Chapter 2


Rio Grande
Dallas.
Austin
Houston
San Antonio
Gulf of Mexi
Monterey
Durango
Chihuahua
California

Chapter 2

The Borderlands—A Region of Physical and Cultural Diversity

By Jean W. Parcher, Diana M. Papoulias, Dennis G. Woodward, and Roger A. Durall

The area surrounding the United States–Mexican border is very physically and culturally diverse and cannot be generalized by any single description. To assist in an accurate appraisal and understanding of this remarkable region, the Borderlands team has divided it into eight subareas based on the watershed subareas of the U.S. Geological Survey Border Environmental Health Initiative (http://borderhealth.cr.usgs.gov) (fig. 2–1), the boundaries of which are defined primarily by surface-water drainage basins. The drainage basins directly adjacent to or crossing the international boundary were automatically included in the defined border region, as were those basins that contain unconsolidated aquifers that extend to or cross the international boundary. Also, "protected areas" adjacent to included basins were selectively added to the defined border region. Though some geographic features are entirely within the Borderlands, many features—deserts, mountain ranges, rivers, etc.—extend beyond the region boundaries but are still influential to Borderlands environments (fig. 2–2). In some cases, the authors of the following chapters have made fine adjustments to the Borderlands boundaries, and they have described those alterations where necessary. By describing and studying these subareas individually and comparing them to one another, we can emphasize the physical and cultural diversity that makes the Borderlands such an important geographic area.

borderlands

Base from U.S. Geological Survey
GTOPO30 (Global 30 Arc Second Elevation Data)

0 50 100 150 200 MILES
0 50 100 150 200 KILOMETERS

EXPLANATION

Subareas of the border region

1. Pacific Basins–Salton Trough
2. Colorado River–Gulf of California
3. Mexican Highlands
4. San Basilio–Mimbres
5. Rio Grande West—Elephant Butte Reservoir to Rio Conchos
6. Rio Grande Central—Rio Conchos to Amistad Reservoir
7. Rio Grande East—below Amistad Reservoir to Falcon Reservoir
8. Lower Rio Grande Valley

Figure 2–1. The eight subareas of the United States–Mexican border region. The subarea boundaries are based on watershed areas used by the U.S. Geological Survey Border Environmental Health Initiative. The boundaries were originally defined by the U.S. Department of the Interior's U.S.-Mexico Border Field Coordinating Committee (Woodward and Durall, 1996).

CALIFORNIA
ARIZONA
NEW MEXICO
TEXAS
BAJA CALIFORNIA
SONORA
CHIHUAHUA
COAHUILA
NUEVO LEÓN
TAMAULIPAS
UNITED STATES
MEXICO
PACIFIC OCEAN
Gulf of California
Gulf of Mexico
Colorado Plateau
Mojave Desert
Basin and Range Province
Lower Colorado River Valley
Salton Trough
Salton Sea
Peninsular Ranges
Pacific Ocean Coastal Plain
Otay Mesa
Colorado River Delta
Arizona Upland
Sonoran Desert
Sierra Madre Occidental
Mexican Highlands
Chihuahuan Desert
Central Plateau
Sierra Madre Oriental
Rio Grande Rift
Great Plains Province
Edwards Plateau
Coastal Plain Province
West Gulf Coastal Plain
SAN ANDREAS TRANSFORM FAULT SYSTEM
COLORADO RIVER
RIO GRANDE
RIO GRANDE / RIO BRAVO
Gila River
Rio Sonoyta
Rio San Rafael
Rio Magdalena
Rio Sonora
Rio Bavispe
Rio Casas Grandes
Rio Conchos
Rio Salado
Rio San Juan
Rio San Fernando
Rio Alamo
Rio Salinas
Santa Cruz River
San Pedro River
Verde River
Pecos River
Devils River
Nueces River
Brazos River
Mimbres River
Sierra Madre
Madrean Sky Islands
Laguna Madre
Los Angeles
San Diego
Tijuana
Yuma
San Luis
Lake Havasu
Parker Dam
Painted Rock Dam
Phoenix
Tucson
Nogales
Hermosillo
Douglas
Agua Prieta
Chihuahua
Albuquerque
Elephant Butte Reservoir
Elephant Butte Dam
Caballo Reservoir
Las Cruces
International Dam
El Paso
Ciudad Juárez
Presidio
Ojinaga
Amistad Reservoir
Amistad Dam
Del Rio
Ciudad Acuña
Eagle Pass
Piedras Negras
San Antonio
Austin
Corpus Christi
Laredo
Nuevo Laredo
Falcon Reservoir
Falcon Dam
Arroyo Colorado
Lower Rio Grande Valley
Brownsville
Matamoros
Monterrey
Saltillo
Ciudad Victoria
Santa Rita Mtns
Patagonia Mtns
Santa Catalina Mtns
MOGOLLON DATIL TRANSITION ZONE
110°
105°
100°
115°
35°
30°
25°

Base from U.S. Geological Survey
National Atlas of the United States, 2001,
and Mexico Instituto Nacional de Estadistica,
Geografia, e Informática, 2000, digital data

Albers Conical Equal Area Projection
North American Datum of 1983 (NAD83)

Shaded relief from U.S. Geological Survey
GTOPO30 (Global 30 Arc Second Elevation Data)

0 125 250 MILES
0 125 250 KILOMETERS

Figure 2–2. Physiographic and geologic features of the United States–Mexican border region.

The subareas are discussed in detail in this chapter. We encourage readers to refer back to this chapter as they read the following challenge theme chapters; the effects of the phenomena addressed by the themes vary according to the physical and cultural characteristics of individual subareas. For an overview of physiographic and geologic features, see figure 2–2, and for more detailed data, see the tables at the end of this chapter: table 2–1 summarizes information about sister cities and other major urban areas and their populations, economic activities, and land use; table 2–2 summarizes information about the physiographic provinces, ecoregions, and climate types in the subareas; and table 2–3 summarizes information about border length, watershed area, major hydrologic features, and elevation ranges in the subareas. For more information on climate in the Borderlands, see chapter 10.

Cabrillo Point, San Diego, California

Subarea 1. Pacific Basins and Salton Trough

The Pacific Basins–Salton Trough subarea stretches for about 225 kilometers (km) (140 miles [mi]) along the international boundary from the Pacific Ocean to the Colorado River and contains basins that drain either to the Pacific Ocean or to enclosed inland seas (fig. 2–3). Physiographic features include the Pacific Ocean coastal plain, the Peninsular Ranges of southern California and Baja California, and the Salton Trough, which includes the Imperial, Coachella, and Mexicali Valleys south of the Salton Sea (fig. 2–2). The climate ranges from Mediterranean along the coast to hot and arid in the inland areas. Average annual precipitation ranges from about 41 centimeters (cm) (16 inches [in]) in the San Diego–Tijuana sister city area (California–Baja California) to about 8 cm (3 in) near the Salton Sea.

With more than 4 million inhabitants, the coastal San Diego–Tijuana sister city area is the largest, best educated, and wealthiest population center along the border. The average income in both cities is higher than the respective average in each country (Anderson and Gerber, 2008). Traveling east across the Peninsular Ranges, the desert population areas of the Calexico-Mexicali sister cities (California–Baja California) depend on water irrigation rights for the Colorado River. Federal lands administered by the U.S. Fish and Wildlife Service (FWS), U.S. Forest Service (FS), Bureau of Land Management (BLM), U.S. Department of Defense (DOD), and various tribal reservations cover more than one third of the basin. These Federal lands include the Tijuana Slough National Wildlife Refuge and National Estuarine Research Reserve (FWS and National Oceanic and Atmospheric Administration), Otay Mountain Wilderness Area (BLM), Cleveland National Forest (FS), and the Sonny Bono Salton Sea National Wildlife Refuge (FWS) (fig. 2–3).

Landsat image of San Diego, California, and Tijuana, Baja California

California coast near
San Diego, California

California brown pelican
(*Pelecanus occidentalis californicus*)

Approach to the United States–Mexican border crossing from Tijuana, Baja California, to San Ysidro, San Diego, California. Traffic on the right is moving north into the United States.

Subarea 2. Colorado River and Gulf of California

The Colorado River–Gulf of California subarea extends about 354 km (220 mi) along the international boundary. Basins in the subarea include the lower Colorado River watershed below Parker Dam, the lower Gila River watershed below Painted Rock Dam, and basins that drain to the Gulf of California (fig. 2–3). This subarea is completely within the Sonoran Desert and encompasses the lower Colorado River valley, the Colorado River delta, and the Arizona Upland (fig. 2–2). The majority of the lower Colorado River valley is sandy or gravely plains, but it also contains low mountains, sand dunes, and alkali sinks.

The major population centers of the Yuma–San Luis sister city area (Arizona-Sonora) rely on agriculture, manufacturing, and tourism for their economic base. The majority of Federal and tribal lands on the United States side of the border are administered by the FWS, FS, BLM, DOD, and the Tohono O'odham Nation. Within Mexico, the Reserva de la Biosfera Alto Golfo de California y Delta del Rio Colorado [biosphere reserve] is one of the largest ecosystem reserves in the world (Rapport and others, 2002) (fig. 2–3).

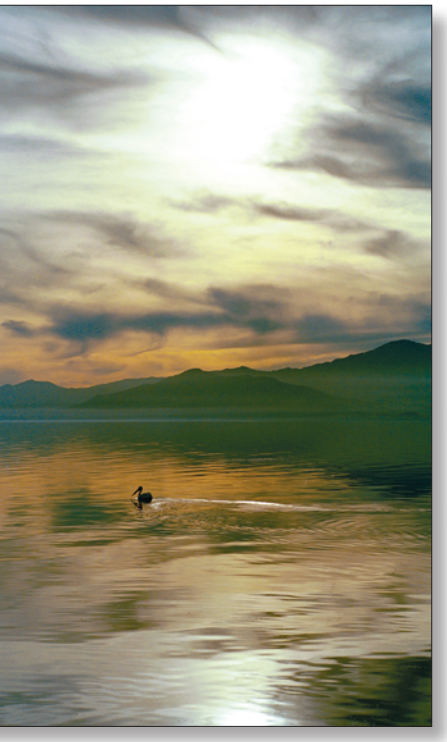
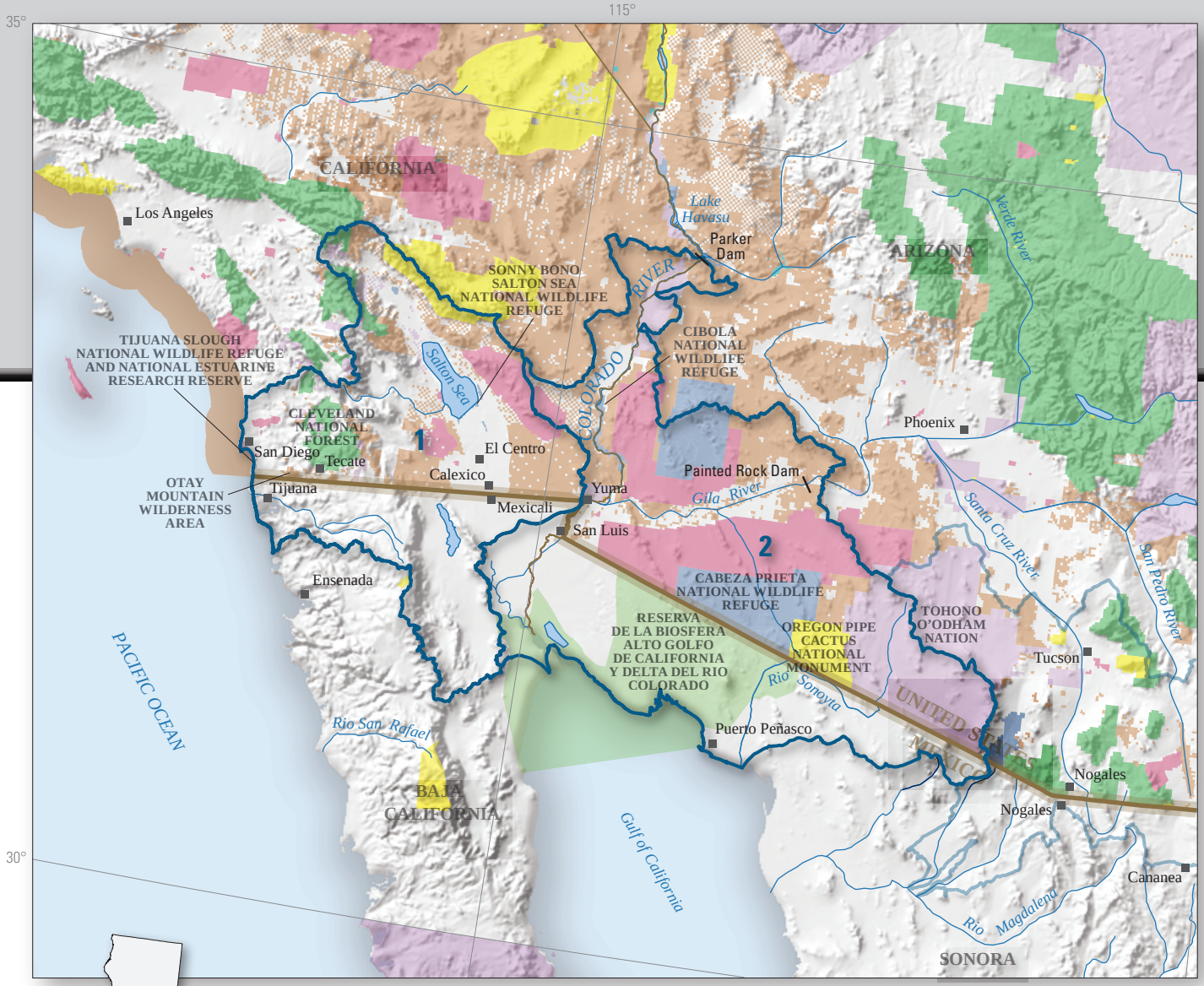


Figure 2–3 (facing page). Locations of the Pacific Basins–Salton Trough subarea (1) and the Colorado River–Gulf of California subarea (2), with United States and Mexican agency land holdings and protected areas.



0 25 50 75 100 MILES

0 25 50 75 100 KILOMETERS

EXPLANATION

Indian reservation lands in the United States

Federal lands in the United States

- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Forest Service
- Fish and Wildlife Service
- National Park Service

Protected areas in Mexico

- Área de Protección de Flora y Fauna
- Parque Nacional
- Reserva de la Biosfera

Subareas of the border region

1 Pacific Basins–Salton Trough

2 Colorado River–Gulf of California

International boundary

Shaded relief base from U.S. Geological Survey GTOPO30 (Global 30 Arc Second Elevation Data), accessed June 2010 at *http://eros.usgs.gov/#/Find_Data/Products_and_Data_Available/gtopo30_info*

Albers Conical Equal Area Projection
North American Datum of 1983 (NAD83)

U.S. river and Federal lands data from the National Atlas of the United States, accessed June 2010 at *http://nationalatlas.gov*

Mexico data from Comisión Nacional de Áreas Naturales Protegidas, accessed June 2010 at *http://sig.conanp.gob.mx/website/anpsig/viewer.htm*

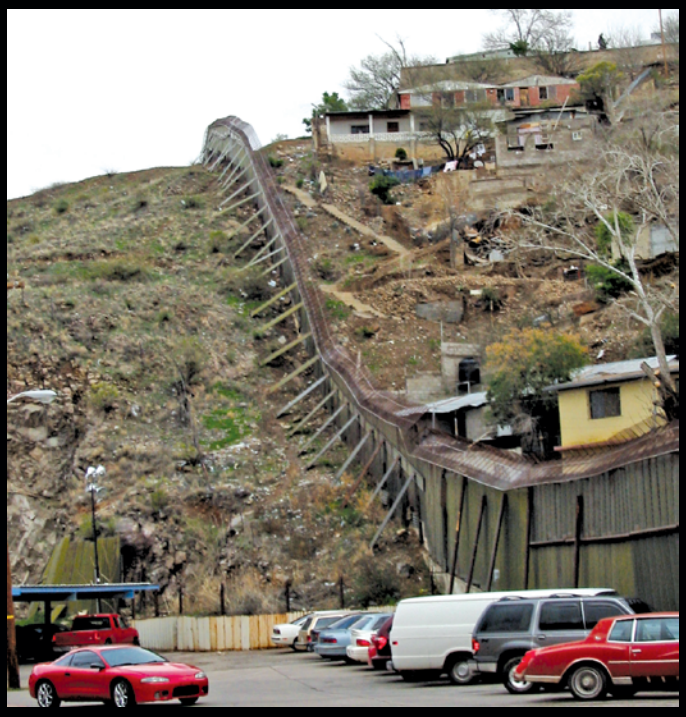
Bisbee, Arizona

Subarea 3. Mexican Highlands

The Mexican Highlands subarea, which is part of the Basin and Range physiographic province, extends about 274 km (170 mi) along the international border and is characterized by broad valleys or basins separated by steeply rising mountain ranges (figs. 2–2 and 2–4). Each basin is essentially an independent hydrologic system. The subarea contains basins that drain to rivers in southern Arizona, southwestern New Mexico, northern Sonora, and the northwestern tip of Chihuahua (Papoulias and others, 1997). The Mexican Highlands subarea is classified as desert. This desert area is noteworthy for its lush vegetation and diverse aquatic habitats, which are remnants from a time when the climate was wetter.

The Arizona Upland (fig. 2–2) is located mostly in south-central Arizona and has more mountain ranges than other areas in the Sonoran Desert. The climate is subtropical desert with two distinct periods of precipitation: winter frontal storms produce periods of extensive, low-intensity rain, and the summer monsoon's intense convective storms produce locally heavy precipitation when moisture-rich air masses originating in the Gulf of Mexico move across the area. The twice-yearly pattern of rainfall, coupled with the variety of landscape and soil types, have led to varied habitats which support some 2,500 species of plants and animals (Phillips and Wentworth-Comus, 1999).

More than a third of the subarea is covered by the Tohono O'odham Indian Reservation (fig. 2–4), extending into the northwest corner of the subarea, and U.S. Federal lands, including various national forests and BLM holdings. Major population centers include Tucson, Ariz., with the second highest per capita income in the Borderlands behind San Diego, Calif.; the sister city area of Nogales-Nogales (Arizona-Sonora); and the former copper mining sister city area of Douglas–Agua Prieta (Arizona-Sonora) (Anderson and Gerber, 2008).

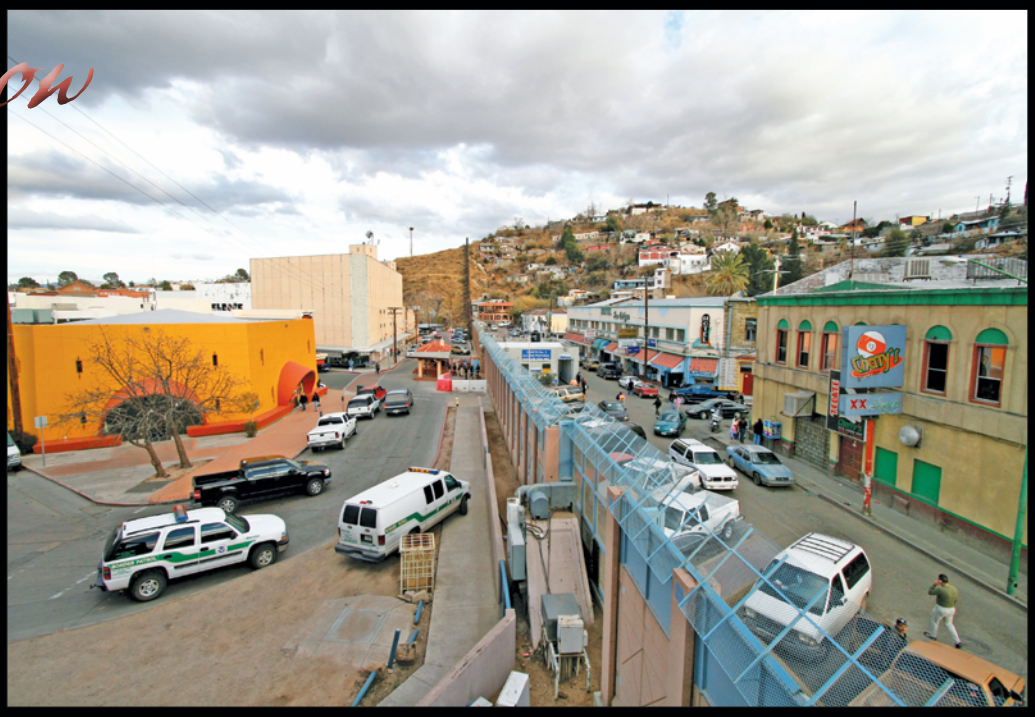


United States–Mexican border fence between Nogales, Arizona (left), and Nogales, Sonora (right)

then

View to the west of Nogales along International Street, with Arizona to the right and Sonora to the left, ca. 1899

now



View to the east along the United States–Mexican border, with Nogales, Arizona, to the left, and Nogales, Sonora, to the right, 2007


Columbus, New Mexico

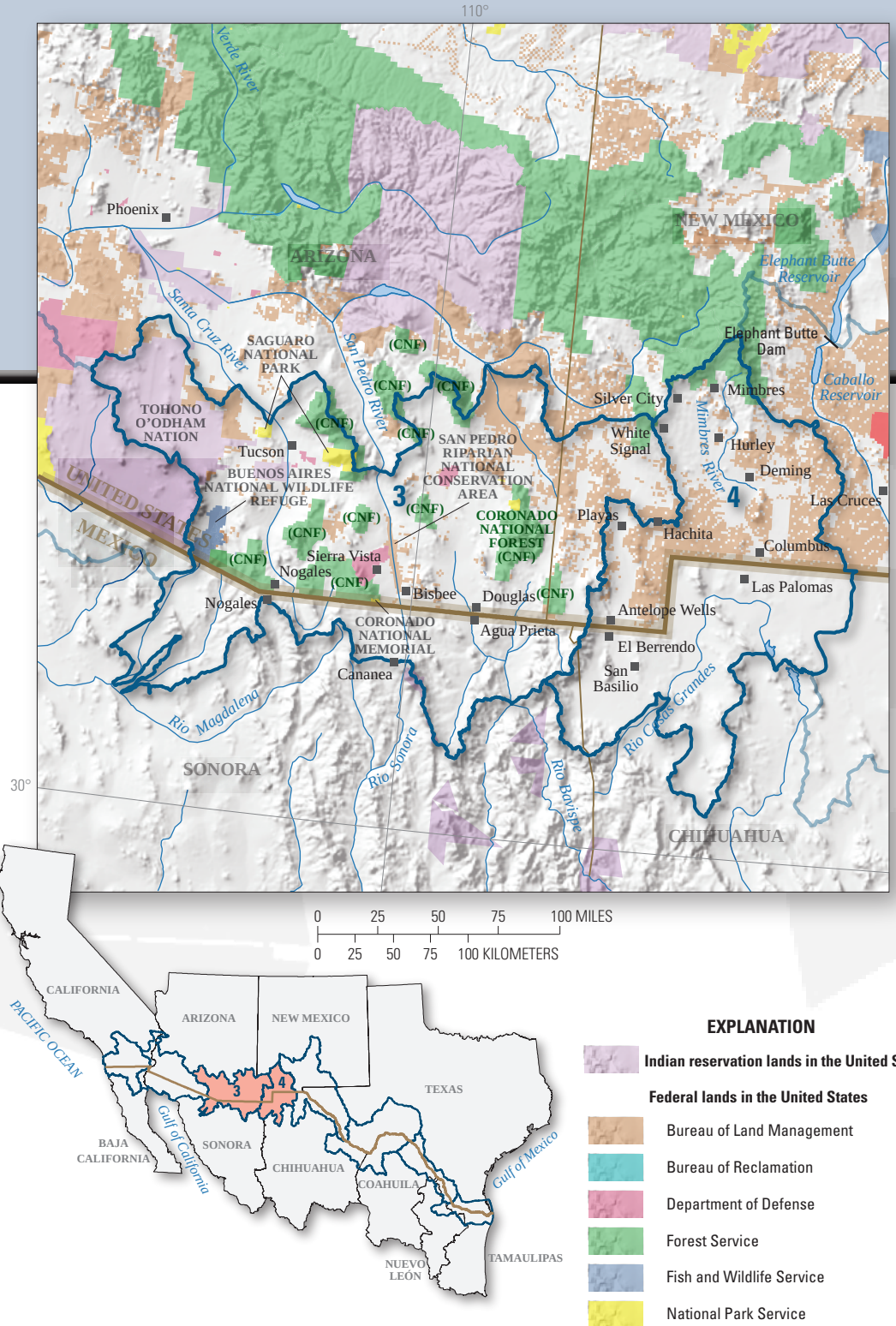
Subarea 4. San Basilio and Mimbres

The San Basilio–Mimbres subarea is an interconnected group of hydrologic subbasins that extend about 225 km (140 mi) along the United States–Mexican international boundary where New Mexico borders Chihuahua (fig. 2–4). Most of the subarea is located in the Mexican Highlands section of the Basin and Range physiographic province (fig. 2–2). This subarea is one of the most sparsely populated areas along the border, characterized in the south by the rocky and dry landscape of the Chihuahuan Desert and extending northward into the Mogollon-Datil transition zone (fig. 2–2). The climate is characterized by hot summers and mild winters with nearly half of the rain falling during the monsoon season from July through September.

Small agricultural communities, such as Playas, Antelope Wells, Hachita, Deming, Columbus, White Signal, Hurley, and Silver City in New Mexico and El Berrendo and Las Palomas in Chihuahua, provide market centers for the farms and rural residents. The BLM manages several recreational areas near the United States–Mexican border.


Herd of pronghorn (*Antilocapra americana*)

Figure 2–4 (facing page). Locations of the Mexican Highlands subarea (3) and the San Basilio–Mimbres subarea (4), with United States and Mexican agency land holdings and protected areas.



EXPLANATION

Indian reservation lands in the United States

Federal lands in the United States

- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Forest Service
- Fish and Wildlife Service
- National Park Service
- Other Federal lands

Protected areas in Mexico

- Área de Protección de Flora y Fauna

Subareas of the border region

- **3** Mexican Highlands
- **4** San Basilio–Mimbres

International boundary

Shaded relief base from U.S. Geological Survey GTOPO30 (Global 30 Arc Second Elevation Data), accessed June 2010 at *http://eros.usgs.gov/#/Find_Data/Products_and_Data_Available/gtopo30_info*

Albers Conical Equal Area Projection
North American Datum of 1983 (NAD83)

U.S. river and Federal lands data from the National Atlas of the United States, accessed June 2010 at *http://nationalatlas.gov*

Mexico data from Comisión Nacional de Áreas Naturales Protegidas, accessed June 2010 at *http://sig.conanp.gob.mx/website/anpsig/viewer.htm*

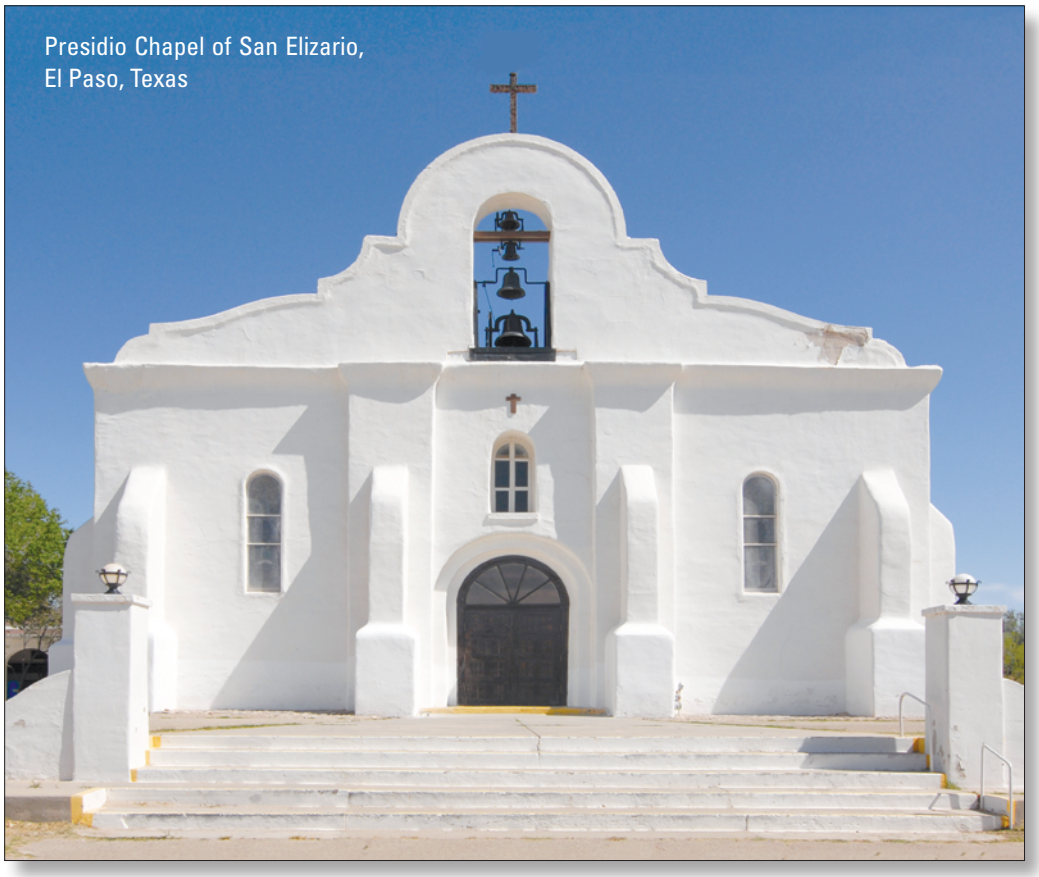
Subarea 5. Rio Grande West—Elephant Butte Reservoir to Rio Conchos

Door at the Socorro Mission, El Paso, Texas

The Rio Grande West subarea extending from Elephant Butte Reservoir to the Rio Conchos is an interconnected group of hydrologic basins in the Rio Grande Rift (an eastern segment of the Basin and Range physiographic province) that drain to the Rio Grande between Elephant Butte Dam and the Rio Conchos confluence (fig. 2–2). The area extends about 515 km (320 mi) along the international boundary between New Mexico and Texas to the northeast and Chihuahua to the southwest. The riparian banks of the Rio Grande support irrigated desert agriculture from Las Cruces, N. Mex., to south of the El Paso–Ciudad Juárez sister city area. Elevations range from about 610 to 1,676 meters (m) (2,000 to 5,500 feet [ft]). Climate is characterized by hot summers and cool winters, and annual precipitation generally is less than 15 cm (6 in).

Major Federal land holdings include the Elephant Butte and Caballo Reservoirs (Bureau of Reclamation), the White Sands National Monument (National Park Service [NPS]), the Chamizal National Memorial in El Paso (NPS), the Guadalupe Mountains National Park and Wilderness Area (NPS), the San Andres National Wildlife Refuge (FWS), and several BLM holdings (fig. 2–5).

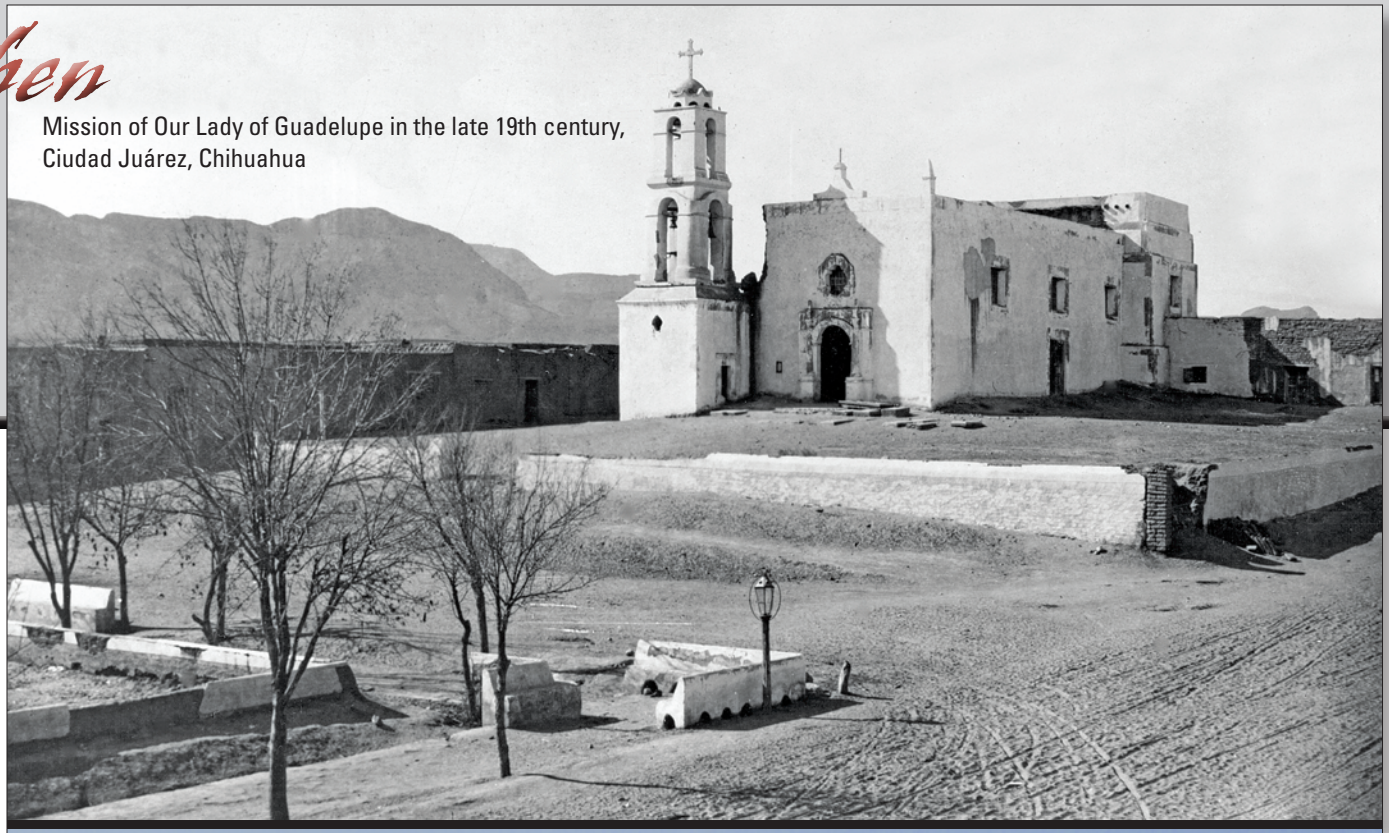
The El Paso–Ciudad Juárez sister city area is the second largest population center along the United States–Mexican border. With five major border crossings and significant manufacturing and commercial centers, this binational metropolitan area is closely linked economically, politically, and socially. Scarcity of water is a limiting factor for growth in the area. The area southeast of El Paso and Ciudad Juárez is sparsely populated and lacks roads and border crossings until the junction of the Rio Conchos with the Rio Grande near the sister city area of Presidio-Ojinaga (Texas-Chihuahua) at the border with the Rio Grande Central subarea.



Presidio Chapel of San Elizario, El Paso, Texas

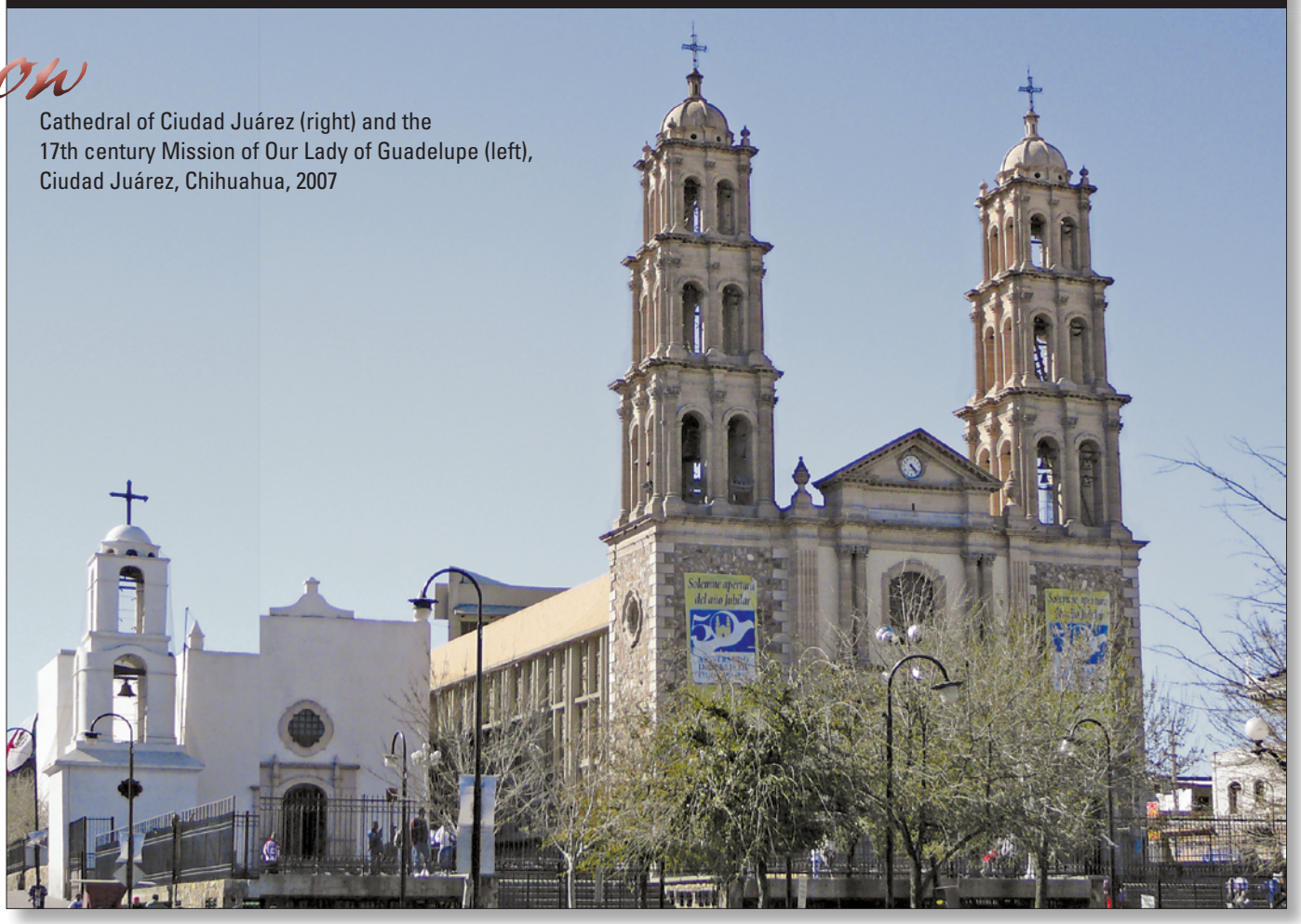
Portico at the Presidio Chapel of San Elizario, El Paso, Texas

then



Mission of Our Lady of Guadelupe in the late 19th century, Ciudad Juárez, Chihuahua

now



Cathedral of Ciudad Juárez (right) and the 17th century Mission of Our Lady of Guadelupe (left), Ciudad Juárez, Chihuahua, 2007

White Sands National Monument, New Mexico, is one of many federally protected areas in the Rio Grande West subarea.

Subarea 6. Rio Grande Central—Rio Conchos to Amistad Reservoir

Sierra del Carmen, Texas

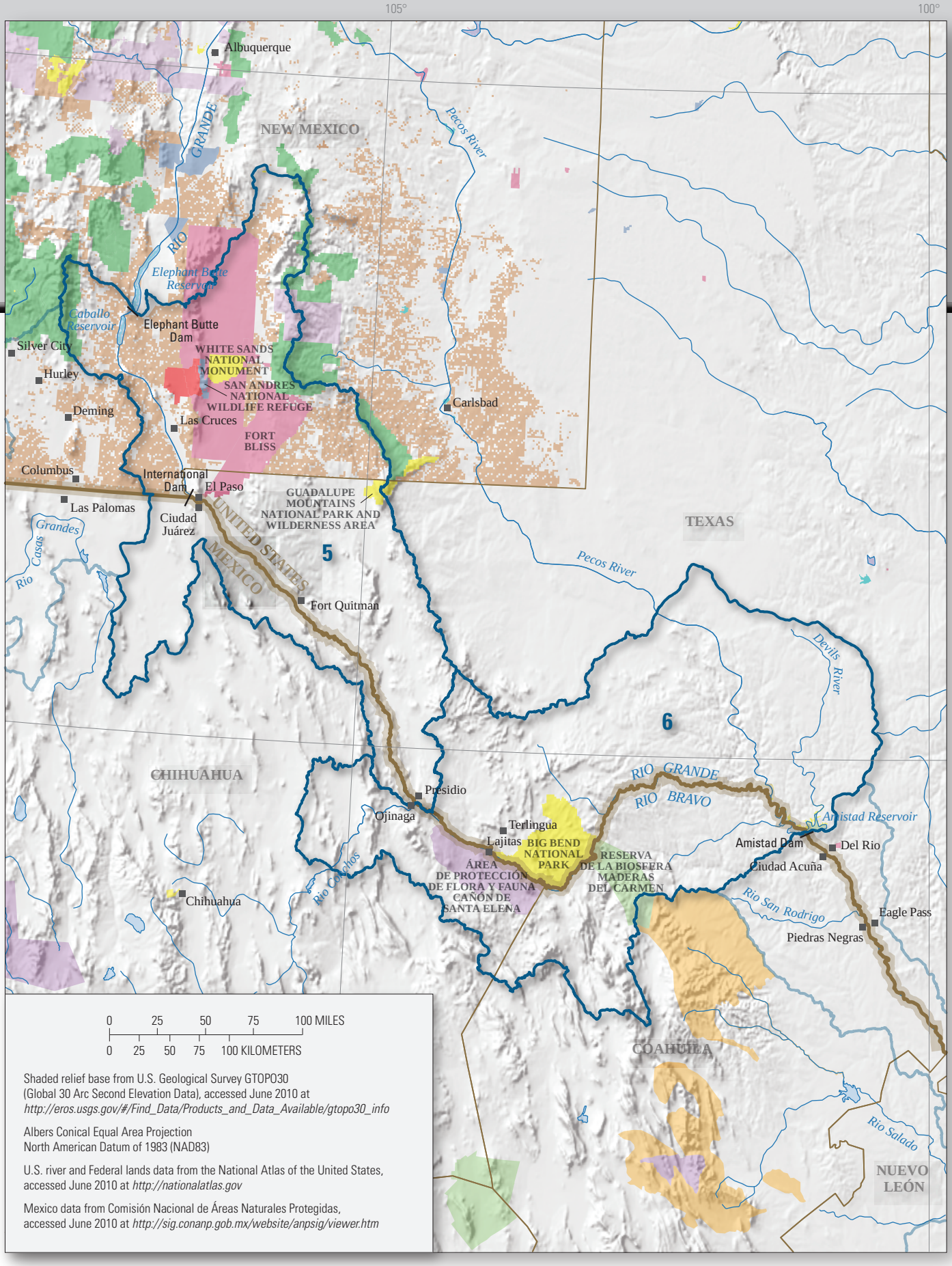
The Rio Grande Central subarea from the Rio Conchos to Amistad Reservoir extends about 636 km (395 mi) along the Rio Grande international border (fig. 2–5). This sparsely populated subarea is in the Chihuahuan Desert and the Rio Grande Rift (fig. 2–2). The isolated mountain ranges separated by desert basins in Big Bend National Park near the center of the subarea are characteristic of the southern Rio Grande Rift and the northern Chihuahuan Desert. The Rio Grande flows through deep, steep-walled canyons of limestone, forming a ribbon-like oasis of riverine and riparian environments that are a stark contrast to the adjacent desert landscape. Contributing tributaries include the Rio Conchos, Pecos River, and Devils River. The latter two contribute flow directly to Amistad Reservoir, which is a binational reservoir shared between Mexico and the United States that was created to control the downstream flooding of homes and farms. The Rio Conchos watershed in its entirety contains almost one half of the entire Rio Grande drainage area in Mexico.

Protected areas can be found on both sides of the international border. The Reserva de la Biosfera Maderas del Carmen [biosphere reserve] and the Área de Protección de Flora y Fauna Cañón de Santa Elena [protected flora and fauna area] in Mexico cover nearly 485,640 hectares (ha) (1.2 million acres) (fig. 2–5). In the United States, the NPS manages Big Bend National Park, the Rio Grande Wild and Scenic River (within and to the east of Big Bend National Park), and the Amistad National Recreation Area at Amistad Reservoir, all in Texas (Blackstun and others, 1998).

There are no major population centers. Along the banks of the Rio Grande just north of Big Bend National Park, the once-thriving mining towns of Lajitas and Terlingua, Tex., currently lack official border crossings.

Pecos River, Texas

Cave art at Amistad Reservoir, Texas



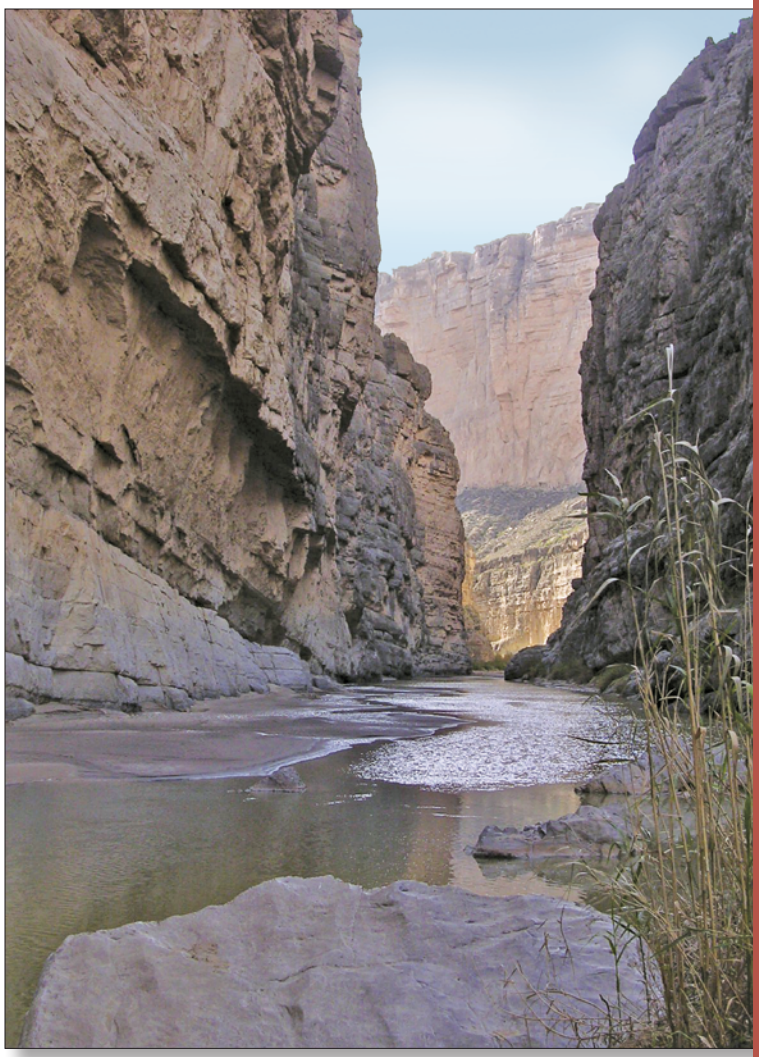
Shaded relief base from U.S. Geological Survey GTOPO30 (Global 30 Arc Second Elevation Data), accessed June 2010 at *http://eros.usgs.gov/#/Find_Data/Products_and_Data_Available/gtopo30_info*

Albers Conical Equal Area Projection
North American Datum of 1983 (NAD83)

U.S. river and Federal lands data from the National Atlas of the United States, accessed June 2010 at *http://nationalatlas.gov*

Mexico data from Comisión Nacional de Áreas Naturales Protegidas, accessed June 2010 at *http://sig.conanp.gob.mx/website/anpsig/viewer.htm*

Figure 2–5 (facing page). Locations of the Rio Grande West subarea (5), from Elephant Butte Reservoir to the Rio Conchos, and the Rio Grande Central subarea (6), from the Rio Conchos to Amistad Reservoir, with United States and Mexican agency land holdings and protected areas.



Santa Elena Canyon, Big Bend National Park, Texas

Cretaceous fossil at Big Bend National Park, Texas

Subarea 7. Rio Grande East—Below Amistad Reservoir to Falcon Reservoir

The Rio Grande East subarea from below Amistad Reservoir to Falcon Reservoir is an interconnected group of hydrologic basins that drain either to the Rio Grande or to the lower reach of the Rio Salado (fig. 2–6). The area extends about 483 km (300 mi) along the international boundary between Texas in the United States and Coahuila, Nuevo León, and Tamaulipas in Mexico. The northernmost section of the subarea is located in the Edwards Plateau, Tex. (fig. 2–2), an area underlain by massive limestone deeply cut by arroyos and canyons. Most of the subarea south of Eagle Pass, Tex., is in the Rio Grande floodplain. Elevations range from about 96 m (314 ft) at the international Falcon Reservoir, managed by the International Boundary and Water Commission (IBWC), to 891.5 m (2,925 ft) in Val Verde County, Tex. The climate is subtropical to subhumid with average annual precipitation of 43–48 cm (17–19 in). Drought periods with annual precipitation of less than 15 cm (6 in) are not uncommon.

Federal lands in this area, including Falcon Reservoir and the right-of-way along the Rio Grande, are all managed by the IBWC. The principal sister city population centers of Del Rio–Ciudad Acuña (Texas-Coahuila), Eagle Pass–Piedras Negras (Texas-Coahuila), and Laredo–Nuevo Laredo (Texas-Tamaulipas) are connected economically and socially, with each Mexican sister city having at least double the population of its United States sister city. The entry ports of the Laredo–Nuevo Laredo area are strategically located near the industrial city of Monterrey, Nuevo León. The Laredo port of entry supports more than 50 percent of all truck crossings through Texas and is the largest inland port in the United States (Anderson and Gerber, 2008).

Founder's Monument, Nuevo Laredo, Tamaulipas

Lake Casa Blanca State Park, Laredo, Texas

Subarea 8. Lower Rio Grande Valley

South Padre Island, Texas

The Lower Rio Grande Valley subarea is physiographically characterized as the West Gulf Coastal Plain (fig. 2–2) (U.S. Geological Survey, 2003). The subarea contains basins that drain to either the Rio Grande, the lower reaches of the Rio San Juan, or the Arroyo Colorado in southern Texas (fig. 2–6). This subarea extends about 451 km (280 mi) along the international border between Texas in the United States and Tamaulipas and Nuevo León in Mexico, terminating in the wetlands and marshes of the Gulf of Mexico and the Laguna Madre of Texas and Tamaulipas (Buckler and others, 2002). The landscape is characterized by a wide deltaic floodplain, interspersed with abandoned river channel meanders, which are locally referred to as resacas.

Native Tamaulipan brushland characterized by dense, woody, and thorny vegetation and a high degree of biological diversity is the dominant land cover. This taller and more lush vegetation in riparian areas not only provides important nesting and feeding habitat, but also serves as corridors for animal movement. The subtropical humid climate, with an average annual rainfall of about 66 cm (26 in) at the mouth of the Rio Grande and about 41 cm (16 in) at Falcon Dam, is strongly influenced by weather activity related to the Gulf of Mexico. Federally owned or managed areas include the Santa Ana and Lower Rio Grande Valley National Wildlife Refuges along the Rio Grande in McAllen, Tex. (FWS), the Laguna Atascosa National Wildlife Refuge (FWS), and the Palo Alto Battlefield National Historic Site in Brownsville, Tex. (NPS) (fig. 2–6). The major metropolitan areas of McAllen, Harlingen, and Brownsville in Texas and Reynosa and Matamoros in Tamaulipas support more than a million habitants through tourism, manufacturing, and agriculture. As in other border subareas, the water resources and associated plant, fish, and wildlife communities of the Lower Rio Grande Valley subarea are increasingly subject to the pressures of human activities.

References cited in this chapter are listed in chapter 12.

Rio Grande at Roma, Texas

Hand-powered ferry on the Rio Grande at the United States–Mexican border crossing between Los Ebanos, Texas, and Gustavo Díaz Ordaz, Tamaulipas

Figure 2–6 (facing page). Locations of the Rio Grande East subarea (7), from below Amistad Reservoir to Falcon Reservoir, and the Lower Rio Grande Valley subarea (8), with United States and Mexican agency land holdings and protected areas.

EXPLANATION

Federal lands in the United States

- Bureau of Reclamation
- Department of Defense
- Fish and Wildlife Service
- National Park Service

Protected areas in Mexico

- Área de Protección de Flora y Fauna
- Área de Protección de Recursos Naturales
- Monumento Natural
- Parque Nacional

Subareas of the border region

- **7** Rio Grande East—below Amistad Reservoir to Falcon Reservoir
- **8** Lower Rio Grande Valley

International boundary

Shaded relief base from U.S. Geological Survey GTOPO30 (Global 30 Arc Second Elevation Data), accessed June 2010 at *http://eros.usgs.gov/#/Find_Data/Products_and_Data_Available/gtopo30_info*

Albers Conical Equal Area Projection
North American Datum of 1983 (NAD83)

U.S. river and Federal lands data from the National Atlas of the United States, accessed June 2010 at *http://nationalatlas.gov*

Mexico data from Comisión Nacional de Áreas Naturales Protegidas, accessed June 2010 at *http://sig.conanp.gob.mx/website/anpsig/viewer.htm*

Table 2–1. Information on sister cities, major urban areas, and population; economic activities; and land use for the eight subareas of the United States–Mexican border region.

[ha, hectare]

Sister cities and major urban areas	Population	Economic activities	Major land use	
1 Pacific Basins–Salton Trough				
San Diego, California	1,256,951	Biotechnology, wireless communication, digital media, defense industries, manufacturing, tourism, agriculture, food processing	Urban	8,880 ha (21,941 acres)
Tijuana, Baja California	1,483,992		Agriculture	8,178 ha (20,208 acres)
			Shrubland	68,094 ha (168,258 acres)
Calexico, California	37,243		Forest	4,520 ha (11,169 acres)
Mexicali, Baja California	855,962		Grassland	8,812 ha (21,774 acres)
			Wetland	410 ha (1,012 acres)
2 Colorado River–Gulf of California				
Yuma, Arizona	87,423	Agriculture, manufacturing, tourism, military	Urban	1,885 ha (4,658 acres)
San Luis, Sonora	157,076		Agriculture	9,284 ha (22,941 acres)
			Shrubland	161,519 ha (399,107 acres)
			Forest	269 ha (665 acres)
			Grassland	4,623 ha (11,423 acres)
			Wetland	3,085 ha (7,624 acres)
3 Mexican Highlands				
Nogales, Arizona	20,878	Mining, agriculture, manufacturing–maquiladoras[1]	Urban	3,819 ha (9,437 acres)
Nogales, Sonora	193,517		Agriculture	3,503 ha (8,657 acres)
			Shrubland	146,143 ha (361,115 acres)
Douglas, Arizona	14,312		Forest	13,473 ha (33,292 acres)
Agua Prieta, Sonora	70,303		Grassland	19,058 ha (47,092 acres)
			Wetland	224 ha (553 acres)
Tucson, Arizona	518,956			
4 San Basilio–Mimbres				
Columbus, New Mexico	1,765	Agriculture	Urban	848 ha (2,096 acres)
Las Palomas, Chihuahua	5,748		Agriculture	4,196 ha (10,367 acres)
			Shrubland	72,706 ha (179,653 acres)
			Forest	6,499 ha (16,060 acres)
			Grassland	22,633 ha (55,925 acres)
			Wetland	42 ha (104 acres)
5 Rio Grande West: Elephant Butte Reservoir to Rio Conchos				
El Paso, Texas	609,415	Manufacturing, commercial, agriculture, military	Urban	3,774 ha (9,325 acres)
Ciudad Juárez, Chihuahua	1,313,338		Agriculture	4,231 ha (10,454 acres)
			Shrubland	201,444 ha (497,762 acres)
Las Cruces, New Mexico	86,268		Forest	10,508 ha (25,966 acres)
			Grassland	22,789 ha (56,311 acres)
			Wetland	202 ha (500 acres)
6 Rio Grande Central: Rio Conchos to Amistad Reservoir				
Presidio, Texas	4,167	Tourism, mining, agriculture	Urban	1,107 ha (2,735 acres)
Ojinaga, Chihuahua	21,157		Agriculture	798 ha (1,973 acres)
			Shrubland	271,511 ha (670,894 acres)
			Forest	3,900 ha (9,637 acres)
			Grassland	16,706 ha (41,279 acres)
			Wetland	306 ha (757 acres)
7 Rio Grande East: below Amistad Reservoir to Falcon Reservoir				
Del Rio, Texas	36,491	Agriculture, mining, tourism	Urban	2,811 ha (6,945 acres)
Ciudad Acuña, Coahuila	126,238		Agriculture	4,618 ha (11,410 acres)
			Shrubland	77,620 ha (191,797 acres)
Eagle Pass, Texas	22,413		Forest	1,352 ha (3,341 acres)
Piedras Negras, Coahuila	169,771		Grassland	23,174 ha (57,262 acres)
			Wetland	716 ha (1,769 acres)
Laredo, Texas	215,484			
Nuevo Laredo, Tamaulipas	355,827			
8 Lower Rio Grande Valley				
McAllen, Texas	146,411	Tourism, manufacturing, agriculture	Urban	5,175 ha (12,788 acres)
Reynosa, Tamaulipas	633,730		Agriculture	29,709 ha (73,409 acres)
			Shrubland	22,012 ha (54,390 acres)
Brownsville, Texas	172,437		Forest	463 ha (1,144 acres)
Matamoros, Tamaulipas	462,157		Grassland	22,158 ha (54,752 acres)
			Wetland	4,345 ha (10,737 acres)
Harlingen, Texas	64,202			

[1]Maquiladoras are foreign-owned manufacturing and assembly plants along the Mexican side of the border. See chapters 5 and 6 for more information.

Table 2–2. Physiographic provinces, ecoregions, and climate types included in the eight subareas of the United States–Mexican border region. See figure 2–2 for more on physiographic and geologic features and figure 3–1 for more on ecoregions.

Physiographic provinces, sections, and other features	Ecoregions	Climate types
1 Pacific Basins–Salton Trough		
Coastal Plain province, Peninsular Ranges, Salton Trough	California Coastal Sage, Chaparral, and Oak Woodlands; Sonoran Desert	Coastal Mediterranean; Inland desert
2 Colorado River–Gulf of California		
Sonoran Desert, Colorado River valley, Colorado River delta, Arizona Upland	Sonoran Desert	Subtropical desert (summer and winter rains)
3 Mexican Highlands		
Broad valleys and steep mountains	Sonoran Desert; Madrean Archipelago; Chihuahuan Desert	Arid
4 San Basilio–Mimbres		
Continental Divide, Rio Grande rift zone	Chihuahuan Desert	Arid
5 Rio Grande West: Elephant Butte Reservoir to Rio Conchos		
Basin and Range province, Chihuahuan Desert, Franklin Mountains	Chihuahuan Desert	Arid
6 Rio Grande Central: Rio Conchos to Amistad Reservoir		
Basin and Range province, Great Plains province	Chihuahuan Desert	Arid
7 Rio Grande East: below Amistad Reservoir to Falcon Reservoir		
Edwards Plateau	Southern Texas Plains/Interior Plains and Hills with Xerophytic Shrub and Oak Forest	Subtropical
8 Lower Rio Grande Valley		
Gulf Coastal Plain	Southern Texas Plains/Interior Plains and Hills with Xerophytic Shrub and Oak Forest; Western Gulf Coastal Plain	Subtropical

EXPLANATION

Subareas of the border region

1 Pacific Basins–Salton Trough
2 Colorado River–Gulf of California
3 Mexican Highlands
4 San Basilio–Mimbres
5 Rio Grande West—Elephant Butte Reservoir to Rio Conchos
6 Rio Grande Central—Rio Conchos to Amistad Reservoir
7 Rio Grande East—below Amistad Reservoir to Falcon Reservoir
8 Lower Rio Grande Valley

International boundary

Table 2–3. Border length, watershed area, major hydrologic features, and elevation ranges for the eight subareas of the United States–Mexican border region. See figure 4–2 for more on watersheds and hydrologic features.

[km, kilometer; mi, mile; km ², square kilometer; mi², square mile; m, meter; ft, foot]

Border length	Watershed area	Major hydrologic features	Elevation range (above sea level)
1 Pacific Basins–Salton Trough			
225 km (140 mi)	36,260 km² (14,000 mi²) Mexico: 12,613 km² (4,870 mi²) United States: 23,647 km² (9,130 mi²)	Pacific Ocean, Salton Sea	Sea level to 3,048 m (10,000 ft)
2 Colorado River–Gulf of California			
354 km (220 mi)	58,508 km² (22,590 mi²) Mexico: 21,678 km² (8,370 mi²) United States: 36,830 km² (14,220 mi²)	Colorado River, Gulf of California	Sea level to 1,067 m (3,500 ft)
3 Mexican Highlands			
274 km (170 mi)	56,566 km² (21,840 mi²) Mexico: 13,973 km² (5,395 mi²) United States: 42,593 km² (16,445 mi²)	Santa Cruz River, San Pedro River	549–2,743 m (1,800–9,000 ft)
4 San Basilio–Mimbres			
225 km (140 mi)	32,245 km² (12,450 mi²) Mexico: 16,019 km² (6,185 mi²) United States: 16,226 km² (6,265 mi²)	Mimbres River, Rio Casas Grandes	1,189–3,094 m (3,900–10,150 ft)
5 Rio Grande West: Elephant Butte Reservoir to Rio Conchos			
515 km (320 mi)	74,954 km² (28,940 mi²) Mexico: 14,918 km² (5,760 mi²) United States: 60,036 km² (23,180 mi²)	Rio Grande, Elephant Butte Reservoir, Caballo Reservoir	762–3,200 m (2,500–10,500 ft)
6 Rio Grande Central: Rio Conchos to Amistad Reservoir			
636 km (395 mi)	89,692 km² (34,630 mi²) Mexico: 36,027 km² (13,910 mi²) United States: 53,665 km² (20,720 mi²)	Rio Grande, Amistad Reservoir, Rio Conchos, Pecos River, Devils River	351–2,377 m (1,150–7,800 ft)
7 Rio Grande East: below Amistad Reservoir to Falcon Reservoir			
483 km (300 mi)	33,437 km² (12,910 mi²) Mexico: 20,306 km² (7,840 mi²) United States: 13,131 km² (5,070 mi²)	Rio Grande, Falcon Reservoir, Las Moras Creek, Rio Salado, Rio Salinas	91–1,311 m (300–4,300 ft)
8 Lower Rio Grande Valley			
451 km (280 mi)	26,522 km² (10,240 mi²) Mexico: 15,942 km² (6,155 mi²) United States: 10,580 km² (4,085 mi²)	Rio Grande, Rio San Juan, Laguna Madre, Gulf of Mexico	Sea level to 1,250 m (4,100 ft)