearly 101°F) down to the mid- to upper eighties in other parts of the region. The region's annual rainfall averages exceed 20 inches only at Mount Locke in Jeff Davis County (20.37 inches), with Brewster County as a whole receiving the largest average amount, about 18 inches. El Paso County averages only 9.4 inches of rain per year.[4]

Exhibit 17

Upper Rio Grande Region Water Sources, by Sector, 2006



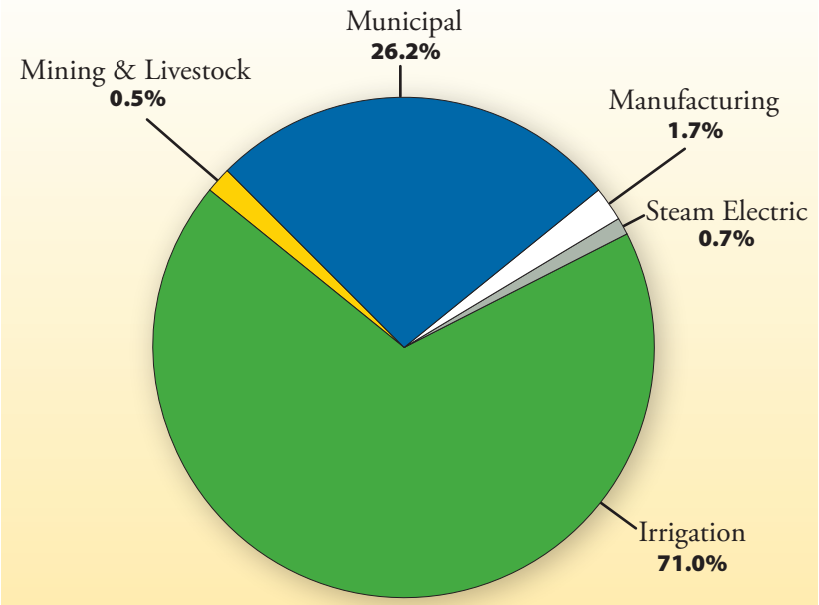
In acre feet:

	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	TOTAL
Surface Water	43,022	1,670	0	215,524	0	185	260,401
Groundwater	77,457	6,027	3,120	111,244	99	1,914	199,861

Source: Texas Water Development Board.

Exhibit 18

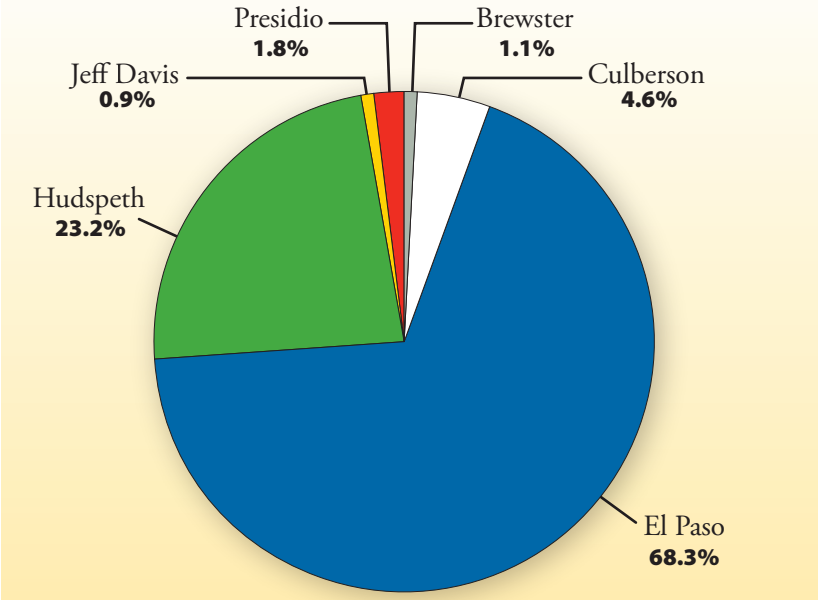
Upper Rio Grande Region Total Water Use, 2006



Note: Numbers may not add due to rounding.
Sources: Texas Water Development Board and Texas Comptroller of Public Accounts.

Exhibit 19

Upper Rio Grande Region Total Water Consumption, by County, 2006



Note: Numbers may not add due to rounding.
Sources: Texas Water Development Board and Texas Comptroller of Public Accounts.

declined from 177,000 in 2000 to 110,000 in 2008, due in large part to a bovine tuberculosis eradication effort in El Paso County. Starting in 2002, the USDA offered a dairy cow buy-out program to producers to eliminate bovine TB in the county. The program had enough success by 2006 to lift dairy restrictions placed on Texas by the USDA.[5]

In 2006, El Paso County consumed 68.3 percent of the region's water. Hudspeth County followed with 23.2 percent; Culberson County used 4.6 percent; Presidio County, 1.8 percent; Brewster County, 1.1 percent; and Jeff Davis County used less than 1 percent (**Exhibit 19**).[6]

The Upper Rio Grande area comprises almost all of the Texas Water Development Board's (TWDB's) planning Region E. Region E also includes Terrell County. According to TWDB, in the next 50 years Upper Rio Grande counties should expect to see a decrease in irrigation water usage, no change in livestock use, a small increase in mining and manufacturing use and a significant increase in steam electric and municipal water use (**Exhibit 20**).[7]

The Rio Grande

Texas shares the Rio Grande River with the states of Colorado, New Mexico and the Republic of Mexico (**Exhibit 21**). Its waters are controlled upstream of the long-abandoned Civil War-era Fort Quitman in Hudspeth County by the Rio Grande Compact Commission (RGCC), and downstream of Fort Quitman by the International Boundary and Water Commission (IBWC), comprising representatives of the U.S. and Mexico. Because the Rio Grande accounts for almost

Exhibit 20

Upper Rio Grande Actual and Projected Water Use by Sector 2000-2060 (in acre feet)

Sector	2000 Actual	2020 Projected	2040 Projected	2060 Projected
Irrigation	508,186	471,833	452,079	435,587
Livestock	4,536	4,536	4,536	4,536
Manufacturing	7,750	10,000	11,373	12,861
Mining	2,256	2,275	2,290	2,309
Municipal	139,221	183,314	217,433	251,740
Steam Electric	2,962	6,937	9,541	13,410
Total	**664,911**	**678,895**	**697,252**	**720,443**

Source: Texas Water Development Board.

all of the region's surface water, decisions by these two authorities can have great influence on the region's economy and way of life.

The Rio Grande originates in the San Juan Mountains of southern Colorado, flowing south for 175 miles until it reaches New Mexico, where it continues for another 470 miles until reaching Texas.[8] The Rio Grande Compact, an interstate agreement approved by each of the three U.S. states, ratified by Congress and signed by the President in 1939, apportions water equitably among the states. The RGCC, which administers the compact, has one representative from each of the three states in addition to a federal representative. RGCC's headquarters is in El Paso.[9]

Although the Upper Rio Grande region of Texas has no reservoirs on the river, New Mexico has two, Elephant Butte and Caballo, plus several smaller dams that direct its waters into canals. The U.S. Bureau of Reclamation manages these reservoirs to provide water for municipal use and crop irrigation to about 178,000 acres of land, including 69,000 acres in El Paso County, the latter under the jurisdiction of the El Paso County Improvement District. Another 18,000 acres in Hudspeth County receive water as available.[10]

Founded in 1889, the IBWC was established to assist the U.S. and Mexico with determining national boundaries and managing common waters from San Diego, California to Brownsville, Texas. The 1944 treaty "Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande," plus several earlier treaties and subsequent amendments (called "minutes"), is now subject to IBWC management.

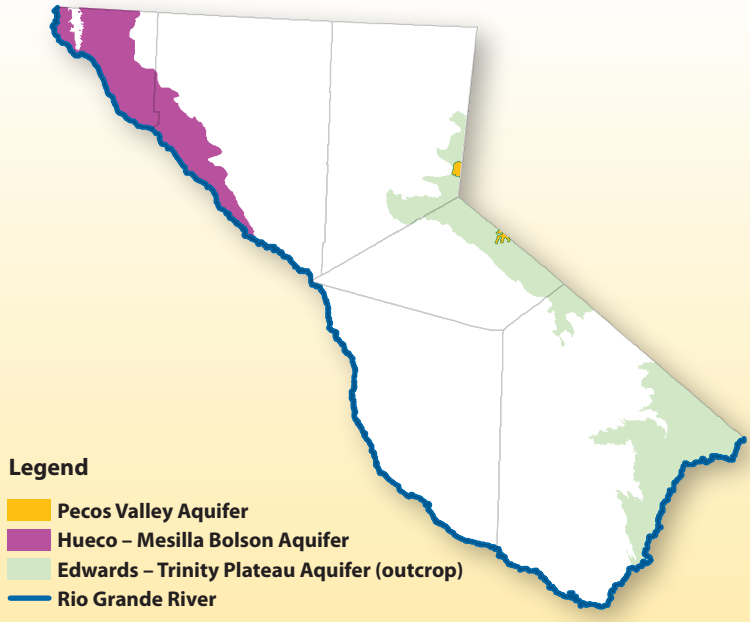
Under that treaty, the U.S. is entitled to all the water flows reaching the main channel of the Rio Grande River from several specific creeks on the U.S. side; one-third of flows from six different Mexican tributaries; and half of all flows south of Fort Quitman in Hudspeth County.[11]

Groundwater

According to TWDB, 75 percent of Region E's groundwater comes from two major

Exhibit 21

Upper Rio Grande Region Water Sources



Source: Texas Water Development Board.

aquifer systems — the Edwards-Trinity (Plateau) and the Hueco and Mesilla Bolsons — and six smaller ones (**Exhibit 21**).

Salinity control is a challenge for both ground and surface waters in this area. The Hueco and Mesilla Bolsons provide groundwater with relatively high levels of total dissolved solids (TDS) that give the water a brackish taste and, over time, can be detrimental to humans, plants and wildlife. ("Bolson" is a Spanish word meaning purse, or pouch; these two aquifers overlay each other but have little hydrological interaction.)

According to TWDB, the Hueco Bolson ranges from less than 1,000 to 3,000 milligrams per liter (mg/l) TDS. The upper limit of Mesilla Bolson waters is closer to 10,000 mg/l TDS. Experts consider water above

The Forgotten River

The stretch of the Rio Grande between Fort Quitman, near Sierra Blanca, down to Presidio and beyond, has been called the "Forgotten River." With no cities or towns on the river until Presidio, it's a flowing oasis through arid ranchlands. Or at least that's how it used to be.

Now, the river has been slowed and altered by dams and withdrawals upstream, while its water quality has been degraded by municipal wastewater flows, agricultural runoff and dissolved salt from stands of tamarisk, also known as saltcedar.

Saltcedar, an exotic, invasive plant originally introduced to this country in the 1800s as an erosion control method for stream banks, as well as for ornamental use, has become an ecological nightmare. It crowds out and out-drinks native willows and cottonwoods in the riparian habitat along rivers, and exudes salt from its leaves that eventually concentrates in the river water. The Forgotten River's channel is choked, its flow is further reduced and traditional crops fail to thrive when irrigated with its salty water.

Numerous agencies and groups, including the Texas Commission on Environmental Quality, the U.S. Army Corps of Engineers, the Trans-Pecos Water Trust and the Environmental Defense Fund, have studied and monitored this stretch of the Rio Grande, trying to find ways to restore this unique and valuable resource. Addressing the saltcedar problem is part of those efforts, and since 2001 releases of saltcedar beetles have shown signs of being an effective weapon against the plant.[12]

Saltcedar, however, is only one aspect of the Forgotten River's severe problems. Restoring the river to viability will require cooperation between various water users, local management agencies, river advocates, states and even nations. The Forgotten River should not be forgotten much longer.

Kay Bailey Hutchison Desalination Plant

The Hueco Bolson aquifer has long been a major source for El Paso's water. The amounts of fresh water pumped from the aquifer, however, have exceeded the rate at which these waters are being replaced by nature. The majority of the aquifer's water is brackish; salty waters actually exceed the amount of potable water in the aquifer by about 600 percent. Realizing this, the El Paso Water Utility began looking at desalination alternatives for the Hueco Bolson Aquifer in the early 1990s.

El Paso Water Utilities' (EPWU's) Kay Bailey Hutchison Desalination Plant, completed in 2007, is one of the world's largest inland desalination plants and represents the "largest public-private project of its kind" involving the Defense Department. The plant is the result of a public-private partnership between Fort Bliss and EPWU.

The plant produces 27.5 million gallons of fresh water per day from brackish groundwater supplies that were previously unusable. It has increased El Paso's water production by 25 percent, and includes a learning center, groundwater wells, transmission pipelines and storage and pumping facilities.

EPWU estimates that 83 percent of the water is recovered, as brackish water flows through fine, reverse-osmosis membranes, resembling thick rolls of wax paper, which separate out salts and other potential contaminants and pollutants. The plant supplements other fresh water supplies in the region to ensure a continued water supply for the next 50 years.[13]

10,000 mg/l TDS to be salty; seawater typically is above 35,000 mg/l TDS.[14]

Future Needs

To prepare for future population increases and constrained water sources, the Upper Rio Grande region intends to increase municipal conservation; recover, clean and reuse municipal water for municipal purposes; and increase imports of desalinated water.[15] The city of El Paso has an active municipal conservation plan in place with an eventual use goal of 140 gallons per resident per day, down from the present 170-180 gallons per capita.[16]

Transportation

The Texas Department of Transportation (TxDOT) builds and maintains the Texas highway system through local offices and alliances with contractors located around the state. TxDOT serves the Upper Rio Grande region from office locations in East El Paso, West El Paso and Alpine.

In all, the region has 1,927 centerline miles (miles traveled in a single direction regardless of the number of lanes) and 4,799 total lane miles of state highways. It has about 593,000 registered vehicles that travel about 12.8 million miles daily. The state as a whole contains 79,975 centerline miles, 192,542 total lane miles and more than 21 million registered vehicles that travel nearly 490 million miles each day (**Exhibit 22**).[17]

TxDOT has prioritized the following repair and expansion projects in the region:

- I-10, running southeast through El Paso county and continuing east through Hudspeth and Culberson counties;

The city of El Paso has an active municipal conservation plan in place.

Exhibit 22

Highway Miles, Vehicle Miles Driven and Registered Vehicles, Upper Rio Grande Region, 2008

County Name	Centerline Miles	Lane Miles	Daily Vehicle Miles	Registered Vehicles
Brewster	290	591	250,341	10,003
Culberson	322	748	683,479	2,315
El Paso	477	1,621	10,276,798	566,539
Hudspeth	340	826	1,223,637	3,566
Jeff Davis	227	469	193,263	3,198
Presidio	272	545	182,369	7,469
Region Total	**1,927**	**4,799**	**12,809,887**	**593,090**
Statewide Total	**79,975**	**192,542**	**488,790,361**	**21,171,729**

Source: Texas Department of Transportation.

- U.S. Highway 67, running northeast from the U.S.-Mexico Border at Presidio to Marfa in Presidio County;
- U.S. Highway 62, running west to east across El Paso, Hudspeth and Culberson counties, and then up into New Mexico;
- State Highway 54, running south to north through Culberson County;
- U.S. Highway 90, running southeast through Culberson, Jeff Davis, Presidio and Brewster counties;
- Loop 375, a partially completed loop around the city of El Paso; and
- State Highway 20, running parallel to I-10 through El Paso county and part of Hudspeth County.[18]

Ports of Entry

The Upper Rio Grande region serves as an international gateway between Texas and Mexico. The region is home to seven of the state's 26 border crossings between Texas and Mexico, four of which link the city of El Paso to the Mexican city of Juarez.[19] These crossings, all of them bridges, receive a mix of commercial, passenger and pedestrian traffic. The Bridge of the Americas receives the most use of any crossing in the region, with more than half of El Paso's border traffic flowing across it.[20]

In 2008, more than 765,000 trucks, 14 million personal vehicles and 8 million pedestrians passed through the seven ports of entry in the Upper Rio Grande region.[21]

Point-of-entry operations at these border crossings, such as vehicle inspections, are a primary cause of traffic congestion. TxDOT is exploring methods to reduce wait times at the area's various crossings, and the city of El Paso has proposed expanding one of its bridges, the Ysleta Zaragoza, to accommodate more traffic. TxDOT, the El Paso Metropolitan Planning Organization and the city of El Paso are also jointly considering the construction of two additional commuter bridges in the region to mitigate traffic congestion.

A new point of entry, the Guadalupe Tornillo International Bridge, being built in the city of Tornillo, Texas is expected to be completed by 2015.[22]

Trade Corridors

As a center for interstate and international trade, the Upper Rio Grande region must maintain healthy trade corridors. Its most important trade corridor, Interstate Highway 10, runs parallel to the Rio Grande River in El Paso County and breaks away from the Rio Grande in Hudspeth County to head east across Texas and several other southern states. In all, I-10 stretches across eight states, originating in California and heading eastward all the way to Florida. These states depend on I-10's continuing smooth operation to transport high volumes of goods.

To help maintain this critical trade route, TxDOT has initiated a number of projects to resurface and repair damaged portions of the highway in the Upper Rio Grande region.[23]

In addition to sustaining the current benefits of I-10, TxDOT and local transportation stakeholders also plan to provide alternatives for I-10 commuters in case of traffic delays or natural disasters. For example, the city of El Paso has undertaken a large-scale project to build Loop 375 around the city so that travelers have an alternative route if I-10 access is blocked. Some portions of Loop 375 are completed; the El Paso Regional Mobility Authority is collaborating with TxDOT to secure additional funding to complete other portions of this project. Another proposed I-10 alternative is the Northeast Parkway, a 21-mile stretch of highway to connect El Paso's Loop 375 with Highway 404 in New Mexico, thereby mitigating congestion at the border between the two states.[24]

The region is home to seven of the state's 26 border crossings between Texas and Mexico.

TecH$_2$O Center

The Carlos M. Ramirez TecH$_2$O Water Resources Learning Center was developed as an educational and training facility for the city of El Paso and surrounding communities. The center, adjacent to the Kay Bailey Hutchison Desalination Plant, houses 16 water management exhibits designed and sponsored by El Paso Water Utilities to help consumers understand their water usage, and to serve EPWU as an excellent tool for communicating with the public.

The center features an exhibit hall, auditorium, amphitheater and two classrooms. The exhibit hall contains water management displays. Both the amphitheater and the auditorium can hold up to 250 people. The amphitheater is an outdoor setting for presentations and gatherings, while the auditorium functions as a meeting spot for teleconferences, lessons and other presentations.

Each classroom accommodates 50 people and can be used for demonstrations, hands-on training and school field trips. The center also contains outdoor areas including a plaza, wildlife refuge and a xeriscaped region.[25] The center's meeting rooms and auditoriums can be used by educators, policymakers, students and the general public to discuss issues concerning the community.[26]

The TecH$_2$O Center hosts several different programs through the year, including a Texas Master Naturalist Volunteer Training Program and the International Drinking Water Week. The naturalist training program runs from February through May and trains volunteers in education and outreach about local natural resources.

In 2009, during International Drinking Water Week (May 3-9), the center held an event designed to raise awareness of the current state of drinking water. The event featured exhibits and educational materials produced by local students, with an award ceremony and prizes for the best water conservation poster.[27]

Yet another proposed corridor that could benefit the region is La Entrada al Pacifico, a highway that would start at the Mexican port town of Topolobampo, cross the border at Presidio, and continue northeast all the way to Midland and Odessa. The original proposed route would run parallel to U.S. Highway 67, cutting through Presidio and Brewster counties; several alternative routes have been discussed as well (**Exhibit 23**).[28]

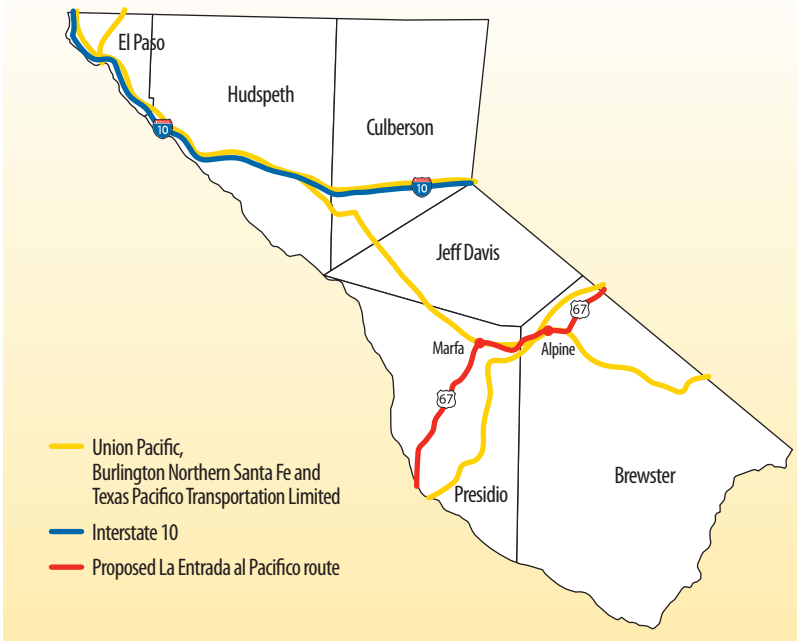
The intent of the corridor is to increase traffic passing through currently under used ports of entry, such as the border crossing at Presidio, thus relieving traffic congestion at border crossings in El Paso.

TxDOT is conducting a feasibility study of the proposed La Entrada al Pacifico route and its impact on traffic flows at the Texas-Mexico border. In February 2008, TxDOT released preliminary results forecasting the number of freight trucks that would come through Presidio as a result of La Entrada construction; the study projects that by 2030, the point of entry would receive between 186 and 587 additional trucks per day, depending on when Mexico portions of the highway are completed.[29]

TxDOT has conducted public meetings to collect input from local stakeholders in affected regions. Although its study is not yet complete, there is evidence that La Entrada al Pacifico could significantly improve traffic conditions at the El Paso-Juarez border crossings. A corridor study conducted by transportation authorities in Mexico indicated that La Entrada would cause significant improvement in trip mileage and travel times, with commuters going from Chihuahua to Dallas saving 134 miles or six hours of combined drive time and border crossing wait time.[30]

Exhibit 23

Upper Rio Grande Region Trade Corridors and Rail Lines



Source: Texas Department of Transportation.

Railways

Three railroad companies operate in the Upper Rio Grande region. Two are Class I railroads (classified as such for their large annual operating revenues), the Burlington Northern Santa Fe Company and the Union Pacific Railroad Company. Union Pacific has a more significant presence in the region, with lines running through all six counties. Burlington Northern has one line running parallel to I-10 through El Paso County (**Exhibit 23**).

A third railroad company, Texas Pacifico Transportation Ltd., operates a line that runs southwest through Brewster and Presidio counties to the Mexico border. In addition, the Amtrak Sunset Limited passenger train services the region, with stops in Alpine and El Paso (see sidebar).[31]

Sunset Limited

Amtrak's Sunset Limited is one of the nation's oldest passenger trains still operating under its original name. Though the Sunset Limited's history dates back to the late 1800s, its route through Texas remains virtually unchanged. The train offers a nostalgic option for travelers in the Upper Rio Grande region, taking passengers back to a time when train travel was the preferred mode of transportation. Amenities include a separate dining car as well as sleeper cars and a lounge car dedicated to sightseeing.

The train's full route extends from New Orleans all the way to Los Angeles, for a total of 1,995 miles. In the Upper Rio Grande region, the train makes a stop in Alpine and another in El Paso. The Sunset Limited operates on rail lines once owned by Southern Pacific, which also owned the train itself. The lines now belong to Union Pacific. In 1993, Amtrak began providing Sunset Limited service as far east as Florida; after Hurricane Katrina in 2005, rail service east of New Orleans was put on hold.[32]

Amtrak offers rides on the Sunset Limited as part of its larger Texas Eagle route, which makes stops in several Texas cities and runs all the way to Chicago.[33] The Sunset Limited operates three days a week. A one-way ticket from Houston to Alpine costs $91. Tickets for sleeping arrangements range from $160 to $297 but include meals and other amenities. Passengers can choose from cozy but simple "roomettes" to bedrooms with private bathrooms.[34]

Passengers on the Sunset Limited are treated to views of the Rio Grande River and stunning desert bluffs and canyons. Many passengers use the Sunset Limited to reach final destinations in Arizona and California, while others enjoy stops at West Texas towns such as Alpine and El Paso.[35] In fiscal 2008, the Sunset Limited had 13,124 boardings and disembarkings in the Upper Rio Grande region alone, with 9,605 in El Paso and 3,519 in Alpine. Amtrak boardings and disembarkings in all of Texas totaled 323,210 for the same year.[36]

Public Transportation

The city of El Paso is by far the region's largest urban area. Sun Metro is the city's mass transit department. Sun Metro began operating a new bus rapid transit system in March 2009.[37] Aside from El Paso, most of the region is rural; citizens in rural areas of El Paso County can use El Paso County Rural Transit.[38]

Airports

The Upper Rio Grande region contains one commercial airport in El Paso and six non-commercial airports.[39] El Paso International Airport, the region's sole commercial airport, reported 1.67 million boardings in 2007, about 1 percent more than in 2006. Eight commercial airlines provide service to El Paso International — American Airlines, US Airways, Continental Airlines, Delta, Frontier, Southwest, United and New Mexico Airlines.

In addition to traditional air transportation services, El Paso International owns an industrial park and a cargo center, both located next to the airport. Industrial businesses use the park's 900-acre space for transportation infrastructure operations, and commercial businesses use portions of the property as well.[40]

Parks and Recreation

The rugged mountains and desert plains of the Upper Rio Grande contain more public parkland than any other region in Texas, providing ample recreational opportunities to the public. The region features five units of the National Park Service — Big Bend National Park in Brewster County, Guadalupe

Foreign Trade Zone #68 (El Paso International Airport)

The El Paso International Airport is vital to the region's economic health, serving as a major transportation hub and trade center.

The airport's foreign trade zone (FTZ), granted to the city of El Paso and operated by the airport, consists of 21 industrial sites and has been ranked as one of the nation's top five FTZs in terms of economic activity for the last five years.[41] It currently supports 70 firms that handle items from more than 80 countries.[42]

Foreign trade zones are designed to help U.S. firms compete against foreign competition in the global marketplace. Duty-free treatment is applied to products entering the zone, and the duty may be applied only after the product has left the FTZ and is purchased within the U.S. market. The product is also not subject to formal Customs entry procedures, quotas and federal excise taxes.

This designation is designed to offset the benefit derived from foreign firms that have similar advantages in their home countries. Most FTZs are located at U.S. ports of entry. Many U.S. firms use El Paso's zone to assemble merchandise, thereby enhancing and adding value to their products under duty-free status.[43]

The rugged mountains and desert plains of the Upper Rio Grande contain more public parkland than any other region in Texas, providing ample recreational opportunities to the public.

Mountains National Park in Culberson County, the Fort Davis National Historic Site in Jeff Davis County and Chamizal National Memorial in El Paso County, as well as the Rio Grande Wild and Scenic River. A national park unit can be either a congressionally-designated national park or another designated area such as a national monument, national seashore, national historic site or national recreation area.

In addition, the region also hosts several state parks, including Big Bend Ranch State Park and Fort Leaton in Presidio County, the Barton Warnock Environmental Education Center in Brewster County, Franklin Mountains State Park and Hueco Tanks State Historic Site in El Paso County and Davis Mountains State Park and Indian Lodge in Jeff Davis County.[44]

National Parks

Big Bend National Park is one of Texas' most famous natural areas. At 801,163 acres, the park is the largest public area in Texas and the eighth-largest national park in the continental U.S. In fiscal 2008, Big Bend National Park welcomed more than 362,000 visitors.[45]

Big Bend National Park is often referred to as "three parks in one" because it features three unique environments: the alpine terrain of the Chisos Mountains in the center of the park; the arid climate of the surrounding Chihuahuan Desert; and the river ecosystem of the Rio Grande along the park's southern border with Mexico.[46] The park has three developed campgrounds, at Rio Grande Village and Castolon along the river and Chisos Basin in the mountains.

In addition, numerous backcountry campsites are available for those seeking even more solitude, with desert sites accessible to those with off-road vehicles and mountain sites available only to backpackers. The park also has a lodge and restaurant located in the Chisos Basin for those who prefer amenities such as a hot shower and a warm meal.

Big Bend's southern border also contains 118 miles of the Rio Grande. This includes 69 miles of the 196-mile stretch of the river running from the Chihuahua/Coahuila

state line in Mexico to the Terrell/Val Verde county line in Texas. This section was designated a Wild and Scenic River by Congress in 1978.[47] Big Bend National Park manages the *Rio Grande Wild and Scenic River* as a unit of the National Park system.[48]

The Rio Grande's course through Big Bend is famous for three spectacular canyons, Santa Elena, Mariscal and Boquillas. Several outdoor outfitters serve visitors to the Big Bend region. Most of these companies are located in nearby Terlingua and Lajitas. They offer activities such as mountain bike rentals, guided rafting trips, shuttle service for backcountry hiking and four-wheel-drive jeep tours.[49]

Situated along the Texas-New Mexico state line in Culberson County, *Guadalupe Mountains National Park* boasts a mountainous environment that has more in common with the lower Rocky Mountains of New Mexico than with the rest of Texas. The park is home to Guadalupe Peak, which at approximately 8,750 feet is the highest point in the state. In fiscal 2008, Guadalupe Mountains National Park had 163,709 visitors.[50]

Guadalupe Mountains National Park has more than 80 miles of hiking trails that cut through its remote wilderness, including some of the nation's most challenging trails.[51] The trail that scales Guadalupe Peak gains a staggering 3,000 vertical feet in just over four miles and provides access not only to the highest point in the state but also the state's highest camp site. Another popular route passes through beautiful McKittrick Canyon alongside a spring-fed mountain creek. This scenic yet strenuous trail is especially popular in the fall when the leaves of its big-tooth maples change colors.[52]

Fort Davis National Historic Site in Jeff Davis County offers both attractive scenery and a history lesson on the Western frontier. From 1854 to 1891, troops stationed at Fort Davis protected settlers from Apaches and Comanches. Now the site is a living monument telling the story of this dramatic period. The site has a visitor center and five other restored buildings, as well as dozens of ruins dating from the fort's time as a federal outpost.[53] In fiscal 2008, Fort Davis National Historic Site had 49,290 visitors.[54]

Chamizal National Memorial in El Paso commemorates a 1963 treaty between the United States and Mexico that settled a border dispute between the two countries. The memorial is adjacent to the El Paso-Juarez port of entry. Chamizal National Memorial regularly offers art exhibits, cultural demonstrations and educational programs and also contains a bookstore featuring items unique to the El Paso-Juarez region.[55] In fiscal 2007, Chamizal National Memorial had 197,767 visitors. **Exhibit 24** summarizes the economic impact of the Upper Rio Grande's national parks.[56]

State Parks

In southern Presidio County, the 301,319-acre *Big Bend Ranch State Park* encompasses the Bofecillos mountain range and 23 miles of frontage along the Rio Grande. Added to Texas state parks system in 1988, this massive park makes up more than half of the state's park land.[57] Big Bend Ranch State Park had 3,181 visitors in fiscal 2008.[58]

Big Bend Ranch is a distinctive natural resource, and the Texas Parks and Wildlife Department (TPWD) has adopted a unique management style to allow for visitors'

Guadalupe Mountains National Park is home to Guadalupe Peak, which at approximately 8,750 feet is the highest point in the state.

Exhibit 24

Economic Impact of National Parks, Upper Rio Grande Region

Name	Number of Visitors 2008	2007 Total Economic Impact on Sales	2007 Spending by Visitors
Big Bend National Park	362,512	$8,220,000	$16,040,000
Guadalupe Mountains National Park	163,709	7,380,000	12,530,000
Fort Davis National Historic Site	49,290	1,060,000	2,100,000
Chamizal National Memorial	197,767	11,210,000	16,550,000
Rio Grande Wild and Scenic River	1,606	90,000	180,000

Sources: U.S. National Parks Service and Michigan State University.

maximum enjoyment, including 44 miles of trails for four-wheel drive vehicles. Activities include horseback riding, mountain biking, river rafting, hiking, camping and bird watching. The park's Sauceda Headquarters provides accommodations for visitors at a group bunkhouse and at the "Big House," a remodeled ranch house built in 1908.

Visitors can drive the "River Road" (FM 170), one of Texas' most scenic highways, which hugs the Rio Grande between Presidio and Lajitas.

The park has more than 200 miles of hiking trails, some passing by isolated desert springs that provide oases for overnight backpackers. The park also has several miles of primitive roads that offer access to isolated backcountry campsites. Visitors can also drive the "River Road" (FM 170), one of Texas' most scenic highways, which hugs the Rio Grande between Presidio and Lajitas.[59]

Situated in Terlingua, between Big Bend National Park and Big Bend Ranch State Park, the *Barton Warnock Environmental Education Center* is a 100-acre facility that offers archaeological, historical and geological information about the region. Visitors can purchase backpacking and river use permits for Big Bend Ranch State Park and learn about the region from park staff. The 80-seat auditorium hosts educational events, while a recently opened Interpretive Center provides information about both the Mexican and U.S. sides of the Rio Grande. The center also has a bookstore and gift shop featuring maps, guides and books about the Big Bend region, as well as postcards and souvenirs.[60]

Fort Leaton State Historic Site, just west of Big Bend Ranch in Presidio, features historic ruins from an adobe trading post established in 1848. The site is a day-use park with picnic areas, and offers guided tours and historical exhibits about the Border region. In fiscal 2008, Fort Leaton had 3,538 visitors.[61]

Near the town of Fort Davis and adjacent to Fort Davis National Historic Site, the 2,709-acre *Davis Mountains State Park* offers beautiful views of the Davis Mountains, the largest range in Texas. McDonald Observatory (see sidebar) and Mount Livermore (Texas' fifth-highest peak) are both visible from the park's Skyline Drive, where nighttime stargazing is a popular activity. Also within the park are the Black Bear Restaurant and Indian Lodge, a recently remodeled adobe-style hotel built by the Civilian Conservation Corps in the 1930s.[62] In fiscal 2008, Davis Mountains State Park had 62,640 visitors.[63]

Franklin Mountains State Park is entirely within the city limits of El Paso. At 24,247

Wyler Aerial Tramway

The Wyler Aerial Tramway in the eastern part of Franklin Mountains spans nearly 200 acres of mountain and rock formations.[64] The tramway was developed by Karl O. Wyler, owner and founder of KTSM-TV and radio. Construction of the tramway began in January 1959 and was completed the following year. While open to the public, it was initially constructed in part so that workers could service TV and radio antennas located at the top of Ranger Peak, near El Paso. In 1997, Wyler donated the tramway to the state and in 2000, after renovations, it was once again opened to the public.[65]

The tramway's aerial cable car offers magnificent views from the top of Ranger Peak. It travels up a 2,600-foot-long steel cable; visitors can see how the gondola works through an opening on the south side of the base station. While on the gondola, a cabin attendant describes the various cacti and rock formations seen as they pass by. The ride takes about four minutes.

Once visitors reach Ranger Peak, visitors can view 7,000 square miles of Mexico, New Mexico and the city of El Paso. The station at the top has an observation deck with a panoramic view.[66]

acres, the park holds the distinction of being the entirely largest urban park in the nation. Franklin Mountains State Park is a popular destination for camping, hiking and mountain biking. It also features the Wyler Ariel Tramway (see sidebar).[67] In fiscal 2008, Franklin Mountains State Park had 28,131 visitors.[68]

Thirty-two miles east of El Paso, Hueco Tanks State Historic Site features ancient pictographs from native peoples who were attracted to the region by the presence of water that pooled in natural stone basins in the Hueco Mountains. Hueco Tanks is also widely recognized as one of the best sites in the world for "bouldering," a challenging variation of mountain climbing done without safety ropes. TPWD strives to balance recreational use with historic preservation at the 860-acre park, and access to parts of the park requires a guide. Reservations are recommended for those interested in visiting or climbing.[69] In fiscal 2008, Hueco Tanks State Historic Site had 28,892 visitors.[70]

Exhibit 25 summarizes the economic impact of the Upper Rio Grande Region's state parks.

Exhibit 25

Economic Impact of State Parks, Historic Sites and Attractions, Upper Rio Grande Region

Name	Number of Visitors 2008	2006 Total Economic Impact on Sales	2006 Spending by Visitors
Big Bend Ranch State Park	3,181	n/a	n/a
Barton Warnock Environmental Education Center	16,193	n/a	n/a
Fort Leaton State Historic Site	3,538	n/a	n/a
Franklin Mountains State Park	28,131	n/a	n/a
Wyler Aerial Tramway	31,148	$730,000	$20,000
Hueco Tanks State Historic Site	28,892	580,000	110,000
Davis Mountains State Park	62,640	2,180,000	1,530,000
Indian Lodge	65,545	3,700,000	2,000,000

Note: Economic data was not available for Big Bend Ranch, Fort Leaton, and Franklin Mountains.
Sources: Texas A&M University and Texas Parks and Wildlife Department.

Fishing and Hunting

Due to the region's largely desert character, fishing opportunities in the Upper Rio Grande region are limited. Big Bend Ranch State Park allows free fishing on the banks of the Rio Grande, primarily for catfish.[71]

Every county in the region offers some sort of legal hunting, with variations in permit requirements for antlerless deer, bag limits for deer and squirrels and the availability of turkey hunting.

In 2007, hunting and fishing enthusiasts in the Upper Rio Grande region purchased more than 14,000 licenses from the Texas Parks and Wildlife Department, at a cost of more than $311,000. All revenue collected from the sale of hunting and fishing licenses goes to a dedicated state fund supporting the protection, regulation and conservation of the state's fish and wildlife.[72]

The area has high potential for the development of solar and geothermal energy.

Energy

In earlier epochs of the earth's history, volcanoes covered much of what is now the Upper Rio Grande region. This activity was in part responsible for the area's mountains and its wide variety of mineral deposits, including silver, mercury, copper and zinc.

Later, shallow seas encroached, but little of the area was submerged long enough for carboniferous life forms to settle on the sea floor — and ultimately develop into oil and gas deposits such as those found to the region's east in the Permian Basin.[73] On the

Exhibit 26

Bag Limits and Other Applicable Hunting Regulations, Upper Rio Grande Region, 2008-09

Animal	Season
White-tailed Deer	Brewster, Culberson, Jeff Davis and Presidio counties allow white-tailed deer hunting. Open season lasts from November 1 until January 4. The bag limit is four deer and no more than two bucks. Archery season lasts from September 27 until October 31. Antlerless deer may be hunted without a permit unless TPWD has issued antlerless managed land deer permits to help control the deer population. Muzzleloader-only season is from the first Saturday following the closing of the general open season for nine consecutive days. A special youth-only season occurs twice a year, on October 25 and 26 and January 17 and 18.
Mule Deer	General season: November 29 – December 14, with a two deer bag limit (limit one buck). Archery only season: September 27 – October 31, with a two deer bag limit (limit one buck).
Javelina	No closed season and a bag limit of two per license year.
Squirrel	No closed season.
Turkey	Jeff Davis and Brewster County allow hunting of the Rio Grande turkey, with a bag limit of four. The season is from March 21 – May 3, 2009 (gobblers only). Special youth-only season: March 14 – 15 and May 9 – 10.
Pronghorn	Jeff Davis, Brewster, Presidio, Culberson and Hudspeth allow pronghorn hunting by permit only from October 4 – 12.
Quail	October 25 – February 22. Daily bag limit: 15; possession limit: 45.
Dove	Central Zone (South of I-10): September 1 – October 30 and December 26 – January 13 with no limit. North Zone (North of I-10): September 1 – October 30.

Source: Texas Parks and Wildlife Department.

other hand, the area has high potential for the development of solar and geothermal energy.

Oil and Gas

Culberson County is the only one of the region's six counties that produces oil and gas, with 23 natural gas wells and 82 oil wells operating as of February 2009.[74] The natural gas is produced from the Barnett Shale, the same formation that produces large quantities of natural gas in the Fort Worth area, although in Culberson County the Barnett Shale gas is found at a greater depth, making it more difficult and more expensive to produce.[75]

One of the region's largest landowners is the University of Texas System. In the nineteenth century, the Texas Legislature dedicated millions of acres of West Texas lands, including some in El Paso, Culberson and Hudspeth counties, to the Permanent University Fund for the financial support of a state university.

University lands in Hudspeth and especially Culberson counties have produced some natural gas in years past; current leaseholders, however, are paying "shut-in royalties" to keep their leases active.[76] These royalties are producer payments to the landowner in lieu of actual production for non-producing wells. Wells may be shut in due to inadequate prices or infrastructure.[77]

Other Minerals

Several mines have operated in the Upper Rio Grande area, some dating back to the 1880s, producing a wide variety of minerals including cinnabar (mercury ore), copper, tin, lead, zinc, molybdenum, bentonite (a type of clay), sulphur, talc, marble, gypsum, stone, sand, gravel, silver, feldspar and zeolite (a mineral useful for removing odors, toxins and chemicals).[78]

Copper minerals once were mined throughout Culberson and Hudspeth counties, although none are operating today. The largest mine was the Hazel copper and silver mine in Culberson County. From 1891 to 1947, the Hazel mine produced more than one million pounds of copper.[79]

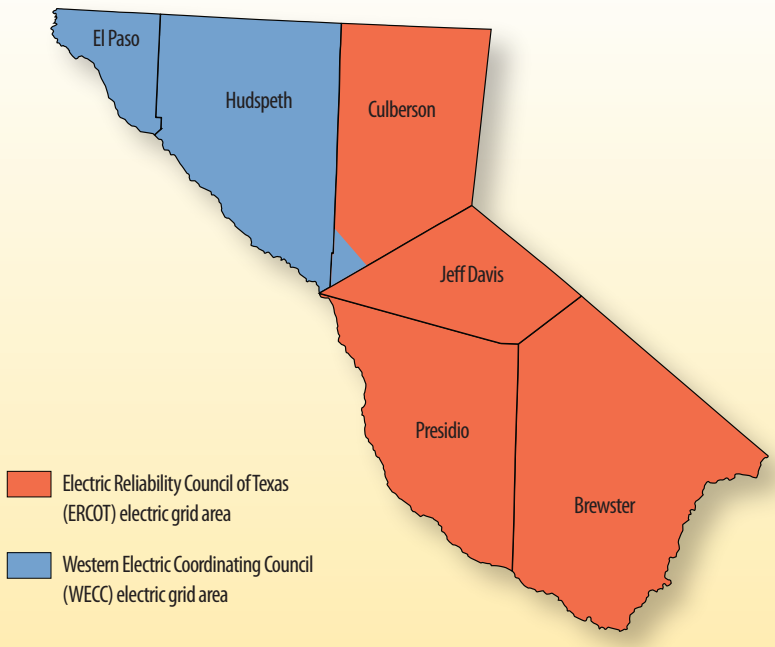
Electricity

About 97 percent of the region's population receives electricity from the Western Electric Coordinating Council (WECC).[80] The council, one of eight "reliability councils" in the U.S. that manage electricity flows, serves El Paso County and parts of nearby counties (**Exhibit 27**). WECC serves

About 97 percent of the region's population receives electricity from the Western Electric Coordinating Council.

Exhibit 27

Areas in the ERCOT and WECC Electric Grids



Sources: Electric Reliability Council of Texas and Western Electric Coordinating Council.

Exhibit 28

Percentage of Electricity Generated by Fuel Type, ERCOT and WECC, 2008

Fuel Source	ERCOT	WECC
Natural Gas	43%	42%
Coal	37	18
Nuclear	13	5
Wind	5	1
Hydroelectric/ Other	2	34
Total	**100%**	**100%**

Note: Fuel source percentages are rounded. For WECC "Natural Gas" includes "dual fuel" generation.
Sources: Electric Reliability Council of Texas and Western Electricity Coordinating Council.

The largest electric utility is the El Paso Electric Company, an investor-owned utility serving 361,000 customers in the Upper Rio Grande region of Texas and New Mexico.

all or most of Arizona, New Mexico, Colorado, Nevada, Wyoming and South Dakota.[81]

Most of the region's land area, however, lies within the jurisdiction of the Electric Reliability Council of Texas (ERCOT). ERCOT is the only U.S. reliability council located entirely within the boundaries of a single state; it covers 75 percent of Texas' land area and administers 85 percent of the state's electric load, serving some 21 million customers.[82]

Exhibit 29 lists the electric providers that serve the Upper Rio Grande Region. The largest electric utility is the El Paso Electric Company, an investor-owned utility serving 361,000 customers in the Upper Rio Grande region of Texas and New Mexico.[83]

Wind Energy

Culberson County is home to two wind farms, the Wind Power Partners '94 farm and Delaware Mountain, with a combined total of 147 turbines capable of producing about 68 megawatts (MW) of electricity — enough to power about 15,640 average Texas homes.[84]

American National Wind Power operates the 30 MW Delaware Mountain wind farm, installed in 1999 on a ranch near Van Horn. Customers purchasing power from this facility include the Lower Colorado River Authority (LCRA) in Austin and Reliant Energy in Houston. The LCRA and the state's General Land Office joined private industry partners to develop the almost 35 MW Wind Power Partners project, which began generating electricity in 1995.[85]

Exhibit 29

Municipally Owned Utilities and Member-Owned Cooperatives Upper Rio Grande Region

Entity Name	Service Area
El Paso Electric Company	El Paso County and parts of Hudspeth and Culberson counties
Rio Grande Electric Cooperative	Parts of Hudspeth, Culberson, Jeff Davis, Presidio and Brewster counties
WTU Retail Energy	Parts of Culberson, Jeff Davis, Presidio and Brewster counties
Lower Colorado River Authority	Parts of Culberson County
Oncor	Parts of Culberson County
Texas-New Mexico Power Company	Parts of Culberson County

Source: Public Utility Commission of Texas.

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