

Ecological site R078BY079TX Loamy 19-26" PZ

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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.

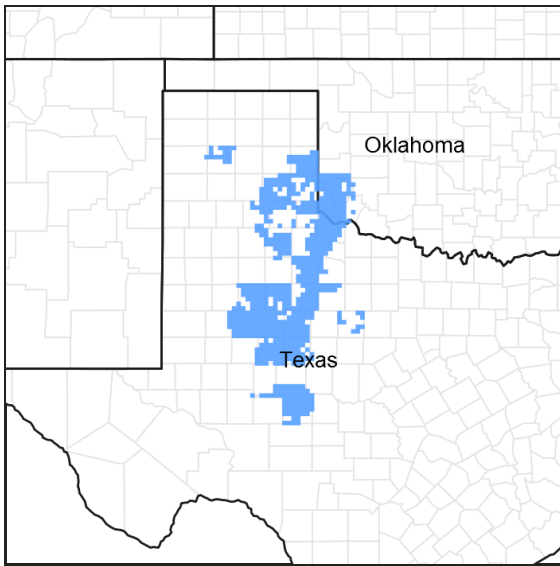


Figure 1. Mapped extent

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): 078B–Central Rolling Red Plains, Western Part

MLRA 78B is characterized by strongly dissected, rolling plains with prominent ridges and valleys and rolling to steep irregular topography. Loamy soils are generally well drained, range from shallow to deep, and developed in sediments of Triassic and Permian age.

LRU notes

NA

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Ecological site concept

These sites occur on deep loam and clay loam soils on uplands. The reference vegetation consists of midgrasses with some shortgrasses and forbs. Few woody species persist in the reference plant community. Abusive grazing

practices can lead to a shift in the plant community. Without periodic fire or alternative brush management, woody species may encroach on the site.

Associated sites

R078BY070TX	Clayey Bottomland 19-26" PZ Downhill from site.
R078BY080TX	Loamy Bottomland 19-26" PZ Downhill from site.
R078BY081TX	Loamy Upland 19-26" PZ Upslope and adjacent to the site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Bouteloua curtipendula</i> (2) <i>Bothriochloa barbinodis</i>

Physiographic features

These soils formed in loamy, calcareous eolian sediments and are on nearly level to moderately sloping plains adjacent to draws or escarpments. Slopes dominantly range from 3 to 5 percent slopes and generate runoff onto sites lower on the landscape. Elevation ranges from 1400 to 2870 feet.

Table 2. Representative physiographic features

Landforms	(1) Plains > Stream terrace (2) Plains > Hillslope
Runoff class	Low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	427–875 m
Slope	0–12%
Aspect	Aspect is not a significant factor

Climatic features

The climate of the western rolling plains is dry sub-humid with hot summers and mild winters. Temperatures often reach 100 degrees F for several consecutive days during summer. Cold spells with temperatures less than 20 degrees F only last short periods of time. The soil is not frozen below the 3-inch depth for more than 2 to 3 days. Humidity is low during the winter and early spring months. Sometimes relative humidity is high enough to make summer days uncomfortable. Most of the precipitation comes in the form of rain and occurs during the spring and early summer principally. May is the wettest month followed by June. July and August are dryer and much hotter. Rainfall often comes as intense showers of relatively short duration. Rainfall rate per hour is often high and runoff is significant. Infiltration is diminished due to lack of opportunity time. The growing season begins in April and ends with the first killing frost in Nov. There is little snowfall with the average being about 10 inches. Rainfall averages about 22 inches.

There is a 70% chance that yearly precipitation will fall between 16 and 24 inches. About 55% of the time, the yearly rainfall is below the mean. Dry spells during the growing season are common and long-term droughts occur in cycles of about 20 years. Native vegetation is principally warm season.

Table 3. Representative climatic features

Frost-free period (characteristic range)	189-194 days
Freeze-free period (characteristic range)	204-222 days
Precipitation total (characteristic range)	584-610 mm
Frost-free period (actual range)	184-201 days
Freeze-free period (actual range)	202-223 days
Precipitation total (actual range)	559-635 mm
Frost-free period (average)	192 days
Freeze-free period (average)	213 days
Precipitation total (average)	584 mm

Climate stations used

- (1) WELLINGTON [USC00419565], Wellington, TX
- (2) PADUCAH [USC00416740], Paducah, TX
- (3) JAYTON [USC00414570], Jayton, TX
- (4) SNYDER [USC00418433], Snyder, TX
- (5) ROBERT LEE [USC00417669], Robert Lee, TX

Influencing water features

None.

Wetland description

NA

Soil features

Loamy soils consist of very deep, well-drained, moderately permeable soils. Parent material kind is calcareous loamy stream terraces and colluvial deposits. Parent material origin is shale and siltstone from the Blaine Formation of Permian age.

Associated soil series include Acme loam, Aspermont silty clay loam, and Snyder clay loam.

Table 4. Representative soil features

Parent material	(1) Colluvium—shale and siltstone
Surface texture	(1) Clay loam (2) Silty clay loam (3) Loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	152–191 cm
Surface fragment cover ≤3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	6.86–20.83 cm
Calcium carbonate equivalent (0-101.6cm)	1–40%

Electrical conductivity (0-101.6cm)	0–10 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–10
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	1–10%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The reference plant community of the Loamy Ecological Site in MLRA 78B was a fire influenced Midgrass Prairie Community (1)1 with occasional woody plants and a good variety of forbs. Pre-settlement influences included grazing or browsing by endemic pronghorn antelope, deer and migratory bison, severe droughts and frequent fires. Wildfires occurred at 7-12 years intervals or less (Frost 1998) maintaining woody species at less than five percent canopy on this level to rolling site. The frequent fires favor grasses over woody plants and forbs, but there are a wide variety of forbs present. Sideoats grama (*Bouteloua curtipendula*) is the dominant species throughout the MLRA contributing as much as 35 percent of the plant annual production. Other characteristic midgrasses found include little bluestem (*Schizachyrium scoparium*), cane bluestem (*Bothriochloa barbinodis*) and silver bluestem (*Bothriochloa laguroides*). Blue grama (*Bouteloua gracilis*) and buffalograss (*Bouteloua dactyloides*) are common shortgrasses. See the Plant Composition and Annual Production Table below for estimated composition of the species.

The Midgrass Prairie Community (1.1) is relatively stable and resilient within the climate, soil and fire regime until the advent of animal husbandry and fencing in the late 1800s. Not understanding the limits of rangeland productivity European settlers, and the ranchers that followed, overstocked the area with domesticated livestock almost universally. As overgrazing occurred on the Loamy site, there was a reduction of midgrasses, a decline in mulch and organic matter and consequently a reduction in intensity of fires. The shift in plant cover and decline in soil properties favored woody plant encroachment. The woody, and herbaceous, invaders were generally endemic species released from competition and fire suppression. In the resulting Midgrass/Shortgrass Community (1.2) the more palatable midgrasses gave way to less palatable or more grazing resistant midgrasses and shortgrasses. Midgrasses, especially sideoats grama, vegetation still dominated annual herbage production, but the encroaching woody species increased in the proportion of production compared to the Midgrass Prairie Community (1.1).

When the Midgrass/Shortgrass Community (1.2) is continually overgrazed and fire is excluded, ecological succession transitions the plant community into one that is dominated by woody plants. More grazing resistant grasses such as blue grama, buffalograss and less palatable forbs begin replacing the midgrasses. As the midgrass cover declines, litter, mulch 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 mesquite, pricklypear and broom snakeweed. Rest from grazing will generally not restore the grassland community when the woody plant community exceeds 10 to 15 percent canopy on this site and/or the plants reach fire resistant age (two years) and/or size (about four feet in height). When this occurs, the site transitions into a new plant community: a Shortgrass/Mixed-Brush Community (2.1). This threshold also marks the beginning of a new state, the Shrubland State (2).

Pricklypear (*Opuntia polyacantha*) and/or broom snakeweed (*Gutierrezia sarothrae*) and sometimes mesquite dominate the Shortgrass/Mixed-Brush Community (2.1). Mesquite (*Prosopis glandulosa*) is often limited by high calcareous soil conditions. The grass component is a mixture of low palatability midgrasses, shortgrasses and low quality forbs. With continued livestock overgrazing, the midgrasses are replaced by grazing resistant shortgrasses, such as buffalograss, sand dropseed (*Sporobolus cryptandrus*) and three-awns (*Aristida* spp.) and western ragweed (*Ambrosia psilostachya*). Sideoats grama often persists because of the high calcium content of the soils. Cool-season grasses such as Texas wintergrass (*Nassella leucotricha*) and Texas bluegrass (*Poa arachnifera*) also increase.

During this stage the process of retrogression can be reversed with relatively inexpensive brush control practices such as individual plant treatments and good grazing management that allows the application of prescribed burning. If these practices are not applied and overgrazing continues, the woody canopy will continue to increase in dominance and ground cover and a woody-plant dominated community, the Mixed-Brush/Shortgrass Community (2.2) occurs. Once the brush canopy exceeds 30 to 35 percent, annual production for the understory becomes limited and is generally made up of unpalatable shrubs, grasses and forbs within tree/shrub interspaces. Brushy species such as mesquite, prickly pear, yucca (*Yucca* spp.) and wolfberry (*Lycium berlandieri*) often form thickets. Shortgrasses, cool-season grasses and annual weeds persist, but in weakened condition.

Until maximum ground cover by woody species is reached erosion continues in the interspaces. Considerable litter and soil movement occurs from exposed soil during heavy rains. The exposed soil crusts readily, creating opportunity for further soil and wind erosion. 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 shrubland environment.

Major, high cost and high energy, accelerating practices are required to restore the Mixed-Brush/Shortgrass Community (2.2) back to the Grassland State. Generally, mechanical or herbicidal brush management practices such as aerial spraying, dozing and/or individual plant treatments (IPT) along with other conservation practices such as range planting, grazing deferment, prescribed grazing and prescribed burning are necessary for the ecological site to return to the reference community.

The soils of the Loamy Ecological Site are deep loams that are calcareous to the surface. The soils have favorable plant-soil-moisture relationships and a high calcium content enabling the site to produce good quality forage plants. If unprotected by vegetation the soil is moderately susceptible to water and wind erosion. The site is moderately resistant to grazing and will maintain a turf under heavy grazing and responds readily to good grazing management.

The Loamy site is used primarily as rangeland. The soils on the flatter areas are arable, however these slopes occur only in small acreages as the site is often dissected by small drainages. The site is moderately erodible and should be cultivated with care, if at all. Most fields previously cultivated for crops have been returned to native or introduced grass species. Most areas of the Loamy site re-vegetated to these introduced grasses are managed as range.

NOTE: Rangeland Health Reference Worksheets have been posted for this site on the Texas NRCS website (www.tx.nrcs.usda.gov) in Section II of the eFOTG under (F) Ecological Site Descriptions.

Plant Communities and Transitional Pathways (diagram) Narrative:

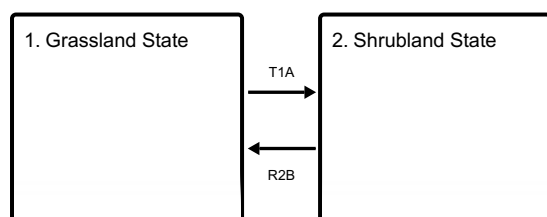
The following diagram depicts the vegetation pathways and states that will most likely occur with heavy livestock grazing/browsing under the prevailing climate. There may be alternative trajectories or states, depending on various natural or man-influenced disturbances, which are not shown on this diagram. Local professional guidance should always be sought before pursuing a treatment scenario.

1 Numbers in parentheses identify plant community types produced by the Shallow ecological site and correspond with the vegetation states depicted in the State and Transitions Diagram below.

2 Scientific names for plants mentioned in the text can be found in the Plant Preference Tables.

State and transition model

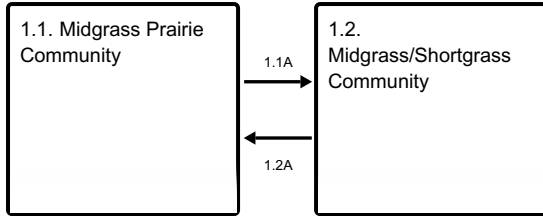
Ecosystem states



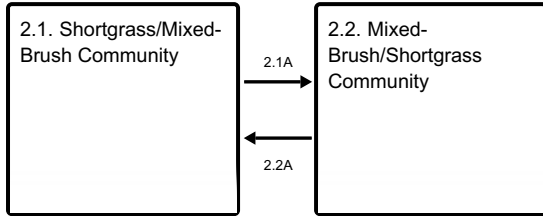
T1A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

R2A - Adequate rest from defoliation, followed by reintroduction of historic disturbance regimes

State 1 submodel, plant communities



State 2 submodel, plant communities



State 1 Grassland State

Little bluestem occupies favorable micro-sites and is locally dominant in the Midgrass Prairie Community (1.1). Sideoats grama is the dominant or co-dominant grass throughout the site. Also occurring on the site, but in smaller amounts, are cane and silver bluestems, vine mesquite, black grama, plains bristlegrass, and Texas wintergrass. Blue grama and buffalograss are the most common shortgrasses. The hackberry trees are widely scattered in protected areas, but probably make up less than one percent of the plant canopy. Littleleaf sumac, yucca, dalea, fourwing saltbush, wolfberry, and catclaw acacia are typical, but infrequent, shrubs. A few of the common forbs found on the site include prairie clover, dotted gayfeather, wild alfalfa, catclaw sensitivebriar, and bundleflower. The Midgrass/Shortgrass Community (1.2) is a midgrass and shortgrass 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 preferred midgrasses are being replaced by the more grazing resistant midgrasses and shortgrasses. Numerous brushy species, including mesquite and pricklypear, are encroaching because overgrazing by livestock has reduced grass cover, exposed more soil and reduced fine fuel for fire. In this plant community type, the increasing woody species are generally less than three feet tall and still subject to control by fire and improved grazing management. The woody canopy varies between 5 and 15 percent.

Dominant plant species

- sideoats grama (*Bouteloua curtipendula*), grass
- cane bluestem (*Bothriochloa barbinodis*), grass

Community 1.1 Midgrass Prairie Community

The Midgrass Prairie Community (1.1) is the interpretive or "reference" plant community for the Loamy Ecological Site. It developed under a dry, sub-humid climate with hot dry summers and mild winters. Herbivory by migrating bison and indigenous antelope and deer influenced the plant composition and structure, but not as much as frequent and intense wild fires, which kept woody species in check. Hackberry (*Celtis* spp.) trees are widely scattered in protected areas, but probably make up less than one percent of the plant canopy. Littleleaf sumac (*Rhus microphylla*), yucca, dalea (*Dalea* spp.), fourwing saltbush (*Atriplex canescens*), wolfberry and catclaw acacia (*Acacia greggii*) are typical, but infrequent, shrubs. Little bluestem occupies favorable micro-sites and is locally dominant. Sideoats grama is the dominant or co-dominant grass throughout the site. Also occurring on the site, but in smaller amounts, are, cane and silver bluestems, vine mesquite (*Panicum obtusum*), black grama (*Bouteloua eriopoda*), plains bristlegrass (*Setaria macrostachya*) and Texas wintergrass. Blue grama and buffalograss are the most common shortgrasses. A few of the common forbs found on the site include prairie clover (*Dalea pupurea*), dotted gayfeather (*Liatrix punctata*), wild alfalfa (*Psoraleidum tenuiflorum*), catclaw sensitivebriar (*Mimosa aculeaticarpa*) and bundleflower (*Desmanthus* spp.). The Midgrass Prairie Community (1.1) produces from 1500 to 2400 pounds of biomass annually, depending upon the soils and the amount of precipitation. Grasses produce as much as 90 percent of the annual production. The vegetation of the site is seasonally well balanced because of the presence of cool season species. A good cover of grasses and mulch aides in the infiltration of

rainfall into the moderately permeable soil and reduces runoff. Little runoff occurs under reference conditions. The Midgrass Prairie Community (1.1) furnishes good habitat for grazing type wildlife such as bison and pronghorn antelope and, in recent times, cattle. Most areas of the site, being close to streams or traversed by drainage ways, receive extra grazing and are often abused unless good prescribed grazing is practiced. This plant type is resilient and recovers well under good grazing management. However, with continuous overgrazing, decrease in intensity and frequency of fires and no brush management, this plant community transitions into a Midgrass-Shortgrass Community (1.2).

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1513	1967	2421
Forb	84	110	135
Shrub/Vine	84	110	135
Tree	–	–	1
Total	1681	2187	2692

Figure 9. Plant community growth curve (percent production by month). TX2020, Midgrass/Shortgrass with few shrubs. Site comprising of mid and shortgrasses with few shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	5	15	25	20	5	5	15	8	1	0

Community 1.2 Midgrass/Shortgrass Community



Figure 10. 1.2 Midgrass/Shortgrass Community

The Midgrass/Shortgrass Community (1.2) is the result of overgrazing by livestock over a long period of time. It is a midgrass and shortgrass 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 preferred midgrasses are being replaced by the more grazing resistant midgrasses and shortgrasses. Numerous brushy species, including mesquite and pricklypear, are encroaching because overgrazing by livestock has reduced grass cover, exposed more soil and reduced fine fuel for fire. In this plant community type, the increasing woody species are generally less than three feet tall and still subject to control by fire and improved grazing management. The woody canopy varies between 5 and 15 percent depending on severity of grazing, time since burned and availability of invading species. Typically mesquite, pricklypear, broom snakeweed and western ragweed increase in density. Less preferred brushy species such as littleleaf sumac, lotebush, wolfberry and catclaw acacia also increase. Important grasses are sideoats grama, little bluestem, vine mesquite, cane or silver bluestem and Texas wintergrass and. Most of the perennial forbs persist. As retrogression occurs, sideoats grama and little bluestem will begin giving way to blue grama and buffalograss. Annual primary production ranges from 1000 to 2000 pounds per acre, depending on precipitation and the soil series. Forage production is predominantly grass. Heavy continuous

grazing has reduced plant cover, litter and mulch and has increased bare ground slightly exposing the soil to some erosion. There could be some mulch and litter movement during rainstorms but due to gentle slopes and soil condition little soil movement would take place in this vegetation type. Unless proper grazing and prescribed burning are initiated at this stage the woody species continue to increase in size and density. When the canopy of the woody plants becomes dense enough (15-20 % canopy) and big enough (greater than four feet) to suppress grass growth and resist fire damage, a threshold in ecological succession is reached. The Midgrass/Shortgrass Community (1.2) becomes the Shortgrass/Mixed-Brush Community (2.1). Once this vegetation type occurs, normal range management practices, such as proper grazing and prescribed burning, cannot reverse the trend to woody plant dominance. Brush control practices, such as individual plant treatment and prescribed burning, are necessary to maintain this vegetation type or to return the community back to grassland.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	897	1345	1793
Shrub/Vine	112	168	224
Tree	56	84	112
Forb	56	84	112
Total	1121	1681	2241

Figure 12. Plant community growth curve (percent production by month). TX2040, Midgrass/Shortgrass Community with Forbs and Shrubs. Warm season mid and shortgrasses along with traces of tallgrasses, forbs, and shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	4	8	25	25	14	6	8	5	2	1

Pathway 1.1A Community 1.1 to 1.2

With heavy continuous grazing, no fires, and brush invasion in the Midgrass Prairie Community, the plant community will shift to the Midgrass/Shortgrass Community.

Pathway 1.2A Community 1.2 to 1.1

With the implementation of various conservation practices such as Prescribed Grazing and Prescribed Burning, the Midgrass/Shortgrass Community can be shifted back to the Midgrass Prairie Community.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2 Shrubland State

The Shortgrass/Mixed-Brush Community (2.1) supports a 15% or greater woody plant canopy of mixed-brush with mesquite often the dominant overstory and pricklypear or broom snakeweed the most common shrubs. There is a continued decline in diversity of the grassland component and an increase in woody species and unpalatable forbs. All, except the more palatable woody species, have increased in size and density. Mesquite is an early increaser throughout the MLRA although it usually does not reach as high a density on this site as on other loamy soils. Many of the climax shrubs are present. Typically, pricklypear, lotebush (*Ziziphus obtusifolia*), littleleaf sumac and broom snakeweed are common in this plant type. The Mixed-Brush/Shortgrass Community (2.2) is dominated by a dense shrubland of mesquite. Common understory shrubs are pricklypear, broom snakeweed, evergreen sumac,

lotebush, yucca and wolfberry. With continued heavy grazing and no brush control, the trees and shrubs can approach 70 percent ground cover. Shortgrasses and low quality annual and perennial forbs occupy the woody plant interspaces. Characteristic grasses are buffalograss, sand dropseed and three-awns. Texas wintergrass and cool-season annuals are found in and around tree/shrub cover. Grasses and forbs make up 25 percent or less of the annual herbage production.

Dominant plant species

- broom snakeweed (*Gutierrezia sarothrae*), shrub
- mesquite (*Prosopis*), shrub
- threeawn (*Aristida*), grass

Community 2.1

Shortgrass/Mixed-Brush Community



Figure 13. 2.1 Shortgrass/Mixed-Brush Community

The Shortgrass/Mixed-Brush Community (2.1) supports a 15% or greater woody plant canopy of mixed-brush with mesquite often the dominant overstory and pricklypear or broom snakeweed the most common shrubs. It is the result of selective overgrazing by livestock and deer and the differential response of plants to defoliation over a long period of time. There is a continued decline in diversity of the grassland component and an increase in woody species and unpalatable forbs. Annual herbage production is reduced due to decline in soil structure and organic matter and composition has shifted toward the non-grass component. All, except the more palatable woody species, have increased in size and density. Mesquite is an early increaser throughout the MLRA although it usually does not reach as high a density on this site as on other loamy soils. Many of the climax shrubs are present. Typically, pricklypear, lotebush (*Ziziphus obtusifolia*), littleleaf sumac and broom snakeweed are common in this plant type. Remnants of climax grasses and forbs and unpalatable invaders occupy the interspaces between trees and shrubs. Cool-season grasses such as Texas wintergrass, plus other grazing resistant climax species, 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 general lack of plant vigor and productivity. Common herbaceous species include three-awns, sand dropseed, and prairie coneflower. Buffalograss, western ragweed and blue grama are persistent increasers until shrub density reaches maximum canopy. As the grassland vegetation declines, more soil is exposed leading to erosion. Higher interception losses by the increasing woody canopy combined with evaporation and runoff can reduce the effectiveness of rainfall. Soil organic matter and soil structure decline within the interspaces but soil conditions improve under the woody plant cover. Some soil loss can occur during heavy rainfall events. Total plant production declines somewhat, being approximately 700 to 1800 pounds per acre, depending on precipitation. In this plant community, annual production is balanced between herbaceous plants and woody plants. Browsing animals such as goats and deer can find fair food value if browse plants have not been grazed excessively. Forage quantity and quality for cattle is low. Unless brush management and good grazing management are applied at this stage, the transition toward the Mixed-Brush/Shortgrass Community (2.2) will continue. The trend cannot be reversed with good grazing management alone.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	392	701	1009
Shrub/Vine	196	354	504
Tree	118	212	303
Forb	78	135	202
Total	784	1402	2018

Figure 15. Plant community growth curve (percent production by month). TX2059, Shortgrass-Mixed-Brush Community. Shortgrasses, annual grasses and invasive shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	5	8	24	25	12	7	10	5	2	0

Community 2.2 Mixed-Brush/Shortgrass Community



Figure 16. 2.2 Mixed-Brush/Shortgrass Community

The Mixed-Brush/Shortgrass Community (2.2) is the result of many years of overgrazing, lack of periodic fires and little brush management. Mesquite dominates the Mixed-Brush/Shortgrass Community (2.2), which is essentially a dense shrubland. Common understory shrubs are pricklypear, broom snakeweed, evergreen sumac, lotebush, yucca and wolfberry. With continued heavy grazing and no brush control, the trees and shrubs can approach 70 percent ground cover. Short-grasses and low quality annual and perennial forbs occupy the woody plant interspaces. Characteristic grasses are buffalograss, sand dropseed and three-awns. Texas wintergrass and cool-season annuals are found in and around tree/shrub cover. Grasses and forbs make up 25 percent or less of the annual herbage production. Forbs commonly found in this community include dotted gayfeather, western ragweed, prairie coneflower (*Ratibida columnifera*), gray goldaster (*Heterotheca canescens*), Louisiana sagewort (*Artemisia ludoviciana*) and catclaw sensitivebriar. The shrub canopy acts to intercept rainfall and increase evapotranspiration losses, creating a more xeric microclimate. Soil fauna and organic mulch are reduced exposing more soil surface to erosion in the few interstitial spaces. The exposed soil crusts and erodes readily. However, within the woody canopy hydrologic processes stabilize and soil organic matter and mulch begin to increase and eventually stabilize under the shrub canopy. The Mixed-Brush/Shortgrass Community (2.2) provides good cover for wildlife, but only limited preferred forage and browse are available for livestock or wildlife. Alternatives for restoration include brush control and range planting to return the shrubland to grassland. Proper stocking, prescribed grazing and prescribed burning would then be necessary to maintain the desired community.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	729	1457	1821
Grass/Grasslike	280	560	701
Forb	45	112	140
Tree	45	112	140
Total	1099	2241	2802

Figure 18. Plant community growth curve (percent production by month).
TX2025, mesquite/prickly pear/shortgrass community.
mesquite/pricklypear/shortgrass.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	4	10	27	27	10	3	9	4	2	1

Pathway 2.1A Community 2.1 to 2.2



Shortgrass/Mixed-Brush
Community



Mixed-Brush/Shortgrass
Community

With the continued heavy grazing and no fires, the Shortgrass/Mixed-Brush Community shifts to the Mixed-Brush/Shortgrass Community.

Pathway 2.2A Community 2.2 to 2.1



Mixed-Brush/Shortgrass
Community



Shortgrass/Mixed-Brush
Community

With the application of conservation practices including Prescribed Grazing, Prescribed Burning, Brush Management, and Range Planting, the Mixed-Brush/Shortgrass Community can be shifted back to the Shortgrass/Mixed-Brush Community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Transition T1A State 1 to 2

Due to heavy continuous grazing and no fires, the Grassland State is transitioned to the Shrubland State.

Restoration pathway R2A State 2 to 1

The Shortgrass/Mixed-brush Community can be restored to the Grassland State through the use of various conservation practices such as Prescribed Grazing, Brush Management, Prescribed Burning, and Range Planting.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Restoration pathway R2B State 2 to 1

The Mixed-Brush/Shortgrass Community can be restored back to the Grassland State by the use of conservation practices including Prescribed Grazing, Reclamation, Prescribed Burning, and Range Planting.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Midgrass			532–846	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	532–846	–
2	Tall/midgrasses			151–242	
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	0–242	–
	silver beardgrass	BOLAT	<i>Bothriochloa laguroides</i> ssp. <i>torreyana</i>	0–242	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–242	–
3	Midgrasses			76–121	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	0–121	–
	vine mesquite	PAOB	<i>Panicum obtusum</i>	0–121	–
	large-spike bristlegrass	SEMA5	<i>Setaria macrostachya</i>	0–121	–
4	Shortgrasses			454–729	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	303–482	–
	buffalograss	BODA2	<i>Bouteloua dactyloides</i>	151–247	–
5	Mid/Shortgrasses			76–121	
	threeawn	ARIST	<i>Aristida</i>	0–121	–
	hooded windmill grass	CHCU2	<i>Chloris cucullata</i>	0–121	–

	fall witchgrass	DICO6	<i>Digitaria cognata</i>	0–121	–
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	0–121	–
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	0–121	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–121	–
6	Cool-season grasses			76–121	
	Texas wintergrass	NALE3	<i>Nassella leucotricha</i>	76–121	–
Forb					
7	Forbs			84–135	
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0–135	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0–135	–
	leather flower	CLEMA	<i>Clematis</i>	0–135	–
	prairie clover	DALEA	<i>Dalea</i>	0–135	–
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	0–135	–
	Engelmann's daisy	ENPE4	<i>Engelmannia peristenia</i>	0–135	–
	beeblossom	GAURA	<i>Gaura</i>	0–135	–
	hoary false goldenaster	HECA8	<i>Heterotheca canescens</i>	0–135	–
	trailing krameria	KRLA	<i>Krameria lanceolata</i>	0–135	–
	dotted blazing star	LIPU	<i>Liatris punctata</i>	0–135	–
	littleleaf sensitive-briar	MIMI22	<i>Mimosa microphylla</i>	0–135	–
	evening primrose	OENOT	<i>Oenothera</i>	0–135	–
	awnless bushsunflower	SICA7	<i>Simsia calva</i>	0–135	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	0–135	–
	vervain	VERBE	<i>Verbena</i>	0–135	–
	Rocky Mountain zinnia	ZIGR	<i>Zinnia grandiflora</i>	0–135	–
Shrub/Vine					
8	Shrubs/Vines			84–135	
	acacia	ACACI	<i>Acacia</i>	0–135	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0–135	–
	prairie clover	DALEA	<i>Dalea</i>	0–135	–
	desert-thorn	LYCIU	<i>Lycium</i>	0–135	–
	littleleaf sumac	RHMI3	<i>Rhus microphylla</i>	0–135	–
	yucca	YUCCA	<i>Yucca</i>	0–135	–
Tree					
9	Tree			0–1	
	hackberry	CELTI	<i>Celtis</i>	0–1	–

Animal community

Many types of grassland insects, reptiles, birds and mammals used the Loamy 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 were indigenous or frequent users. Most are still plentiful. Bison and pronghorn antelope, however, are no longer present, but white-tailed deer and mule deer utilize the Loamy site in its various states. Deer, turkey and quail particularly favor the habitat provided by the

Midgrass/Shortgrass (1.2) and Mixed-Brush/Shortgrass (2.1) plant communities. Deer, turkey, quail and dove hunting is an important sport, or commercial enterprise, providing considerable income to land owners.

The site is very suited to primary grass eaters such as bison and 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. Predators, however, may preclude sheep and goats. Livestock 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/Shortgrass Community (2.2) will have little to offer as habitat except cover.

Hydrological functions

The Loamy Ecological Site is a moderately permeable Loamy upland with nearly level to gentle slopes. Runoff is negligible on 0 to 1 percent slopes, very low on 1 to 3 percent slopes, and low on 3 to 5 percent slopes. However, soil crusting can cause erosion from bare ground on steeper slopes if plant cover is removed.

Under reference condition, the grassland vegetation intercepts and utilizes much of the incoming rainfall in the soil solum. Only during extended rains or heavy thunderstorms is there much runoff. Litter and soil movement was slight. Standing plant cover, duff and organic matter decrease and surface runoff increases as the Midgrass Prairie Community (1.1) transitions to the Midgrass/Shortgrass Community (1.2). These processes continue in the interstitial spaces in the Shortgrass/Mixed-Brush Community (2.1). Evaporation and interception losses are higher, resulting in less moisture reaching the soil. If overgrazing continues, the plant community deteriorates further and desertification processes continue. Biomass production is reduced relative to the reference and production shifts from primarily grasses to primarily woody plants. The deeper-rooted woody plants are able to extract water from greater depths than the short 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. Decreased litter and more bare ground allow erosion from soils in openings between shrubs. Once the Mixed-Brush/Shortgrass Community canopy surpasses 70 percent the hydrological and ecological processes, nutrient cycling and energy flow, stabilize within the woody plant canopy.

Recreational uses

The Loamy site occurs in narrow bands with Loamy Bottomland and Loamy Prairie sites. Together, these sites are well suited for many outdoor recreational uses including recreational hunting, hiking, camping, equestrian and bird watching. The Loamy site, along with adjacent uplands, provides diverse scenic beauty and many opportunities for recreation and hunting.

Wood products

None, except for firewood and fence posts.

Other products

Jams and jellies are made from many fruit bearing species. Seeds are harvested from many plants for commercial sale. 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, such as mesquite.

Other information

None.

Inventory data references

The information in this document is based on observation of range sites over many years and knowledge of where well managed rangelands are found. It is also based on the review of data such as NRCS 417 data, old range inventories going back many years, and from range site descriptions prepared by NRCS specialists. Many historical

accounts of pre-settlement times have been reviewed.

Other references

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4. USDA/NRCS Soil Survey Manuals for Jones and King Counties.
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Approval

Bryan Christensen, 9/15/2023

Acknowledgments

Site Development and Testing Plan:

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.

Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

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.

Author(s)/participant(s)	Stan Bradbury, Zone RMS, NRCS, Lubbock, Texas
Contact for lead author	806-791-0581
Date	09/04/2007

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

Indicators

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

2. **Presence of water flow patterns:** None to slight.

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

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 20-25% bare ground.

5. **Number of gullies and erosion associated with gullies:** None to slight.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None to slight.

7. **Amount of litter movement (describe size and distance expected to travel):** None to slight.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Moderately resistance to surface erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Loamy friable surface and medium SOM.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Basal cover and density with small interspaces should make rainfall impact minimal. This site has moderately permeable soil, runoff is medium to high depending on slope and available water holding capacity is medium.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None.

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 midgrasses >

Sub-dominant: Warm-season shortgrasses >

Other: Warm-season tallgrasses > Forbs = Shrubs/Vines

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant mortality and decadence is minimal.
-

14. **Average percent litter cover (%) and depth (in):** Litter is dominantly herbaceous.
-

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1,500 to 2,400 pounds per acre.
-

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:** Yucca, pricklypear and broom snakeweed can be invasive.
-

17. **Perennial plant reproductive capability:** All plant species should be capable of reproduction except during periods of prolonged drought conditions, heavy natural herbivory or intense wildfires.
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