USDA Natural Resources Conservation Service

Ecological site R081BY343TX
Shallow 23-31 PZ

Last updated: 9/19/2023
Accessed: 11/04/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

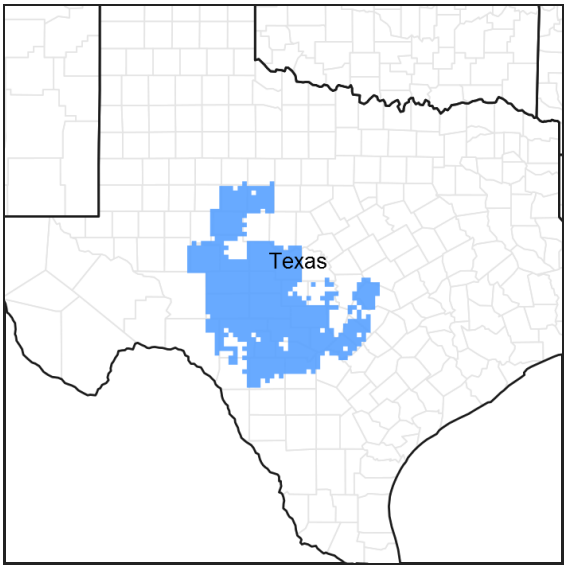


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 081B–Edwards Plateau, Central Part

This area is entirely in south-central Texas. It makes up about 11,125 square miles (28,825 square kilometers). The towns of Fredericksburg, Junction, Menard, Rocksprings, and Sonora are in this MLRA. Interstate 10 crosses the middle part of the area. A few State parks and State historic sites are in this MLRA.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 81B

Ecological site concept

The Shallow ecological site is located on uplands with soils 10 to 20 inches deep over a petrocalcic horizon.

Associated sites

R081BY328TX	**Deep Redland 23-31 PZ** The Deep Redland site are on similar positions but have red subsoil with Post oak trees.

R081BY326TX	**Clay Loam 23-31 PZ** The Clay Loam site may be encountered on adjacent slopes.
R081BY335TX	**Loamy Bottomland 23-31 PZ** The Loamy Bottomland site may be encountered downslope from the Shallow site.
R081BY350TX	**Steep Rocky 23-31 PZ** The Steep Rocky site may be encountered upslope.
R081BY320TX	**Adobe 23-31 PZ** The Adobe site occur in similar positions.

Similar sites

R081BY320TX	**Adobe 23-31 PZ** The Adobe site has similar soils but lower in calcium carbonate.
R081BY337TX	**Low Stony Hill 23-31 PZ** The Low Stony Hill site has shallow soils with more gravels, cobbles, and stones.
R081BY354TX	**Very Shallow 23-31 PZ** The Very Shallow site is less than 10 inches to petrocalcic horizon.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Schizachyrium scoparium* (2) *Sorghastrum nutans*

Physiographic features

The Shallow ecological site consists of nearly level to gently sloping soils on uplands. Slope ranges from 0 to 5 percent. This site is usually found on stream terraces, alluvial fans, hills, ridges, divides, and foot slopes. Runoff is low to medium due to the gently sloping nature. The elevation ranges from 1,000 feet to 2,800 feet above sea level. These soils are on nearly level to gently sloping uplands. The majority of the site is used for rangeland due to the shallow soils. However, there are some areas that are used for permanent pastureland and small grains.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Ridge (2) Plateau > Stream terrace (3) Plateau > Plain
Runoff class	Low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	1,000–2,800 ft
Slope	0–5%
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to very high
Flooding frequency	Not specified
Ponding frequency	Not specified

Elevation	Not specified
Slope	Not specified

Climatic features

The climate in the MLRA 81B is subtropical subhumid on the eastern portion and subtropical steppe on the western portion of the MLRA. Winters are dry, and the summers are hot and humid. The precipitation increases from west to east and the temperatures increase from north to south. The area usually receives 65 to 70 percent sunshine each year. The majority of the rainfall occurs during the warm months of April to October. Most precipitation comes from thunderstorms that vary in the amount of water received and the areas covered. Spring is characterized by fluctuating patterns, but mild temperatures prevail. July and August are relatively dry and hot with little weather variability day-to-day. As summer progresses through fall, an increase of precipitation usually occurs in the eastern portions while a decrease of precipitation occurs to the west. Winter temperatures are mild, but polar Canadian air masses bring rapid drops in temperature. These cold spells last 2 or 3 days. Prevailing winds are southerly with March and April the windiest months.

Table 4. Representative climatic features

Frost-free period (characteristic range)	210-240 days
Freeze-free period (characteristic range)	240-280 days
Precipitation total (characteristic range)	25-28 in
Frost-free period (actual range)	210-240 days
Freeze-free period (actual range)	240-280 days
Precipitation total (actual range)	24-30 in
Frost-free period (average)	225 days
Freeze-free period (average)	260 days
Precipitation total (average)	27 in

Climate stations used

- (1) FT MCKAVETT [USC00413257], Fort Mc Kavett, TX
- (2) ROCKSPRINGS 1S [USC00417706], Rocksprings, TX
- (3) BRADY [USC00411017], Brady, TX
- (4) EDEN [USC00412741], Eden, TX
- (5) FREDERICKSBURG [USC00413329], Fredericksburg, TX
- (6) HUNT 10 W [USC00414375], Hunt, TX
- (7) JUNCTION 4SSW [USC00414670], Junction, TX
- (8) JUNCTION KIMBLE CO AP [USW00013973], Junction, TX
- (9) MENARD [USC00415822], Menard, TX
- (10) SAN SABA [USC00417992], San Saba, TX

Influencing water features

The sites are located on uplands and are not influenced by a stream or wetland.

Wetland description

N/A

Soil features

In a representative profile, the parent material is limestone and alluvium derived from limestone. The surface layer is dark grayish-brown, calcareous loam about 6 to 9 inches thick. The soil depth to bedrock or a petrocalcic horizon

ranges from 10 to 20 inches. Cemented limestone and caliche fragments are usually below 10 inches in depth, but may be present in the surface horizon. Internal drainage is well drained and permeability is moderately slow. The available water capacity is low and calcium carbonate makes up 40 percent in the soil profile. Soil series correlated to this site include: Doss, Kavett, Mereta, Prade, and Purves.

Table 5. Representative soil features

Parent material	(1) Alluvium–limestone (2) Residuum–limestone
Surface texture	(1) Silty clay (2) Clay (3) Clay loam
Family particle size	(1) Clayey (2) Loamy (3) Clayey-skeletal
Drainage class	Well drained
Permeability class	Moderately slow
Depth to restrictive layer	10–20 in
Soil depth	10–20 in
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0–5%
Available water capacity (0-20in)	1.2–3.8 in
Calcium carbonate equivalent (0-20in)	2–40%
Electrical conductivity (0-20in)	0–2 mmhos/cm
Sodium adsorption ratio (0-20in)	0
Soil reaction (1:1 water) (0-20in)	7.4–8.4
Subsurface fragment volume <=3" (4-20in)	0–10%
Subsurface fragment volume >3" (4-20in)	0–8%

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Slow to moderate
Depth to restrictive layer	Not specified
Soil depth	Not specified
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–20%
Available water capacity (0-20in)	Not specified
Calcium carbonate equivalent (0-20in)	Not specified
Electrical conductivity (0-20in)	Not specified

Sodium adsorption ratio (0-20in)	Not specified
Soil reaction (1:1 water) (0-20in)	Not specified
Subsurface fragment volume <=3" (4-20in)	0–30%
Subsurface fragment volume >3" (4-20in)	0–30%

Ecological dynamics

The Shallow Ecological Site is a fire influenced midgrass prairie with scattered oak (Quercus spp.) mottes. Pre-settlement influences included grazing or browsing by endemic pronghorn antelope, deer and migratory bison, severe droughts, and frequent fires. Wildfires occurred at 7 to 12 years intervals or less maintaining woody species at less than 10 percent canopy on this relatively level site. The soils of the site vary from very shallow clays to shallow clay loams with pockets and crevices of deeper soils. Productivity of the site varies with these fluctuations and decreases with precipitation from east to west. Moisture holding capacity is relatively limited and often limits productivity. Long-term droughts, occurring three to four times per century, may cause shifts in vegetation by causing woody plant mortality.

Tallgrasses, such as little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), and Indiangrass (Sorgastrum nutans), dominated the grassland community in the eastern boundary of the MLRA originally. Sideoats grama (*Bouteloua curtipendula*) and little bluestem were the co-dominants on the drier western boundary. There was a large component of midgrasses including several feathery bluestems (Bothriochloa spp.). The frequent fires favored grasses over woody plants and forbs, but there were a wide variety of forbs, including legumes, present. Trees, primarily live oak and hackberry (*Celtis laevigata*) occupied rock crevices and deeper soil pockets on areas protected from wildfires, covering less than 10 percent of the ground area.

The Mid and Tallgrass Prairie Community is relatively stable and resilient within the climate, soil, and fire regime until European settlement. Not understanding the limits of rangeland productivity, the settlers overstocked the land with domesticated livestock almost universally. As overgrazing occurred, there was a reduction of late seral tallgrasses, decline in mulch, organic matter, and reduction in intensity and frequency of fires. The shift in plant cover and decline in soil properties favored woody plant encroachment. The woody and grassland vegetation invaders were generally endemic species released from competition. The plant community resulted in a Midgrass/Oak Savannah Community. In this community, midgrasses such as sideoats grama, feathery bluestems, plains lovegrass (*Eragrostis intermedia*), and low palatability forbs began replacing the preferable tallgrasses and forbs. In this phase, grasses still dominate primary production, but the encroaching woody species contributes an increasing amount. The higher percentage of woody species is more favorable to browsing animals. While observing the woody species use by browsing animals, early settlers stocked the area with large numbers of cattle, sheep, and goats than the site was able to sustain.

When the Midgrass/Oak Savannah Community is continually overgrazed and fire is excluded, the process of succession proceeds toward woody plant dominants and replacement of the more preferred midgrasses with shortgrasses. As grass cover declines, litter and soil organic matter decline and bare ground, erosion and other desertification processes increase. The microclimate in the grassland areas becomes more arid. Increasing woody dominants are primarily Ashe juniper (*Juniperus ashei*) in the eastern half of the MLRA and mesquite (*Prosopis glandulosa*) in the western half. When the woody plant community exceeds 20 to 25 percent canopy, rest from grazing generally will not restore the grassland community. When this transition occurs, the site develops the Oak/Juniper Shortgrass Community. This plant community also marks the beginning of the Woodland State.

Oaks (Quercus spp.) and juniper dominate the Oak/Mixedbrush Shortgrass Community in the east side of the MLRA while oaks and juniper and/or mesquite dominate in the western half. The grass component is a mixture of midgrasses, shortgrasses, and low-quality forbs. With continued livestock overgrazing, the more desirable shortgrasses, such as buffalograss (*Bouteloua dactyloides*) and curlymesquite (*Hilaria belangeri*), are replaced by less palatable species such as three-awns (Aristida spp.) and broom snakeweed (*Gutierrezia sarothrae*). Cool-season grasses such as Texas wintergrass (*Nassella leucotricha*) also increase in this phase. During this phase, the process of deterioration can be reversed with brush control and improved grazing management. If these

conservation practices are not applied, the woody canopy will continue to increase in size and density and another woody plant dominated community develops.

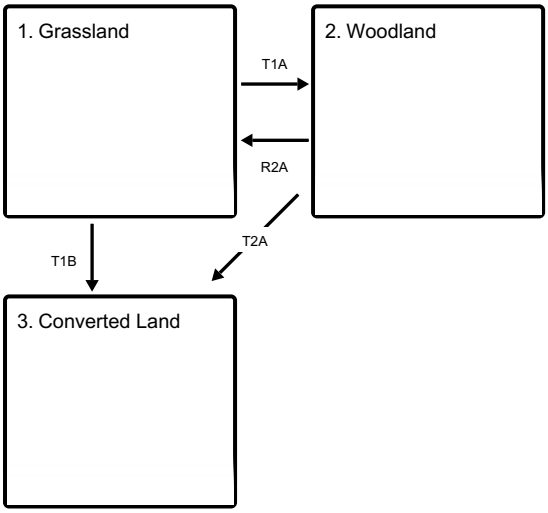
The Oak/Juniper/Mesquite Woodland Community is dominated by live oak, Ashe juniper and mesquite to the exclusion of most climax herbaceous species except within the small interspaces. Once ground cover exceeds 35 to 40 percent understory, forage production is very limited being generally made up of unpalatable shrubs, grasses, and forbs. Shortgrasses and cool-season grasses and forbs are in weakened condition due to shading and competition from the woody plants. Desertification, including erosion, continues in the interspaces until maximum ground cover by woody species is approached. The microclimate becomes drier as interception losses increase with canopy cover. Once canopy cover reaches potential, however, the hydrologic processes, energy flow and nutrient cycling stabilize under the woodland environment.

The Oak/Juniper/Mesquite Woodland Community is poor for livestock and low quality deer habitat providing only cover and low quality browse. However, this plant community provides good habitat for songbirds and woodland mammals, particularly predators. Major expense and energy are necessary to restore the Oak/Juniper/Mesquite Woodland Community to a grassland community. Generally, broadcast mechanical or herbicidal treatments, such as dozing, range planting followed by grazing deferment, prescribed grazing and prescribed burning, are essential for the site to return to the reference plant community. Erosion during the retrogression process may preclude return to reference condition.

During the settlement period of the late 1800’s, the site was often plowed to cropland. Much of the site was plowed for food, fiber, and hay. Although some winter cereal crops are planted today, most of the fields in the site are planted in native or non-native grasses such as bermudagrass (*Cynodon dactylon*) or Kleingrass (*Panicum coloratum*). Some areas originally planted to crops have been abandoned and let “Go Back” to native pasture. These generally re-establish with seed from adjacent areas, especially brush species. If these invaders are not controlled with brush management, woody species will eventually dominate the plant community.

State and transition model

Ecosystem states



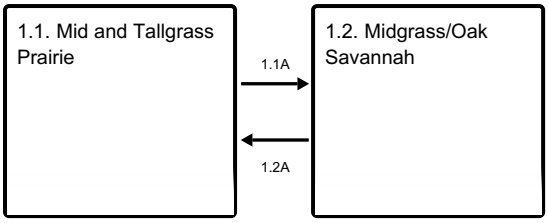
T1A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

T1B - Extensive soil disturbance followed by seeding

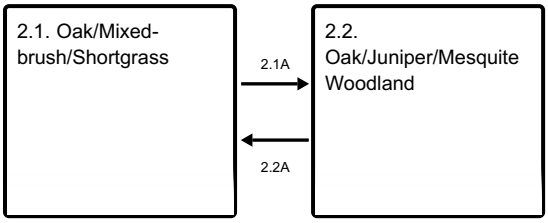
R2A - Reintroduction of historic disturbance return intervals

T2A - Extensive soil disturbance followed by seeding

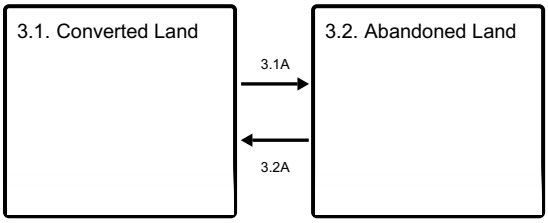
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Grassland

Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass
- Indiangrass (*Sorghastrum nutans*), grass

Community 1.1
Mid and Tallgrass Prairie

Figure 8. 1. Mid and Tallgrass Prairie Community

The reference plant community for this site is a fire induced mid and tallgrass prairie. Live oak was widely scattered on ridges and along draws, but made up less than three percent canopy. Woody plant production consisted mostly of shrubs. Little bluestem (*Schizachyrium scoparium*) was the dominant grass on the east side of the MLRA. Big bluestem (*Andropogon gerardii*) and Indiangrass (*Sorghastrum nutans*) occupied favorable micro-sites and were locally dominant. In the western half, sideoats grama (*Bouteloua curtipendula*) and little bluestem were the co-dominants and big bluestem and Indiangrass were seldom present. Also occurring on the site but in smaller amounts were meadow dropseed (Sporobolus asper var. asper), feathery bluestems (Bothriochloa spp.), Texas

wintergrass (*Nassella leucotricha*), Texas cupgrass (*Eriochloa sericea*), and a number of shortgrasses. Typical forbs were Maximilian sunflower (*Helianthus maximiliani*), Engelmann's daisy (*Engelmannia peristenia*), wooly-white (Hymenopappus spp.), half-shrub sundrop (*Calylophus serrulatus*), catclaw sensitivebriar (*Mimosa nuttallii*), and bundleflower (Desmanthus spp.). Shrubs included sumacs (Rhus spp.), Texas kidneywood (*Eysenhardtia texana*), greenbriar (Smilax spp.), and bumelia (Sideroxylon spp.). Live oak (*Quercus virginiana*), hackberry (Celtis spp.), Texas redbud (*Cercis canadensis* var. texensis), and mesquite (Prosopsis glandulosa) were typical tree species. The Mid and Tallgrass Prairie Community (1.1) produced approximately 1,800 to 3,500 pounds of biomass annually, depending upon the amount of precipitation. Annual production declines from east to west due to decline in precipitation. Grasses made up to 85 to 90 percent of the total annual production. The mid and tallgrasses aided in the infiltration of rainfall into the slowly permeable soil and reduced runoff. The Mid and Tallgrass Community (1.1) furnished good habitat for grass and forb eaters such as bison and pronghorn antelope.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1530	2023	2975
Shrub/Vine	108	168	210
Forb	108	168	210
Tree	54	84	105
Total	**1800**	**2443**	**3500**

Figure 10. Plant community growth curve (percent production by month). TX3622, Mid and Shortgrass Savannah, 10% canopy. Mid and shortgrasses dominate the site with less than 20 percent forbs, shrubs, and woody plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	3	5	13	23	15	4	5	15	7	5	3

Community 1.2
Midgrass/Oak Savannah

Figure 11. 1.2 Midgrass/Oak Savannah Community.

The Midgrass/Oak Savannah Community (1.2) is a midgrass dominated grassland being encroached by indigenous or invading woody species that had been held at low densities by repeated fires and competition from a vigorous grass component. The overstory is primarily live oak. Numerous brushy species, including juniper and mesquite, are increasing in density because overgrazing by livestock has reduced grass cover, exposed some soil and reduced fine fuel for fire. In this phase, the increasing woody species are generally less than five feet tall and are subject to control by fire and improved grazing management. The woody canopy varies between 10 and 25 percent depending on severity of grazing, time since last burned and availability of invading species. Typically, oaks increase in size and mesquite and/or juniper increase in density. Less preferred brushy species such as bumelia, Texas persimmon (*Diospyros texana*), spiny hackberry (Celtis pallida), sumacs (Sumac spp.), condalia (Condalia spp.), elbowbush

(*Forestiera pubescens*), and feather dalea (Dalea spp.) also increase. The prairie becomes a savannah being encroached by woody species. The preferred tall grasses are being replaced by the more grazing resistant midgrasses, although little bluestem persists. Important grasses are sideoats grama, tall dropseed, meadow dropseed, vine mesquite (*Panicum obtusum*), plains lovegrass (*Eragrostis intermedia*), Texas cupgrass (*Eriochloa sericea*), and feathery bluestems (Bothriochloa spp.). Most of the reference forbs still exist. Annual primary production ranges from 1,600 to 3,500 pounds per acre depending on precipitation amounts and the soil series, with production generally decreasing from the eastern boundary of the MLRA to the western boundary of the MLRA. Forage production is predominantly grass species. Heavy abusive grazing by livestock and wildlife has reduced plant cover, litter and mulch and has increased bare ground exposing the soil to some erosion. There could be some mulch and litter movement during rainstorms but due to gentle slopes, little soil movement would take place in this vegetation phase.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	500	1250	1500
Shrub/Vine	160	280	350
Tree	80	140	175
Forb	80	140	175
Total	**820**	**1810**	**2200**

Pathway 1.1A
Community 1.1 to 1.2

Mid and Tallgrass Prairie **Midgrass/Oak Savannah**

With overgrazing, decrease in intensity and frequency of fires and no brush management, this plant community transitions very quickly into the Midgrass/Oak Savannah Community.

Pathway 1.2A
Community 1.2 to 1.1

Midgrass/Oak Savannah **Mid and Tallgrass Prairie**

With brush management, proper grazing, and prescribed burning, the Midgrass/Oak Savannah will transition back to the Mid and Tallgrass Prairie Community.

State 2
Woodland

Dominant plant species

- live oak (*Quercus virginiana*), tree
- Ashe's juniper (*Juniperus ashei*), tree
- mesquite (*Prosopis*), tree

Community 2.1

Oak/Mixed-brush/Shortgrass

Figure 13. 2.1 Oak/Mixed-brush/Shortgrass Community.

The Oak/Mixedbrush Plant community presents a 25 percent or greater woody plant canopy dominated by live oak with mixed brush, especially Ashe juniper and/or mesquite increasing in density and size. It is the result of selective overgrazing by livestock and deer and the differential response of plants to defoliation. There is a decline in diversity of the grassland component and an increase in woody species and unpalatable forbs. Primary production has decreased due to decline in soil structure and organic matter and has shifted toward the woody component. All, except the more palatable woody species, have increased in size. Mesquite was an early increaser throughout the MLRA. Ashe juniper spreads throughout the eastern boundary and some redberry juniper (*Juniperus pinchotii*) is found in the western boundary. Many of the climax shrubs are present. Typically, algerita (Mahonia trifoliata), Texas persimmon, prickly pear (Opuntia spp.), condalia (Condalia spp.), shin oak (*Quercus sinuata*), and sumac (Sumac spp.) form thickets. Remnants of reference condition grasses and forbs and unpalatable invaders occupy the interspaces between trees and shrubs. Cool-season grasses such as Texas wintergrass can be found under and around woody plants. Because of grazing pressure and competition for nutrients and water from the woody plants, the grassland component shows lack of plant vigor and productivity. Common herbaceous species are three-awns (Aristida spp.), hairy tridens (*Erioneuron pilosum*), hairy grama (*Bouteloua hirsuta*), sedges (Carex spp.), Queen's delight (*Stillingia sylvatica*), prairie coneflower (*Ratibida columnifera*), Texas grama (*Bouteloua rigidiseta* var. rigidiseta), and red grama (*Bouteloua trifida*). As the grassland vegetation declines, more soil is exposed to crusting and erosion. During this phase, soil and water erosion can be high. High interception losses by the increasing woody canopy combined with evaporation and runoff can reduce the effectiveness of rainfall. Soil organic matter and structure decline in the interspaces but conditions may improve under woody plant cover. Some soil loss could occur during heavy rainfall events. Annual primary production is approximately 1,000 to 3,000 pounds per acre. In this stage, production is balanced between herbaceous plants and woody plants. Browsing animals such as goats and deer find fair food value if browsing has not been excessive. Forage quality for cattle is low. Unless brush management and good grazing management are applied at this stage, the transition toward dense woodland community will continue. The trend cannot be reversed with good grazing management practices alone.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	500	1250	1500
Tree	250	625	750
Shrub/Vine	150	325	450
Forb	100	250	300
Total	**1000**	**2450**	**3000**

Community 2.2
Oak/Juniper/Mesquite Woodland

Figure 15. 2.2 Oak/Juniper/Mesquite Woodland Community.

Oak, juniper and/or mesquite dominate the Oak/Juniper/Mesquite Woodland Community. Juniper is more prevalent in the eastern portion of the MLRA. With the associated brushy understory shrubs, the woody canopy can approach 100 percent ground cover with continued heavy grazing. Common understory shrubs are pricklypear (Opuntia spp.), algerita (Mahonia trifoliata), condalia (Condalia spp.), yucca (Yucca spp.), Texas persimmon (*Diospyros texana*), elbowbush (*Forestiera pubescens*), pricklyash (Zanthoxylum spp.), and tasajillo (Opuntia leptocaulis). Shortgrasses and low quality annual and perennial forbs occupy the tree interspaces. Characteristic grasses are Texas wintergrass, curlymesquite, buffalograss, Hall's panicum (*Panicum hallii* var. hallii), rough tridens (*Tridens muticus* var. muticus), slim tridens (*Tridens muticus*), tobosagrass (*Pleuraphis mutica*), and fall witchgrass (*Digitaria cognata*). Grasses and forbs make up 25 percent or less of the annual biomass production. Common forbs include dotted gayfeather (*Liatris punctata* var. punctata), orange zexmenia (Wedelia hispida), croton (Croton spp.), western ragweed (*Ambrosia psilostachya*), prairie coneflower (*Ratibida columnifera*), and broomweed (Gutierrezia spp.). The tree and shrub canopy acts to intercept rainfall and increase evapotranspiration losses, creating a more xeric microclimate. Soil fauna and litter are reduced exposing more soil surface to erosion in the few interstitial spaces. However, within the woody canopy hydrologic processes stabilize and soil organic matter and mulch begin to increase and eventually stabilize under the woodland. Without major brush control and management inputs, this plant community cannot be reversed. Without proper management, the site will continue to thicketize until it stabilizes with the climate and soil. Although this state provides good habitat cover for wildlife, only limited preferred forage or browse is available for livestock or wildlife.

Table 10. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	400	1000	1500
Grass/Grasslike	200	500	750
Shrub/Vine	160	400	600
Forb	40	100	150
Total	**800**	**2000**	**3000**

Pathway 2.1A
Community 2.1 to 2.2

Oak/Mixed-brush/Shortgrass

Oak/Juniper/Mesquite Woodland

With heavy abusive grazing, no fire, no brush management, and invasion of brush species, the Mixed-brush/Shortgrass Community will shift to the Mixed-brush Shrubland Community.

Pathway 2.2A
Community 2.2 to 2.1

Oak/Juniper/Mesquite Woodland

Oak/Mixed-brush/Shortgrass

With prescribed grazing, prescribed burning, and brush management (IPT) conservation practices, the Mixed-brush Shrubland Community can revert back to Mixed-brush/Shortgrass Community.

State 3
Converted Land

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass
- kleingrass (*Panicum coloratum*), grass

Community 3.1
Converted Land

Figure 17. 3.1 Converted Land Community.

Early settlers of the MLRA, having farming background, cultivated small fields for vegetable crops, grain, forage sorghum, and winter cereals for livestock forage. Many of the Shallow sites were converted to cropland. In Edwards Plateau summer crops succeed only one in every four or five years, so farming is not sustainable. Cropping small acreages is still practiced, however, for summer annual forage crops or winter small grain grazing. Cropland fields are used for livestock grazing, grain harvesting or wildlife food plots on many ranches. Many fields, however, have been abandoned and let ‘go back’ to native range or planted to native or introduced grasses for pasture. Abandoned cropland areas, or woodland areas, are often cleared and plowed for seeding to native or introduced species such as Kleingrass (*Panicum coloratum*), blue panicum (*Panicum antidotale*), or weeping lovegrass (*Eragrostis curvula*). Herbage production on those seeded to adapted introduced grasses or native grasses reach peak production within a few years, if a full stand is established. In this case, herbage production will equal the reference community if species such as little bluestem or sideoats grama are seeded. Adapted introduced species plantings such as Kleingrass may surpass reference community production. The practice of including adapted legumes or other forbs will enhance productivity and usefulness, especially for wildlife.

Table 11. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2200	3000	4500
Forb	100	300	400
Total	**2300**	**3300**	**4900**

Community 3.2
Abandoned Land

The Abandoned Land Community describes cropland fields that have been abandoned and are undergoing secondary succession. The ‘go back land’ results from abandoning cropped land and leaving it idle without seeding or brush management. Settlers cultivated many areas of the Shallow Ecological Site because of their gentle slopes, loamy soils and location. Many cropland fields have since been abandoned. The abandoned cropland will be invaded by brush from the adjacent rangeland. The initial composition of abandoned fields on the Shallow site is composed of annual, biennial and weak perennial grasses and forbs. The species depends on the seed source from adjacent rangeland. The rate of succession depends on grazing management and drought frequency, but reestablishment of reference community species takes many years. Without grazing management and brush management practices, brush species such as pricklypear, mesquite, and juniper will dominate the site before a grass community can become established. Biomass production will be limited in the early seral stage and increase as the reference community is approached. Brush management and grazing management are necessary to allow the field to ‘go back’ near reference community conditions.

Table 12. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	550	990	1320
Forb	300	540	720
Shrub/Vine	100	180	240
Tree	50	90	120
Total	**1000**	**1800**	**2400**

Pathway 3.1A
Community 3.1 to 3.2

Invasion of the seeded fields by brush is common in this MLRA. Drought and reduced soil cover due to cropping and grazing and a nearby seed source trigger the invasions. The shrub seedlings that appear in seeded or abandoned fields are true seedlings established by seeds brought in by animals, water, or wind. The invading brush must be controlled with grazing management, prescribed burning or other brush management methods or the woody invaders will again dominate.

Pathway 3.2A
Community 3.2 to 3.1

With the implementation of various conservation practices such as prescribed grazing, range/pasture/cropland management, pasture planting, range planting, and crop cultivation, the Abandoned Land Community can be reverted to the Converted Land Community.

Transition T1A
State 1 to 2

The changes in species composition are small initially, but unless proper grazing and prescribed burning are applied; the woody species continue to increase in size and density. When the canopy of the woody plants becomes dense enough (25 percent) and tall enough (greater than five feet) to suppress grass growth and resist fire damage, a threshold in ecological succession is crossed. The Midgrass/Oak Savannah Community transitions

into the Oak/Mixedbrush Shortgrass Community. Normal range management practices, such as proper grazing and prescribed burning, cannot reverse the trend to tallgrass dominance.

Transition T1B
State 1 to 3

Brush management, pasture planting, range planting, and crop cultivation are some conservation practices that can shift from the Grassland State to the Converted Land State.

Restoration pathway R2A
State 2 to 1

With reclamation, prescribed grazing, prescribed burning, brush management, and range planting, the Woodland State can shift to the Grassland State.

Transition T2A
State 2 to 3

Brush management, pasture planting, range planting, and crop cultivation are some conservation practices that can shift from the Grassland State to the Converted Land State.

Additional community tables

Table 13. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**tallgrass**			450–875	
	little bluestem	SCSC	*Schizachyrium scoparium*	450–875	–
2	**tallgrasses**			270–525	
	big bluestem	ANGE	*Andropogon gerardii*	270–525	–
	Indiangrass	SONU2	*Sorghastrum nutans*	270–525	–
3	**midgrasses**			540–1050	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	540–1050	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	540–1050	–
	tall grama	BOHIP	*Bouteloua hirsuta var. pectinata*	540–1050	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	540–1050	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	540–1050	–
	Texas cupgrass	ERSE5	*Eriochloa sericea*	540–1050	–
	green sprangletop	LEDU	*Leptochloa dubia*	540–1050	–
	vine mesquite	PAOB	*Panicum obtusum*	540–1050	–
	Reverchon's bristlegrass	SERE3	*Setaria reverchonii*	540–1050	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	540–1050	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	540–1050	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	540–1050	–
	slim tridens	TRMU	*Tridens muticus*	540–1050	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	540–1050	–
4	**shortgrasses**			180–350	

	threeawn	ARIST	*Aristida*	180–350	–
	buffalograss	BODA2	*Bouteloua dactyloides*	180–350	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	180–350	–
	Texas grama	BORI	*Bouteloua rigidiseta*	180–350	–
	red grama	BOTR2	*Bouteloua trifida*	180–350	–
	fall witchgrass	DICO6	*Digitaria cognata*	180–350	–
	hairy woollygrass	ERPI5	*Erioneuron pilosum*	180–350	–
	curly-mesquite	HIBE	*Hilaria belangeri*	180–350	–
5	**cool-season grasses**			90–175	
	cedar sedge	CAPL3	*Carex planostachys*	90–175	–
	Canada wildrye	ELCA4	*Elymus canadensis*	90–175	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	90–175	–
Forb					
6	**forbs**			108–210	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	108–210	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	108–210	–
	aster	ASTER	*Aster*	108–210	–
	yellow sundrops	CASE12	*Calylophus serrulatus*	108–210	–
	croton	CROTO	*Croton*	108–210	–
	prairie clover	DALEA	*Dalea*	108–210	–
	bundleflower	DESMA	*Desmanthus*	108–210	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	108–210	–
	beeblossom	GAURA	*Gaura*	108–210	–
	starviolet	HEDYO2	*Hedyotis*	108–210	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	108–210	–
	trailing krameria	KRLA	*Krameria lanceolata*	108–210	–
	dotted blazing star	LIPU	*Liatris punctata*	108–210	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	108–210	–
	yellow puff	NELU2	*Neptunia lutea*	108–210	–
	narrowleaf Indian breadroot	PELI10	*Pediomelum linearifolium*	108–210	–
	beardtongue	PENST	*Penstemon*	108–210	–
	smartweed leaf-flower	PHPO3	*Phyllanthus polygonoides*	108–210	–
	wild petunia	RUELL	*Ruellia*	108–210	–
	white rosinweed	SIAL	*Silphium albiflorum*	108–210	–
	awnless bushsunflower	SICA7	*Simsia calva*	108–210	–
	fuzzybean	STROP	*Strophostyles*	108–210	–
	queen's-delight	STSY	*Stillingia sylvatica*	108–210	–
	creepingoxeye	WEDEL	*Wedelia*	108–210	–
Shrub/Vine					
7	**shrubs/vines**			108–210	
	acacia	ACACI	*Acacia*	108–210	–
	snakewood	CONDA	*Condalia*	108–210	–
	featherplume	DAFO	*Dalea formosa*	108–210	–

	Texas crabgrass	DITE	*Digitaria texana*	108–210	–
	jointfir	EPHED	*Ephedra*	108–210	–
	Texas kidneywood	EYTE	*Eysenhardtia texana*	108–210	–
	stretchberry	FOPU2	*Forestiera pubescens*	108–210	–
	western white honeysuckle	LOAL	*Lonicera albiflora*	108–210	–
	algerita	MATR3	*Mahonia trifoliolata*	108–210	–
	plum	PRUNU	*Prunus*	108–210	–
	fragrant sumac	RHAR4	*Rhus aromatica*	108–210	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	108–210	–
	sumac	RHUS	*Rhus*	108–210	–
	bully	SIDER2	*Sideroxylon*	108–210	–
	greenbrier	SMILA2	*Smilax*	108–210	–
	grape	VITIS	*Vitis*	108–210	–
Tree					
8	**trees**			54–105	
	eastern redbud	CECA4	*Cercis canadensis*	54–105	–
	hackberry	CELTI	*Celtis*	54–105	–
	juniper	JUNIP	*Juniperus*	54–105	–
	mesquite	PROSO	*Prosopis*	54–105	–
	live oak	QUVI	*Quercus virginiana*	54–105	–

Animal community

Many types of grassland insects, reptiles, birds, and mammals use the Shallow Ecological Site, either as their base habitat or from the adjacent sites. Small mammals include many kinds of rodents, jackrabbit, cottontail rabbit, raccoon, skunk, opossum, and armadillo. Predators include coyote, red fox, gray fox, bobcat, and occasionally mountain lion. Game birds, songbirds, and birds of prey are indigenous or frequent users. Bison and pronghorn antelope, however, are no longer present, but white-tailed and many species of exotic deer utilize the Shallow site. Deer, turkey, and quail particularly favor the habitat. Deer, turkey, quail, and dove hunting is an important sport, or commercial enterprise, providing considerable income to landowners.

The site is suitable for the production of livestock, including cattle, sheep, and goats. The site in reference condition is very suited to primary grass eaters such as cattle. As retrogression occurs and woody plants invade it becomes better habitat for sheep, goats, deer, and other wildlife because of the browse and cool-season grasses. Cattle, sheep, and goats should be stocked in proportion to the available grass, forb, and browse forage, keeping deer competition for forbs and browse in mind. If the animal numbers are not kept in balance with herbage and browse production through grazing management and good wildlife population management, the late mixed-brush shrubland phase will have little to offer as habitat except cover.

Hydrological functions

The Shallow Ecological Site is a well-drained, very shallow upland with nearly level to gentle slopes. Most soils are 10 to 20 inches deep with pockets and crevices of deeper soils included. A hard limestone or caliche layer below the surface horizon limits soil moisture holding capacity. Runoff is slow due to gentle slopes. However, soil crusting can cause erosion from bare ground on steeper slopes. Under reference conditions, the grassland vegetation intercepted and utilized much of the incoming rainfall in the soil solum. Only during extended rains or heavy thunderstorms was there much runoff. Litter and soil movement was slight. Standing plant cover, duff, and organic matter decrease and surface runoff increases as the Mid and Tallgrass Prairie Community transitions to the Midgrass/Oak Savannah Community. These processes continue in the interstitial spaces in the Oak/Mixed-brush Shortgrass Community.

Once the Oak/Juniper/Mesquite Woodland Community canopy surpasses 50 percent the hydrology and ecological processes, nutrient cycling and energy flow, stabilize within the woody plant canopy. Evaporation and interception losses are higher, however, resulting in less moisture reaching the soil. If overgrazing continues, the plant community deteriorates further and desertification processes continue. Herbage production has shifted from primarily grasses to primarily woody plants. The deeper-rooted woody plants are able to extract water from greater depths than grasses, so less water will be available for down-slope movement. The woody plants compete for moisture with the remaining grasses and forbs further reducing production and ground cover in openings, which in the advanced woodland state occur only on very shallow soil areas. Decreased litter and more bare ground allow erosion from soils in openings between trees.

Recreational uses

The Shallow site is well suited for many outdoor recreational uses including recreational hunting, hiking, camping, equestrian, and bird watching. This site along with adjacent upland sites and Loamy Bottomland sites also provide diverse scenic beauty and many opportunities for recreation and hunting.

Wood products

Posts and specialty wood products are made from juniper, mesquite, oak, and many shrubs. Mesquite and oak are used for firewood and charcoal.

Other products

Jams and jellies are made from many fruit-bearing species. Seeds are harvested from many plants for commercial sale. Many grasses and forbs are harvested by the dried-plant industry for sale in dried flower arrangements. Honeybees are utilized to harvest honey from the many flowering plants.

Inventory data references

Information presented here has been derived from the revised Shallow Site, literature, limited NRCS clipping data (417s), field observations and personal contacts with range-trained personnel. Photos by J. L. Schuster.

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Date	12/02/2005
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None to few.

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2. **Presence of water flow patterns:** None to few. Erosion which might cause rills, flow patterns and pedestals and terracettes would have occurred only if intense rainstorms occurred during extended drought or shortly after an intense wildfire.

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3. **Number and height of erosional pedestals or terracettes:** None to few.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Less than 10 percent bare ground. Small and non-connected areas. Lower slopes would have less bare ground.

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5. **Number of gullies and erosion associated with gullies:** None to rare. Drainages are stable with adequate vegetative cover to reduce erosive action of runoff. Rare gullies would be vegetated and stabilized.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None to slight. Wind erosion hazard of soil is slight.

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7. **Amount of litter movement (describe size and distance expected to travel):** Minimal movement of litter for short distances. Litter is fairly uniformly distributed.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Erosion Stability Values estimated at 5 to 6. and water erosion is slight.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface layer is dark grayish brown clay 11 to 14 inches thick. Structure is moderate, fine and medium blocky. There are many fine and medium roots throughout soil profile. SOM is high.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Tall and midgrasses having good distribution and ground cover provide excellent infiltration and slow runoff. Except on steeper slopes, runoff is essentially nil but when rainfall exceeds site's ability to hold water, the run off is free of erosive action.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Rock layer at 14 inches restricts water and root penetration.

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Warm-season tallgrasses

    Sub-dominant: Warm-season midgrasses Warm-season shortgrasses

    Other: Forbs = Shrub/Vines Cool-season grasses Trees

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal. Grasses will almost always show some mortality and decadence, especially during drought conditions.

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14. **Average percent litter cover (%) and depth (in):** Interspaces between plant canopies essentially covered with various sizes of litter and mulch. Wildfires, natural herbivory and/or extended drought might reduce litter to none. Recovery will take 2 to 5 years.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1,800 pounds per acre in years with below average moisture, 2,800 pounds per acre in years with average moisture and 3,500 pounds per acre in above average moisture years.

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Mesquite, pricklypear, broom snakeweed, agarito, acacia, sumacs, junipers, Texas persimmon, and condalia.

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17. **Perennial plant reproductive capability:** Good. All species should be capable of reproducing except during periods of prolonged drought, heavy natural herbivory or intense fire. Recovery from these disturbances will take 2 to 5 years.
