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**Ecological Systems of Texas' Blackland Prairies**

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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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## FOREST AND WOODLAND

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### CES205.682 CROSTIMBERS OAK FOREST AND WOODLAND

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This system is primarily found within central Texas and Oklahoma, ranging north to southeastern Kansas, and east into eastern Oklahoma. It is distinct from the surrounding prairie by the higher density of tree species. The area consists of irregular plains with primarily sandy to loamy Ustalf soils that range from shallow to moderately deep. Rainfall can be moderate, but somewhat erratic, therefore moisture is often limiting during part of the growing season. Short, stunted *Quercus stellata* and *Quercus marilandica* characterize and dominate this system. Other species, such as *Carya texana*, *Carya cordiformis*, *Quercus prinoides*, *Ulmus crassifolia*, and *Quercus* spp., can also be present within their respective ranges. The understory often contains species typical of the surrounding prairies, in particular *Schizachyrium scoparium*. Shrubs such as *Rhus* spp. may also be present. Drought, grazing, and fire are the primary natural processes that affect this system. Overgrazing and conversion to agriculture, along with fire suppression, have led to the invasion of some areas by problematic brush species such as *Juniperus virginiana* and *Juniperus ashei* and *Prosopis glandulosa* farther south in Texas and Oklahoma. It has also led to decreases in native grass cover allowing for annual grasses and forbs to invade.

This system is located on irregular plains comprised of sandy to loamy Ustalf soils. These soils range from shallow to moderately deep. Rainfall can be moderate, but sporadic, leading to periods of limiting moisture.

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### CES205.679 EAST-CENTRAL TEXAS PLAINS POST OAK SAVANNA AND WOODLAND

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This system is primarily found within eastern Texas, lying in a broad band west of the Upper West Gulf Coastal Plain and Gulf Coast Prairies and Marshes ecoregions, ranging from Live Oak and Atascosa counties in the south and trending in a northeasterly band to the Red River along the Oklahoma-Texas border. It exhibits some floristic and physiognomic variation across this northeast-southwest gradient. Its range is roughly co-incident with (parts of) the "East Central Texas Plains" (Level III Ecoregion 33) of EPA (Griffith et al. 2004). It is distinguished from the surrounding prairie by the higher density of trees and diversity of woody species. The system differs from the floristically similar Crosstimbers Oak Forest and Woodland (CES205.682) in that it generally occurs on Tertiary (primarily Eocene) geologic formations on the East-Central Texas Plains, while the related Crosstimbers ecological system occupies Cretaceous and older formations of the interior plains (EPA Level III Ecoregion 29). Floristically, Post Oak Savanna (at least north of the Colorado River) contains species of more eastern affinities such as *Callicarpa americana*, *Sassafras albidum*, *Cornus florida*, *Vaccinium arboreum*, *Ulmus alata*, and particularly *Ilex vomitoria*, the latter species being absent from Crosstimbers Oak Forest and Woodland (CES205.682). Post Oak Savanna generally occurs on sandy or loamy soils, often underlain by a claypan subsoil. Rainfall ranges from about 120 cm in the northeastern part of the range to about 70 cm in the southwest, where it becomes increasingly erratic. Therefore moisture is often limiting during part of the growing season. The system was historically characterized as having significant areas of graminoid cover with species composition resembling that of nearby prairie systems, punctuated by short, stunted woodlands and forests dominated by *Quercus stellata* and *Quercus marilandica*. Other species, such as *Carya texana*, *Quercus incana* (on more xeric sites), *Quercus fusiformis*, *Ulmus alata*, *Juniperus virginiana*, and *Prosopis glandulosa*, can also be present. In some sites, particularly in the south, *Quercus fusiformis* may codominate the woodlands. Shrubs may attain significant cover in the understory, with species including *Ilex vomitoria* (often dominant), *Callicarpa americana*, *Vaccinium arboreum*, *Sideroxylon lanuginosum*, *Ilex decida*, *Toxicodendron radicans*, and *Symphoricarpos orbiculatus*. Where light penetration allows the development of an herbaceous understory or in areas with reduced woody canopy, the understory contains species typical of the surrounding prairies, in particular *Schizachyrium scoparium*, but also including *Andropogon gerardii*, *Bothriochloa laguroides* ssp. *torreyana*, *Paspalum plicatum* (to the south), *Sorghastrum nutans*, and *Sporobolus cryptandrus*. Drought, grazing, and fire are the primary natural processes that affect this system. Much of this system has been impacted by conversion to improved pasture or crop production. Overgrazing and fire suppression have led to increased woody cover on most extant occurrences and the invasion of some areas by problematic brush species such as *Juniperus virginiana* var. *virginiana* and *Prosopis glandulosa* in the southern part of the system's range. These factors have also led to decreases in native grass cover allowing for annual grasses and forbs to invade.

This system is located on irregular plains comprised of sandy to loamy Alfisols, generally associated with Tertiary (primarily Eocene) formations of the East Central Texas Plains (Level III Ecoregion 33) of EPA (Griffith et al. 2004). These soils range from shallow to moderately deep and are often underlain by claypan subsoils. Rainfall ranges from about 120 cm in the northeastern part of the range to about 70 cm in the southwest, where it becomes increasingly erratic.

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

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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.

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### **CES303.660 EDWARDS PLATEAU LIMESTONE SAVANNA AND WOODLAND**

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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*, *Liatris mucronata*, *Stillingia texana*, *Symphotrichum 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

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### CES303.041 EDWARDS PLATEAU LIMESTONE SHRUBLAND

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This ecological system occurs as a matrix on relatively thin-soiled surfaces of plateaus of the massive limestones such as the Edwards limestone. These short to tall shrublands are variable in density depending on the relative amount of, and depth to, bedrock. *Quercus sinuata* var. *breviloba* is an important component of the system, with some areas dominated by *Quercus fusiformis*. *Juniperus ashei* is often an important component of this system. In the west, *Pinus remota* may also contribute to a scattered emergent overstory. Other shrub species may include *Rhus virens*, *Rhus lanceolata*, *Cercis canadensis* var. *texensis*, *Forestiera pubescens*, *Forestiera reticulata*, *Fraxinus texensis*, *Ungnadia speciosa*, *Sophora secundiflora*, *Diospyros texana*, *Salvia ballotiflora*, *Mimosa borealis*, *Condalia hookeri*, *Rhus trilobata*, *Opuntia engelmannii*, and *Mahonia trifoliolata*. This system also includes *Quercus mohriana*- or *Quercus vaseyana*-dominated shrublands that are more common to the west, often sharing dominance with *Juniperus pinchotii*. Herbaceous cover may be patchy and is generally graminoid with species including *Schizachyrium scoparium*, *Bouteloua curtipendula*, *Bouteloua rigidisetata*, *Bouteloua trifida*, *Hilaria belangeri*, *Bothriochloa laguroides* ssp. *torreyana*, *Nassella leucotricha*, *Erioneuron pilosum*, *Aristida* spp., and others. Disturbances such as fire may be important processes maintaining this system. However, it appears to persist on thin-soiled sites. In the western portions of the Edwards Plateau, more xeric conditions lead to the slow succession of sites to woodlands, resulting in long-persisting shrublands. This system occurs on thin soils over limestone in the Edwards Plateau of Texas.

This system occurs in a steady state on thin-soiled xeric sites. Shrub cover can be 100% in patches, but overall cover may be 40-50%. Patches of dense shrubs may be interspersed with bare rock and grasslands over shallow soil. Farther west this system grades into other shallow-soiled shrubland systems.

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### CES301.983 TAMAULIPAN MIXED DECIDUOUS THORNSCRUB

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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

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## CES205.684 TEXAS BLACKLAND TALLGRASS PRAIRIE

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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.

This system 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.

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

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### CES303.651 EDWARDS PLATEAU FLOODPLAIN

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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.

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### CES303.652 EDWARDS PLATEAU RIPARIAN

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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.

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### CES205.710 SOUTHEASTERN GREAT PLAINS FLOODPLAIN FOREST

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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.

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### CES205.709 SOUTHEASTERN GREAT PLAINS RIPARIAN FOREST

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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.

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### **CES203.488 WEST GULF COASTAL PLAIN LARGE RIVER FLOODPLAIN FOREST**

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This system represents a geographic subset of Kuchler's (1964) Southern Floodplain Forest found west of the Mississippi River. Examples may be found along large rivers of the West Gulf Coastal Plain and Upper West Gulf Coastal Plain, especially the Trinity, Neches, Sabine, and others. Several distinct plant communities can be recognized within this system that may be related to the array of different geomorphic features present within the floodplain. Some of the major geomorphic features associated with different community types include natural levees, point bars, meander scrolls, oxbows, and sloughs. Vegetation generally includes forests dominated by bottomland hardwood species and other trees tolerant of flooding, including bald-cypress and water tupelo. However, herbaceous and shrub vegetation may be present in certain areas as well.

Some of the major geomorphic features associated with different community types within this system include natural levees, point bars, meander scrolls, oxbows, and sloughs (Sharitz and Mitsch 1993).

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### **CES203.487 WEST GULF COASTAL PLAIN SMALL STREAM AND RIVER FOREST**

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This is a predominantly forested system of the West Gulf Coastal Plain associated with small rivers and creeks. In contrast to West Gulf Coastal Plain Large River Floodplain Forest (CES203.488), examples of this system have fewer major geomorphic floodplain features. Those features that are present tend to be smaller and more closely intermixed with one another, resulting in less obvious vegetational zonation. Bottomland hardwood tree species are typically important and diagnostic, although mesic hardwood species are also present in areas with less inundation, such as upper terraces and possibly second bottoms. As a whole, flooding occurs annually, but the water table usually is well below the soil surface throughout most of the growing season. Areas impacted by beaver impoundments are also included in this system. This system is associated with small rivers and creeks in the West Gulf Coastal Plain.



## **BARREN**

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### **CES203.398 SOUTHEASTERN COASTAL PLAIN CLIFF**

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This ecological system consists of steep to vertical or overhanging outcrops of unconsolidated sediment or rock in the Gulf and Atlantic Coastal Plain. They occur on lower bluffs adjacent to rivers or streams. The vegetation is generally sparse, limited to plants growing on bare substrate, small ledges, and other favorable microsites. The flora is a mix of herbs, shrubs, vines, tree seedlings, and some larger trees, with bryophytes potentially dominant in some examples. It typically includes opportunistic species of open and disturbed areas, along with species from adjacent forest communities and other species of wet and dry open areas. Dense shrubby or woodland vegetation may occur on the edges. Occasional examples may have denser bryophyte vegetation. More information is needed on the associations that belong to this system. Compared to cliffs of other regions, the soft Coastal Plain cliffs tend to be more frequently disturbed and more dynamic. Soil development and primary succession would quickly replace any examples that are not periodically disturbed and renewed by slumping, generally caused by undercutting by streams. Smaller slumps and active erosion by upland runoff may also disturb the communities. This is the primary rock outcrop system of the Coastal Plain, but small shaded outcrops of limestone or sandstone may be included in other systems.

These cliffs occur on steep to vertical or overhanging outcrops of Coastal Plain substrates, usually sand, clay, or sandstone. Outcrops typically occur along rivers or streams, where undercutting causes slumps that periodically renew the bare substrate. Most of these cliffs are dry, but small zones of seepage are often present, especially at the top. One association represents small clay cliffs that are kept wet by seepage. Lower portions of cliffs may periodically flood.