USDA Natural Resources Conservation Service

Ecological site R078CY099TX
Draw 23-30" 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.

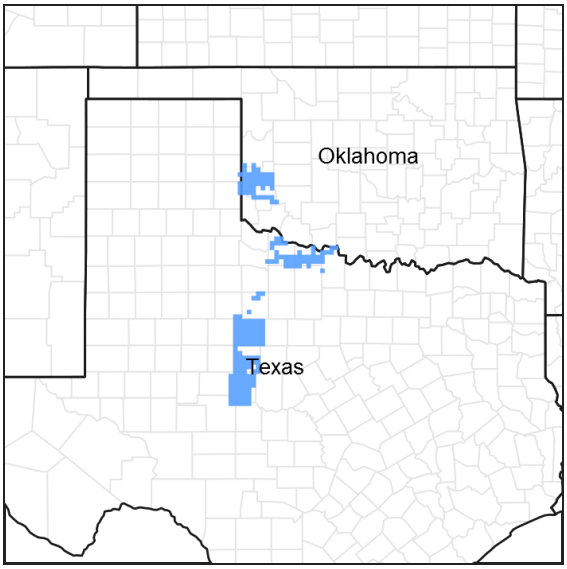


Figure 1. Mapped extent

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): 078C–Central Rolling Red Plains, Eastern Part

MLRA 78C is characterized by moderately dissected, rolling plains with prominent ridges and valleys and numerous terraces adjacent to dissecting streams. Loamy and clayey soils are generally deep, well drained, and developed in calcareous and gypsiferous sediments of 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

The Draw sites occur on clay loam soils on drainageways. The reference vegetation consist of midgrasses and forbs with few woody species. However, without brush management or prescribed fire, woody species may

encroach onto the site. Proper grazing management is essential to maintaining the reference vegetation on the site.

Associated sites

R078CY096TX	**Clay Loam 23-30" PZ** Clay Loam is often adjacent and uphill, draining onto the Draw site.
R078CY097TX	**Claypan 23-30" PZ** Claypan Prairie is often adjacent, draining onto the Draw site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Bouteloua curtipendula* (2) *Panicum obtusum*

Physiographic features

The Draw 23-30” PZ Ecological Site was formed in loamy and calcareous clayey alluvium and colluviums. The soils formed in clayey sediments several feet thick washed largely from clayey soils formed in Permian or Triassic red beds. These soils are on nearly level to very gently sloping floodplains of streams, outwash fans, and valley floors. Slopes are usually 0 to 1 percent, but range up to 3 percent. Elevation ranges from 1000 to 3000 feet.

Table 2. Representative physiographic features

Landforms	(1) River valley > Draw (2) River valley > Flood plain (3) River valley > Valley
Runoff class	Negligible to high
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	305–914 m
Slope	0–1%
Water table depth	183 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 78C lies within the subtropical sub-humid climate regime, which typically has dry winters with hot and not as humid summers. This regime is characterized by rapid changes in temperature; marked extremes, both daily and annual; and rather erratic rainfall.

This region lies in the path of polar air masses that move down from the north during the winter. With the passage of cold fronts during the fall and winter, abrupt temperature drops sometimes occur. While the area is subject to a wide range of temperature, winters are generally mild. Low humidity and good wind movements characterize the summers.

Wind speeds average more than eleven miles an hour with prevailing southern winds. Rather strong winds can occur in all months of the year. While strong gusty winds occur, severe dust storms are rare.

Normal rainfall averages 23 to 30 inches a year but distribution of rainfall patterns are so erratic short dry periods are common. The majority of the rainfall occurs as showers, rather than general rain events between March and November. Dry periods of three to four weeks can be expected during this time as well. Even if these dry conditions

occur, complete crop failures seldom results. May is the wettest month and December is the driest. Effective precipitation is low due to high temperatures, amounts received and intensity.

Table 3. Representative climatic features

Frost-free period (characteristic range)	164-199 days
Freeze-free period (characteristic range)	190-223 days
Precipitation total (characteristic range)	660-686 mm
Frost-free period (actual range)	148-201 days
Freeze-free period (actual range)	179-227 days
Precipitation total (actual range)	635-737 mm
Frost-free period (average)	183 days
Freeze-free period (average)	206 days
Precipitation total (average)	686 mm

Climate stations used

- (1) WILMORE 16SE [USC00148914], Coldwater, KS
- (2) MUTUAL [USC00346139], Mutual, OK
- (3) CLINTON SHERMAN AP [USW00003932], Dill City, OK
- (4) ALTUS AFB [USW00003981], Frederick, OK
- (5) MUNDAY [USC00416146], Munday, TX
- (6) ABILENE RGNL AP [USW00013962], Abilene, TX

Influencing water features

NA

Wetland description

NA

Soil features

Soils are mapped for each county within the MLRA. Mapunits are representations of the major soil series component(s) and named accordingly. Each Mapunit is spatially represented on a digital soils map as polygons of different shapes and sizes. Within these Mapunits, there are often minor soil series components included. These minor components are soils that occur within a Mapunit polygon but are of small extent (15% or less of the Mapunit area). However, it is difficult to separate these minor soils spatially due to the scale of soil mapping.

Ecological sites are correlated at the component level of the soil survey. Therefore, a single Mapunit may contain multiple Ecological Sites just as it may contain multiple soil components. This is important to understand when investigating soils and Ecological Sites. A soil survey Mapunit may be correlated to a single Ecological Site based on the major component; however, there may be inclusional areas of additional Ecological Sites which are correlated to the minor components of that particular soil Mapunit.

Representative soil components for this site include:
Gageby, Mangum, and Spur, Clairemont, Port and Wheatwood (these are all soils that may also be in other bottomland sites, but due to surface texture and plant community difference can be Draw.)

The soils in the Draw ecological site are very deep and well drained. Permeability is very slow to moderately slow. Runoff is negligible to high on slopes less than 1 percent and very low to high on 1 to 3 percent slopes. The soils overflow for brief periods about 1 or 2 times a year to once in 10 to 20 years. Occasional to frequent flooding may occur on this site. Water enters the soil rapidly when the soil is dry and cracks, but after the cracks are closed water

movement into the soil is very slow.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Clay loam (2) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Very slow to moderate
Soil depth	152–213 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	9.14–20.83 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The information contained in the State and Transition Diagram (STD) and the Ecological Site Description was developed using archeological and historical data, professional experience, and scientific studies. The information presented is representative of a very complex set of plant communities. Not all scenarios or plants are included. Key indicator plants, animals and ecological processes are described to inform land management decisions.

The Draw Ecological Site is found on second bottoms or on wide, gently concave drainage ways. The site often receives additional moisture as runoff from adjacent slopes and rarely overflow of the drainage way. The deep, fine textured soils often have alluvium or colluvial layers of soils on the surface which have been deposited more often by runoff from adjacent sites but sometimes overflow of the drainage way.

The reference plant community found on the site by settlers in the early 1800’s is assumed to have been a Midgrass Prairie Community (1.1) with occasional trees and shrubs scattered throughout the drainage way. This “Reference” plant community evolved under the influence of occasional flooding, periodic long droughts, grazing by bison, pronghorn antelope and other herbivores and frequent wildfires. It is postulated that fires occurred as often as at four to six-year intervals in this region (Frost 1998) prior to European settlement. Fire was likely the most influential disturbance in shaping the vegetation into an open Midgrass Prairie Community (1.1). It interacted with the climatic regime and intermittent heavy grazing to favor grasses over woody plants and forbs (Brown and Smith 2000). Midgrasses, such as vine-mesquite , sideoats grama, Arizona cottontop characterized the Midgrass Prairie Community. Texas wintergrass and western wheatgrass were also common midgrasses. Tobosa occurred in small amounts in the western or drier sides, of the MLRA but was absent east of the 25-inch rainfall line. Sedges and tallgrasses including little bluestem, sand bluestem and switchgrass occupied the infrequent depressions and wetter areas along the drainage. Trees, such as hackberry, American elm, Osage orange, western soapberry and shrubs and vines were scattered along the drainage or clumped where depressions provided extra water and protection

from fire. See the “Species Composition List” table below for the estimated species composition and production values.

The Midgrass Prairie Community (1.1) was relatively stable and resilient within the climate, multi-species grazing and fire regime until European settlement in the 1850s (Milchunas 2006). By the early 1800s horses, cattle and sheep that had escaped from early Spanish missions had begun putting increased grazing pressure on the plant community. European settlement in the mid 1800’s brought elimination of the bison herd, reduction of the antelope and deer herds, removal of the American Indian and a large increase of domestic livestock. The development of the windmill and barbed wire fencing during the 1870s helped spread overgrazing by livestock throughout the region. Overstocking by domesticated livestock induced a reduction of more palatable grasses and forbs and allowed less palatable, or more grazing resistant, grasses and forbs increase. Total herbage production declined as grazing resistant shortgrasses and forbs began replacing the midgrasses and forbs. Texas wintergrass, meadow dropseed and buffalograss were early increasers under grazing. There was a concomitant decline in vegetative ground cover, mulch and soil organic matter and an increase in bare soil and runoff. The shift in composition of the plant cover and decline in soil properties favored woody plant encroachment. This, along with the reduction in intensity and frequency of fires, allowed invasion of species from adjacent sites or the increase of more grazing resistant endemic species. Under the above scenario, the Midgrass Prairie Community (1.1) transitioned into a Mixed-grass Prairie Community (1.2) where grasses dominated but the encroaching woody species contributed an increasing amount to the annual production of the plant community.

If the Mixed-grass Prairie Community is continuously overgrazed and fire is excluded the transition toward woody plant dominance continues. The primary encroaching woody species are mesquite and pricklypear. Salt cedar and juniper can also become invasive on this site. Tobosa (in the west), buffalograss and other unpalatable or more grazing resistant grasses increase while palatable historic forbs and midgrasses decline. Grass cover, litter and soil organic matter decline as bare ground, erosion and other desertification processes increase. When the woody plant component reaches approximately 15% percent of the annual production, grazing management strategies, such as rest from grazing alone, generally will not reverse the transition to shrubland. A combination of proper grazing, timely prescribed burning and selective control of fire resistant woody species can be successful in maintaining the grass dominant community, however. With continued livestock grazing and no brush management the Mixed-grass Prairie Community (1.2) transitions into a Shortgrass/Mixed-brush Community (2.1), where shortgrass and cool-season grasses persist but woody plants begin to dominate the structure and function of the plant community.

Mesquite and pricklypear usually characterize the woody cover of the Shortgrass/Mixed-brush Community (2.1), but other woody species are present. There may be occasions where western soapberry, hackberry or elm form thickets. Bumelia, pricklyash and wolfberry are characteristic understory shrubs. American elm and hackberry trees increase in size, but are infrequent. The grass component is a mixture of shortgrasses, midgrasses, cool season grasses and low quality forbs, initially. Buffalograss and blue grama are persistent initially but with continued livestock overgrazing they are gradually replaced by less palatable species such as threeawn, white tridens and meadow dropseed. Cool-season grasses, such as Texas wintergrass, are persistent. Japanese brome and other winter annuals occupy the increasing amount of bare ground, especially following wet winters. During this stage, the transition to shrubland can be reversed, with considerable effort, by mechanical and/or chemical brush control methods and prescribed grazing management that provides fine fuel loadings necessary for prescribed burning. Prescribed burning generally does not kill mesquite once plants reach >2 years of age, but fire can suppress mesquite of any age if the fire can cause top kill. Slick-bark mesquite is more susceptible. Prescribed burning/chemical control systems have been developed to aid in enhancing and utilizing this vegetation type.

If abusive grazing by livestock continues and brush control practices are not applied, the woody component will increase in size and density. The grassland component will not produce enough fine fuel for fires to effectively suppress the woody plants when the woody plant canopy cover reaches about 30 to 35 percent. At this point, the site completes the transition into a new plant community type, the Mixed-brush/Shortgrass/Annuals Community (2.2). This plant type is dominated by mesquite and mixed-brush to the exclusion of most reference herbaceous species. Buffalograss, threeawns, tobosa, alkali sacaton and annuals persist in the woody plant interspaces. Texas wintergrass is common under protection of shrubs and trees. Once canopy cover exceeds 35 to 50 percent woody plant cover, forage production is very limited except in wet periods when annuals provide extra forage. Shortgrasses and cool-season grasses and forbs are present but sparse due to shading and competition from the woody plants. Mesquite and understory brush continue to increase in size and density regardless of grazing management. Desertification, including soil and fertility erosion, continues in the interspaces until maximum ground cover by woody species is approached. Once shrub cover reaches potential, the hydrologic processes, energy flow and

nutrient cycling stabilize under the woody vegetation environment (Thurow 1991).

Major expense and energy are required to restore the Mixed-brush/Shortgrass/Annuals Community (2.2) back to a Grassland state. Restoration of site in this stage is very difficult to accomplish because of soil characteristics. An integrated approach is required. Mechanical or herbicidal treatments such as dozing, individual plant treatments (IPT), herbicide spraying and range planting followed by grazing deferment, prescribed grazing and prescribed burning, are essential for the site to return to near the postulated reference community. The brushy species, namely mesquite, are hard to control with herbicides on this site. Re-invasion occurs due to the residual seed bank. Mechanical control such as grubbing or root plowing can destroy the perennial grass cover and more often than not, annuals prevail for two or three years, even with reseeding. The restoration process may take several years of repeated treatments. Therefore, maintaining the site in at least the Shortgrass/Mixed–brush Community (2.1) stage, or better, the Mixed-grass Prairie (1.2) stage, through proper stocking and brush management, including the use of prescribed burning, is recommended.

State and Transition Diagram:
A State and Transition Diagram for the Draw (R078CY099TX) site is depicted below. Thorough descriptions of each state, transition, and pathway follow the model. Experts base this model on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.
Plant communities will differ across the MLRA because of the natural variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal; other vegetative states may be desired plant communities as long as the Range Health assessments are in the moderate and above category.

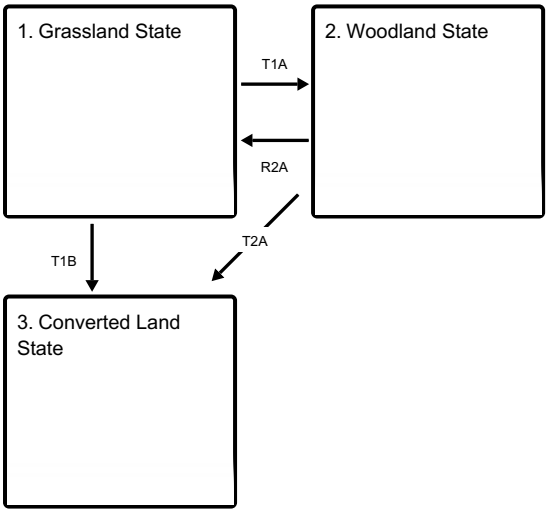
The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Composition by dry weight and percent canopy cover are provided to describing the functional groups. Most observers find it easier to visualize or estimate percent canopy for woody species (trees and shrubs).

The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances. It does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

State and transition model

Ecosystem states



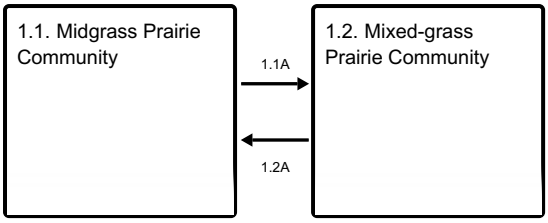
T1A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

T1B - Extensive soil disturbance followed by seeding

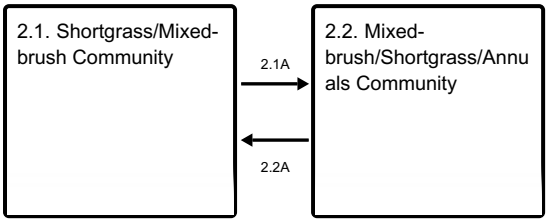
R2A - Adequate rest from defoliation and removal of woody canopy, followed by reintroduction of historic disturbance regimes

T2A - Extensive soil disturbance followed by seeding

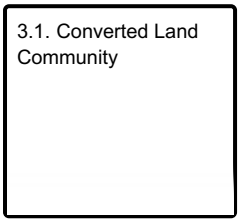
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Grassland State

The Midgrass Prairie Community (1.1) was an open prairie community dominated by midgrasses. Trees such as hackberry, western soapberry, American elm and Osage orange grew along the drainage ways and areas protected from fires. The most common midgrasses are thought to have been sideoats grama, vine mesquite, cane or silver bluestem, meadow dropseed, Arizona cottontop, and white tridens. Buffalograss and blue grama were common shortgrasses with lesser amounts of plains bristlegrass and sand dropseed. Texas wintergrass, Canada wildrye and western wheatgrass were important parts of the midgrass and cool-season grass component. Alkali sacaton was common where soil salt accumulations were high and sedges were present in most depressions. Forbs included Engelmann daisy, Maximilian sunflower, Illinois bundleflower, bush sunflower, and annual forbs. Shrubs and vines were scarce but probably included fire resistant species such as catclaw acacia, bumelia, ephedra, greenbriar and lotebush. (See plant community composition table below for complete listing of probable climax species.) The Midgrass Prairie Community (1.1) produced as much as 5000 pounds herbage in good moisture years and as little as 2000 pounds in dry years. Grasses and forbs contributed up to 90 percent of the total annual production in reference conditions. The Mixed-grass Prairie Community (1.2) is a grassland community being invaded by woody species that had previously been held at low densities by repeated fires, infrequent droughts and competition from a vigorous grass component. With continuous heavy grazing the more palatable plants are consumed more readily than less palatable ones. When they are subjected to repeated over-utilization they lose their competitive advantage and are replaced by less palatable or more grazing resistant species. Western wheatgrass and Canada wildrye generally decline with overgrazing. Most of the perennial forbs remain in this plant community, although in lesser amounts. Saline conditions may occur in overgrazed areas, resulting in increased amounts of alkali sacaton. Salt cedar can invade this site where saline conditions develop. The encroaching woody species are generally less than four feet tall and subject to control by prescribed burning in conjunction with proper stocking and grazing management. The woody canopy varies between five and 15 percent depending on length and severity of grazing, timing and frequency of fires and seed availability of invading species. Typically, mesquite, pricklypear, lotebush, wolfberry and bumelia were early and persistent encroaching woody species. Annual primary production is reduced slightly relative to the reference community, ranging from 2000 to 4000 pounds per acre.

Community 1.1
Midgrass Prairie Community

Figure 8. 1.1 Midgrass Prairie Community

The Midgrass Prairie Community (1.1) is the interpretative plant community for the Draw Ecological Site in MLRA 78C. It was an open prairie dominated by midgrasses. Trees such as hackberry, western soapberry, American elm and Osage orange grew along the drainage ways and areas protected from fires. The most common midgrasses are thought to have been sideoats grama, vine mesquite, cane or silver bluestem, meadow dropseed, Arizona cottontop, and white tridens. Buffalograss and blue grama were common shortgrasses with lesser amounts of plains bristlegrass and sand dropseed. Texas wintergrass, Canada wildrye and western wheatgrass were important parts of the midgrass and cool-season grass component. Alkali sacaton was common where soil salt accumulations were high and sedges were present in most depressions. Forbs included Engelmann daisy, Maximilian sunflower, Illinois bundleflower, bush sunflower, evening primrose, western ragweed, heath aster, gaura, verbena, greenthread, trailing ratany and annual forbs. Shrubs and vines were scarce but probably included fire resistant species such as catclaw acacia, hawthorn, bumelia, wolfberry, ephedra, greenbriar and lotebush. (See plant community composition table below for complete listing of probable species.) The Midgrass Prairie Community (1.1) produced as much as 5000 pounds herbage in good moisture years and as little as 2000 pounds in dry years. Grasses and forbs contributed up to 90 percent of the total annual production in reference conditions. The midgrasses aided in the infiltration of rainfall into the moderately permeable soil and reduced runoff. The Midgrass Prairie Community (1.1) furnished good forage for grass-eating type animals such as bison before settlement and for horses and cattle after settlement. Near reference grassland conditions can be maintained with proper stocking, prescribed grazing and frequent prescribed burning. Stocking rates must consider the kind of livestock and balance their numbers with current annual forage production and competition from other herbivores. Flexibility in animal numbers is important because of the nature of the soil and infrequent flooding events. Under the present climate livestock overgrazing, decrease in intensity and frequency of fires and no brush management will allow this plant community to transition into a Mixed-grass Prairie Community (1.2), which is relatively open grassland with various amounts of invading shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2018	3531	5044
Forb	112	196	280
Tree	67	118	168
Shrub/Vine	45	78	112
Total	**2242**	**3923**	**5604**

Figure 10. Plant community growth curve (percent production by month). TX2280, Midgrass Prairie Community. Warm-season native grassland with some cool-season grasses..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	3	6	15	25	20	5	3	12	7	2	1

Community 1.2
Mixed-grass Prairie Community

Figure 11. 1.2 Mixed-grass Prairie Community

The Mixed-grass Prairie Community (1.2) is a grassland community being invaded by woody species that had previously been held at low densities by repeated fires, infrequent droughts and competition from a vigorous grass component. It is the Midgrass Prairie Community (1.1), a grassland, in transition toward a shrubland. The Mixed-grass Prairie Community is the result of continuous heavy grazing which reduced grass cover, exposed soil and reduced the frequency and intensity of fires. With continuous heavy grazing the more palatable plants are consumed more readily than less palatable ones. When they are subjected to repeated over-utilization they lose their competitive advantage and are replaced by less palatable or more grazing resistant species. Buffalograss, blue grama, white tridens, alkali sacaton, vine mesquite, silver bluestem and tobosa (where present originally) persist in this vegetation type. Texas wintergrass may increase on some areas, especially in and around woody plants, in response to shading or possibly climate change toward more cool-season precipitation. Western wheatgrass and Canada wildrye generally decline with overgrazing. Most of the perennial forbs remain in this plant community, although in lesser amounts. Saline conditions may occur in overgrazed areas, resulting in increased amounts of alkali sacaton. Salt cedar can invade this site where saline conditions develop. The encroaching woody species are generally less than four feet tall and subject to control by prescribed burning in conjunction with proper stocking and grazing management. The woody canopy varies between five and 15 percent depending on length and severity of grazing, timing and frequency of fires and seed availability of invading species. Typically, mesquite, pricklypear, lotebush, wolfberry and bumelia were early and persistent encroaching woody species. Annual primary production is reduced slightly relative to the reference community, ranging from 2000 to 4000 pounds per acre depending on precipitation amounts and soil conditions. Grasses remain the dominant producers of forage, but the proportion that is woody species is increasing. The amount of litter and mulch is reduced with continuous overgrazing and more bare ground occurs. The exposed soil crusts easily and is subject to erosion. There could be some mulch and litter movement during flooding events. The Mixed-grass Prairie Community is relatively stable and the change in species composition is small initially, but if overgrazing continues the invading species continue to increase in size and density. Once the woody plants become dense enough (>15 %) to suppress grass growth and/or big enough (> 4 feet) to resist fire damage the Mixed-grass Prairie Community (1.2) transitions into the Shortgrass/Mixed-brush Community (2.1). At this threshold the fine fuel load provided by grasses is too low to control brush effectively with prescribed burning alone.

Table 6. Annual production by plant type

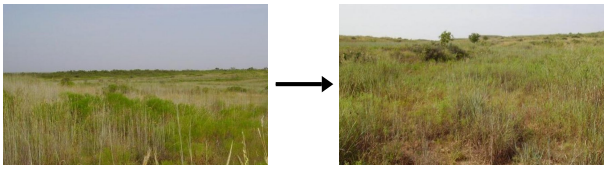
Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1793	2690	3587
Shrub/Vine	224	336	448
Tree	112	168	224
Forb	112	168	224
Total	**2241**	**3362**	**4483**

Figure 13. Plant community growth curve (percent production by month).

TX2284, Mixedgrass Prairie with Forbs . Warm-season rangeland with some cool-season species along with some shrubs and trees component..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	5	15	25	20	4	5	15	5	2	1

Pathway 1.1A
Community 1.1 to 1.2

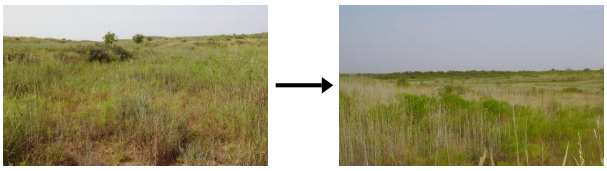


Midgrass Prairie Community

Mixed-grass Prairie Community

With heavy continuous grazing, no fires, brush invasion, and no brush management, the Midgrass Prairie Community will shift to the Mixed-grass Prairie Community.

Pathway 1.2A
Community 1.2 to 1.1



Mixed-grass Prairie Community

Midgrass Prairie Community

With Prescribed Grazing and Prescribed Burning conservation practices implemented, the Mixed-grass Prairie Community can be restored to the Midgrass Prairie Community.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Woodland State

The Shortgrass/Mixed-brush Community (2.1) is comprised of woody species producing 15 to 35 percent of the annual production. The diversity of the grassland component has declined while unpalatable woody plants and forbs increase. All, but the more palatable woody species, have increased in size and density. The typical woody plant cover is a mesquite dominant overstory with pricklypear, lotebush, ephedra, and lotebush as common understory shrubs. Tobosa dominates the herbaceous layer in the interspaces between trees and shrubs in the western portion of the MLRA where it was present originally. Buffalograss becomes dominant elsewhere. Remnants of reference community grasses and forbs and less palatable species such as alkali sacaton, vine-mesquite, meadow dropseed, threeawn, silver bluestem, white tridens and annuals occur in the woody plant interspaces. Some forbs are found in this community. Cool-season grasses, such as Texas wintergrass and Canada wildrye, are persistent under and around woody plants where shading occurs and they are protected from grazing. Annual herbage production ranges from approximately 1800 to 3750 pounds per acre. The Mixed-brush/Shortgrass/Annuals Community (2.2) is a usually a mesquite-dominated shrubland with hackberry and American elm trees along the stream line. Other trees such as western soapberry, Osage orange or oaks may be scattered throughout the drainage. Salt cedar is often invasive in wetter places. Junipers may also invade the site. Remnants of the climax grassland vegetation, mostly tobosa (in western portion) and/or buffalograss, cool-season grasses and annuals, occupy the shrub interspaces. Alkali sacaton is found where saline conditions have developed. As this plant community nears maturity, trees and shrubs provide 75 percent or more canopy cover and dominate biomass production. Annual primary production is approximately 1800 to 4000 pounds per acre.

Community 2.1
Shortgrass/Mixed-brush Community

Figure 14. 2.1 Shortgrass/Mixed-brush Community

The Shortgrass/Mixed-brush Community (2.1) is the result of selective grazing by livestock, the differential response of plants to defoliation and the increase in size and density of unpalatable brush. Woody species produce 15 to 35 percent of the annual production. The diversity of the grassland component has declined while unpalatable woody plants and forbs increase. All, but the more palatable woody species, have increased in size and density. The typical woody plant cover is a mesquite dominant overstory with pricklypear, wolfberry, lotebush, ephedra, pricklyash, tasajillo and lotebush as common understory shrubs. Western soapberry, hackberry and American may be found along the lower portions of the drainage. Tobosa dominates the herbaceous layer in the interspaces between trees and shrubs in the western portion of the MLRA where it was present originally. Buffalograss becomes dominant elsewhere. Remnants of climax grasses and forbs and less palatable species such as alkali sacaton, vine-mesquite, meadow dropseed, threeawn, silver bluestem, white tridens and annuals occur in the woody plant interspaces. Where present, tobosa remains dominant, but as regression progresses under heavy grazing pressure, tobosa gives way to buffalograss and other less palatable shortgrasses and forbs. Gaura, aster, dotted gayfeather, Indian rushpea western ragweed, verbena, greenthread and, upright prairie coneflower are commonly found in this community. Cool-season grasses, such as Texas wintergrass and Canada wildrye, are persistent under and around woody plants where shading occurs and they are protected from grazing. Annual herbage production ranges from approximately 1800 to 3750 pounds per acre, depending on precipitation events, flooding events and dry cycles. Annual herbage production is somewhat less than in the Mixed-grass Community (1.2) due to decline in soil structure, organic matter, and reduced rainfall capture. Herbaceous production and woody plant production are about equal. As the grassland component declines, more soil is exposed to crusting and erosion. During the middle and later stages of this plant community phase, considerable soil becomes exposed. Water erosion is not a serious problem because of shallow slopes on the site, but erosion can be rather high in bare spots created in depressions during flooding events. Higher interception loss of water by the increasing woody canopy combined with evaporation losses reduces the effectiveness of rainfall. Litter, soil organic matter and soil structure decline in the interspaces reducing water infiltration but hydrologic conditions improve under the woody plant cover. When the woody plant cover reaches 35 to 40 percent and the herbaceous component contributes less than 50 percent of the herbage production, the Shortgrass/Mixed-brush Community (2.1) transitions into a Mixed-brush/Shortgrass/Annuals Community (2.2). At this threshold the mixed-brush component begins to dominate ecological functions within the community and major economic and energy inputs in the form of brush management and reseeding are required to reverse the process.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1110	1696	2312
Shrub/Vine	504	770	1050
Tree	202	308	420
Forb	202	308	420
Total	**2018**	**3082**	**4202**

Figure 16. Plant community growth curve (percent production by month). TX2285, Shortgrass/Mixedbrush Community. Shortgrasses, annual grasses and shrubs dominate the plant community..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	3	6	15	24	18	3	5	15	7	2	1

Community 2.2
Mixed-brush/Shortgrass/Annuals Community

Figure 17. 2.2 Mixed-brush/Shortgrass/Annuals Community

The Mixed-brush/Shortgrass/Annuals Community (2.2) is a usually a mesquite-dominated shrubland with hackberry and American elm trees along the stream line. Other trees such as western soapberry, Osage orange or oaks may be scattered throughout the drainage. Carolina snailseed, ivy treebine, greenbriar, plum, lotebush and pricklypear are common understory shrubs or vines. Salt cedar is often invasive in wetter places. Junipers may also invade the site. Remnants of the climax grassland vegetation, mostly tobosa (in western portion) and/or buffalograss, cool season grasses and annuals, occupy the shrub interspaces. Alkali sacaton is found where saline conditions have developed. This community is the result of long term overgrazing by livestock and wildlife, absence of natural fires and the differential response of plants to defoliation. Tobosa or buffalograss remain dominant in the herbaceous layer initially, but with heavy continuous grazing give way to less palatable grasses, such as threeawns, meadow dropseed, sand dropseed, white tridens, tumblegrass and weedy annuals. Dotted gayfeather, aster, pricklypoppy, dayflower, western ragweed, gaura, sida, Louisiana sagewort, Indian rushpea, and verbena are common forbs. Cool-season grasses such as Texas wintergrass and Canada wildrye can be found under and around woody plants. Annual broomweed, spiny cocklebur, curlycup gumweed and annual sunflowers are common, especially following unusually wet winters. As this plant community nears maturity, trees and shrubs provide 75 percent or more canopy cover and dominate biomass production. Annual primary production is approximately 1800 to 4000 pounds per acre, primarily by the woody plant and cool-season component. The herbaceous component, including cool-season grasses, contributes less than 30 percent of the annual production. Browsing animals such as deer can find fair quantity of food, but most of the woody species are considered secondary choice browse for deer. Forage quantity and quality for cattle in this plant community are low, however. Livestock stocking decisions should consider the forage species composition, quantity of available forage and rangeland health in making stocking rate decisions. Without brush control, the Mixed-brush/Shortgrass/Annuals Community will complete its transition to dense woodland regardless of proper stocking or prescribed grazing. Unless brush management is applied, the transition toward dense shrubland will continue until the woody plant community stabilizes. Restoration and conservation

practices for the Mixed-brush/Shortgrass/Annuals Community for livestock or wildlife production include: (a) brush management to remove undesirable brush species, (b) range planting of native species to return vegetation back to near climax and (c) establish prescribed grazing and prescribed fire and other conservation practices to maintain the health of the desired plant community. Caution should be applied in choosing brush control and seeding methods.

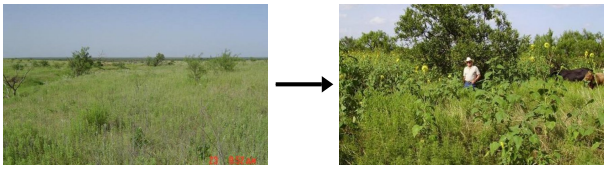
Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	841	1681	2522
Grass/Grasslike	420	841	1261
Tree	336	673	1009
Forb	84	168	252
Total	**1681**	**3363**	**5044**

Figure 19. Plant community growth curve (percent production by month). TX2291, MixedBrush/Shortgrass/Annuals Community. Spring & Fall growth of grasses, annuals and woody shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	6	10	20	22	6	8	12	10	2	1

Pathway 2.1A
Community 2.1 to 2.2



Shortgrass/Mixed-brush Community

Mixed-brush/Shortgrass/Annuals Community

The community phase shifts to the Mixed-brush/Shortgrass/Annuals Community when there is heavy continuous grazing, no fires, and no brush management. When the woody plant canopy reaches 35 to 40 percent, the Shortgrass/Mixed-brush Community (2.1) will transition into a Mixed-brush/Shortgrass/Annuals Community (2.2).

Pathway 2.2A
Community 2.2 to 2.1

Mixed-brush/Shortgrass/Annuals Community

Shortgrass/Mixed-brush Community

With the implementation of Brush Management and Prescribed Grazing conservation practices, the Mixed-Brush/Shortgrass/Annuals Community will shift to the Shortgrass/Mixed-brush Community.

Conservation practices

Brush Management
Prescribed Grazing

State 3
Converted Land State

Site is converted into cropland or pastureland using native or introduced grass species. Land is also abandoned and let go back into a brush invaded community.

Community 3.1
Converted Land Community

The Draw Ecological Site is often Cultivated (3.1) and planted to crops. Technical advice as to adapted crops, cropping systems, production, and cultivation practices are available from local NRCS or Extension Service offices. When abandoned from cropping, the site should be re-vegetated with adapted native plant mixtures, which include reference species. Cultivation and erosion may have reduced soil productivity but near reference forage production may be obtained with a native plant mix that approximates reference specie composition. Introduced species often require more care, but can also be productive as pasture. In any case brush management is required to prevent brush invasion from adjacent areas. If fields are abandoned and left to re-vegetate naturally, weedy grasses, forbs and shrubs will be the first species in secondary succession. Woody species will encroach and eventually dominate unless brush management practices such as individual plant treatments (IPT) and prescribed burning are applied.

Figure 20. Plant community growth curve (percent production by month). TX2252, Small Grains. Cool-season small grain crops..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5	5	10	10	5	0	0	0	20	25	15	5

Figure 21. Plant community growth curve (percent production by month). TX2264, Warm-season Pasture Grasses. warm-season pasture grasses having nutrient management, pest management, and prescribed grazing..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	5	12	25	20	5	5	14	8	2	1

Transition T1A
State 1 to 2

If overgrazing continues the invading species continue to increase in size and density. Once the woody plants become dense enough (>15 %) to suppress grass growth and/or big enough (> 4 feet) to resist fire damage the Mixed-grass Prairie Community (1.2) transitions into the Shortgrass/Mixed-brush Community (2.1). At this threshold the fine fuel load provided by grasses is too low to control brush effectively with prescribed burning alone.

Transition T1B
State 1 to 3

With brush removal practices, crop cultivation, plowing, pasture planting, pest management and nutrient management, the Grassland State can be converted into the Converted Land State.

Restoration pathway R2A
State 2 to 1

Restoration and conservation practices for the Woodland State to the Grassland State include: (a) brush management to remove undesirable brush species, (b) range planting of native species to return vegetation back to near reference conditions and (c) establish prescribed grazing and prescribed fire and other conservation practices to maintain the health of the desired plant community.

Conservation practices

Brush Management
Prescribed Burning

Range Planting
Prescribed Grazing

Transition T2A
State 2 to 3

With Crop Cultivation, Plowing, Range Planting, Pasture Planting, Pest Management, Nutrient Management and Prescribed Grazing conservation practices, the Woodland State will transition to the Converted Land State.

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	**Tallgrasses**			22–56	
	big bluestem	ANGE	*Andropogon gerardii*	22–56	–
	switchgrass	PAVI2	*Panicum virgatum*	22–56	–
	little bluestem	SCSC	*Schizachyrium scoparium*	22–56	–
	Indiangrass	SONU2	*Sorghastrum nutans*	22–56	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	22–56	–
2	**Midgrasses**			1345–3923	
	sideoats grama	BOCU	*Bouteloua curtipendula*	392–1121	–
	vine mesquite	PAOB	*Panicum obtusum*	392–1009	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	0–224	–
	alkali sacaton	SPAI	*Sporobolus airoides*	50–224	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	50–224	–
	white tridens	TRAL2	*Tridens albescens*	50–224	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	50–224	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	50–224	–
	Arizona cottontop	DICA8	*Digitaria californica*	50–224	–
3	**Shortgrasses**			13–280	
	buffalograss	BODA2	*Bouteloua dactyloides*	13–56	–
	blue grama	BOGR2	*Bouteloua gracilis*	13–56	–
	beaked panicgrass	PAAN	*Panicum anceps*	13–34	–
	tumblegrass	SCPA	*Schedonnardus paniculatus*	13–34	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	13–34	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	13–34	–
	purple threeawn	ARPU9	*Aristida purpurea*	13–34	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	13–34	–
4	**Cool-season grasses**			101–841	
	Canada wildrye	ELCA4	*Elymus canadensis*	101–224	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	101–224	–
	western wheatgrass	PASM	*Pascopyrum smithii*	101–224	–

	sedge	CAREX	*Carex*	34–168	–
Forb					
5	**Forbs**			112–280	
	Drummond's onion	ALDR	*Allium drummondii*	4–11	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	4–11	–
	anemone	ANEMO	*Anemone*	4–11	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	4–11	–
	aster	ASTER	*Aster*	4–11	–
	milkvetch	ASTRA	*Astragalus*	4–11	–
	purple poppymallow	CAINI4	*Callirhoe involucrata var. involucrata*	4–11	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	4–11	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	4–11	–
	beeblossom	GAURA	*Gaura*	4–11	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	4–11	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	4–11	–
	Indian rushpea	HOGL2	*Hoffmannseggia glauca*	4–11	–
	trailing krameria	KRLA	*Krameria lanceolata*	4–11	–
	dotted blazing star	LIPU	*Liatris punctata*	4–11	–
	littleleaf sensitive-briar	MIMI22	*Mimosa microphylla*	4–11	–
	evening primrose	OENOT	*Oenothera*	4–11	–
	groundcherry	PHYSA	*Physalis*	4–11	–
	knotweed	POLYG4	*Polygonum*	4–11	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	4–11	–
	awnless bushsunflower	SICA7	*Simsia calva*	4–11	–
	globemallow	SPHAE	*Sphaeralcea*	4–11	–
	greenthread	THELE	*Thelesperma*	4–11	–
	prairie spiderwort	TROC	*Tradescantia occidentalis*	4–11	–
	vervain	VERBE	*Verbena*	4–11	–
Shrub/Vine					
6	**Shrubs/Vines**			45–112	
	fourwing saltbush	ATCA2	*Atriplex canescens*	3–17	–
	plum	PRUNU	*Prunus*	3–11	–
	gum bully	SILA20	*Sideroxylon lanuginosum*	3–11	–
	greenbrier	SMILA2	*Smilax*	3–8	–
	Texas Hercules' club	ZAHI2	*Zanthoxylum hirsutum*	3–8	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	3–8	–
	sorrelvine	CITR2	*Cissus trifoliata*	3–8	–
	Carolina coralbead	COCA	*Cocculus carolinus*	3–8	–
	hawthorn	CRATA	*Crataegus*	3–8	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	3–8	–
	jointfir	EPHED	*Ephedra*	3–8	–
	desert-thorn	LYCIU	*Lycium*	3–8	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	3–8	–

	pricklypear	OPUNT	*Opuntia*	3–8	–
Tree					
7	**Trees**			67–168	
	hackberry	CELTI	*Celtis*	13–34	–
	Osage-orange	MAPO	*Maclura pomifera*	13–34	–
	eastern cottonwood	PODE3	*Populus deltoides*	13–34	–
	post oak	QUST	*Quercus stellata*	13–34	–
	western soapberry	SASAD	*Sapindus saponaria var. drummondii*	13–34	–
	American elm	ULAM	*Ulmus americana*	13–34	–

Animal community

Many types of wildlife use the Reference Plant Community of the Draw Ecological Site. Being located on second bottoms or gently concave drainage ways, it probably received concentrated animal use at times. Bison are presumed to have utilized the site heavily during migrations prior to European settlement. Grassland insects, reptiles, birds and mammals frequented the site, either as their base habitat or from the adjacent sites. Small mammals included many kinds of rodents, jackrabbit, cottontail rabbit, raccoon, skunk, opossum and armadillo. Predators included coyote, fox and bobcat. 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. White-tailed deer and mule deer utilize the Draw site in its various states.

The site in reference condition is very suited to primary grass eaters such as cattle. As retrogression occurs and woody plants invade it becomes better habitat for a mixture of cattle, sheep, goats, deer and other wildlife because of the browse and cool season grasses. Sheep and goats are seldom pastured in the MLRA, however. Deer, turkey and quail particularly favor the habitat provided by the Shortgrass/Mixed-brush Community. 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 proper stocking and good wildlife population management the site will transition into the Mixed-brush/Shortgrass/Annuals Community (2.2). The late Mixed-brush/Shortgrass/Annuals phase offers good wildlife cover but low preference deer food and limited livestock forage. The Mixed-grass Prairie Community (1.2) or Shortgrass/Mixed-brush (2.1) might be most productive if both livestock and wildlife are to be optimized.

Hydrological functions

The Draw Ecological Site is a gently sloping second bottom or concave drainage way. It may receive water from uphill sites or may be covered with by water during flooding events. Flooding occurs once or twice a year to once in 10 to 20 years. Soil moisture holding capacity is high. The soil generally cracks to great depth when dry, allowing rapid water intake when rainfall occurs on dry soil. When moist the soil is moderate to slowly permeable, however. Essentially no water passes through the soil profile to underground water.

Under reference condition, the grassland vegetation probably intercepted and utilized much of the incoming rainfall in the soil profile. Litter and soil movement was slight. Standing plant cover, duff and organic matter decrease as the Midgrass Prairie Community (1.1) transitions to the Mixed-grass Prairie Community (1.2). These processes continue in the spaces between woody plants in the Shortgrass/Mixed-brush Community (2.1) and the Mixed-brush/Shortgrass/Annuals Community (2.2). Once the shrubland matures, the hydrologic and ecological processes, nutrient cycling and energy flow stabilize within the woody plant canopy. Evaporation and interception losses are higher, however, resulting in less moisture reaching the soil.

Recreational uses

The Draw site, in conjunction with surrounding sites, is well suited for many outdoor recreational uses including recreational hunting, hiking, camping, equestrian and bird watching. This site along with adjacent upland sites provides diverse scenic beauty and many opportunities for recreation and hunting.

Wood products

Mesquite is sometimes used for posts and charcoal. It is also used for furniture and specialty products. Osage orange produces a very hard wood. It was used by Native American Indians for bows and arrows and subsequently by settlers for posts and building materials.

Other products

Jams and jellies are made from fruit bearing species. Seeds are harvested from many plants for commercial sale. Grasses and forbs may be 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

Information presented has been derived from Draw RSD 36-46 (Area 3, dated 3/1/74) Draw RSD (Area 8 dated 11/24/71), literature, personal experience, field observations and personal contacts with range-trained personnel. Photos by: J.L. Schuster --taken on Waggoner Ranch, Baylor and Wilbarger Counties and Jones County, TX. July 2007.

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Other references

1. Archer S. 1994. Woody plant encroachment into southwestern grasslands and savannas: rates, patterns and proximate causes. In Ecological implications of livestock herbivory in the West, pp.13-68. Edited by M. Vavra, W. Laycock, R. Pieper, Society for Range Management Publication. , Denver, CO.
2. Brown, J.K. and J.K. Smith (Editors). 2000. Wildland fire in Ecosystems; effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden. UT: U.S.D.A., Forest Service, Rocky Mtn. Sta. 257p.
3. Frost, C. C. 1998. Pre-settlement fire frequency regions of the United States: A first approximation. Tall Timbers Fire Ecology Conference Proceedings No. 20
4. Milchunas, D.G. 2006. Responses of Plant Communities to grazing in the southwestern United States. USDA-Forest Service. Rocky Mtn. Sta. GTR. 169
5. Thurow T.L., 1991. Hydrology and erosion. Chapter 6 in: Grazing Management: An Ecological Perspective Edited by: R.K. Heitschmidt and J.W. Stuth. Timber Press, Portland, Oregon.
6. USDA/NRCS Soil Survey Manuals for Knox, Baylor and Haskell Counties, Texas.
7. Plant symbols, common names and scientific names according to USDA/NRCS Texas Plant List (Unpublished)
8. Bestelmeyer, B. T., J.R. Brown, K. M. Havsted, R. Alexander, G. Chavez and J. E. Hedrick. 2003. Development and use of state-and-transition models for rangelands. J. Range Management. 56(2): 114-126.
9. Hamilton W. and Darrell Ueckert. 2005. Rangeland Woody Plant Control--Past, Present, and Future.Ch 1 in: Brush Management-Past, Present, and Future. Texas A & M University Press. Pp.3-16.

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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)	Lem Creswell, Zone RMS, NRCS, Weatherford, Texas
Contact for lead author	817-596-2865
Date	03/19/2008
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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2. **Presence of water flow patterns:** Water flow patterns are common and follow old stream meanders. Deposition or erosion is uncommon for normal rainfall but may occur during intense rainfall events.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals or terracettes would have been uncommon for this site when occupied by the natural HCPC.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Expect no more than 20% bare ground randomly distributed throughout.

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5. **Number of gullies and erosion associated with gullies:** Some gullies may be present on side drains into perennial and intermittent streams. Gullies should be vegetated and stable.

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

7. **Amount of litter movement (describe size and distance expected to travel):** This is a flood plain with occasional out of bank flow. Under normal rainfall, little litter movement should be expected, however, litter of all sizes may move long distances depending on obstructions under intense storm events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface is resistant to erosion. Stability class range is expected to be 5 to 6.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** 0 to 10" thick with colors from reddish brown silty clay loam with generally moderately fine subangular blocky to fine subangular blocky structure. SOM is approximately 1-6%. See soil survey for specific soils information.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The prairie of warm-season grasses and forbs with adequate litter and little bare ground provides for maximum infiltration and little runoff under normal rainfall events.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No evidence of compaction under HCPC.

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: Cool-season midgrasses >>

    Other: Warm-season shortgrasses = forbs = trees > shrubs & vines = warm-season tallgrasses

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** There should be little mortality or decadence for any functional group.

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 2500 to 5000 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:** Mesquite, prickly pear, prickly ash, juniper, lotebush

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