Ecoregions of Texas

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. They are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. By recognizing the spatial differences in the capacities and potentials of ecosystems, ecoregions stratify the environment by its probable response to disturbance (Bryce and others, 1999). These general purpose regions are critical for structuring and implementing ecosystem management strategies across federal agencies, state agencies, and nongovernment organizations that are responsible for different types of resources within the same geographical areas (Omernik and others, 2000).

The approach used to compile this map is based on the premise that ecological regions are hierarchical and can be identified through the analysis of the spatial patterns and the composition of biotic and abiotic phenomena that affect or reflect differences in ecosystem quality and integrity (Wiken 1986; Omernik 1987, 1995). These phenomena include geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. The relative importance of each characteristic varies from one ecological region to another regardless of the hierarchical level. A Roman numeral hierarchical scheme has been adopted for different levels of ecological regions. Level I is the coarsest level, dividing North America into 15 ecological regions. Level II divides the continent into 52 regions (Commission for Environmental Cooperation Working Group 1997). At level III, the continental United States contains 104 ecoregions and the conterminous United States has 84 ecoregions (United States Environmental Protection Agency [USEPA] 2003). Level IV, depicted here for the State of Texas, is a further refinement of level III ecoregions. Explanations of the methods used to define the USEPA's ecoregions are given in Omernik (1995), Omernik and others (2000), and Gallant and others (1989).

Ecological and biological diversity of Texas is enormous. The state contains barrier islands and coastal lowlands, large river floodplain forests, rolling plains and plateaus, forested hills, deserts, and a variety of aquatic habitats. There are 12 level III ecoregions and 56 level IV ecoregions in Texas and most continue into ecologically similar parts of adjacent states in the U.S. or Mexico.

The level III and IV ecoregions on this poster were compiled at a scale of 1:250,000 and depict revisions and subdivisions of earlier level III ecoregions that were originally compiled at a smaller scale (USEPA 2003; Omernik 1987). This poster is part of a collaborative project primarily between USEPA Region VI, USEPA National Health and Environmental Effects Research Laboratory (Corvallis, Oregon), Texas Commission on Environmental Quality (TCEQ), and the United States Department of Agriculture-Natural Resources Conservation Service (NRCS). Collaboration and consultation also occurred with the United States Department of the Interior-Geological Survey (USGS)-Earth Resources Observation Systems Data Center, and with other State of Texas agencies and universities.

The project is associated with an interagency effort to develop a common framework of ecological regions (McMahon and others, 2001). Reaching that objective requires recognition of the differences in the conceptual approaches and mapping methodologies applied to develop the most common ecoregion-type frameworks, including those developed by the United States Forest Service (Bailey and others, 1994), the USEPA (Omernik 1987, 1995), and the NRCS (U.S. Department of Agriculture-Soil Conservation Service, 1981). As each of these frameworks is further refined, their differences are becoming less discernible. Regional collaborative projects such as this one in Texas, where some agreement has been reached among multiple resource management agencies, are a step toward attaining consensus and consistency in ecoregion frameworks for the entire nation.

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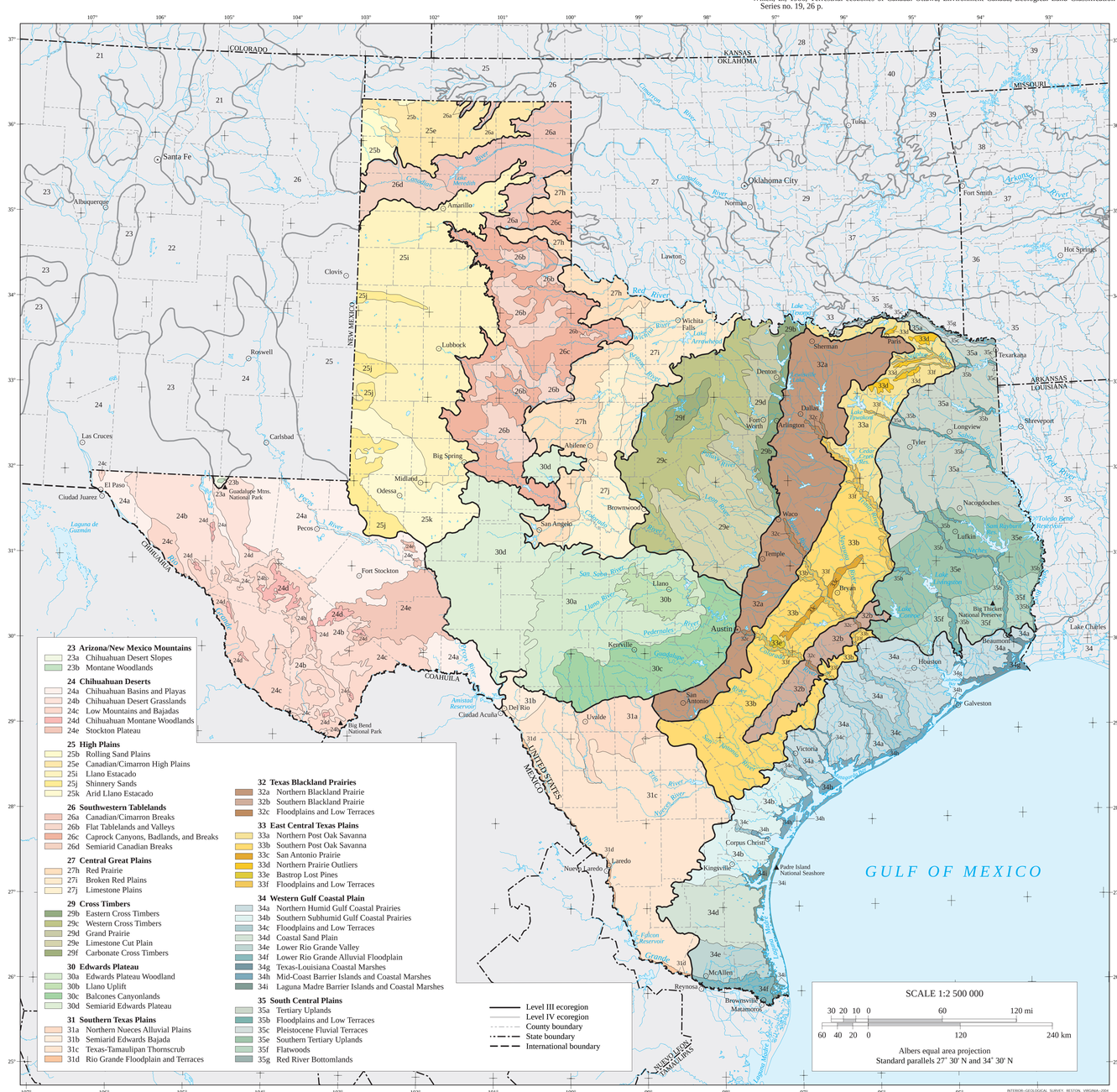


23 Arizona/New Mexico Mountains
- 23a Chihuahuan Desert Slopes
- 23b Montane Woodlands

24 Chihuahuan Deserts
- 24a Chihuahuan Basins and Playas
- 24b Chihuahuan Desert Grasslands
- 24c Low Mountains and Bajadas
- 24d Chihuahuan Montane Woodlands
- 24e Stockton Plateau

25 High Plains
- 25b Rolling Sand Plains
- 25e Canadian/Cimarron High Plains
- 25i Llano Estacado
- 25j Shinnery Sands
- 25k Arid Llano Estacado

26 Southwestern Tablelands
- 26a Canadian/Cimarron Breaks
- 26b Flat Tablelands and Valleys
- 26c Caprock Canyons, Badlands, and Breaks
- 26d Semiarid Canadian Breaks

27 Central Great Plains
- 27h Red Prairie
- 27i Broken Red Plains
- 27j Limestone Plains

29 Cross Timbers
- 29b Eastern Cross Timbers
- 29c Western Cross Timbers
- 29d Grand Prairie
- 29e Limestone Cut Plain
- 29f Carbonate Cross Timbers

30 Edwards Plateau
- 30a Edwards Plateau Woodland
- 30b Llano Uplift
- 30c Balcones Canyonlands
- 30d Semiarid Edwards Plateau

31 Southern Texas Plains
- 31a Northern Nueces Alluvial Plains
- 31b Semiarid Edwards Bajada
- 31c Texas-Tamaulipan Thornscrub
- 31d Rio Grande Floodplain and Terraces

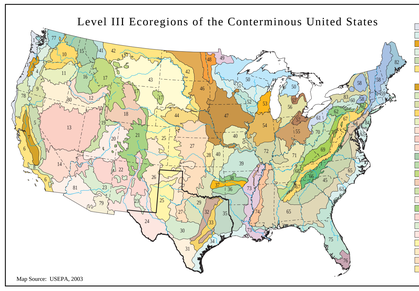
32 Texas Blackland Prairies
- 32a Northern Blackland Prairie
- 32b Southern Blackland Prairie
- 32c Floodplains and Low Terraces

33 East Central Texas Plains
- 33a Northern Post Oak Savanna
- 33b Southern Post Oak Savanna
- 33c San Antonio Prairie
- 33d Northern Prairie Outliers
- 33e Bastrop Lost Pines
- 33f Floodplains and Low Terraces

34 Western Gulf Coastal Plain
- 34a Northern Humid Gulf Coastal Prairies
- 34b Southern Subhumid Gulf Coastal Prairies
- 34c Floodplains and Low Terraces
- 34d Coastal Sand Plain
- 34e Lower Rio Grande Valley
- 34f Lower Rio Grande Alluvial Floodplain
- 34g Texas-Louisiana Coastal Marshes
- 34h Mid-Coast Barrier Islands and Coastal Marshes
- 34i Laguna Madre Barrier Islands and Coastal Marshes

35 South Central Plains
- 35a Tertiary Uplands
- 35b Floodplains and Low Terraces
- 35c Pleistocene Fluvial Terraces
- 35e Southern Tertiary Uplands
- 35f Flatwoods
- 35g Red River Bottomlands

Level III Ecoregions of the Conterminous United States



Map Source: USEPA, 2003

1 Coast Range
2 Puget Lowland
3 Willamette Valley
4 Cascades
5 Sierra Nevada
6 Southern and Central California Chaparral and Oak Woodlands
7 Central California Valley
8 Southern California Mountains
9 Eastern Cascades Slopes and Foothills
10 Columbia Plateau
11 Blue Mountains
12 Snake River Plain
13 Central Basin and Range
14 Mojave Basin and Range
15 Northern Rockies
16 Idaho Batholith
17 Middle Rockies
18 Wyoming Basin
19 Wasatch and Uinta Mountains
20 Colorado Plateaus
21 Southern Rockies
22 Arizona/New Mexico Plateau
23 Arizona/New Mexico Mountains
24 Chihuahuan Deserts
25 High Plains
26 Southwestern Tablelands
27 Central Great Plains
28 Flint Hills
29 Cross Timbers
30 Edwards Plateau
31 Southern Texas Plains
32 Texas Blackland Prairies
33 East Central Texas Plains
34 Western Gulf Coastal Plain
35 South Central Plains
36 Ouachita Mountains
37 Arkansas Valley
38 Boston Mountains
39 Ozark Highlands
40 Central Irregular Plains
41 Canadian Rockies
42 Northwestern Glaciated Plains
43 Northwestern Great Plains
44 Nebraska Sand Hills
45 Piedmont
46 Northern Glaciated Plains
47 Western Corn Belt Plains
48 Lake Agassiz Plain
49 Northern Minnesota Wetlands
50 Northern Lakes and Forests
51 North Central Hardwood Forests
52 Driftless Area
53 Southeastern Wisconsin Till Plains
54 Central Corn Belt Plains
55 Eastern Corn Belt Plains
56 Southern Michigan/Northern Indiana Drift Plains
57 Huron/Erie Lake Plains
58 Northeastern Highlands
59 Northeastern Coastal Zone
60 Northern Appalachian Plateau and Uplands
61 Erie Drift Plain
62 North Central Appalachians
63 Middle Atlantic Coastal Plain
64 Northern Piedmont
65 Southeastern Plains
66 Blue Ridge
67 Ridge and Valley
68 Southwestern Appalachians
69 Central Appalachians
70 Western Allegheny Plateau
71 Interior Plateau
72 Interior River Valleys and Hills
73 Mississippi Alluvial Plain
74 Mississippi Valley Loess Plains
75 Southern Coastal Plain
76 Southern Florida Coastal Plain
77 North Cascades
78 Klamath Mountains
79 Madrean Archipelago
80 Northern Basin and Range
81 Sonoran Basin and Range
82 Laurentian Plains and Hills
83 Eastern Great Lakes and Hudson Lowlands
84 Atlantic Coastal Pine Barrens

PRINCIPAL AUTHORS: Glenn E. Griffith (Dynamac Corporation), Sandra A. Bryce (Dynamac Corporation), James M. Omernik (USGS), Jeffrey A. Comstock (Indus Corporation), Anne C. Rogers (TCEQ), Bill Harrison (TCEQ), Stephen L. Hatch (Texas A&M University), and David Bezanson (Natural Area Preservation Association).

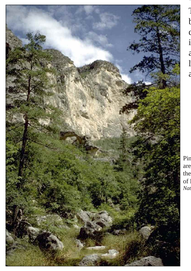
COLLABORATORS AND CONTRIBUTORS: Philip A. Crocker (USEPA), Art Crowe (TCEQ), Micheal Golden (NRCS), Susan Cashy-Horton (NRCS), James Greenwade (NRCS), Conrad Neitsch (NRCS). Shannen S. Chapman (Dynamac Corporation), Augie De La Cruz (TCEQ), Kevin Wagner (Texas State Soil and Water Conservation Board [TSSWCB]), Richard Egg (TSSWCB), Alan J. Woods (Oregon State University), Clark Hubbs (University of Texas), David L. Certain (The Nature Conservancy) and Thomas R. Loveland (USGS).

REVIEWERS: Charles T. Hallmark (Texas A&M University), Gordon Linam (Texas Parks and Wildlife Department [TPWD]), Milo Pyne (NatureServe), Judy Teague (NatureServe), and Raymond C. Telfair II (TPWD).

CITING THIS POSTER: Griffith, G.E., Bryce, S.A., Omernik, J.M., Comstock, J.A., Rogers, A.C., Harrison, B., Hatch, S.L., and Bezanson, D., 2004, Ecoregions of Texas (color poster with map, descriptive text, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:2,500,000).

This project was partially supported by funds from the U.S. Environmental Protection Agency Region VI, Regional Applied Research Effort (RARE) and Total Maximum Daily Load (TMDL) programs.

23. Arizona/New Mexico Mountains



Pine, fir, and hardwoods are found in patches on the upper or cooler slopes of Ecoregion 23. *Photo: National Park Service*

The Arizona/New Mexico Mountains are distinguished from neighboring mountainous ecoregions by their lower elevations and an associated vegetation indicative of drier, warmer environments, due in part to the region's more southerly location. Forests of spruce, fir, and Douglas-fir, common in the Southern Rockies (21) and the Wasatch and Uinta Mountains (19), are only found in limited areas at the highest elevations in this region in Arizona and New Mexico. Chaparral is common at lower elevations; pinyon-juniper and oak woodlands are found at lower and middle elevations; and the higher elevations, outside of Texas, have mostly open to dense ponderosa pine forests.

Once part of a marine reef in a tropical ocean more than 250 million years ago, El Capitan and Guadalupe Peak now reach over 8000 feet in elevation. *Photo: Gary Stolz, USFWS*

24. Chihuahuan Deserts

This desert ecoregion extends from the Madrean Archipelago in southeastern Arizona to the Edwards Plateau in south-central Texas. The physiography of the region is generally a continuation of basin and range terrain (excluding the Stockton Plateau) that is typical of the Mojave Basin and Range (14) and the Central Basin and Range (13) ecoregions to the west and north, although the pattern of alternating mountains and valleys is not as pronounced as it is in Ecoregions 13 and 14. The mountain ranges are a geologic mix of faulted limestone reefs, volcanoes and associated basalt, rhyolite, and tuff extrusive rocks. Outside the major river drainages, such as the Rio Grande and Pecos River, the landscape is largely internally drained. Vegetative cover is predominantly semi-desert grassland and arid shrubland, except for high elevation islands of oak, juniper, and pinyon pine woodland. The extent of desert shrubland is increasing across lowlands and mountain foothills due to gradual desertification caused in part by historical grazing pressure.

The area generally west of the Pecos River in Texas is often called the Trans-Pecos. It occupies the northern part of the Chihuahuan Desert, which extends south nearly 500 miles into Mexico. Shown here is Croton Peak in the northern part of Big Bend National Park. *Photo: USGS*

The Chihuahuan Deserts ecoregion contains great contrasts and variation in both topography and vegetation. It includes desert flats and valleys, bolson drainages, plateaus, sand hills, and mountain ranges. Grasslands, shrublands, cactus savannas, and mountain woodlands occur. *Photo: Michel Farhi*

25. High Plains

Higher and drier than the Central Great Plains (27) to the east, and in contrast to the irregular, mostly grassland or grazing land of the Northwestern Great Plains (43) to the north, much of the High Plains is characterized by smooth to slightly irregular plains with a high percentage of cropland. Grama-buffalograss is the potential natural vegetation in this region compared to mostly wheatgrass-needlegrass to the north, Trans-Pecos shrub savanna to the south, and taller grasses to the east. The northern boundary of this ecological region is also the approximate northern limit of winter wheat and sorghum and the southern limit of spring wheat. Oil and gas production occurs in many parts of the region.

Much of the surface water in Ecoregion 25 is in the Texas Panhandle occurs in seasonal playa lakes that form in small depressions. Many of these shallow recharge wetlands have been hydrologically modified or converted to cropland or feedlot uses. *Photo: Loren M. Smith, Texas Tech University*

In a region receiving less than 20 inches of precipitation, playas are key sites of biodiversity and provide important habitat to ducks, geese, sandhill cranes, shorebirds, amphibians, and small mammals. *Photo: Wyman Meinzer, USFWS*

26. Southwestern Tablelands

The Southwestern Tablelands flank the High Plains (25) with red hued canyons, mesas, badlands, and dissected river breaks. Unlike most adjacent Great Plains ecological regions, little cropland occurs in the Southwestern Tablelands. Much of this region is in sub-humid grassland and semiarid rangeland. The potential natural vegetation in this region is grama-buffalograss with some mesquite-buffalograss in the southeast, juniper-scrub oak-midgrass savanna on escarpment bluffs, and shinnery (midgrass prairie with low oak brush) along parts of the Canadian River. Soils in this region include Alfisols, Inceptisols, Entisols, and Mollisols.

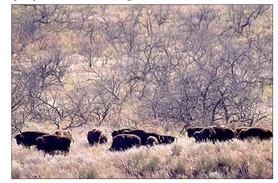
Tableland topography is evident in the Palo Duro canyon area of Ecoregion 26c. Colorful Permian and Triassic-age layers of gypsum, sandstone, claystone, and mudstone are topped by the hard caprock of the Miocene-Pliocene-age Ogallala Formation sandstone, siltstone, and conglomerate.

The large trough of the Canadian Breaks (26a, 26d) north of Amarillo was caused in part by the dissolution of salt beds beneath the Permian-age geologic layers, creating continual collapse of the upper rocks into the salt chambers. As a result, the Canadian River can have a high salt content.

27. Central Great Plains

The Central Great Plains are slightly lower, receive more precipitation, and are more irregular than the High Plains (25) to the west. The ecological region was once grassland, a mixed or transitional prairie from the tallgrass in the east to shortgrass farther west. Scattered low trees and shrubs occur in the south. Most of the ecoregion is now cropland. The eastern boundary of the region marks the eastern limits of the major winter wheat growing area of the United States. Soils in this region are generally deep with shallow soils on ridges and breaks.

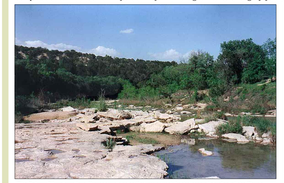
Some areas in the Texas portion of the Central Great Plains contained grasslands, which were transitional from tallgrass to shortgrass prairie. Bluestems, gramas, Texas wintergrass, and buffalograss were typical. Many areas of Ecoregion 27 in Texas are now dominated by more brushy species, such as mesquite and totebush. These invasive species tend to increase with overgrazing, soil erosion, lowering of ground water tables, and the decline of native grasslands.



Herds of bison were once common on the rolling Central Great Plains landscapes and were important to the Comanche and Kiowa Indians who inhabited these lands until the 1870's. *Photo: TPWD*

29. Cross Timbers

The Cross Timbers ecoregion is a transitional area between the once prairie, now winter wheat growing regions to the west, and the forested low mountains or hills of eastern Oklahoma and Texas. The region stretches from southern Kansas into central Texas, and contains irregular plains with some low hills and tablelands. It is a mosaic of forest, woodland, savanna, and prairie. The Cross Timbers ecoregion is not as arable or as suitable for growing corn and soybeans as the Central Irregular Plains (40) to the northeast. The transitional natural vegetation of little bluestem grassland with scattered blackjack oak and post oak trees is used mostly for rangeland and pastureland, with some areas of woody plant invasion and closed forest. Oil production has been a major activity in this region for over eighty years.

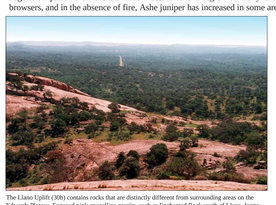


The Paluxy River cuts into Cretaceous-age sedimentary rock in the central portion of the Texas Cross Timbers. *Photo: John Crossley*

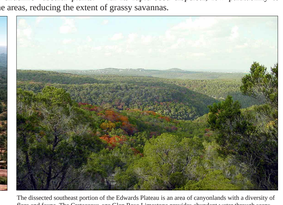
Bluebonnets in a small prairie area at the edge of Cross Timbers woods. The typical stands of post oak and blackjack oak rarely exceed thirty feet in height, decreasing to the west. *Photo: John Crossley*

30. Edwards Plateau

This ecoregion is largely a dissected limestone plateau that is hillier to the south and east where it is easily distinguished from bordering ecological regions by a sharp fault line. The region contains a sparse network of perennial streams. Due to karst topography (related to dissolution of limestone substrate) and resulting underground drainage, streams are relatively clear and cool in temperature compared to those of surrounding 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. Covered by juniper-oak savanna and mesquite-oak savanna, most of the region is used for grazing beef cattle, sheep, goats, exotic game mammals, and wildlife. Hunting leases are a major source of income. Combined with topographic gradients, fire was once an important factor controlling vegetation patterns on the Edwards Plateau. It is a region of many endemic vascular plants. With its rapid seed dispersal, low palatability to browsers, and in the absence of fire, Ashe juniper has increased in some areas, reducing the extent of grassy savannas.



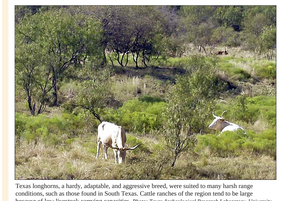
The Llano Uplift (30b) contains rocks that are distinctly different from surrounding areas on the Edwards Plateau. Exposed pink crystalline granite, such as Enchanted Rock south of Llano, forms domelike hills that often contain unique plant communities.



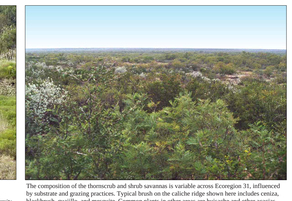
The dissected southeast portion of the Edwards Plateau is an area of canyonlands with a diversity of flora and fauna. The Cretaceous-age Glen Rose Limestone provides abundant water through seeps, springs, and cool, clear streams that support the deciduous woodland and associated wildlife. *Photo: Carlo Abbruzese*

31. Southern Texas Plains

This rolling to moderately dissected plain was once covered in many areas with grassland and savanna vegetation that varied during wet and dry cycles. Following long continued grazing and fire suppression, thorny brush, such as mesquite, is now the predominant vegetation type. Ceniza and blackbrush occur on caliche soils. Also known as the Tamaulipan Thornscrub, or the "brush country" as it is called locally, the region has its greatest extent in Mexico. The subhumid to dry region contains a diverse mosaic of soils, mostly clay, clay loam, and sandy clay loam surface textures, and ranging from alkaline to slightly acid. The ecoregion also contains a high and distinct diversity of plant and animal life. It is generally lower in elevation with warmer winters than the Chihuahuan Deserts (24) to the northwest. Oil and natural gas production activities are widespread.



Texas longhorns, a hardy, adaptable, and aggressive breed, were suited to many harsh range conditions, such as those found in South Texas. Cattle ranches of the region tend to be large because of low livestock carrying capacities. *Photo: Texas Archeological Research Laboratory, University of Texas.*



The composition of the thornscrub and shrub savannas is variable across Ecoregion 31, influenced by substrate and grazing practices. Typical brush on the caliche ridge shown here includes ceniza, blackbrush, guajillo, and mesquite. Common plants in other areas are huisache and other acacias, along with guayacan, amargosa, yuccas, and Texas prickly pear. Typical grasses are silver bluestem, multiflowered false rhodesgrass, plains bristlegrass, purple threeawn, and grama species.

32. Texas Blackland Prairies

The Texas Blackland Prairies form a disjunct ecological region, distinguished from surrounding regions by fine-textured, clayey soils and predominantly prairie potential natural vegetation. The predominance of Vertisols in this area is related to soil formation in Cretaceous shale, chalk, and marl parent materials. Unlike tallgrass prairie soils that are mostly Mollisols in states to the north, this region contains Vertisols, Alfisols, and Mollisols. Dominant grasses included little bluestem, big bluestem, yellow Indiangrass, and switchgrass. This region now contains a higher percentage of cropland than adjacent regions; pasture and forage production for livestock is common. Large areas of the region are being converted to urban and industrial uses. Typical game species include mourning dove and northern bobwhite on uplands and eastern fox squirrel along stream bottomlands.

Less than one percent of the original vegetation remains in the Texas Blackland Prairies, scattered in several small parcels across the region. A transitional prairie type at the western edge of the region is shown here. These remnant prairies contain imperiled plant communities and provide habitat for many bird species and other fauna. Restoration activities in some of the protected prairies include prescribed burning, haying, and bison grazing. *Photo: Lee Stone, City of Austin*

Cropland and pasture along with more urban uses have transformed the Texas Blackland Prairies (32). The former tallgrass prairies, once dominated by yellow Indiangrass, little bluestem, and big bluestem, now grow grain sorghum, corn, wheat, and hay crops. *Photo: NRCS*

33. East Central Texas Plains

Also called the Post Oak Savanna or the Claypan Area, this region of irregular plains was originally covered by post oak savanna vegetation, in contrast to the more open prairie-type regions to the north, south, and west, and the pine forests to the east. The boundary with Ecoregion 35 is a subtle transition of soils and vegetation. Soils are variable among the parallel ridges and valleys, but tend to be acidic, with sands and sandy loams on the uplands and clay to clay loams in low-lying areas. Many areas have a dense, underlying clay pan affecting water movement and available moisture for plant growth. The bulk of this region is now used for pasture and range.

Alternating bands of post oak woods or savanna on areas of sandy soil and blackland prairies on more clayey soils typify the landscape pattern of the East Central Texas Plains (33). *Photo: James R. Manhart, Texas A&M University*

A small prairie opening within some post oak woods in the northern part of Ecoregion 33b. Although post oaks predominate, the woods can contain other trees, such as blackjack oak, black hickory, and eastern redcedar. *Photo: James R. Manhart, Texas A&M University*

34. Western Gulf Coastal Plain

The principal distinguishing characteristics of the Western Gulf Coastal Plain are its relatively flat topography and mainly grassland potential natural vegetation. Inland from this region the plains are older, more irregular, and have mostly forest or savanna-type vegetation potentials. Largely because of these characteristics, a higher percentage of the land is in cropland than in bordering ecological regions. Rice, grain sorghum, cotton, and soybeans are the principal crops. Urban and industrial land uses have expanded greatly in recent decades, and oil and gas production is common.

Barrier islands, peninsulas, bays, lagoons, marshes, estuaries, and flat plains characterize Ecoregion 34. The region has been greatly modified. About 35 percent of the state's population and a large part of its industrial base, commerce, and jobs are located within 100 miles of the coastline. More than half of the United States' chemical and petroleum production is located on the Texas coast. *Photo: U.S. Army Corps of Engineers*

The Western Gulf Coastal Plain is one of the most ecologically complex and biologically diverse regions of Texas. With nearly 500 recorded species of resident and migratory birds, the Texas coastal region is one of the richest birding areas in North America. *Photo: U.S. Army Corps of Engineers*

35. South Central Plains

Locally termed the "piney woods", this region of mostly irregular plains represents the western edge of the southern coniferous forest belt. Once blanketed by a mix of pine and hardwood forests, much of the region is now in loblolly and shortleaf pine plantations. Soils are mostly acidic sands and sandy loams. Covering parts of Louisiana, Arkansas, east Texas, and Oklahoma, only about one sixth of the region is in cropland, primarily within the Red River floodplain, while about two thirds of the region is in forests and woodland. Lumber, pulpwood, oil, and gas production are major economic activities.

Many parts of the historic longleaf pine forest on rolling sandy uplands of Ecoregion 35 in Texas were characterized by a species-rich herbaceous understory with bluestem grasses and a variety of forbs and shrubs. *Photo: R.E. Rosiere, Tarleton State University*

Tupelo-red maple forest in a Big Thicket lowland of Ecoregion 35f. *Photo: National Park Service*

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