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# 9.2 Temperate Prairies

## 9.2.1 Aspen Parkland/Northern Glaciated Plains

**Location:** This region extends in an arc-like manner from Calgary, Alberta, across Saskatchewan and southwestern Manitoba, and south into North Dakota, South Dakota, and a small portion of western Minnesota.

**Climate:** The ecoregion has a severe, mid-latitude, humid continental climate, bordering in places on a dry mid-latitude steppe climate. It is marked by short, warm summers and long, cold winters, with nearly continuous snow cover to the north. The mean annual temperature varies from approximately 1.5°C in the north to 8°C in the south. The mean summer temperature ranges from 15°C in the north to 19°C in the south, and mean winter temperatures are -12.5°C in the north and -4°C in the south. The mean annual precipitation ranges from 400 to 610 mm. The frost-free period ranges from 90 to 150 days.

**Vegetation:** Most of the region is now farmland but in its native state, the landscape was characterized by trembling aspen, oak groves, mixed tall shrubs, and intermittent fescue grasslands. Bur oak and grassland communities occupied drier sites. Many areas had transitional grassland containing tallgrass and shortgrass prairie, including big and little bluestem, green needlegrass, blue grama, western wheatgrass, and switchgrass.

**Hydrology:** There is a low density of streams and rivers across the area. High concentrations of temporary and seasonal wetlands create favorable conditions for waterfowl nesting and migration.

**Terrain:** The region features flat to gently rolling plains composed of glacial moraine. There are areas of lacustrine and hummocky to ridged fluvioglacial deposits; the typical bedrock is composed of Tertiary and Cretaceous sandstones and shales. Soils are very fertile; Mollisols are common, with mostly frigid soil temperature regimes and udic and aquic soil moisture regimes.

**Wildlife:** There are major habitats in the region for waterfowl. It provides a major breeding habitat for waterfowl and includes habitat for white-tailed deer, coyote, snowshoe hare, cottontail, red fox, northern pocket gopher, Franklin's ground squirrel, and bird species like sharp-tailed grouse and black-billed magpie.

**Land Use/Human Activities:** This region represents some of the most productive agricultural lands in the Prairies. It produces a wide diversity of crops, including spring wheat, flax, rye, barley, oats, corn, soybeans, and sunflowers, as well as forages and several specialty crops. However, agricultural success is subject to annual climatic fluctuations. Large cities and communities include Calgary, Edmonton, Brandon, Minot, Jamestown, Aberdeen, Watertown, Brookings, Huron, and Yankton.

## 9.2.2 Lake Manitoba and Lake Agassiz Plain

**Location:** This ecoregion stretches southeastward from the Dauphin Lake area in Manitoba to south of the Fargo area in North Dakota and to Minnesota.

**Climate:** The ecoregion has a severe, mid-latitude, humid continental climate, marked by warm summers and cold winters. It is one of Canada’s most humid and warm prairie regions, although one of the coldest for the Great Plains of the United States. The mean annual temperature ranges from approximately 2°C in the north to 6°C in the south. The mean summer temperature is about 17°C, and the mean winter temperature is approximately -10°C. The frost-free period ranges from 95 to 145 days. The mean annual precipitation is 560 mm, with a range of 450-700 mm. Most of the precipitation falls during growing season thunderstorms.

**Vegetation:** In the north, transitional boreal forest occurred, with some aspen parkland to the south. The Canadian portion is a mosaic of trembling aspen/oak groves and rough fescue grasslands. In the United States, riparian areas have cottonwood, willow, bur oak, green ash, and elm. The historic tallgrass prairie has been replaced by intensive row crop agriculture.

**Hydrology:** Low density, low-gradient stream and river networks cross the area and are part of the Red River watershed; late winter flooding is common. In some areas, ditching and channelization has been done.

**Terrain:** The terrain is characterized by flat to low rolling plains with elevations ranging from about 410 to 218 m. Moraine and lacustrine deposits cover this low-relief area; calcareous glacial till occurs in the north. The glacial Lake Agassiz was the last in a series of proglacial lakes to fill the Red River valley in the three million years since the beginning of the Pleistocene. Thick beds of lake sediments on top of glacial till create the extremely flat floor of the Lake Agassiz Plain. Mollisols and Vertisols soils are typical, with a frigid soil temperature regime and aquic and udic soil moisture regime.

**Wildlife:** Wildlife in the region includes significant waterfowl, as well as white-tailed deer, coyote, red fox, jackrabbit, cottontail rabbit, raccoon, muskrat, sharp-tailed grouse, ring-tail pheasant, geese, ducks, perch, walleye, and ground squirrel.

**Land Use/Human Activities:** Cropland is extensive, with potatoes, beans, sugar beets, wheat, spring wheat, barley, canola, sunflowers, corn, and soybeans. Some hunting and water-oriented recreation are also significant land uses. Major communities include Winnipeg, Portage la Prairie, Emerson, Dauphin, Grand Forks, and Fargo.

## 9.2.3 Western Corn Belt Plains

**Location:** The Western Corn Belt Plains stretches across southern Minnesota, most of central and western Iowa, eastern South Dakota, eastern Nebraska, northwest Missouri, and northeast Kansas.

Climate: The ecoregion has a severe, mid-latitude, humid continental climate, marked by hot summers and cold winters. The mean annual temperature is approximately 6°C in the north to 12°C in the south. The frost-free period ranges from 140 to 200 days. The mean annual precipitation is 800 mm, ranging between 610 and 1,000 mm and occurring mainly in the growing season.

**Vegetation:** Once a tallgrass prairie covered with little bluestem, big bluestem, Indiangrass, switchgrass, numerous forbs, and with small areas of bur oak and oak-hickory woodlands, the region has nearly all been converted to agricultural land.

**Hydrology:** There are intermittent and perennial streams, many of which have been channelized. A few areas have natural lakes. Surface and groundwater contamination from fertilizer and pesticide applications as well as from concentrated livestock production is a regional issue.

**Terrain:** The topography consists of nearly level to gently rolling glaciated till plains and hilly loess

plains. Thick loess and glacial till cover the Mesozoic and Paleozoic shale, sandstone, and limestone. Mollisols and Alfisols are dominant with mesic soil temperatures and udic soil moisture.

**Wildlife:** Regional wildlife includes white-tailed deer, beaver, raccoon, red-tailed hawk, barn owl, bobwhite quail, western meadowlark, Canada goose, pheasant, gray partridge, mallard, teal, Great Plains toad, walleye, northern pike, bluegill, sunfish.

**Land Use/Human Activities:** Over 75 percent of the Western Corn Belt Plains is now used for cropland agriculture and much of the remainder is in forage for livestock. It is one of the most productive areas in the world for growing corn and soybeans. Hog and cattle production and some dairies also occur. Larger towns and cities include Mankato, Worthington, Albert Lea, Austin, Sioux Falls, Sioux City, Fort Dodge, Mason City, Ames, Des Moines, Marshalltown, Waterloo, Cedar Falls, Cedar Rapids, Iowa City, Omaha, Council Bluffs, Lincoln, Atchison, Maryville, and St. Joseph.

## 9.2.4 Central Irregular Plains

**Location:** This ecoregion spans southern Iowa, northern and western Missouri, eastern Kansas, and northeastern Oklahoma.

**Climate:** The ecoregion has a severe, mid-latitude, humid continental climate in the north and a milder humid subtropical climate to the south. It is marked by hot summers and mild to cold winters. The mean annual temperature is approximately 10°C to 16°C, with a frost-free period of between 165 and 235 days. The mean annual precipitation is 983 mm, ranging from 865 to 1,145 mm. Most of the rain falls during the growing season though there is snow in winter.

**Vegetation:** The historical vegetation is a grassland/forest mosaic with wider forested strips along the streams, compared to ecoregion 9.2.3 to the north. The grassland was an allgrass prairie with little bluestem, big bluestem, switchgrass, and Indiangrass, and the forests are oak-hickory woodlands with red oak, white oak, bur oak, chinkapin oak, post oak, shagbark hickory, and bitternut hickory.

**Hydrology:** Perennial streams are common; in some areas many are channelized. Some large rivers cross the region. A few large reservoirs occur. Groundwater is highly mineralized in some areas.

**Terrain:** Rolling and irregular plains are common in this area, with some cuestas and low hills: topographically it is more irregular than the Western Corn Belt Plains (9.2.3) to the north, The region, however, is less irregular than the ecoregions to the south and east. Geology is mostly Pennsylvanian period sandstone, shale, limestone, and coal. Loess overlies clayey glacial drift in the north; Mollisols and Alfisols are typical, with mesic and thermic soil temperatures and udic and aquic soil moisture regimes.

**Wildlife:** White-tailed deer, badger, raccoon, skunk, muskrat, cottontail rabbit, mink, Canada geese, bobwhite quail, western meadowlark, ring-neck pheasant.

**Land Use/Human Activities:** The region presents a mosaic of land uses, with cropland, woodland, and grassland. Agriculture here includes the production of corn, soybeans, wheat, alfalfa, hay, grain sorghum, cattle, and broiler chickens. There is some oil and gas production and mining of high-sulfur bituminous coal occurs, although less now than formerly. The disturbance of coal strata in southern Iowa and northern Missouri has degraded water quality and affected aquatic biota. Larger towns and cities include Ottumwa, Kirksville, Mexico, Warrensburg, Topeka, Lawrence, Fort Scott, Independence, Miami, Claremore, Tulsa, Broken Arrow, and Muskogee.

# 9.3. West Central Semi-Arid Prairies

## 9.3.1 Northwestern Glaciated Plains

**Location:** From Saskatoon and Calgary in the north, the region covers portions of southwestern Saskatchewan, southeastern Alberta, northern Montana, all along the Missouri River in the central Dakotas, and a small portion of northern Nebraska.

**Climate:** The ecoregion has mostly a dry, mid-latitude steppe climate. It is marked by warm to hot summers and cold winters. The mean annual temperatures range from 2.5°C in the north to 7°C in the south. The mean summer temperatures are 15.5°C to 16°C and the mean winter temperatures are -10°C to -11°C. The frost-free period ranges from 95 days to 170 days. The mean annual precipitation ranges from 250 to 350 mm in drier areas and from 350 to 550 mm in moist areas.

**Vegetation:** Spear grass, blue grama grass, and wheat grass were once dominant native grasses that

covered many parts of the landscape. A variety of shrubs and herbs were also common as well as some sagebrush. On the driest sites yellow cactus and prickly pear can be found. Scrubby aspen, willow, cottonwood, and box elder occur to a limited extent on shaded slopes of valleys and river terraces. Local saline areas support alkali grass, wild barley, greasewood, red sampire, and sea blite.

**Hydrology:** Streams in the region are mostly intermittent, though some are perennial, and there are some larger rivers. The region is drained by the Missouri River system to the south and to the north by the South Saskatchewan River. In some areas, a high concentration of semi-permanent and seasonal wetlands can be found, locally referred to as Prairie Potholes.

**Terrain:** This is a transitional region between the generally more level, moister, more agricultural

Northern Glaciated Plains (9.2.1) to the east and the generally more irregular, dryer, Northwestern Great Plains (9.3.3) to the south and southwest. The western and southwestern boundary in the US portion roughly coincides with the limits of continental glaciation. The rolling hills and gentle plains are mantled almost entirely by moraine, outwash, and glaciolacustrine sediments. Mollisols and some Entisols soils are common, with frigid soil temperature regimes, mesic in the south, and ustic soil moisture regimes.

**Wildlife:** White-tailed deer, pronghorn antelope, bobcat, jackrabbit, sage grouse, short-horned lizard, western diamondback rattlesnake, coyote, ground squirrel, prairie dog, golden eagle, ferruginous hawk, and lark bunting are common species in the region.

**Land Use/Human Activities:** Land uses include rangeland for cattle grazing, and some cropland. The production of spring wheat and other cereal grains occurs by employing a grain-fallow rotation. Oilseed crops are also important. Waterfowl hunting is common, and recreation is important around several large reservoirs. Major communities include Lethbridge, Saskatoon, Moose Jaw, Regina, Medicine Hat, Swift Current, Great Falls, Bismarck, Havre, Mobridge, and O’Neill.

## 9.3.3 Northwestern Great Plains

**Location:** This region encompasses the Missouri Plateau section of the Great Plains in southeastern

Montana, northeastern Wyoming, and the western portion of the Dakotas.

**Climate:** The ecoregion has a dry mid-latitude steppe climate. It is marked by hot summers and cold winters with a mean annual temperature of approximately 5°C in some northern areas rising to 8.5°C in the south. The frost-free period ranges from 90 days to 155 days. The mean annual precipitation is 393 mm, ranging from 250 to 510 mm.

**Vegetation:** Grasslands persist in rangeland areas, especially on broken topography, but have been replaced by cropland on some areas of level ground. Shortgrass and mixedgrass prairies contain blue grama, western wheatgrass, green needlegrass, prairie sandreed, and buffalograss. There are areas of sagebrush steppe with fringed sage, Wyoming big sagebrush, rabbitbrush, and sand sagebrush; some areas have scattered ponderosa pine and Rocky Mountain juniper.

**Hydrology:** Mostly ephemeral and intermittent streams are found here, with a few larger perennial rivers that cross the region from the western mountains. Many small impoundments occur, and there are some large reservoirs on the Missouri River.

**Terrain:** The region is an unglaciated, rolling plain of shale and sandstone punctuated by occasional buttes. Some areas are of dissected, badland terrain and river breaks. Entisols, Mollisols, Aridisols, and Inceptisols occur. Frigid and mesic soil temperature regimes and ustic and aridic soil moisture regimes are typical.

**Wildlife:** White-tailed deer, pronghorn antelope, bobcat, cougar, prairie dog, jackrabbit, golden eagle, ferruginous hawk, meadowlark, sage grouse, sage thrasher, northern pintail, prairie rattlesnake are common species.

**Land Use/Human Activities:** The region's grassland and shrubland are used for livestock grazing, mostly of cattle and sheep. Agriculture is restricted by the erratic precipitation and limited opportunities for irrigation. Some areas grow wheat, alfalfa, and barley. A few areas are used for coal mining. Larger settlements include Billings, Lewiston, Livingston, Miles City, Dickinson, Mandan, Belle Fourche, Pierre, Rapid City, Sheridan, Gillette, and Casper.

## 9.3.4 Nebraska Sand Hills

**Location:** The Nebraska Sandhills of north-central and northwestern Nebraska, in the heart of the Great Plains, comprise one of the most distinct and homogenous ecoregions in North America.

**Climate:** The ecoregion has a dry, mid-latitude steppe climate, marked by hot summers and cold winters. The mean annual temperature is approximately 9°C. The frost-free period ranges from 130 to 155 days. The mean annual precipitation is 518 mm, ranging from 440 to 580 mm.

**Vegetation:** One of the largest areas of grass-stabilized sand dunes in the world, this region is mostly treeless except for some riparian areas in the north and east. Mid and tallgrass prairie communities include little bluestem, sand bluestem, prairie sandreed, needle-and-thread grass, sand lovegrass, blue grama, and hairy grama. In alkaline wetlands are found alkali sacaton, alkaline bulrush, and inland saltgrass.

**Hydrology:** Large portions of this ecoregion contain numerous lakes and wetlands and have a lack of streams. A few large streams or small rivers cross the region, including the Niobrara, North and Middle Loup, Dismal, Calamus, and Elkhorn. Groundwater resources are important. The Nebraska Sand Hills are a major recharge area for the Ogallala Aquifer.

**Terrain:** The predominant terrain is of rolling to steep, irregular sand dunes, some gently sloping valleys. Tertiary sandstones and conglomerates are deeply covered by Quaternary aeolian sand and some loess. Elevations range from 580 to 1,250 m. Entisols and Mollisols are typical, with mesic soil temperature regimes and ustic, aridic, and aquic soil moisture regimes.

**Wildlife:** Historically, bison and wolves were important mammalian species. Today, one finds mule deer, white-tailed deer, and pronghorn occur, along with bobcat, red fox, cottontail and jackrabbits, prairie dogs, upland sandpiper, western meadowlark, greater prairie-chicken, and blue-wing teal.

**Land Use/Human Activities:** In contrast to some adjacent regions, the Nebraska Sand Hills are generally devoid of cropland agriculture. Large ranches occupy the region, with livestock grazing a primary activity. A few small valleys have irrigated corn or hay crops. The human population is low. Small settlements include Ainsworth, Mullen, Thedford and Valentine.

# 9.4 South Central Semi-Arid Prairies

## 9.4.1 High Plains

**Location:** This region covers a large latitudinal extent, from southeastern Wyoming, western Nebraska, eastern Colorado, western Kansas, through the panhandles of Oklahoma and Texas, and into eastern New Mexico.

**Climate:** The ecoregion has a dry mid-latitude steppe climate. It is drier than the Central Great Plains(region 9.4.2) to the east, and is marked by hot summers and cold winters. The mean annual temperature varies by latitude, from approximately 8°C in the north to 17°C in the far south. The frost-free period ranges from 120 to 230 days. The mean annual precipitation is 433 mm, and ranges from 305 to 530 mm.

**Vegetation:** Historically, the region had mostly short and midgrass prairie vegetation; much of it is now greatly altered. Shortgrass prairie featured blue grama, buffalograss, and fringed sage, and mixed grass areas had sideoats grama, western wheatgrass, and little bluestem. Sandsage prairies had sand sagebrush, sand bluestem, prairie sandreed, little bluestem, Indian ricegrass, and sand dropseed. Shinnery sands areas in the south featured Havard shin oak, fourwing saltbush, sand sagebrush, yucca, and mid- and shortgrasses.

Hydrology: Mostly intermittent and ephemeral streams prevail here. A few larger rivers that originate in the Southern Rockies (6.2.14) cross the region, such as the Platte, Arkansas, and Cimarron. The southern portion has few to no streams. Surface water there occurs in numerous ephemeral pools or playas. These serve as recharge areas for the important Ogallala Aquifer. Water withdrawals from the aquifer usually exceed recharge, however.

**Terrain:** The region's landforms are mostly smooth to slightly irregular plains. In the southern portion, there is a distinct, elevated plateau, also known as the Llano Estacado. Elevations throughout the region range from 725 to 2,035 m. The terrain is mostly Tertiary and Cretaceous sandstones, siltstones, claystones, and caliche layers. Mollisols, Alfisols, Entisols, and Aridisols occur, with mesic and thermic soil temperature regimes, and ustic and aridic soil moisture regimes.

**Wildlife:** Bison, black-tailed prairie dogs, black-footed ferrets, gray wolf, and cougar were once prominent wildlife elements. Now, some pronghorn, coyote, swift fox, jackrabbit, cottontail rabbit, ferruginous hawk, lesser prairie-chickens are found. Numerous waterfowl on the Central Flyway of the continent depend on the playa lake habitats.

**Land Use/Human Activities:** Cropland and grazing land are the principal land uses. The northern boundary of this ecological region is the approximate northern limit of winter wheat and sorghum and the southern limit of spring wheat. In the south, some cotton, corn, winter wheat, grain sorghum, cattle feedlots. Oil and gas production occurs in many areas of the region. Larger cities and towns include Torrington, Cheyenne, Fort Collins, Loveland, Denver, Aurora, Scottsbluff, Sidney, Garden City, Liberal, Clovis, Portales, Lovington, Hobbs, Amarillo, Lubbock, Midland, and Odessa.

## 9.4.2 Central Great Plains

**Location:** Lying across central Nebraska, Kansas, Oklahoma, and north-central Texas, this is a transitional prairie region between the tallgrass regions to the east and the shortgrass regions to the west.

**Climate:** The ecoregion borders different climate zones: severe to mild, mid-latitude climates north to south and more humid to dry steppe climates from east to west. It is marked by hot summers and mild to severe winters. The mean annual temperature ranges from approximately 10°C in the north to 18°C in the south. The frost-free period ranges from a low of 150 days in the north to 240 days in the south. The mean annual precipitation is 658 mm, ranging from 455 to 940 mm.

**Vegetation:** Once a transitional, mostly mixed-grass prairie, with some scattered low trees and shrubs in the south, much of this ecological region is now cropland. Little bluestem, big bluestem, sideoats grama, blue grama, Indiangrass, sand bluestem, sand dropseed were typical. To the south are Texas wintergrass, buffalograss, white tridens, along with some honey mesquite, lotebush, sand sagebrush, and yucca.

**Hydrology:** Mostly intermittent and a few perennial streams are found here. Some larger rivers cross the region, typically with braided, sandy channels, and often turbid water. Some springs occur but few natural lakes.

**Terrain:** Nearly level to irregular plains, broad alluvial valleys, and some more hilly, dissected plains are the typical terrain. The region features slightly lower elevations and is somewhat more irregular than the High Plains (region 9.4.1) to the west. Cretaceous limestone and shale, and Tertiary sandstone are found in the north; to the south are Permian shale, sandstone, gypsum, and dolomite. Mollisols, Entisols, and Alfisols are dominant, with some Vertisols in the south. There are mostly thermic soil temperature regimes, mesic in the north, and ustic soil moisture regimes.

**Wildlife:** Bison, wolves, black-tailed prairie dogs, and black-footed ferret were once common. Today, white-tailed deer, mule deer, pronghorn, coyote, jackrabbit, cottontail rabbit, plains pocket mouse, sandhill crane, burrowing owl, prairie falcon, lark sparrow, and the Great Plains toad are the common species.

**Land Use/Human Activities:** The region's land uses are dominated by dryland and irrigated cropland. Some pastureland and rangeland also occur. The eastern boundary of the region marks the eastern limits of the major winter wheat growing area of the United States. Other crops include corn, grain sorghum, alfalfa, and cotton. Oil and gas production also occurs. Larger towns and cities include North Platte, Kearney, Grand Island, Columbus, Hastings, Hays, Salina, McPherson, Hutchinson, Wichita, Ponca City, Stillwater, Oklahoma City, Norman, Lawton, Wichita Falls, Abilene, and San Angelo 9.4.3 Southwestern Tablelands

**Location:** Lying mostly between the High Plains (9.4.1) and the Southern Rockies (6.2.14), this region covers parts of southeastern Colorado, eastern New Mexico, the panhandles of Texas and Oklahoma, with a small area in southwest Kansas.

**Climate:** The ecoregion has a dry mid-latitude steppe climate, marked by hot summers and cool winters. The mean annual temperature is approximately 9°C to 15°C. The frost-free period ranges from 90 to 200 days. The mean annual precipitation is 448 mm, ranging from 255 to 710 m.

**Vegetation:** Mostly, the region's vegetation is that of the shortgrass and some midgrass prairie, with blue grama, black grama, sideoats grama, sand dropseed, threeawns, little bluestem, western wheatgrass, buffalograss, galleta, and alkali sacaton, with some sand sagebrush, yucca, and cholla. Some sandy areas have Havard shin oak, fourwing saltbush, sand bluestem, and big sandreed. There are also areas of pinyon pine, Rocky Mountain juniper and oneseed juniper, scrub oaks, and some escarpments with redberry juniper, skunkbush sumac, mountain mahogany. Riparian woodlands have cottonwood, willow, elm, and hackberry.

**Hydrology:** Water is generally scarce; streams are mostly ephemeral and intermittent. A few perennial rivers cross the region that originate in the Southern Rockies, i.e., the Arkansas, Canadian, and Pecos.

**Terrain:** There are elevated tablelands with red-hued canyons, mesas, badlands, gorges, and dissected river breaks in a topography that is mostly broad, rolling plains, piedmonts, and flat plains. Elevations range from 350 to 2,650 m. It is generally more rugged than ecoregions 9.4.1 or 9.4.2 of the Great Plains. Areas are mantled with loess, windblown sand, alluvium, or colluvium. Alfisols, Entisols, Aridisols, and Mollisols occur. Mesic soil temperature regimes occur in the north and thermic to the south, with mostly ustic or aridic soil moisture regimes.

**Wildlife:** Historically, bison, wolves, prairie dog, and black-footed ferret were dominant here. Currently, mule deer, pronghorn, coyote, ringtail, black-tailed prairie dog, desert cottontail, kangaroo rat, Plains pocket mouse, scaled quail, Swainson’s hawk, burrowing owl, lark sparrow, rattlesnake, and prairie skink are found.

**Land Use/Human Activities:** Unlike most adjacent Great Plains ecological regions, little of the Southwestern Tablelands is in cropland; most is semiarid rangeland, with ranching and livestock grazing as the dominant land uses. There are small areas of agriculture where hay, alfalfa, corn, grain sorghum, or wheat are cultivated. There is some oil and gas production in the southern part of the Texas portion. Larger towns and cities include Castle Rock, Colorado Springs, Pueblo, La Junta, Lamar, Trinidad, Raton, Las Vegas, Santa Rosa, Tucumcari, and Snyder.

## 9.4.4 Flint Hills

**Location:** The Flint Hills in eastern Kansas and the Osage Hills in north-central Oklahoma mark the western edge of the tallgrass prairie.

**Climate:** The ecoregion has a severe, mid-latitude, humid continental climate, marked by hot summers and mild to severe winters. The mean annual temperature is approximately 12°C to 15°C. The frost-free period ranges from 170 to 200 days. The mean annual precipitation is 880 mm; it ranges from 710 to 1,065 mm.

**Vegetation:** The Flint Hills mark the western edge of the tallgrass prairie, and contain the largest remaining intact tallgrass prairie in the Great Plains. Big bluestem (Andropogon gerardii), switchgrass (Panicum virgatum), Indiangrass (Sorghastrum nutans), and little bluestem (Schizachyrium scoparium) are the dominant grasses.

**Hydrology:** Intermittent and perennial streams are found here, of low to moderate gradient. Several springs occur to increase summer base flow in some streams. Few lakes are present in the region.

**Terrain:** Dominant landforms are rolling hills, cuestas, and relatively narrow steep valleys, with elevations ranging from 245 to 495 masl. The region is composed mostly of Pennsylvanian and Permian period shale and cherty limestone with rocky soils. The flint-like cherty beds of limestone contributed to the areas name. Mollisols are typical, with a mesic or thermic soil temperature regime and udic or ustic soil moisture regime.

**Wildlife:** Historically, bison and elk were hunted by prairie wolves. Today, some bison have been reintroduced. Common species now include white-tailed deer, coyote, bobcat, red fox, badger, raccoon, cottontail rabbit, fox squirrel, plains pocket gopher, prairie vole, meadowlarks, and Cooper’s hawk.

**Land Use/Human Activities:** In contrast to surrounding ecological regions that are mostly in cropland, the Flint Hills were difficult to plow. Most of the Flint Hills region is grazed by beef cattle. Small areas of cropland occur in some river valleys. Part of the region is now in national preserve land and other conservation land. Larger towns include Manhattan, Emporia, and El Dorado.

## 9.4.5 Cross Timbers

**Location:** This region occurs in north-central Texas, central Oklahoma, and southeastern Kansas. It is a transitional area between the former prairie, now winter wheat-growing regions to the west, and the forested low mountains of eastern Oklahoma.

**Climate:** The ecoregion has a mild, mid-latitude, humid subtropical climate, marked by hot summers and mild winters. The mean annual temperature ranges from approximately 13°C in the north to 19°C in the south. The frost-free period ranges from 200 to 280 days. The mean annual precipitation is 856 mm, ranging from 610 to 1,060 mm.

**Vegetation:** Transitional “cross-timbers” vegetation consists of little bluestem grassland with scattered blackjack oak and post oak trees. Big bluestem, Indiangrass, switchgrass, elm, black hickory, greenbriar, and Virginia creeper also occur. A dense woody understory forms in the absence of fire.

**Hydrology:** Intermittent and perennial streams, low to moderate gradient. Several large rivers cross the region from west to east. Some reservoirs are present.

**Terrain:** Landforms and soil types are rolling plains, with some rounded hills, ridges, and cuesta topography with Pennsylvanian sandstone, mudstone, and claystone, and Cretaceous limestone and claystone. Alfisols, Inceptisols, and Mollisols occur, with thermic soil temperatures and ustic soil moisture regimes.

**Wildlife:** White-tailed deer, bobcat, gray fox, raccoon, cottontail rabbit, black-tailed jackrabbit, prairiechicken, wild turkey, mourning dove, eastern meadowlark, lark sparrow, box turtle, and rattlesnake are the dominant species.

**Land Use/Human Activities:** Rangeland and pastureland predominate, along with areas of woodland. Oil extraction has been a major activity in this region for over eighty years. The region does not possess the arability and suitability for crops such as corn and soybeans that are common in the Central Irregular Plains (9.2.4) to the northeast. However, some small areas of cropland sown with peanuts, grain sorghum, small grains, hay, cotton, and peaches occur. Larger towns include Sapulpa, Shawnee, Ada, Duncan, Ardmore, Denton, Fort Worth, and Arlington.

## 9.4.6 Edwards Plateau

**Location:** The Edwards Plateau lies in central Texas, in the transition zone between eastern mesic and western arid regions.

**Climate:** The ecoregion has some transitional climates, with dry subtropical steppe in the south, midlatitude steppe to the north, and mild, mid-latitude, humid subtropical on the east. It has hot summers and mild winters. The mean annual temperature is approximately 18°C. The frost-free period ranges from 220 to 280 days. The mean annual precipitation is 706 mm, ranging from 410 mm in the west to 860 in the east.

**Vegetation:** Originally, the Plateau was covered by a juniper-oak savanna and mesquite-oak savanna. The savanna, with grassland of little bluestem, yellow Indiangrass, and sideoats grama, had scattered groves of plateau live oak, Texas oak, and Ashe juniper. With its rapid seed dispersal, low palatibility to browsers, and in the absence of fire, Ashe juniper has increased in some areas, reducing the extent of grassy savannas. More sparse and shrubby vegetation occurs to the more arid west. In the east, the Balcones Canyonlands contain more mesic species and a variety of endemic and rare plants.

**Hydrology:** The region contains a sparse network of perennial streams, but they are relatively clear and cool compared to those of surrounding areas, and are often spring-fed. Streams are low to moderate gradient with mostly bedrock, cobble, gravel, and sandy substrates. The region has a karst system of sinkholes and underground fissures and caverns that fill with groundwater to create aquifers.

**Terrain:** Largely a dissected limestone plateau that is hillier in the south and east where it is easily distinguished from bordering ecological regions by a sharp fault line, the region features rolling terrain and broad valleys, with ridges and canyons common in some areas. Soils in this region are mostly Mollisols with shallow and moderately deep soils on plateaus and hills, and deeper soils on plains and valley floors. There is a thermic soil temperature regime and ustic soil moisture regime.

**Wildlife:** White-tailed deer, javelina, bobcat, coyote, badger, ringtail, porcupine, armadillo, brown mink, Llano pocket gopher, Mexican free-tailed bat, Rio Grande turkey, scaled quail, mourning dove, goldencheeked warbler, black-capped vireo, Texas map turtle, Rio Grande perch, Guadalupe bass, widemouth blindcat, Comal blind salamander are found here.

**Land Use/Human Activities:** Most of the region is used for grazing beef cattle, sheep, goats, and wildlife. Hunting leases are a major source of income. Tourism and recreation are also important in the region. Larger towns include Sonora, Junction, Menard, Mason, Llano, Fredericksburg, Johnson City, Kerrville, Bandera, and western portions of Austin.

## 9.4.7 Texas Blackland Prairies

Location: In eastern Texas, the region stretches over 300 miles from near the Oklahoma border in the north to San Antonio in the south. It also includes the separate Fayette Prairie region to the southeast.

**Climate:** The ecoregion has a mild, mid-latitude, humid, subtropical climate, marked by hot summers and mild winters. The mean annual temperature ranges from approximately 17°C in the north to 21°C in the south. The frost-free period ranges from 240 to 290 days. The mean annual precipitation is 954 mm, ranging from 760 to 1,170 mm. Temperature increases and precipitation decrease to the south.

**Vegetation:** Historically, the region was a tallgrass prairie of little bluestem, big bluestem, yellow Indiangrass, tall dropseed, eastern gamagrass and many forbs, such as asters, clovers, and black-eyed susan. Almost the entire prairie has now been converted to other uses. Riparian areas have bur oak, humard oak, sugar hackberry, elm, ash, eastern cottonwood, and pecan.

**Hydrology:** Low to moderate gradient intermittent and perennial streams are found here. The region lacks lakes, but many reservoirs have been built.

**Terrain:** The prevailing landform is that of nearly level to gently sloping plains, lightly to moderately dissected and underlain mostly by Cretaceous chalk, claystone, marl, and shale, and some Miocene sandstone and shale. Mostly fine-textured clayey soils occur. Gilgai microtopography and mima mounds are found here. Vertisols, Mollisols, Alfisols are dominant with thermic soil temperatures and ustic and some udic soil moisture regimes.

**Wildlife:** Once the region had bison, pronghorn, wolves, cougar, ocelot, and greater prairie-chickens, but little habitat remains to support a diversity of wildlife. Species today include coyote, ringtail cat, armadillo, raccoon, skunk, cottontail rabbit, plains pocket gopher, turkey vulture, lark sparrow, northern cardinal, mourning dove, Texas toad, and Texas horned lizard.

**Land Use/Human Activities:** Mostly, this prairie is now devoted to cropland, pasture, rangeland, and urban uses. Crops include cotton, grain sorghum, corn, small grains, and hay. It contains a higher percent of cropland than adjacent regions, although much of the land has been recently converted to urban, suburban, and industrial uses. Larger cities include Sherman, Dallas, Waco, Temple, Austin (eastern portions), San Marcos, and San Antonio.

# 9.5 Texas-Louisiana Coastal Plain

## 9.5.1 Western Gulf Coastal Plain (Planicie de la costa occidental del Golfo)

**Location:** Includes southwestern Louisiana, coastal Texas, and northeastern Tamaulipas. The boundaries of this ecoregion are the Mississippi Delta to the north and the Gulf of Mexico coastal plains to the south mild winters. The mean annual temperature ranges from approximately 20°C to 25°C. The frost-free period ranges from 270 to 365 days. The mean annual precipitation is 1,069 mm, ranging from 580 to 1,625 mm.

**Vegetation:** Most of the region is now cropland but originally had tallgrass prairies in the north, with bluestems, yellow Indiangrass, and brownseed paspalum mixed with other herbaceous species. Central areas also had tall dropseed, silver bluestem, common curleymesquite, and plains bristlegrass. The southern sand plains of Texas had southern oak, honey mesquite, Texas persimmon, colima, granjeno, seacoast bluestem, little bluestem, and sand dropseed. Coastal marshes present cordgrass, saltgrass, needlerush, and saltmarsh bulrush. Barrier islands present seacoast bluestem, gulfdune paspalum, and sea oats. In Mexico, the ecozone presents associations of xerophytic scrub, hydrophyle vegetation,[matorrales de tipo xerófilo y vegetación hidrófila] halophytes associated to the Laguna Madre system, [sistema de Laguna Madre con pastizales halófilos y vegetación arbustiva halófila] tropical deciduous thorn forest (such as the Tamaulipan thornscrub), [selvas bajas espinosas caducifolias, matorral espinoso

tamaulipeco] and barren areas.

**Hydrology:** Low gradient intermittent and perennial streams are found here, some channelized. Main features include the Rio Grande (Rio Bravo) and the Laguna Madre coastal lagoon system in Texas and Tamaulipas.

**Terrain:** The terrain includes flat coastal plains, barrier islands, dunes, beaches, bays, estuaries, and tidal marshes. The sedimentary materials that form the coastal plain include Pleistocenic marine sand, silt, and clay. Alfisols, Vertisols, Entisols, and Mollisols are dominant soil types, with hyperthermic soil temperatures (thermic in the north) and ustic, udic, and aquic soil moisture regimes.

**Wildlife:** White-tailed deer, ocelots, jaguarundi, coyote, ringtail cat, armadillo, javelina, swamp rabbit, American alligator, ferruginous pygmy-owl, green jay, Altimira oriole, Attwater’s prairie-chicken, whooping cranes, ducks and geese are found here.

**Land Use/Human Activities:** In the United States portion, much of the region is cropland with rice, soybeans, sugarcane, cotton, corn, grain sorghum, wheat, hay, vegetables, melons, and citrus fruits. In Mexico primarily, crops are sorghum fodder and milo [cultivos principalmente de sorgo forrajero y mijo]. Grasslands and shrub rangeland provide fodder for livestock grazing in both countries. Oil and gas production are important activities for the entire region as well. Recent urbanization and industrialization have brought regional concerns, though. The largest cities include Lafayette, Crowley, Lake Charles, Port Arthur, Beaumont, Houston, Galveston, Victoria, Corpus Christi, Kingsville, McAllen, Brownsville, San Fernando, Ciudad Reynosa, Matamoros, Rio Bravo, and Valle Hermoso.

# 9.6 Tamaulipas-Texas Semi-Arid Plain (Planicie semiárida de Tamaulipas-Texas)

## 9.6.1 Southern Texas (Tablelands) Plains/Interior Plains and Hills with Xerophytic Shrub and Oak Forest (Planicies del sur de Texas / Planicies y lomeríos interiores con matorral xerófilo y bosque de encino)

**Location:** This is a border region, spanning southern Texas, northeast Coahuila, northern Nuevo León, and northern Tamaulipas.

**Climate:** The ecoregion has a dry subtropical steppe climate, with hot summers and mild winters. The mean annual temperature is approximately 20°C to 24°C. The frost-free period ranges from 270 to 360 days. The mean annual precipitation is 592 mm, and ranges from 450 to 750 mm. Spring and fall are when most of the rains occur.

**Vegetation:** Lowlands were once mostly covered with grassland and savanna vegetation and areas of shrubs. Having been subject to long, continued grazing, thorny brush is now the predominant vegetative type. Honey mesquite, brasil, colima, lotebush, granjeno, kidneywood, coyotillo, Texas paloverde, anacahuita, and various species of cacti occur in the region. Some areas also present blackbrush, guajillo, cenizo, tall and mid grasses. Some scattered live oak and post oak occur in the far northern portion. Rio mimosa, and common reed. The highest elevations in Mexico present oak and mixed oak/pine forests.

**Hydrology:** Surface waters are mostly a sparse network of ephemeral and intermittent streams, with a few larger perennial rivers crossing the region. Lakes are rare, but some reservoirs occur.

**Terrain:** Lightly to moderately dissected irregular plains. Sediments are mostly Miocene, Oligocene, and Eocene sands, silts and clays of varying hardness. Aridisols, Alfisols, Mollisols, and Vertisols occur, with a hyperthermic soil temperature regime and ustic aridic to aridic soil moisture regimes. In Mexico, this region gives birth to the Sierra Madre Oriental, with altitudes of 600 to 1,600 m, the highest habitats for this ecozone.

**Wildlife:** White-tailed deer, javelina, coyote, ringtail cat, ocelot, armadillo, Texas pocket gopher, Mexican ground squirrel, chachalaca, green kingfisher, greater roadrunner, Mississippi kite, northern bobwhite, white-winged dove, green jay, mourning dove, mesquite lizard, and Laredo striped whiptail live here.

**Land Use/Human Activities:** Principal land use activities include agriculture, ranching, livestock grazing, as well as oil and gas production. Main crops are corn, cotton, small grains, citrus fruits, and vegetables. The largest towns and cities include Uvalde, Del Rio, Eagle Pass, Laredo, Ciudad Acuña, Ciudad Victoria, Piedras Negras, Sabinas, Nuevo Laredo, Sabinas Hidalgo, Cadereyta, and Monterrey. This region is heavily populated in both countries and is highly impacted by migration to the north.