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TERRESTRIAL ECOLOGICAL CLASSIFICATIONS

Ecological Systems of the Southern Texas Plains

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by

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This subset of the International Ecological Classification Standard covers terrestrial ecological systems attributed to the Texas. This classification has been developed in consultation with many individuals and agencies and incorporates information from a variety of publications and other classifications. Comments and suggestions regarding the contents of this subset should be directed to [Judy Teague <judy_teague@natureserve.org>].



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TABLE OF CONTENTS

FOREST AND WOODLAND..... 3
 CES303.656 Edwards Plateau Dry-Mesic Slope Forest and Woodland 3
 CES303.660 Edwards Plateau Limestone Savanna and Woodland 3

SHRUBLAND 4
 CES302.731 Chihuahuan Creosotebush Desert Scrub 4
 CES302.734 Chihuahuan Mixed Desert and Thornscrub..... 4
 CES302.738 Chihuahuan Succulent Desert Scrub 5
 CES301.986 Tamaulipan Calcareous Thornscrub 5
 CES301.983 Tamaulipan Mixed Deciduous Thornscrub 5

HERBACEOUS 6
 CES301.538 South Texas Sand Sheet Grassland 6
 CES301.989 Tamaulipan Caliche Grassland 6
 CES301.987 Tamaulipan Clay Grassland 6
 CES301.985 Tamaulipan Savanna Grassland..... 6
 CES301.988 Tamaulipan Tallgrass Grassland..... 6
 CES205.684 Texas Blackland Tallgrass Prairie..... 7

WOODY WETLAND 8
 CES303.651 Edwards Plateau Floodplain 8
 CES303.652 Edwards Plateau Riparian 8
 CES205.710 Southeastern Great Plains Floodplain Forest..... 8
 CES205.709 Southeastern Great Plains Riparian Forest..... 8
 CES301.992 Tamaulipan Arroyo Shrubland 9
 CES301.990 Tamaulipan Floodplain 9

MIXED UPLAND AND WETLAND 10
 CES302.746 Chihuahuan-Sonoran Desert Bottomland and Swale Grassland 10

FOREST AND WOODLAND

CES303.656 EDWARDS PLATEAU DRY-MESIC SLOPE FOREST AND WOODLAND

This system occurs on dry-mesic, middle slopes of the rolling uplands of the Edwards Plateau of Texas. The canopy is typically dominated by deciduous trees, including *Quercus buckleyi*, *Fraxinus texensis*, or *Ulmus crassifolia*. *Quercus fusiformis* and *Juniperus ashei* are often present but not dominant in this system. Canopy closure is variable, and this system can be expressed as forests and woodlands. This system occurs on dry-mesic, primarily north- and east-facing limestone slopes in the Edwards Plateau of Texas.

CES303.660 EDWARDS PLATEAU LIMESTONE SAVANNA AND WOODLAND

This upland system occurs primarily on limestone soils in the Edwards Plateau and forms the matrix within this ecoregion. It can also occur on limestone in the shortgrass regions of Texas and north into Oklahoma in areas such as the Arbuckle Mountains. This system is typified by a mosaic of evergreen oak forests, woodlands and savannas over shallow soils of rolling uplands and upper slopes within the Edwards Plateau and Lampasas Cutplain. *Quercus fusiformis* or *Juniperus ashei* typically dominate the canopy of this system. Other species may include *Quercus buckleyi*, *Quercus laceyi*, *Quercus stellata*, *Ulmus crassifolia*, *Fraxinus texensis*, *Quercus sinuata*, *Quercus vaseyana*, and *Diospyros texana*. Physiographic expression of this system varies from dense mottes (patches of forest where canopy cover approaches 100%) interspersed with grasslands to open savannalike woodlands with scattered individual or small groups of trees. Understories can contain various shrubs and graminoids, including *Cercis canadensis* var. *texensis*, *Forestiera pubescens*, *Sideroxylon lanuginosum*, *Diospyros texana*, *Rhus trilobata*, *Bouteloua* spp., *Schizachyrium scoparium*, *Nassella leucotricha*, *Carex planostachys*, *Aristida purpurea*, *Aristida oligantha*, *Liatis mucronata*, *Stillingia texana*, *Symphyotrichum ericoides*, *Hedyotis nigricans*, *Monarda citriodora*, and *Salvia texana*. Grasslands dominated by *Schizachyrium scoparium* occur in small patches within more closed woodlands and in larger patches between mottes or in open savannalike woodlands with scattered trees. Grasslands in this system tend to grade from shortgrass communities in the west to mixedgrass communities to the east. Substrate (limestone) determines the range of this system within given examples. Some disturbed areas of the western plateau are now dominated by mesquite woodland. Natural mesquite woodlands are believed to have occurred on the deeper soils of adjacent riparian systems. This system is primarily restricted to limestone soils of rolling uplands within the Cretaceous limestone formations of the Edwards Plateau and dissected Pennsylvanian limestone formations within Texas and north into Oklahoma. Soil moisture and topography influence this system.

SHRUBLAND

CES302.731 CHIHUAHUAN CREOSOTEBUSH DESERT SCRUB

This ecological system is the common lower elevation desert scrub that occurs throughout much of the Chihuahuan Desert and has recently expanded into former desert grasslands in the northern portion of its range. Stands typically occur in flat to gently sloping desert basins and on alluvial plains, extending up into lower to mid positions of piedmont slopes (bajada). Substrates range from coarse-textured loams on gravelly plains to finer-textured silty and clayey soils in basins. Soils are alluvial, typically loamy and non-saline, and frequently calcareous as they are often derived from limestone, and to a lesser degree igneous rocks. The vegetation is characterized by a moderate to sparse shrub layer (<10% cover on extremely xeric sites) that is typically strongly dominated by *Larrea tridentata* with *Flourensia cernua* often present to codominant. A few scattered shrubs or succulents may also be present, such as *Agave lechuguilla*, *Parthenium incanum*, *Jatropha dioica*, *Koeberlinia spinosa*, *Lycium* spp., and *Yucca* spp. Additionally, *Flourensia cernua* will often strongly dominate in silty basins that are included in this ecological system. In general, shrub diversity is low as this ecological system lacks codominant thornscrub and other mixed desert scrub species that are common on the gravelly mid to upper piedmont slopes. However, shrub diversity and cover may increase locally where soils are deeper and along minor drainages with occasional *Atriplex canescens*, *Gutierrezia sarothrae*, or *Prosopis glandulosa*. Herbaceous cover is usually low and composed of grasses. Common species may include *Bouteloua eriopoda*, *Dasyochloa pulchella* (= *Erioneuron pulchellum*), *Muhlenbergia porteri*, *Pleuraphis mutica*, *Scleropogon brevifolius*, and *Sporobolus airoides*. Included in this ecological system are *Larrea tridentata*-dominated shrublands with a sparse understory that occur on gravelly to silty, upper basin floors and alluvial plains. A pebbly desert pavement may be present on the soil surface.

This ecological system is the common lower elevation desert scrub that occurs throughout much of the Chihuahuan Desert and has recently expanded into former desert grasslands in the northern portion of its range. Stands typically occur in flat to gently sloping, desert basins and on alluvial plains, extending up into the lower to mid positions of piedmont slopes (bajada). Substrates range from coarse-textured loams on gravelly plains to finer-textured silty and clayey soils in basins. Soils are alluvial, typically loamy and non-saline, and frequently calcareous as they are often derived from limestone, and to a lesser degree igneous rocks (Brown 1982, MacMahon and Wagner 1985, Henrickson and Johnston 1986, MacMahon 1988, Dick-Peddie 1993).

CES302.734 CHIHUAHUAN MIXED DESERT AND THORNSCRUB

This ecological system is the widespread desert scrub that occurs on gravelly mid to upper bajadas, foothills and dissected gravelly alluvial fans in the Chihuahuan Desert and has recently expanded into former desert grasslands in the northern portion of its range. It generally occurs on mid to upper piedmonts above the desert plains Chihuahuan Creosotebush Desert Scrub (CES302.731) and extends up to the chaparral zone. Soils are typically well-drained, non-saline, gravelly loams often with a petrocalcic layer. Substrates are frequently derived from limestone although igneous rocks are common in some areas. Vegetation is characterized by the presence of *Larrea tridentata*, typically mixed with thornscrub or other desert scrub such as *Agave lechuguilla*, *Aloysia wrightii*, *Baccharis pteronioides*, *Dasyilirion leiophyllum*, *Flourensia cernua* (not bottomland), *Fouquieria splendens*, *Koeberlinia spinosa*, *Krameria erecta*, *Leucophyllum minus*, *Mimosa aculeaticarpa* var. *biuncifera*, *Mortonia scabrella* (= *Mortonia sempervirens* ssp. *scabrella*), *Opuntia engelmannii*, *Parthenium incanum*, *Prosopis glandulosa*, and *Rhus microphylla* (in drainages). Stands of *Acacia constricta*-, *Acacia neovernicosa*- or *Acacia greggii*-dominated thornscrub are included in this system, and limestone substrates appear important for at least these species. If present, *Prosopis glandulosa* has relatively low cover and does not dominate the shrub layer. This system also includes upper piedmont stands of desert scrub that are strongly dominated by *Larrea tridentata*. Grasses are common but generally have lower cover than shrubs. Common species may include *Bouteloua curtipendula*, *Bouteloua eriopoda*, *Bouteloua gracilis*, *Bouteloua hirsuta*, *Bouteloua ramosa*, *Dasyochloa pulchella*, and *Muhlenbergia porteri*. Also included in this ecological system are shrublands with a sparse understory of *Larrea tridentata* that occur on gravelly piedmont slopes that may extend down gravelly upper basins. A pebbly desert pavement may be present on the soil surface. This may indicate remnant erosional surfaces from the early Holocene that are thought to be some of the historic distribution of *Larrea tridentata* desert scrub in the Chihuahuan Desert. Historically, much of this desert scrub was thought to be a steppe characterized by perennial desert grasses (typically *Bouteloua eriopoda*) with an open creosotebush - mixed desert shrub layer.

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CES302.738 CHIHUAHUAN SUCCULENT DESERT SCRUB

This ecological system is found in the Chihuahuan Desert on colluvial slopes, upper bajadas, sideslopes, ridges, canyons, hills and mesas. Sites are hot and dry, typically with southerly aspects. Gravel and rock are often abundant on the ground surface. The vegetation is characterized by the relatively high cover of succulent species such as *Agave lechuguilla*, *Euphorbia antisiphilitica*, *Fouquieria splendens*, *Ferocactus* spp., *Opuntia engelmannii*, *Opuntia imbricata*, *Opuntia spinosior*, *Yucca baccata*, and many others. Perennial grass cover is generally low. The abundance of succulents is diagnostic of this desert scrub system, but desert shrubs are usually present. Stands in rolling topography may form a mosaic with more mesic desert scrub or desert grassland ecological systems that would occur on less xeric northerly slopes. *Agave lechuguilla* is more abundant in stands in the southern part of the mapzone. This system does not include loamy plains desert grasslands or shrub-steppe with a strong cacti component such as cholla grasslands.

CES301.986 TAMAULIPAN CALCAREOUS THORNSCRUB

This xeric thornscrub ecological system is restricted to limestone and calcareous sandstone hills and caliche substrates such as along the Bordas Scarp in southern Texas and northeastern Mexico. Soils are shallow, alkaline, strongly calcareous and underlain by bedrock or a caliche layer. It has a shorter, more open shrub canopy (usually less than 2 m) when compared to more typical thornscrub growing on more favorable sites. However, shrub cover is generally greater than 70% and often greater than 85%. Dominant species include *Leucophyllum frutescens*, *Acacia berlandieri*, and *Acacia farnesiana* with many other shrub species that may be locally dominant such as *Acacia rigidula*, *Amyris madrensis*, *Amyris texana*, *Castela erecta ssp. texana*, *Celtis pallida*, *Eysenhardtia texana*, *Helietta parvifolia*, *Koeberlinia spinosa*, *Parkinsonia texana var. macra*, *Sophora secundiflora*, or *Yucca* spp. The sparse to moderately dense herbaceous layer is dominated by perennial graminoids. This system is restricted to limestone and calcareous sandstone hills and caliche substrates such as along the Bordas Scarp in southern Texas and northeastern Mexico. Soils are shallow, alkaline, strongly calcareous and underlain by bedrock or a caliche layer.

CES301.983 TAMAULIPAN MIXED DECIDUOUS THORNSCRUB

This thornscrub ecological system occurs throughout much of northeastern Mexico and southern Texas. It occurs on a variety of substrates and landforms. Dominant species include *Acacia roemeriana*, *Leucophyllum frutescens*, and *Prosopis glandulosa*. Other species present to codominant include *Acacia berlandieri*, *Acacia farnesiana*, *Amyris madrensis*, *Amyris texana*, *Celtis pallida*, *Parkinsonia texana*, and cacti such as *Opuntia engelmannii var. lindheimeri*.

HERBACEOUS

CES301.538 SOUTH TEXAS SAND SHEET GRASSLAND

This system occurs on the ridge-and-swale topography within 100 km of the Texas coast on the Holocene-aged eolian sand deposits of the South Texas Sand Sheet (primarily Kenedy and Brooks counties and extending into adjacent Jim Hogg, Hidalgo, and Willacy counties). While the vegetation of the ridges and swales is somewhat distinct, they are not separated here. In general, ridges are dominated by *Schizachyrium littorale* and a mixture of forbs, and swales are dominated by *Paspalum monostachyum*, *Andropogon gerardii*, *Muhlenbergia capillaris*, and *Sorghastrum nutans*. *Paspalum plicatulum* may be important in both environments. In addition to the dominants, common herbaceous components include *Eragrostis* spp., *Acalypha radians*, *Argythamnia mercurialina* var. *pilosissima*, *Chamaecrista flexuosa* var. *texana*, *Cnidocolus texanus*, *Croton argyranthemus*, *Dalea phleoides*, *Froelichia floridana*, *Galactia canescens*, *Gaura mckelveyae*, *Helianthemum georgianum*, *Monarda fruticulosa* (= *Monarda punctata* var. *fruticulosa*), *Phlox cuspidata*, *Rhynchosia americana*, *Stillingia sylvatica*, and *Thelesperma nuecense*. These grasslands occur intermixed with woodlands dominated by *Quercus fusiformis* and/or *Prosopis glandulosa* var. *glandulosa*.

This system is endemic to Texas. It is found within 100 km of the coast on the Holocene-aged eolian sand deposits of the South Texas Sand Sheet primarily Kenedy and Brooks counties and extending into adjacent Jim Hogg, Hidalgo, and Willacy counties.

This system occurs on deep sands of the Pleistocene-aged Ingleside barrier-strandplain and the Holocene-aged eolian sand deposits of the South Texas Sand Sheet. Topography varies from larger dunes to smaller ridges and swales.

CES301.989 TAMAULIPAN CALICHE GRASSLAND

This ecological system is restricted to the Loreto Plain in Tamaulipas, Mexico. It occurs on shallow sandy loam soils with a caliche hardpan subhorizon. These small-patch grasslands are less than 40 ha in area and are dominated by perennial grasses often with sparse low shrubs within a mosaic of thornscrub. Dominant grasses may include *Aristida purpurea*, *Bouteloua hirsuta*, *Bouteloua radicata*, *Cenchrus spinifex*, *Paspalum setaceum*, and *Tridens muticus*. Perennial forbs may be abundant such as *Boerhavia coccinea*, *Chamaecrista flexuosa*, *Heliotropium confertifolium*, or *Rhynchosia americana*. Low shrubs are *Calliandra conferta* and *Krameria ramosissima*.

CES301.987 TAMAULIPAN CLAY GRASSLAND

This Tamaulipan ecological system occurs on clay prairies near the Gulf Coast and drier sites further inland. Substrates are fine calcareous clays and clay loam. Occasional fires and root pruning from montmorillonitic clay limit shrub invasion, if the grassland is not overgrazed. If overgrazed the land will convert to stable thornscrub dominated by *Prosopis glandulosa* and *Celtis pallida*. Vegetation is dominated by perennial mid and short grasses such as *Schizachyrium scoparium*, *Paspalum* spp., *Chloris pluriflora*, *Buchloe dactyloides*, with other grasses such as *Bothriochloa saccharoides*, *Bouteloua curtipendula*, *Chloris andropogonoides*, *Nassella leucotricha*, *Schedonnardus paniculatus*, *Setaria leucopila*, and clumps of *Andropogon gerardii* on less clayey sites. *Prosopis glandulosa* or *Quercus fusiformis* are often present as scattered mottes or are restricted to drainages. *Opuntia engelmannii* var. *lindheimeri* is often present.

Occurs on clay prairies near the Gulf Coast and drier sites further inland.

CES301.985 TAMAULIPAN SAVANNA GRASSLAND

This Tamaulipan ecological system is dominated by perennial grasses with sparse overstory of mesquite or oak trees and thornscrub. Dominant grasses are *Cynodon* spp. This system was once a common matrix system, but has largely been converted to desert scrub and exists as remnant patches. Degraded subtropical forests and woodlands may have similar structure but are not included in this system because different ecological processes maintain them.

CES301.988 TAMAULIPAN TALLGRASS GRASSLAND

This ecological system occurs on the most favorable growing sites in the South Texas Plain where rainfall is highest or locally on lower slopes and near water. Substrates are deep sands and sandy loam soils. The vegetation is dominated by tall perennial grasses such as *Andropogon gerardii*, *Sorghastrum nutans*, and *Tripsacum dactyloides*.

CES205.684 TEXAS BLACKLAND TALLGRASS PRAIRIE

This system is found primarily in the Blackland Prairie region of Texas but can range into southern Oklahoma. It is typified by the presence of dark alkaline Vertisol soils over calcareous parent material interspersed with patches of acidic, sandy loam Alfisols and Mollisols. Microtopography such as gilgai and mima mounds can occur and are important microhabitats that lead to a high degree of plant diversity in this system. *Schizachyrium scoparium* and *Sorghastrum nutans* are the most frequent species with *Andropogon gerardii* as a possible associate, especially on the patches of Mollisol soils. *Tripsacum dactyloides* and *Panicum virgatum* are common associates on the Vertisol soils, especially on the gilgai microtopography. Fire and grazing constitute the major natural dynamics influencing this system. Infrequent, but intense, fires prevent woody species from establishing. Fire suppression and over grazing have allowed woody species to invade, and heavy grazing has allowed species such as *Buchloe dactyloides* and *Bouteloua rigidiseta* to invade.

This system is restricted to the Blackland Prairie region, part of the Crosstimbers and Southern Tallgrass Prairie Ecoregion, in Texas and possibly adjacent southern Oklahoma.

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The Main Belt of the Blackland Prairie is divided into Vertisol, Alfisol and Mollisol regions. The Vertisol region is characterized by the presence of dark clay alkaline soils over limestone marl parent material, while the Eastern Marginal prairies are characterized by variously textured Alfisols over sandstone parent material. Alkaline clay and clay loam Mollisols are found on the Austin Chalk formation on fragmented Cretaceous limestone. Two outlier prairies, the Fayette (EPA 32b) and San Antonio Prairies (EPA 33c), are underlain by both Vertisols and Alfisols. Each variation in soil texture and pH supports its characteristic community.

WOODY WETLAND

CES303.651 EDWARDS PLATEAU FLOODPLAIN

This system occurs on floodplain terraces along perennial rivers and streams in central Texas. Canopy dominants may include *Ulmus crassifolia*, *Juniperus ashei*, *Celtis laevigata*, *Quercus fusiformis*, *Fraxinus texensis*, *Platanus occidentalis*, *Acer negundo*, *Juglans major*, *Quercus macrocarpa*, or *Carya illinoensis*. *Carya illinoensis* may be more likely to occur in deeper and better-developed alluvial soils. Apparent dominance of *Carya illinoensis* may also be an artifact of preferential harvesting of other species, leaving this species in greater abundance. Alluvial sedimentation processes dominate the formation and maintenance of this system. However, overgrazing and/or overbrowsing may influence recruitment of overstory species and composition of the understory and herbaceous layers. This system occurs along larger permanent rivers and streams throughout the Edwards Plateau of Texas and possibly adjacent ecoregions. It occurs from the Leon watershed in the Limestone Cutplain (EPA 29e) south to the edge of the Bacones Canyonlands (EPA 30c), west through the Edwards Plateau and north to the Pecan Bayou and Concho River watersheds in the lower Limestone Plains (EPA 27j) and lower Crosstimbers (EPA 29c) (EPA 2001). This system occurs on alluvial terraces along permanent rivers and streams in central Texas.

CES303.652 EDWARDS PLATEAU RIPARIAN

This system occurs in various situations along small and intermittent streams of the Edwards Plateau, with drier representatives occurring in the western plateau and the Stockton Plateau, and moister representatives (such as communities dominated by *Juglans microcarpa* and *Brickellia laciniata*) in the eastern plateau. Representatives of this system typically occur in stream-scoured situations and vary in the openness of the habitat and physiognomy.

CES205.710 SOUTHEASTERN GREAT PLAINS FLOODPLAIN FOREST

This ecological system is found in the floodplains of medium and larger rivers of the East Central Texas Plains, Texas Blackland Prairie Regions, Crosstimbers, and the southeastern edge of the Central Great Plains (Level 3 Ecoregions 33, 32, 29 and 27 respectively, *sensu* Griffith et al. (2004)). Alluvial soils and sedimentation processes typify this system. Periodic, intermediate flooding and deposition (every 5-25 years) dominates the formation and maintenance of this system. Dominant communities within this system range from floodplain forests to wet meadows to gravel/sand flats; however, they are linked by underlying soils and the flooding regime. Canopy dominants may include *Carya illinoensis*, *Ulmus crassifolia*, *Ulmus americana*, *Celtis laevigata*, *Quercus nigra*, *Platanus occidentalis*, *Acer negundo*, *Quercus macrocarpa*, *Morus rubra*, *Fraxinus pennsylvanica*, *Salix nigra*, and *Sapindus saponaria* var. *drummondii* (= *Sapindus drummondii*). Overgrazing and/or overbrowsing may influence recruitment of overstory species and composition of the understory and herbaceous layers. Shrub species may include *Callicarpa americana*, *Ilex decidua*, *Ilex americana*, *Sideroxylon lanuginosum*, *Diospyros virginiana*, *Juniperus virginiana*, *Cornus drummondii*, and *Viburnum rufidulum*, which may occur as dense patches following disturbance, but are otherwise generally fairly sparse. Vines such as *Berchemia scandens*, *Campsis radicans*, *Vitis* spp., *Parthenocissus quinquefolia*, and *Ampelopsis arborea* may be conspicuous. Herbaceous cover includes *Elymus virginicus*, *Verbesina virginica*, *Chasmanthium latifolium*, *Chasmanthium sessiliflorum*, *Tripsacum dactyloides*, *Symphotrichum drummondii* var. *texanum*, *Geum canadense*, *Sanicula canadensis*, *Panicum virgatum*, *Galium* spp., and *Carex* sp. Herbaceous cover may be quite high, especially in situations where shrub cover is low. The environment and vegetation of this system become generally and correspondingly drier from east to west with moister representatives (such as communities containing *Quercus phellos*, *Quercus pagoda*, *Quercus alba*, and *Quercus lyrata*) occurring along the eastern and northeastern margins of the range. Representatives of this system may vary in the openness of the habitat and physiognomy.

This system occupies relatively broad flats at low topographic positions, along large streams where alluvial deposition dominates. It is found in the floodplains of medium and larger rivers of the East Central Texas Plains, Texas Blackland Prairie Regions, Crosstimbers, and the southeastern edge of the Central Great Plains (Level 3 Ecoregions 33, 32, 29 and 27 respectively, *sensu* Griffith et al. (2004)). Soils are primarily alluvial and range from sandy to dense clays.

CES205.709 SOUTHEASTERN GREAT PLAINS RIPARIAN FOREST

This ecological system occurs in various situations along small and intermittent streams in the East Central Texas Plains, Texas Blackland Prairie Regions, Crosstimbers, and the southeastern edge of the Central Great Plains (Level 3 Ecoregions 33, 32, 29 and 27, respectively, *sensu* Griffith et al. (2004)). Some trees that may be present in stands of this system include *Celtis laevigata* var. *laevigata*, *Celtis laevigata* var. *reticulata*, *Platanus occidentalis*, *Quercus nigra*, *Quercus phellos*, *Amorpha fruticosa*, *Forestiera*

acuminata, *Acer saccharinum*, *Sapindus saponaria*, *Salix nigra*, *Fraxinus pennsylvanica*, *Gleditsia triacanthos*, *Carya illinoensis*, and *Ulmus crassifolia*. The environment and vegetation of this system become generally and correspondingly drier from east to west with moister representatives (such as communities containing *Quercus nigra*) occurring in the eastern parts of the range. Representatives of this system typically occur in stream-scoured situations and vary in the openness of the habitat and physiognomy.

This system occurs on minor intermittent streams and tributaries throughout the East Central Texas Plains, Texas Blackland Prairie Regions, Crosstimbers, and the southeastern edge of the Central Great Plains (Level 3 Ecoregions 33, 32, 29 and 27 respectively, sensu Griffith et al. (2004)). It is found along medium to very small, intermittent to ephemeral drainages. This type is ubiquitous throughout, but species composition and flood regimes are variable and are thought to be dependent on soil and geologic substrates. Generally, these are less thick alluvium than in floodplain terraces. These are flashy streams, and flooding rather than fire will be the dominant process in this system. Fuels in this system are variable, and fire-return interval is partially determined by that of the adjacent and surrounding matrix upland system, where fuels are present.

CES301.992 TAMAULIPAN ARROYO SHRUBLAND

This Tamaulipan riparian shrubland system is restricted to drainages in upland areas or ramaderos that are intermittently flooded. The dense shrub canopy is a mix of species often dominated by *Acacia farnesiana*, *Celtis pallida*, *Haematoxylum brasiletto*, *Prosopis glandulosa*, or *Tecoma stans*. The Ramadero of Jahrsdoerfer and Leslie (1988) is equivalent to this system concept, but could be considered narrower if more information on how it occurs elsewhere in Mexico can be obtained. Not much more information is likely to be found because this system is not sampled very often. Intermittent drainages (arroyos and ramaderos) are not sampled that often because of scale and variability issues. More information is needed to fully characterize this system.

This Tamaulipan riparian shrubland system is restricted to drainages in upland areas or ramaderos (isolated strips of dense brush associated with arroyos) that are intermittently flooded.

CES301.990 TAMAULIPAN FLOODPLAIN

This ecological system is limited to riparian areas of the lower Rio Grande Valley and Rio Corona in southern Texas and northeastern Mexico. Stands occur on riverbanks, floodplains and deltas. These woodlands are a unique mix of species from southeastern North America and subtropical Central America and are often dominated by *Acacia farnesiana*, *Carya ovata*, *Celtis laevigata*, *Diospyros texana*, *Ebenopsis ebano*, *Ehretia anacua*, *Fraxinus berlandieriana*, *Populus deltoides*, or *Ulmus crassifolia*, and many other tree species present to locally dominant, with *Carya illinoensis*, *Carya texana*, *Quercus stellata*, and *Quercus fusiformis* more common in the northern extent. The highly variable understory is dependent on canopy density and may include dense shrub or herbaceous layers. Riparian areas of the lower Rio Grande Valley and Rio Corona in southern Texas and northeastern Mexico.

Stands of this ecological system occur on riverbanks, floodplains, deltas and other riparian areas of the lower Rio Grande Valley and Rio Corona in southern Texas and northeastern Mexico.

MIXED UPLAND AND WETLAND

CES302.746 CHIHUAHUAN-SONORAN DESERT BOTTOMLAND AND SWALE GRASSLAND

This ecological system occurs in relatively small depressions or swales and along drainages throughout the northern and central Chihuahuan Desert and adjacent Sky Islands and Sonoran Desert, as well as limited areas of the southern Great Plains on broad mesas, plains and valley bottoms that receive runoff from adjacent areas. Occupying low topographic positions, these sites generally have deep, fine-textured soils that are neutral to slightly or moderately saline/alkaline. During summer rainfall events, ponding is common. Vegetation is typically dominated by *Sporobolus airoides*, *Sporobolus wrightii*, *Pleuraphis mutica* (tobosa swales), or other mesic graminoids such as *Pascopyrum smithii* or *Panicum obtusum*. With tobosa swales, sand-adapted species such as *Yucca elata* may grow at the swale's edge in the deep sandy alluvium that is deposited there from upland slopes. *Sporobolus airoides* and *Sporobolus wrightii* are more common in alkaline soils and along drainages. Other grass species may be present, but these mesic species are diagnostic. Scattered shrubs such as *Atriplex canescens*, *Prosopis glandulosa*, *Ericameria nauseosa*, *Fallugia paradoxa*, *Krascheninnikovia lanata*, or *Rhus microphylla* may be present. This bottomland/depressional wetland system can be similar to the upland Chihuahuan Loamy Plains Desert Grassland (CES302.061) but is restricted to moist depressions and intermittently flooded drainage terraces and adjacent flats. Alkali sacaton (*Sporobolus airoides*) is often associated with more alkaline (to gypsic), poorly drained areas and giant sacaton (*Sporobolus wrightii*) with less alkaline better drained areas. *Distichlis spicata*, *Allenrolfea occidentalis*, and *Suaeda* spp. are characteristic of more saline and alkaline sites.

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