USDA Natural Resources
Conservation Service

Ecological site R085AY177TX
Blackland 30-38" 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): 085A–Grand Prairie

The Grand Prairie MLRA is characterized by predominately loam and clay loam soils underlain by limestone and shale. Topography transitions from steeper ridges and summits of the Lampasas Cut Plain on the southern end to the more rolling hills of the Fort Worth Prairie to the north. The Arbuckle Mountain area in Oklahoma is also within this MLRA.

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 clay soils on terraces and plains. The reference vegetation consists of native tall and midgrasses with forbs and few scattered shrubs and trees. In the absence of fire or other brush management, woody species may increase and dominate the site. These sites often have low slopes, however, runoff can be significant sue to the slowly permeable clay soils.

Associated sites

R085AY179TX	**Clayey Slope 30-38** Clay loam sites do not hold water with gilgia. The Blackland plant species are uniquely different depending on elevations differences caused by the gilgia.
R085AY178TX	**Clayey Bottomland 30-38" PZ** Clayey alluvial soils
R085AY563TX	**Shallow Clay 30-38" PZ** Shallow clay soils higher on landscape
R085AY185TX	**Shallow 30-38" PZ** Drainage is usually from the more sloping shallow site toward the blackland site, which favor the adjoining deeper soil sites.

Similar sites

R085AY179TX	**Clayey Slope 30-38** Clay loam sites do not hold water with gilgia. The Blackland plant species are uniquely different depending on elevations differences caused by the gilgia.

Table 1. Dominant plant species

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

Physiographic features

This site occurs on side slopes and base slopes of hillslopes in the Grand Prairie. Slopes are typically less than 12 percent.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Stream terrace (2) Hills > Hillslope (3) Hills > Ridge
Runoff class	High to very high
Elevation	500–1,900 ft
Slope	0–12%
Aspect	Aspect is not a significant factor

Climatic features

The climate is subhumid subtropical and is characterized by hot summers and relatively mild winters. Tropical maritime air controls the climate during spring, summer and fall. In winter and early spring, frequent surges of Polar Canadian air cause sudden drops in temperatures and add considerable variety to the daily weather. The average first frost should occur around November 5 and the last freeze of the season should occur around March 19.

The average relative humidity in mid-afternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible during the summer and 50 percent in winter. The prevailing wind direction is from the south and highest windspeeds occur during the spring months.

Approximately two-thirds of annual rainfall occurs during the April to September period. Rainfall during this period generally falls during thunderstorms, and fairly large amounts of rain may fall in a short time. The driest months are usually July and August.

Table 3. Representative climatic features

Frost-free period (characteristic range)	194-208 days
Freeze-free period (characteristic range)	216-243 days
Precipitation total (characteristic range)	32-38 in
Frost-free period (actual range)	190-209 days
Freeze-free period (actual range)	209-245 days
Precipitation total (actual range)	31-39 in
Frost-free period (average)	201 days
Freeze-free period (average)	230 days
Precipitation total (average)	35 in

Climate stations used

- (1) LAMPASAS [USC00415018], Lampasas, TX
- (2) BENBROOK DAM [USC00410691], Fort Worth, TX
- (3) CLEBURNE [USC00411800], Cleburne, TX
- (4) WHITNEY DAM [USC00419715], Clifton, TX
- (5) DENTON MUNI AP [USW00003991], Ponder, TX
- (6) DECATUR [USC00412334], Decatur, TX
- (7) EVANT 1SSW [USC00413005], Evant, TX
- (8) BROWNWOOD 2ENE [USC00411138], Early, TX

Influencing water features

These sites often have low slopes, however, runoff can be significant sue to the slowly permeable clay soils. The presence of deep rooted tallgrasses aids the infiltration of water into the soil profile. They are not associated with wetland sites.

Wetland description

NA

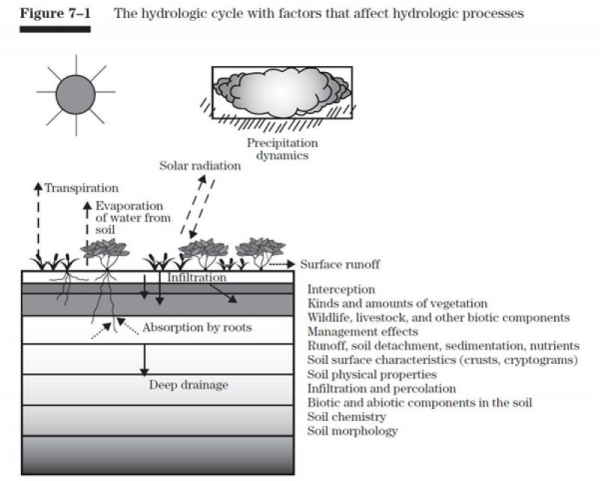


Figure 8.

Soil features

Representative soil components for this ecological site include: Medlin, San Saba, Sanger, and Slidell

The site is characterized by moderately deep to very deep calcareous, clayey soils with very high shrink-swell potential. Undisturbed sites form circular or linear gilgai as a function of increased slope gradient and variation in the natural drainage.

Table 4. Representative soil features

Parent material	(1) Slope alluvium–limestone (2) Residuum–mudstone (3) Slope alluvium–mudstone (4) Residuum–limestone
Surface texture	(1) Stony clay (2) Silty clay (3) Clay
Drainage class	Moderately well drained to well drained

Permeability class	Very slow
Soil depth	24–72 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	4–10 in
Calcium carbonate equivalent (0-40in)	1–35%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–4
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–8%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

The reference plant community for the Blackland site is a tallgrass prairie with scattered motts of large live oak. Soils are nearly level to sloping. The nearly level areas have a microrelief of knolls and depressions which are called gilgai. The sloping soils also have gilgai which have microridges and valleys extending up and down the slopes. The grasses are primarily little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*) and big bluestem (*Andropogon gerardii*). Smaller amounts of Virginia wildrye (*Elymus virginicus*), switchgrass (*Panicum virgatum*) and eastern gamagrass (*Tripsacum dactyloides*) occur and are found growing in the microrelief depressions or valleys. Soil erosion is very low if the tall grasses and the water trapping gilgai are present. As much as 6 inches of water could be temporarily trapped in these gilgai microreliefs before runoff begins.

Both buffalo impact and fires were dominant forces to maintain the historic tallgrass prairie. Large herds of buffalo would intensely graze this site and then not come back for many months or even years post-fire. It is anticipated that bison would follow the occurrence of historic fires. Animal impacts were a key to maintaining the open tallgrass prairie with the broadly spaced oak trees. Fires and large concentrated buffalo herds prevented woody plant encroachment from occurring.

The plant communities of this site are dynamic varying in relation to grazing, fire and drought. Fire was a very important factor in maintaining the original prairie/liveoak vegetation and also had a major impact on the plant community structure. Periodic fire set either by lightening or Native Americans reduced the canopy cover of woody species. Liveoak is capable of resprouting following fire. Grass species such as little bluestem, big bluestem and Indiangrass are considered fire enhanced as far as their response to fire.

Indians inhabited the prairies for nearly three centuries prior to the 1800’s using mounted horses which were imported from the Spanish explorers. These same explorers brought to Texas domesticated cattle as early as 1690. By the late 1700’s these domesticated cattle became wild and free-ranging in South Texas, competing with the native ruminants such as buffalo, elk, pronghorn antelope and white-tailed deer. By 1845, European settlers stopped wild fires from taking place and at the same time many cattle herds migrated north along streams and major rivers. These wild herds continued to expand especially after the extirpation of the buffalo in the 1870’s. Then in 1867, a railhead was established in Abilene, Kansas which caused a thriving livestock industry to be born. By early 1880’s, the Texas prairies became more and more overstocked with domesticated livestock. By 1885, livestock were fenced, further concentrating livestock and causing rapidly deteriorating plant communities across the landscape due to overgrazing and droughts. By the 1920’s, large prairie land areas were already plowed for crop cultivation. Early farmers had to protect their crops from burning so controlling fire was more important for farmers than livestock operators. With the cessation of fire, prairies soon yielded to woodland and shrubland

communities in many areas. Overgrazing and drought reduced grass vigor and left little ground cover or litter to carry even an occasional fire across the landscape.

Climate, including drought, and soils are the most important and limiting factors affecting grass vegetation on the site. Fire stimulated forbs growth if the timing was right and the fires of pre-settlement days were probably more severe due to more fuel being available. This situation would have been damaging to woody plants. Fire usually creates more diversity in this site for a year or two post-burn. Then the grasses tend to crowd out the forbs and diversity decreases. Forbs also need spring moisture that is perhaps the major factor in creating diversity in the plant community. Fire will usually not produce much mortality in older woody plants.

With abusive grazing practices, the vigorous Indiangrass and big bluestem will become lower in vigor while little bluestem will increase along with secondary successional species such as sideoats grama (*Bouteloua curtipendula*), silver bluestem (*Bothriochloa laguroides*), Texas wintergrass (*Nassella leucotricha*) and buffalograss (Buchloe dactyloides) will begin to increase along with an increase in density and stature of woody plants. Little bluestem is tolerant of some fairly heavy grazing for long periods. At some point, if abusive grazing is long-term, a threshold is crossed. The ground cover is opened up resulting in bare places where weedy species can become established. Plants such as Texas wintergrass, buffalograss, western ragweed (*Ambrosia psilostachya*), prairie coneflower (*Ratibida columnifera*), sumpweed (*Iva annua*) and cool season annuals will quickly increase if the principal species are in a weakened condition.

Birds consume the seed of many woody species. When passed through the digestive system and excreted in the droppings, the seed has an excellent seed environment for establishment complete with moisture and nutrients. Grazing management with cattle alone probably has minimal effect on the proliferation of woody plants even though they do spread mesquite (*Prosopis glandulosa*) seeds through their droppings. However, a good cover of perennial grasses likely minimizes the seed to soil contact mesquite needs to establish. Juniper (Juniperus spp.) may in fact increase with good grass cover once seeds are introduced. Prescribed fire then is an important tool to control the spread of woody plants. Selective individual removal of mesquite and/or juniper is easy and economical when plants initially appear on the site. However, the increase of number of plants can be rapid and the number of woody plants per acre will soon become too numerous for individual control to be feasible.

Prescribed grazing with a reasonable stocking rate can sustain the grass species composition and production at a near reference community level. The Blackland site can be abused to the point that the perennial warm-season grasses thin out and lower successional grasses along with annual forbs begin to dominate. This process of degradation usually takes many years and is further exacerbated by summer drought and above average winter moisture.

Long term droughts that occur only three to four times in a century can effect some change in historic plant communities, when coupled with abusive grazing. Short term droughts are common and usually do not have a lasting effect in changing stable plant communities, although annual production will be affected. When a brush canopy becomes established, which shades the ground; it tends to favor cool-season annual species. Once a state of brush and cool-season annuals is reached, recovery to a good perennial warm-season grass cover is unlikely without major input with brush management and reseeding.

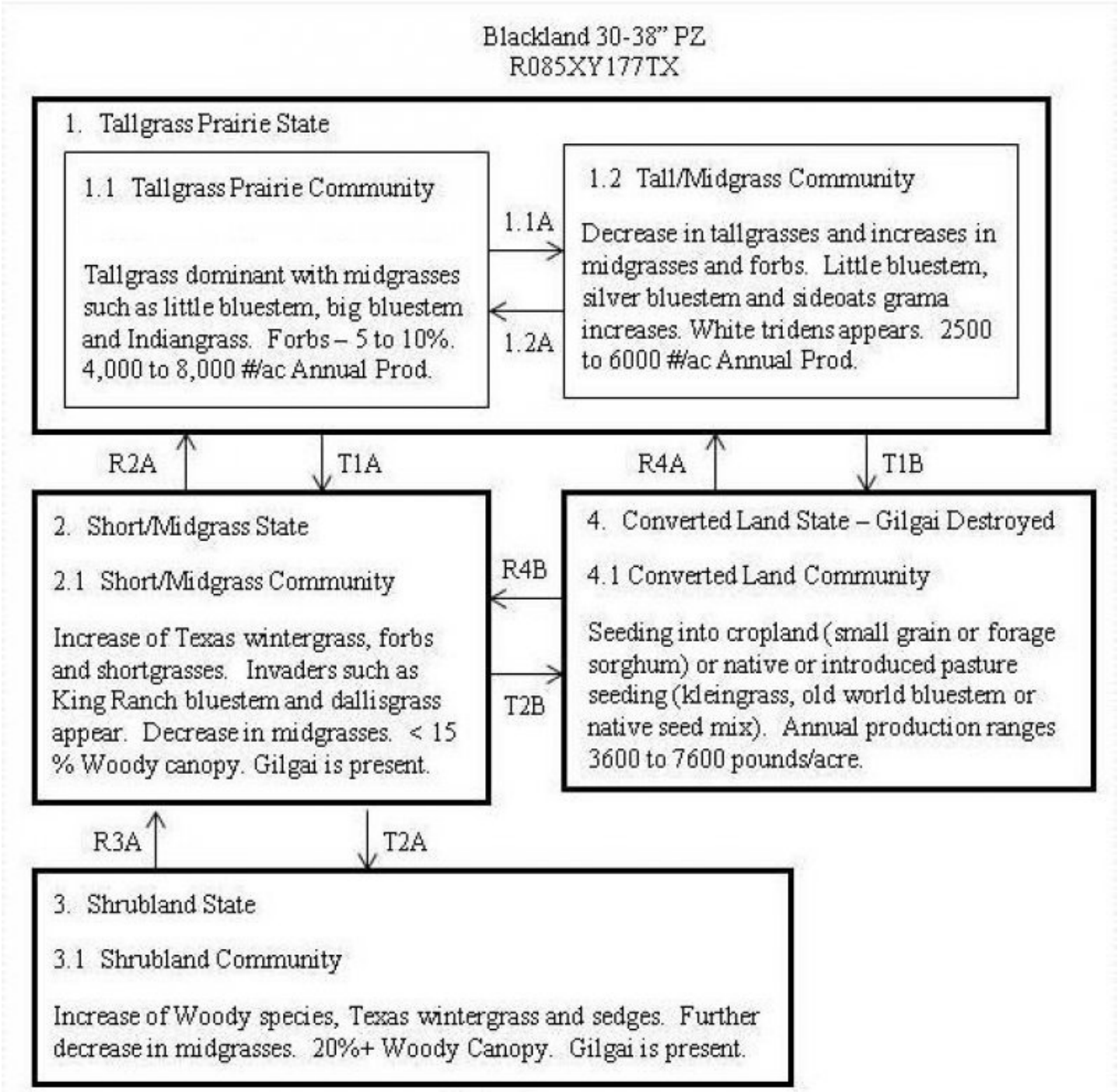
In summary, the change in states of vegetation depends on the type of grazing management applied over many years and the rate of invasion and establishment of woody species. The effects of seasonal moisture and short term dry spells become more pronounced after the site crosses thresholds to different vegetative state. Plant communities that consist of warm-season perennial grasses such as little bluestem and the associated species of historic climax are able to persist and withstand climatic extremes with only minor shifts in the overall plant community.

State and Transitional Pathways: Narrative

The following diagram suggests some pathways that the vegetation on this site might take in response to various treatments or natural stimuli over time. There may be other states that are not shown on this diagram. This information is to show that changes in plant community do occur due to management and natural factors and can be changed by implementing certain practices. The plant communities described in the state and transition model are commonly observed for this site. Before making plans for plant community manipulation for specific purposes, consult local professionals.

As a site changes in plant community makeup, the changes may be due to many factors. Change may occur slowly or in some cases, fairly rapidly. As vegetative changes occur, certain thresholds are crossed. This means that once a certain point is reached during the transition of one community to another, a return to the first state may not be possible without the input of some form of energy. This often means intervention with practices that are not part of natural processes. An example might be the application of herbicide to control some woody species in order to reduce its population and encourage more grass and forbs growth. Merely adjusting grazing practices would probably not accomplish any significant change in a plant community once certain thresholds are crossed. The amount of energy required to effect change in community would depend on the present vegetative state and the desired change.

State and transition model



Legend

1.1A Heavy Continuous Grazing, No Brush Management, No Fire
1.2A Prescribed Grazing, Brush Management, Prescribed Burning
T1A Heavy Continuous Grazing, Idle, No Fire
T1B Brush Management, Crop Cultivation, Range Planting, Pasture Planting
R2A Prescribed Grazing, Brush Management, Range Planting, Prescribed Burning
R4A Prescribed Grazing, Prescribed Burning
T2A Heavy Continuous Grazing, Idle, No Fire
T2B Brush Management, Crop Cultivation, Pasture Planting Range Planting, Prescribed Grazing, Prescribed Burning
R3A Prescribed Grazing, Brush Management, Range Planting, Prescribed Burning
R4B Heavy Continuous Grazing, No Brush Management, No Fire, Idle

State 1

Tallgrass Prairie State - Reference

Dominant plant species

- Texas live oak (*Quercus fusiformis*), tree
- little bluestem (*Schizachyrium scoparium*), grass

Community 1.1
Tallgrass Prairie Community

Figure 9. 1.1 Tallgrass Prairie Community

The interpretive plant community for this site is a tallgrass prairie community with scattered live oak. The grasses are primarily little bluestem, Indiangrass and big bluestem. Smaller amounts of Virginia wildrye, switchgrass and eastern gamagrass occur as well and are found growing in the microrelief depressions or valleys. Perennial forbs such as sundrops (*Calylophus serrulatus*), prairie clovers (Pediomelum spp.), bundleflowers (Desmanthus spp.), and daleas (Dalea spp.) are well represented throughout the community. Recurrent fire and grazing by bison were natural processes that maintained this community therefore the removal of these processes began to cause change. As fire is eliminated, and overstocking becomes continuous, this plant community begins to change to a Tall & Midgrass Community (1.2). The tallgrasses decrease and midgrasses such as little bluestem, silver bluestem and sideoats grama increase. White tridens (*Tridens albescens*) replaces the wildryes, switchgrass and eastern gamagrass. Introduction of prescribed fire at appropriate time intervals and the implementation of prescribed grazing can maintain the Tallgrass Prairie Community (1). Ashe juniper (*Juniperus ashei*) encroachment can be easily controlled with prescribed fire until the plant reach approximately 3 to 4 feet in height. Without treatment, Ashe juniper will continue to increase and move towards the Short and Midgrass Community (2.1). With continued heavy grazing pressure along with the removal of fire, the reference community will change into a Short and Midgrass Community (2.1) with less than 15 percent woody plants or a Shrubland Community (3.1) having greater than 20 percent canopy of woody plants. The changes within the grassland communities can change fairly rapid while the communities having an increase of woody plants are somewhat slower. The Tallgrass Prairie Community (1.1) or the Tall and Midgrass Community (1.2) can be converted to a Converted Land State consisting of various land uses such as Cropland, Pastureland or Native Seeding. The Converted Land State with prescribed burning and prescribed grazing could revert back to the Tall and Midgrass Community (1.2) only after many years of proper grazing management and prescribed burns.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	3600	5400	7200
Forb	200	300	400
Shrub/Vine	120	180	240
Tree	80	120	180
Total	**4000**	**6000**	**8020**

Figure 11. Plant community growth curve (percent production by month). TX6011, Warm-season perennial tallgrass prairie. The community is dominated by warm-season perennial tallgrasses with few shrubs, trees and forbs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	2	18	23	17	6	4	16	6	3	2

Community 1.2
Tall and Midgrass Prairie Community

Figure 12. 1.2 Tall and Midgrass Prairie Community

This transition state occurs without fire or brush management with heavy yearlong grazing. The tall grasses will start to disappear from the plant community and are replaced by midgrasses such as sideoats grama, which will increase. Invader brush species such as Ashe juniper appears and becomes established. Greenbriar (*Smilax bona-nox*), cedar elm (*Ulmus crassifolia*), bumelia (*Sideroxylon lanuginosum*), and hackberry (Celtis spp.) also start to increase. Texas wintergrass increases as brush canopy increases. The plant community consists of less than 10 percent canopy of woody plants. Continuous grazing by domestic livestock and fire suppression has accelerated the shift towards the Shrubland Community (3.1). The Tall and Midgrass Community (1.2) can revert back to the Tallgrass Prairie Community (1) with the implementation of prescribed burning and/or prescribed grazing management practices. Without prescribed burning and/or prescribed grazing, this plant community would continue to shift toward the Short and Midgrass Community (2.1) or Shrubland Community (3.1). The Tall/Midgrass Community (1.2) can be converted to the Converted Land State consisting of Cropland, Pastureland or Native Seeding communities. The Converted Land State with many years of executing the prescribed burning and prescribed grazing practices could revert back to the Tall/Midgrass Community. The gilgai will return after 20 or more years if the plant community is not plowed.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1750	2970	4200
Forb	375	645	900
Shrub/Vine	250	425	600
Tree	125	210	300
Total	**2500**	**4250**	**6000**

Figure 14. Plant community growth curve (percent production by month). TX6018, Tall/Midgrass Community. Tallgrasses decrease and being replaced by midgrasses..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	2	18	23	17	6	4	16	6	3	2

Pathway 1.1A
Community 1.1 to 1.2

Tallgrass Prairie Community

Tall and Midgrass Prairie Community

With heavy continuous grazing, no brush management, and no fire, the Tallgrass Prairie Community transitions to the Tall and Midgrass Prairie Community.

Pathway 1.2A
Community 1.2 to 1.1

Tall and Midgrass Prairie Community

Tallgrass Prairie Community

With the implementation of conservation practices such as Prescribed Grazing, Brush Management, and Prescribed Burning, the Tall and Midgrass Prairie Community can be restored to the Tallgrass Prairie Community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

State 2
Short/Midgrass State

Dominant plant species

- Texas live oak (*Quercus fusiformis*), tree
- buffalograss (*Bouteloua dactyloides*), grass

Community 2.1
Short and Midgrass Community

Figure 15. 2.1 Short and Midgrass Community

The Short and Midgrass Community (2.1) consists of short- and midgrasses with ten to fifteen percent canopy of woody plants. As the plant community ages, brush canopy continues to increase while midgrasses such as sideoats grama decreases and grasses such as Texas wintergrass, buffalograss, hairy grama (*Bouteloua hirsuta*), Texas grama (*Bouteloua rigidiseta*) and hairy tridens (*Erioneuron pilosum*) increase. Without fire, Ashe juniper becomes the dominant invader plant while mesquite (*Prosopis glandulosa*) and prickly pear (Opuntia spp.) become established. Invaders such as dallisgrass (*Paspalum dilatatum*) and King Ranch Bluestem (*Bothriochloa ischaemum*) may appear and grow in the microrelief depressions or valleys. Warm-season perennial tallgrasses such as Indiangrass and switchgrass have all but disappeared. Continuous grazing by domestic livestock has accelerated this shift. The shift to this state has occurred due to the absence of fire or other means of brush suppression coupled with heavy grazing by domestic livestock. The grass species that dominate the site are mostly cool-season annual species. This state can be reverted back to near reference condition by some means of brush suppression and good grazing management. Without these management practices, the site will continue to shift toward denser stands of brush and will become the Shrubland Community (3.1) state.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1500	2000	2400
Forb	500	650	800
Shrub/Vine	250	325	400
Tree	250	325	400
Total	**2500**	**3300**	**4000**

Figure 17. Plant community growth curve (percent production by month). TX6019, Shortgrass/Midgrass Community. This plant community has short and midgrasses with ten to fifteen percent canopy woody plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	8	20	25	20	5	3	10	4	1	1

State 3
Shrubland State

Dominant plant species

- Ashe's juniper (*Juniperus ashei*), tree
- Texas wintergrass (*Nassella leucotricha*), grass

Community 3.1
Shrubland Community

Figure 18. 3.1 Shrubland Community

This plant community is a Shrubland Community (3.1) having greater than 20% woody canopy dominated by Ashe juniper, prickly pear cactus and honey mesquite. Other species present in small amounts are elm, hackberry, and live oak. The herbaceous understory is almost nonexistent. Shade tolerant species such as Texas wintergrass tends to dominate the site where mesquite is the major woody plant. When the canopy of juniper increases toward a cedar breaks type community, most grasses have almost disappeared. Continuous grazing by domestic livestock has accelerated the shift. The tallgrass prairie can be restored by prescribed burning but will require many years of burning under very selective conditions due to light fuel load of fine fuel and the absence of a seed source for the tall grasses. (The Engling Wildlife Management Area accomplished this in three steps: 1. Prescribed burn during dry winter after frost has dropped woody plant leaves, 2. Conduct a summer prescribed burn to reduce cool-season plants and favor warm-season herbaceous plants, 3. Use combinations of winter and/or summer fires to maintain the desired vegetation.) Chemical control alone is usually a good option for treatment on a large scale especially where a seed source is present. Mechanical treatment of this site along with range planting is a good option when seeding is necessary. Due to the presence of shade, the amount of grass cover is greatly reduced which in turn reduces forage production from the reference state.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	810	970	1130
Forb	450	540	630
Shrub/Vine	270	320	370
Tree	270	320	370
Total	**1800**	**2150**	**2500**

Figure 20. Plant community growth curve (percent production by month). TX6014, Mesquite/Juniper/Brushland Community. Consist of mixed grasses with greater than 50 percent canopy of woody plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	3	8	20	25	19	5	3	10	4	1	1

State 4
Converted Land State

Dominant plant species

- yellow bluestem (*Bothriochloa ischaemum*), grass

Community 4.1
Converted Land Community

Figure 21. 4.1 Pastureland Community

Extensive conversion of the Blackland ecological site to cropland (primarily cotton and corn) occurred from the middle 1800s to the early 1900s. Some remains in cropland today – typically small grain production for stocker-cattle grazing. While restoration of this site to a semblance of the tallgrass prairie is possible with range planting, prescribed grazing, and prescribed burning - complete restoration of the reference community in a reasonable time is very unlikely due to deterioration of the soil structure and organisms. If cropping is abandoned, this land is usually planted to introduced grasses and forbs and managed as pastureland. The Pastureland Community is the result of mechanical brush control and reseeding using one or more introduced grass species. Introduced species such as kleingrass (*Panicum coloratum*) or one of the old world bluestems (*Bothriochloa ischaemum*) such as WW Spar or WB Dahl may be a part of the seed mixture. Production will depend upon soil fertility. Due to the lack of diversity of plant species and presence of introduced species it will take a long time if ever for this state to again reach the historic state. The Native Planting community is usually the result of mechanical brush control and reseeding using one or more native grass species. Various native species such as switchgrass, eastern gamagrass, little bluestem and big bluestem may be a part of the seed mixture. Due to the lack of diversity of plant species compared to the reference community it will take a long time if ever for this seeded state to again reach the historic community. The gilgai are also being re-developed since the community is not being cultivated.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	3600	5400	7200
Total	**3600**	**5400**	**7200**

Figure 23. Plant community growth curve (percent production by month). TX6011, Warm-season perennial tallgrass prairie. The community is dominated by warm-season perennial tallgrasses with few shrubs, trees and forbs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	2	18	23	17	6	4	16	6	3	2

Figure 24. Plant community growth curve (percent production by month). TX6102, Cool-Season Annual Grasses & Legumes. Oats, Rye, Wheat, Ryegrass, Clover and Vetch planted..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
11	13	19	21	19	0	0	0	0	0	8	9

Figure 25. Plant community growth curve (percent production by month). TX6103, Warm-Season Annual Grasses & Legumes. Forage Sorghum, Grain Sorghum, Haygrazer..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	8	20	25	20	10	10	5	2	0	0

Figure 26. Plant community growth curve (percent production by month). TX6104, Introduced Pasture Seeding. Grass species such as bermudagrass, kleingrass, old world bluestems and other introduced grassland species are planted..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	2	18	23	17	6	4	16	6	3	2

Transition T1A
State 1 to 2

With heavy continuous grazing, land in abandoned/idled conditions, and no fire, the Tallgrass Prairie State transitions to the Short/Midgrass State.

Transition T1B
State 1 to 4

With the application of converted land community practices such as Brush Management, Crop Cultivation, Range Planting, Pasture Planting, and Prescribed Burning, the Tallgrass Prairie State is transitioned to the Converted Land State.

Restoration pathway R2A
State 2 to 1

With the use of conservation practices such as Prescribed Grazing, Brush Management, Range Planting, and Prescribed Burning, the Short/Midgrass State has a chance to be restored to the Tallgrass Prairie State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Transition T2A
State 2 to 3

With heavy continuous grazing, land being abandoned/idled, and no fire, the Short/Midgrass State would transition into the Shrubland State.

Transition T2B
State 2 to 4

With the implementation of Converted Land State conservation practices such as Brush Management, Crop Cultivation, Pasture Planting, Range Planting, Prescribed Grazing, and Prescribed Burning, the Short/Midgrass State would transition into the Converted Land State.

Restoration pathway R3A
State 3 to 2

With the use of conservation practices such as Prescribed Grazing, Brush Management, Range Planting, and Prescribed Burning, the Shrubland State can be restored to the Short/Midgrass State.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing
Range Planting

Restoration pathway R4A
State 4 to 1

The Converted Land State can be restored to the Tallgrass Prairie State through the use of conservation practices such as Prescribed Grazing and Prescribed Burning.

Conservation practices

Prescribed Burning

Prescribed Grazing

Restoration pathway R4B
State 4 to 2

With heavy continuous grazing, no brush management, no fires and land abandonment/idled, the Converted Land State would be restored to the Short/Midgrass State.

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrass**			1800–3600	
	little bluestem	SCSC	*Schizachyrium scoparium*	1800–3600	–
2	**Tallgrasses**			1000–2000	
	big bluestem	ANGE	*Andropogon gerardii*	250–2000	–
	switchgrass	PAVI2	*Panicum virgatum*	250–2000	–
	Indiangrass	SONU2	*Sorghastrum nutans*	250–2000	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	250–2000	–
3	**Midgrasses**			600–1200	
	purple threeawn	ARPUP9	*Aristida purpurea var. perplexa*	50–1200	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	50–1200	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	50–1200	–
	buffalograss	BODA2	*Bouteloua dactyloides*	50–1200	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	50–1200	–
	Canada wildrye	ELCA4	*Elymus canadensis*	50–1200	–
	Virginia wildrye	ELVI3	*Elymus virginicus*	50–1200	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	50–1200	–
	Texas cupgrass	ERSE5	*Eriochloa sericea*	50–1200	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	50–1200	–
	vine mesquite	PAOB	*Panicum obtusum*	50–1200	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	50–1200	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	50–1200	–
4	**Midgrasses**			200–400	
	tall grama	BOHIP	*Bouteloua hirsuta var. pectinata*	0–400	–
	sedge	CAREX	*Carex*	0–400	–
	fall witchgrass	DICO6	*Digitaria cognata*	0–400	–
	seep muhly	MURE2	*Muhlenbergia reverchonii*	0–400	–
	white tridens	TRAL2	*Tridens albescens*	0–400	–
	slim tridens	TRMU	*Tridens muticus*	0–400	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	0–400	–
Forb					

5	**Forbs**			190–380	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–380	–
	sagebrush	ARTEM	*Artemisia*	0–380	–
	yellow sundrops	CASE12	*Calylophus serrulatus*	0–380	–
	whitemouth dayflower	COER	*Commelina erecta*	0–380	–
	prairie clover	DALEA	*Dalea*	0–380	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–380	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	0–380	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0–380	–
	beeblossom	GAURA	*Gaura*	0–380	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0–380	–
	bluet	HOUST	*Houstonia*	0–380	–
	coastal indigo	INMI	*Indigofera miniata*	0–380	–
	trailing krameria	KRLA	*Krameria lanceolata*	0–380	–
	dotted blazing star	LIPU	*Liatris punctata*	0–380	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	0–380	–
	yellow puff	NELU2	*Neptunia lutea*	0–380	–
	beardtongue	PENST	*Penstemon*	0–380	–
	snoutbean	RHYNC2	*Rhynchosia*	0–380	–
	false gaura	STLI2	*Stenosiphon linifolius*	0–380	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–380	–
6	**Forbs**			10–20	
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	0–20	–
	American star-thistle	CEAM2	*Centaurea americana*	0–20	–
	croton	CROTO	*Croton*	0–20	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	0–20	–
	Leavenworth's eryngo	ERLE11	*Eryngium leavenworthii*	0–20	–
	snow on the mountain	EUMA8	*Euphorbia marginata*	0–20	–
	hoary false goldenaster	HECA8	*Heterotheca canescens*	0–20	–
	groundcherry	PHYSA	*Physalis*	0–20	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–20	–
	wild petunia	RUELL	*Ruellia*	0–20	–
	pitcher sage	SAAZG	*Salvia azurea var. grandiflora*	0–20	–
	Texas star	SACA3	*Sabatia campestris*	0–20	–
	fanpetals	SIDA	*Sida*	0–20	–
	compassplant	SILA3	*Silphium laciniatum*	0–20	–
Shrub/Vine					
7	**Shrubs/Vines**			120–240	
	stretchberry	FOPU2	*Forestiera pubescens*	0–240	–
	plum	PRUNU	*Prunus*	0–240	–
	fragrant sumac	RHAR4	*Rhus aromatica*	0–240	–
	winged sumac	RHCO	*Rhus copallinum*	0–240	–

	saw greenbrier	SMBO2	*Smilax bona-nox*	0–240	–
Tree					
8	**Trees**			80–120	
	hackberry	CELTI	*Celtis*	0–120	–
	Texas live oak	QUFU	*Quercus fusiformis*	0–120	–
	bully	SIDER2	*Sideroxylon*	0–120	–
	elm	ULMUS	*Ulmus*	0–120	–
	Hercules' club	ZACL	*Zanthoxylum clava-herculis*	0–120	–

Animal community

Domestic livestock are the dominant grazer of the site. As the prairie changes through the various vegetative states towards the shrubland, the quality of the habitat may improve for some species and decline for others. Deer and turkey are mostly found along the wooded streams adjacent to this site, occasionally feeding on the open prairie. Turkey, bobcats and coyotes along with resident and migratory birds and small mammals can be found using this site for at least a portion of their requirements. Woody plants provide cover for white-tailed deer and bob-white quail. These wildlife species have increased in population along with the brushy plants due to the canopy cover that are provided. Prescribed fire and grazing are tools to promote diversity.

Often, the objective of many land owners is to manage for both wildlife and domestic livestock. This can be accomplished by a carefully planned grazing and brush management program. Managing at a lower successional level may meet some wildlife species requirements very well but not be productive for livestock. Lower successional level plant communities may not satisfy functions such as nutrient cycling, hydrologic protection, plant community stability or soil protection.

Hydrological functions

Hydrologically, the site contributes runoff to the various draws, creeks, and streams that are commonly found in the MLRA Peak rainfall periods occur in April, May, June, September and October. Rainfall amounts may be high (3 to 10 inches per event) and events may be intense. Gilgai develops pools of standing water during wet weather, and as much as 6 inches of water can be temporarily trapped in these gilgai microreliefs before runoff begins. Periods of 60 plus days of little or no rainfall during the growing season are common. During periods of good rainfall with good grass cover water when the soil profile is full, water infiltrates to the limestone rock below and moves to lower elevations and emerges as seeps and springs. The hydrology of this site may be manipulated with management to yield either higher runoff volumes or greater infiltration. More perennial grass cover means less runoff but the runoff that does occur has less sediment. Potential movement of soil (erosion), pesticides and both organic and inorganic nutrients (fertilizer) should always be considered when managing for higher volumes of surface runoff. Soil with low organic matter is prone to drought stress since it acts as a sponge. Overall watershed protection is enhanced by a healthy grassland community, as is nutrient cycling.

Recreational uses

Hunting, hiking, camping, equestrian, bird watching and off road vehicle use.

Wood products

None.

Other products

None.

Other information

None.

Inventory data references

Information presented here has been derived from NRCS clipping data and field observations of range trained personnel: James Luton RMS, Montague; William Donham, DC, Weatherford; Kent Ferguson RMS, Weatherford; Dan Caudle

References

. 2021 (Date accessed). USDA PLANTS Database. http://plants.usda.gov.

Bailey, V. 1905. Biological Survey of Texas. North American Fauna 25:1–222.

Other references

Ajilvsgi, Geyata, Wildflowers of Texas, Shearer Publishing, Fredericksburg, Texas, 1984
Anderson, C. A. et.al, The Western Range: Letter from Sec. of Agr. in Response to Senate Resolution No. 289, A Report on the Western Range, A great Neglected Natural Resource, Document No. 199, United States Government Printing Office, Washington , April 24, 1936
Bentley, H. L., Cattle Ranges of the Southwest: A History of the Exhaustion of the Pasturage and Suggestions for Its Restoration, USDA Farmer's Bulletin No. 72, Abilene, Texas, 1898
Bogusch, E. R., Brush Invasion in the Rio Grande Plain of Texas, Texas Journal of Science, 1952
Bonnell, G. W., Topographical descriptions of Texas, Clark, Wing and Brown, Austin, 1840
Box, T. W., Brush, fire and West Texas Rangeland, Proceedings of the Tall Timbers Fire Ecology Conference, 1967
Bray, W. L., Forest Resources of Texas, 600 Acres Cedar Brake Burned at Marble Falls July, 1901, USDA, Bulletin No. 47 Bureau of Forestry,
Bray, W. L., The timber of the Edwards Plateau of Texas: It's Relation to Climate, Water Supply and Soil, USDA, Forest Bulletin No 49, 1904
Clambey, Gary K, The Prairie: Past, Present, and Future, Proceedings of the Ninth North American Prairie Conference, Tri-College University Center for Environmental Studies, Fargo North Dakota, October, 1986
Clements, Dr. Frederic E., Dynamics of Vegetation, The H. W. Wilson Company, New York, 1949
Clements, Frederic E., Plant Succession and Indicators: A Definitive Edition of Plant Succession and Plant Indicators, The H. W. Wilson Company, New York City 1928
Collins, O. B., Smeins, Fred E & Johnson, M.C., Plant Communities of the Blackland Prairie of Texas, In Prairie: A Multiple View, University of North Dakota Press, Grand Forks, North Dakota, 1975
Coranado, Francisco V., Early Spanish Explorations of New Mexico and Texas, Journal of Pedro de Castenda, who was the historian for the Expedition of Francisco V. Coronado, April, 1541
Custis, Peter & Freeman, Jefferson and Southwestern Exploration: The Freeman and Curtis Accounts of the Red River Expedition of 1806, Norman, University of Oklahoma Press, 1984
Custis, Peter, The Ecology of the Red River in 1806: Peter Custis and Early Southwestern Natural History, Southern Historical Quarterly, 1806
Dary, David A., The Buffalo Book: The Saga of an American Symbol, A Spellbinding recreation of lore, legend and fact about the great American Bison,
Diamond, David & Smeins, Fred E., Remnant Grassland Vegetation and Ecological Affinities of the Upper Coastal Prairie of Texas, The American Midland Naturalist 110, The University of Notre Dame, Notre Dame, Indiana, August 28, 1984
Diamond, David D., Texas Prairies: Almost Gone, Almost Forgotten, Texas Parks and Wildlife, Vol. 48, No. 3, March, 1990
Diggs, George M., Liscomb, & O'Kennor, Skinners & Mahler's Illustrated Flora of North Central Texas, Botanical Research Institute of Texas, Fort Worth, Texas, 1999
Dyksterhuis, E. J., The Vegetation of the Fort Worth Prairie, Contribution No 146 from the Department of Botany, University of Nebraska, January, 1946
Flores, Dan, Indian Use of Range Resources, Texas Tech Department of History, 20th Annual Range Management Conference, Lubbock, Texas, About 1990
Flores, Dan, The Red River Branch of the Alabama-Coushatta Indians: An Ethnohistory, Southern Studies Journal 16, Spring 1977

Foreman, Grant, Adventure on the Red River, Norman, University of Oklahoma Press, 1937
Foster, J.H., The Spread of Timbered Areas in Central Texas, Journal of Forestry No. 15, 1917
Gard, Wayne, The Chisholm Trail, Norman, University of Oklahoma Press, 1954
Geiser, S. W., Naturalists of the Frontier, Southern Methodist University Press, Dallas, Texas 1948
Gey, Kenneth, et.al, White-tailed Deer, Their Foods and Management in the Cross Timbers, A Samuel Roberts Nobel Foundation Publication, 1991
Gibson, A.M., From the Brazos to the North Fork: The Autobiography of Otto Koeltzow, The Chronicles of Oklahoma, University of Oklahoma, Part 1 & 2, Vol. XL, No. 1, 1962
Hignight, K.W., et. Al, Grasses of the Texas Cross Timbers and Prairies, MP-1657, Texas Agricultrual Experiment Station, College Station, Texas 1988
Jackson, A.S., Wildfires in the Great Plains Grassland, Proceedings of the Tall Timbers Fire Ecology Conference, 1965
Jenkins, John Holmes III, Recollections of Early Texas, The Memoirs of John Holland Jenkins, University of Texas Press, Austin Texas, 1958
Johnston, M.C, Past and Present Grasslands of Southern Texas and Northeastern Mexico, Ecology 44, 1963
Jordan, Gilbert J., Yesterday in the Texas Hill Country, Texas A&M University Press, College Station, Texas, 1979
Jordan, Terry G., German Seed in Texas Soil, Immigrants Farmers in Nineteenth-Century Texas, University of Texas Press, Austin, Texas, 1966
Kelton, Elmer, History of Rancher Use of Range Resources, 20th Annual Ranch Management Conference, Lubbock, Texas, September 30, 1983
Kelton, Elmer, West Texas: From Settlement to the Present, Talk presented to Texas Section, Society for Range Management, San Angelo, Texas October 8, 1993
Kendall, G. W., Narrative of the Texas Sante Fe Expedition, Vol. I, Wiley and Putman, London, 1844
King, I. M., John Q. Meusebach, German Colonizer in Texas, University of Texas Press, Austin, Texas, 1967
Kruger, M.A. P., Second Fatherland: The Life and Fortunes of a German Immigrant, Texas A&M University Press, College Station, Texas 1976
Kurlansky, Mark, Salt – A World History, Walter Publishing Company, New York, NY, USA 2002
Launchbaugh, J.L., Vegetational Changes in the San Antonio Prairie Associated with Grazing, retirement from grazing, and abandonment from cultivation, Ecol. Monogr., 25, 1955
Lehmann, V. W., Fire in the Range of the Attwater's Prairie Chicken, Proceedings of the Tall Timbers Fire Ecology Conference, 1965
Marcy, R. B., His diary as captain of 5th Infantry U.S. Army, 31st Cong., 1st Sess., U. S. Senate Exec. Doc., Vol. 14, 1849 –1850
Marcy, R. B., Thirty Years of Army Life on the Border, Harper & Fros., Franklin Square, New York, 1866
Marks, Paula Mitchell, The American Gold Rush Era: 1848 – 1900, William Morrow and Company, Inc., New York, 1994
Martin, P.S., Vanshings, and Future of the Prairie, Geoscience and Man, 1965
Moorehead, M.L., Commerce of the Prairies by Josiah Gregg, University of Oklahoma Press, Norman, Oklahoma 1954
Murrah, David J., C. C. Slaughter, Rancher, Banker, Baptist, University of Texas Press, Austin, Texas 1981
Newcomb, S.P., Journal of a trip from the Clear Fork of the Brazos to the San Saba River, Addenda in Interwoven by Sallie R. Matthews, Reprint by Hertzog, El Paso, Texas 1958
Norton-Griffiths,M., The Influence of Grazing, Browsing, and Fire on the Vegetation of the Serengeti, In Serengeti Dynamics of an Ecosystem, Edited by A.R.E Barnes and Company, New York, 1976
Nuez, Cabeza de Vaca, The Journey of Alvar Nuez Cabeza de Vaca and His Companions for Florida to the Pacific 1528 – 1536, Edited with Introduction by A. F. Bandeleir, A.S. Barnes and Company, New York, 1905
Odum, E.P., Fundamentals of Ecology, 3rd Edition, W.B. Saunders Company, Philadelphia, 1971
Olmsted, Frederick Law, A Journey through Texas, Or, A Saddle-Trip on the Southwestern Frontier, University of Texas Press, Austin, Texas, 1857
Ormsby, Waterman L., The Butterfield Overland Mail, The Huntington Library San Marino, California, 1942
Parker, William B., Notes Taken during the Expedition through Unexplored Texas: With Capitan Randolph March and Major Robert S. Neighbors in 1854. Transcript given Archer County Soil Conservation Service by K.F. Neighbors
Parker, A.A., Trip to West and Texas, Comprising a Journey of 8,000 Miles, Through New York, Michigan, Illinois, Missouri, Louisiana and Texas in the Autumn and Winter of 1834 – 1835, 2nd Edition William White, Concord, New Hampshire 1836
Riskind, David H. & Diamond, David D., Edwards Plateau Vegetation, B Amos & F.R. Gehlbach, Baylor University Press, 1988

Roemer, F, Texas with Particular Reference to German Immigrants: The Physical Appearance of the Country, Standard Printing Company, San Antonio, Texas 1935
Sauer, C. O., Man's Dominance by Use of Fire, Geoscience and Man, 1975
Smeins, Fred E. & Diamond, David D., Composition, Classification and Species Response Patterns of Remnant Tallgrass Prairies in Texas, The American Midland Naturalist 113, The University of Notre Dame, Notre Dame, Indiana, 1985
Smeins, Fred E. & Diamond, David D., Remnant Grasslands of the Fayette Prairie, The American Midland Naturalist 110, The University of Notre Dame, Notre Dame, Indiana, 1983
Smith, Jared.G., Grazing problems in the Southwest and How to Meet Them, USDA, Division Agronomy, Bulletin No. 16, 1899
Spaeth, Kenneth E, Grazingland Hydrology Issues: Perspectives for the 21st Century, Published by the Society for Range Management, Denver, Colorado, 1996
Stefferud, Alfred, Grass: The Yearbook of Agriculture 1948, USDA, U. S. Government Printing Office, Washington 1948
Stoddart, Laurence A., Range Management, McGraw-Hill Book Company, Inc., New York, 1955
Terry, J. Dale, Explorations of the Big Wichita, Etc., Terry Bros., Printers, Wichita Falls, Texas August, 1962.
Tharp, B. C., Structure of the Texas Vegetation East of the 98th Meridian, University of Texas Bulletin No 2606, 1926
Unknown, Author, Saga of the Buffalo: From Multitudes to Near Extinction, Ranch Magazine, San Angelo, Texas November, 1994
Unknown, Timber of the Edwards Plateau of Texas, Cedar Brake Fires, More Cedars by Fire than by the Axe 1880 – 1904, USDA, Bulletin No. 49, Bureau of Forestry
Vasey, Dr. George, Report of an Investigation of the Forage Plants of Western Texas, USDA Publication, January 17, 1888, Houston, Texas
Vine, Robert A., Trees, Shrubs and Wood Vines of the Southwest, University of Texas, Austin, Texas, 1960
Webb, W. P., The Great Plains, Gossett and Dunlap, New York, 1965
Williams, Jesse Wallace, Old Texas Trails, USA, Eakin Press, Burnet, Texas 1979
Wright, Henry A., Fire Ecology: United States and Southern Canada, Awiley-Interscience Publication, New York, 1982

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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)	Lem Creswell, Zone RMS, NRCS, Weatherford Texas
Contact for lead author	817-596-2865
Date	08/25/2005
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Matched what is expected for this site, minimal evidence of past or current rills, vegetation common and no signs of erosion.

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2. **Presence of water flow patterns:** This site has minimal flow patterns, and minimal evidence of past or current soil deposition or erosion.

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3. **Number and height of erosional pedestals or terracettes:** Some very minor pedestalling may occur. Rarely should they be over 1/4 inch height.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 2 to 5 percent bare ground in small and non-connected areas.

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

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Minimal and short. Less than 6 inches. Only associated with water flow patterns following extremely high intensity rainfall.

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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):** Soil surface is stabilized by organic matter, decomposition products and/or a biological crust.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Dark grayish brown to very dark gray A horizon about 32 inches thick of moderately fine granular or moderate medium angular blocky structure.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** High grass canopy and basal cover with very small gaps between plants reduces raindrop impact and slows runoff providing increased time for infiltration. High vegetative cover on this site will result in more water retained in the soil for plant growth.

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 tall bunchgrasses >>

    Sub-dominant: Warm-season mid bunchgrasses >

    Other: Forbs > Shrubs = Trees > Warm-season shortgrasses

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal under normal weather conditions. Grasses almost always show some decadence and mortality if fire and grazing is eliminated.

14. **Average percent litter cover (%) and depth (in):** Litter is dominantly herbaceous and covers most of all plant and rock interspaces.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 4000 - 8000 #/ac. 4000 pounds in below average moisture years, 6000 pounds in normal years and 8000 pounds in above average moisture years.

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:** Ashe juniper, prickly pear, and mesquite are the primary invaders.

17. **Perennial plant reproductive capability:** All plants are capable of reproduction except during periods of prolonged drought conditions, heavy natural herbivory, and intense wildfires.
