Natural Resources
Conservation Service

Ecological site R083AY017TX
Blackland

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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.

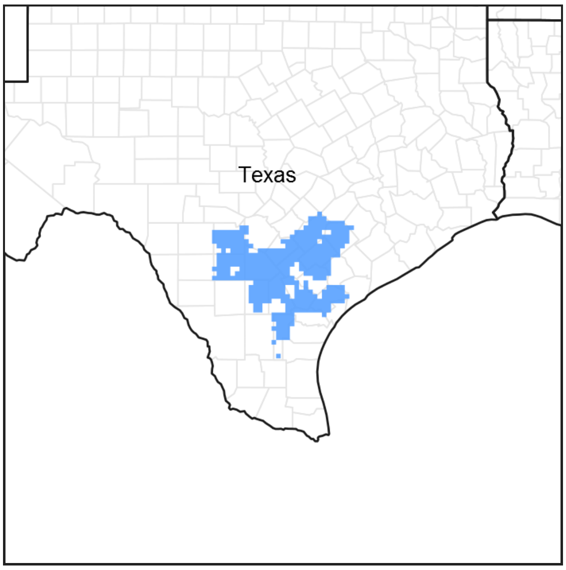


Figure 1. Mapped extent

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): 083A–Northern Rio Grande Plain

This area is entirely in Texas and south of San Antonio. It makes up about 11,115 square miles (28,805 square kilometers). The towns of Uvalde, Cotulla, and Hondo are in the western part of the area, and Beeville, Goliad, and Kenedy are in the eastern part. The town of Alice is just outside the southern edge of the area. Interstate Highways 35 and 37 cross this area. This area is comprised of inland, dissected coastal plains.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 83A

Ecological site concept

The Blackland ecological site shows an intact grass community with small clumped dispersal of woody species. The soils are moderately deep to very deep, richly black in color, and characterized by their shrink-swell nature. The sites are widely distributed across the uplands and terraces throughout the region.

Associated sites

R083AY002TX	**Shallow Ridge**
R083AY005TX	**Shallow**
R083AY024TX	**Tight Sandy Loam**
R083AY016TX	**Saline Clay Loam**
R083AY019TX	**Gray Sandy Loam**

Similar sites

R083BY017TX	**Blackland**
R083CY017TX	**Blackland**

Table 1. Dominant plant species

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

Physiographic features

The Blackland site was formed by calcareous, clayey residuum. The site features are found as a gilgai effect on the interfluves of the Coastal Plains. Slopes range from 0 to 5 percent, but are mainly less than 1 percent. Runoff rate is slow to high depending upon the slope. Elevation ranges from 200 to 1,000 feet. This area is comprised of inland, dissected coastal plains.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Interfluve (2) Coastal plain > Ridge
Runoff class	Negligible to very high
Flooding frequency	None
Ponding frequency	None
Elevation	61–305 m
Slope	0–3%
Aspect	Aspect is not a significant factor

Climatic features

MLRA 83A is subtropical, subhumid on the western boundary and subtropical humid on the eastern boundary. Winters are dry and mild and the summers are hot and humid. Tropical maritime air masses predominate throughout spring, summer, and fall. Modified polar air masses exert considerable influence during winter, creating a continental climate characterized by large variations in temperature. Average precipitation for MLRA 83A is 20 inches on the western boundary and 35 inches on the eastern boundary. Peak rainfall, because of rain showers, occurs late in spring and a secondary peak occurs early in fall. Heavy thunderstorm activities increase in April, May, and June. July is hot and dry with little weather variations. Rainfall increases again in late August and September as tropical disturbances increase and become more frequent. Tropical air masses from the Gulf of Mexico dominate during the spring, summer, and fall. Prevailing winds are southerly to southeasterly throughout the year except in December when winds are predominately northerly.

Table 3. Representative climatic features

Frost-free period (characteristic range)	223-251 days
Freeze-free period (characteristic range)	263-365 days
Precipitation total (characteristic range)	635-813 mm
Frost-free period (actual range)	208-263 days
Freeze-free period (actual range)	254-365 days
Precipitation total (actual range)	610-940 mm
Frost-free period (average)	235 days
Freeze-free period (average)	314 days
Precipitation total (average)	737 mm

Climate stations used

- (1) CHARLOTTE 5 NNW [USC00411663], Charlotte, TX
- (2) PEARSALL [USC00416879], Pearsall, TX
- (3) CHEAPSIDE [USC00411671], Gonzales, TX
- (4) CROSS [USC00412125], Tilden, TX
- (5) FOWLERTON [USC00413299], Fowlerton, TX
- (6) HONDO [USC00414254], Hondo, TX
- (7) NIXON [USC00416368], Stockdale, TX
- (8) POTEET [USC00417215], Poteet, TX
- (9) CARRIZO SPRINGS 3W [USC00411486], Carrizo Springs, TX
- (10) DILLEY [USC00412458], Dilley, TX
- (11) FLORESVILLE [USC00413201], Floresville, TX
- (12) KARNES CITY 2N [USC00414696], Karnes City, TX
- (13) LYTLE 3W [USC00415454], Natalia, TX
- (14) MATHIS 4 SSW [USC00415661], Mathis, TX
- (15) PLEASANTON [USC00417111], Pleasanton, TX
- (16) UVALDE 3 SW [USC00419268], Uvalde, TX
- (17) HONDO MUNI AP [USW00012962], Hondo, TX
- (18) BEEVILLE 5 NE [USC00410639], Beeville, TX
- (19) CUERO [USC00412173], Cuero, TX
- (20) GOLIAD [USC00413618], Goliad, TX
- (21) TILDEN 4 SSE [USC00419031], Tilden, TX
- (22) CALLIHAM [USC00411337], Calliham, TX

Influencing water features

Water enters the soil rapidly when it is dry and cracked, and very slowly when it is wet and sealed. The site does not have a water table near the surface. No ponding or flooding is expected.

Wetland description

N/A

Soil features

This Blackland site consists of very deep, moderately well to well drained, very slowly permeable, slightly acid to moderately alkaline soils. Soils were formed in clayey alluvium or residuum from limestone and shale. Undisturbed areas exhibit a more noticeable gilgai micro-relief. Soil series correlated to this site include: Denhawken, Elmendorf, Eloso, Leemont, Kincheloe, Monteola, Rosenbrock, and Tordia.

Table 4. Representative soil features

Parent material	(1) Residuum–sedimentary rock
Surface texture	(1) Clay (2) Clay loam (3) Sandy clay loam
Family particle size	(1) Fine
Drainage class	Somewhat poorly drained to well drained
Permeability class	Very slow
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.16–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–7
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)	0–1%

Ecological dynamics

The reference state of the Blackland site in MLRA 83A was a stable, tall and midgrass prairie that was in dynamic equilibrium with the ecological forces that formed the site. The ecological drivers which shaped this community included grazing by native wild herbivores, natural and anthropogenic fire, and periodic drought and wet cycles. Bison were the primary large ungulates that grazed the site but companion species included antelope and whitetail deer. The typical bison grazing pattern was short but very intense followed by total deferment from grazing animals until bison herds migrated back into the area (Edward 1836; Tharp 1926). Long deferments allowed the tallgrasses time to recover carbohydrate reserves and produce a seed crop. A fire regime and frequency of three to eight years was likely and was a more important factor in shaping this prairie than was grazing (Lehmann 1965).

The reference state for this site is a true grassland prairie dominated by tall and midgrasses. (Bailey 1905; Edward 1836; Foster 1998; Tharp 1926). Major grass species included little bluestem (*Schizachyrium scoparium*), yellow Indiangrass (*Sorghastrum nutans*), Arizona cottontop (*Digitaria californica*), four-flower trichloris (*Trichloris pluriflora*), and sideoats grama (*Bouteloua curtipendula*). Other grasses occurring in smaller amounts included vine mesquite (*Panicum obtusum*), silver bluestem (*Bothriochloa laguroides*), and plains bristlegrass (*Setaria leucopila*). Perennial forbs included sensitivebriar (Mimosa spp.), bundleflower (Desmanthus spp.), snoutbean (Rhynchosia spp.), and gayfeather (Liatris spp.). Little bluestem decreases in amount and is partly replaced in the reference community by cane bluestem (*Bothriochloa barbinodis*) and four-flower trichloris in the southern and western edges of this site. Annual forbs occurred on this site in relatively high numbers in wet years and following intense grazing events by bison. Woody plants were nearly excluded from this site by competition from grasses and periodic intense fires (Olmsted 1857; Stiles 1906). It should be noted however that some early accounts of this area showed a variable scattering of mesquite (*Prosopis glandulosa*), liveoak (*Quercus virginiana*), and hackberry (Celtis spp.) trees across the landscape. This is in keeping with the definition of true prairie which allows some large trees to be present but not enough to be termed savannah. The microhighs and microlows (gilgai micro-relief) on this site contribute to the diverse plant community. The microhighs are slightly drier and the microlows slightly wetter. More wet-tolerant vegetation grows on the lower portions of the site while less wet-tolerant vegetation grows on the slightly higher portions of the site.

With the introduction of wild longhorn cattle in the late 1700's and domestic cattle in the 1820's, an era of heavy grazing began. During the Spanish Mission era of the 1600 to 1700's in the San Antonio, Refugio, and Goliad areas, vast herds of cattle, horses, sheep, and goats were used for meat production for the missions. With no fences, these were vast free-roaming herds, which were not always closely managed. Some portion of these herds took the place of bison in the animal community once the bison herds were eliminated. This heavy grazing was exacerbated with the introduction of barbed wire and windmills in the 1880's. Excessive grazing reduced or eliminated the tallgrass component of the grassland state, such as yellow Indiangrass and Arizona cottontop and some midgrasses like little bluestem and sideoats grama. As the site deteriorated, species such as silver bluestem, knotroot bristlegrass (*Setaria parviflora*), shortspike windmillgrass (Chloris subdolichostachya), and other shorter-statured species, such as plains bristlegrass and paspalum species, increased.

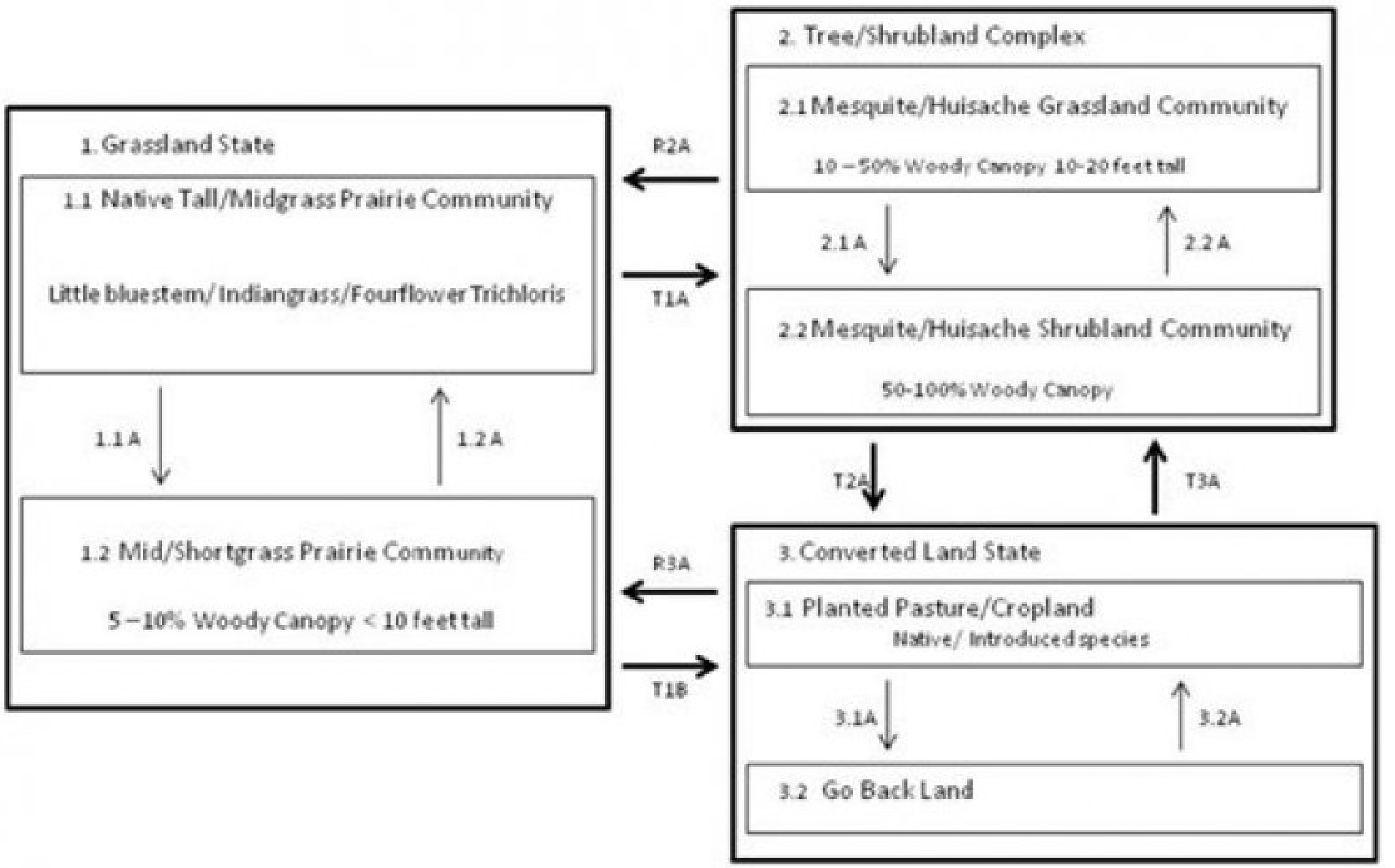
As the tall and midgrasses decreased in composition and biomass production decreased, fuel for fires decreased as well, resulting in less frequent and lower intensity fires. Continued overuse of the site by livestock and the cessation of fire allowed woody plants to invade. These woody pioneers included mesquite, huisache (*Acacia farnesiana*), and eastern baccharis (Baccharis halamifolia). The shrink-swell and soil cracking characteristics of the Blackland soils favor brush species with tolerance for soil movement. There was also an increase in annual weeds and shortgrasses such as western ragweed (*Ambrosia psilostachya*), annual broomweed (*Amphiachyris amoena*), threeawn (Aristida spp.), Texas wintergrass (*Nassella leucotricha*), and whorled dropseed (*Sporobolus pyramidatus*).

Introduced, invasive grass species are common on this site and will invade deteriorated or overutilized sites. They can also increase following episodic weather conditions which allow them to colonize open spaces. Introduced bluestems such as King Ranch bluestem (*Bothriochloa ischaemum*), Kleberg bluestem (Dichanthium annualatum), and other Old World bluestems are some of the most common introduced grasses. These plants are highly adapted to this area and are highly productive. However, these invasive plants can become a monoculture and reduce the native vegetation component of a site. The site is still able to function from a production standpoint, but once a herbaceous invasive plant has established or naturalized to a site, controlling it becomes highly unlikely and overall plant diversity might decrease. In those cases where aggressive introduced species have dominated, fires may be more intense than historic fires.

As thresholds from tall/midgrass prairie to tree/shrubland complex are crossed, changes have occurred which impact plant composition, biomass production, litter accumulation, and water infiltration and storage. These changes impact other natural ecological functions such as frequency and intensity of fire. The result has been conversion of this Blackland site from a true prairie to wooded grassland to a tree/shrub complex. In the heavily wooded state, total canopy cover may exceed 100 percent because of varying heights and multiple layers of woody species.

The resulting increase in woody cover signifies that thresholds have been crossed. Once these thresholds are crossed, restoration back to the reference plant community becomes much more difficult and expensive. Even though the reference plant community may be restored through the use of a combination of practices such as mechanical and herbicidal brush management, planned grazing, and fire, this grassland community cannot be maintained without the continuous use of these tools on a frequent basis (Scifres 1975).

State and transition model



1.1A, T1A, T2A	Heavy continuous grazing, No fire, No brush management
1.2A, 2.2A, R2A	Prescribed grazing, Prescribed fire, Brush management
2.1A, 3.1A, T3A	Heavy continuous grazing, No fire, Brush invasion
3.2A, T1B, T2A	Brush management, Range planting, Pasture Planting, Crop Cultivation, Prescribed grazing

Figure 8. STM

State 1
Grassland

Dominant plant species

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

Community 1.1
Native Tall/Midgrass Prairie

Figure 9. 1.1 Native Tall/Midgrass Prairie Community

This Native Tall/Midgrass Prairie Community (1.1) developed under natural disturbance regimes spanning thousands of years. Composition of tall grasses makes up over 60 percent of annual production, midgrasses approximately 30 percent, and associated grasses, forbs, shrubs, and woody vines make up the remainder. Annual forbs occur in varying amounts in response to grazing intensity, fire, drought, or excessive precipitation. This community is highly productive and can be managed to attain many landowner goals for livestock, wildlife, or recreation. The deep clay soils of this site, when managed in this state, will contain high amounts of organic matter, nutrients, and microbial activity. The soil also has a high available water capacity which can provide moisture to plants for extended amounts of time after rainfall events. These soil properties make this state of the Blackland site one of the most productive in the area. On the Blackland site rainfall can vary from lows on the western side to highs on the eastern side of the range. This difference in rainfall will cause subtle changes in plant community and overall productivity, which is displayed as high and low values in the annual production tables. Although the values provided in this report are representative, doing an onsite inventory of plant community and production when planning management decisions will help land managers make sound decisions based on actual conditions on the ground.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	4035	4483	4932
Forb	224	263	308
Tree	–	45	84
Shrub/Vine	–	–	–
Total	**4259**	**4791**	**5324**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	0-1%
Grass/grasslike foliar cover	70-90%
Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-25%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%

Bare ground	0-5%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	0-1%	0-1%	10-40%	5-10%
>0.15 <= 0.3	0-1%	0-1%	10-40%	5-10%
>0.3 <= 0.6	0-1%	0-1%	40-100%	5-10%
>0.6 <= 1.4	0-1%	–	40-100%	–
>1.4 <= 4	0-1%	–	–	–
>4 <= 12	0-1%	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 11. Plant community growth curve (percent production by month). TX4537, Mid/Tallgrass Community. Mid and tallgrasses dominant with less than 5% woody canopy species..

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

Community 1.2
Mid/Shortgrass Priaire

Figure 12. 1.2 Mid/Shortgrass Prairie Community

The Mid/Shortgrass Prairie Community (1.2) developed because of continued heavy grazing, an absence of the historic fire regime, and brush management. This community could also be driven by precipitation and may have been more common than the Native Tall/Midgrass Prairie Community (1.1) in drier parts of the MLRA. In comparison to the reference plant community (1.1) the Mid/Shortgrass Prairie Community (1.2) has reduced biomass production and litter accumulation which causes subtle impacts to the water, mineral, and energy cycles. For instance, this plant community has a slight decrease in live herbaceous cover which is replaced with litter and bare ground. The loss of thermal protection will start to negatively affect the available water in the soil. In this situation reduced rainfall and prolonged droughts will begin to have more of an impact of plant production. As tallgrasses decrease, midgrasses such as little bluestem, sideoats grama, plains bristlegrass and silver bluestem increase. Reduced fuel loads result in reduced fire frequency/intensity. Annual and perennial forbs often increase as a result of decreased competition for sunlight and moisture. Introduced grass species such as common bermudagrass (*Cynodon dactylon*), Kleberg bluestem, and other introduced bluestems may start to invade. For the first time on this site, woody invader seedlings such as mesquite and huisache, attain shrub and then tree status. While the appearance of introduced plants prevents a full restoration to the reference plant community, some of these plants do perform the same functions as native species. Management activities can slow down the increase of introduced plants if this is the management goal.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3587	4035	4259
Tree	336	420	504
Forb	224	263	308
Shrub/Vine	56	84	112
Total	**4203**	**4802**	**5183**

Figure 14. Plant community growth curve (percent production by month). TX4525, Midgrass Dominant, 5% woodies. Midgrass plant community with less than a 5 percent canopy of woody plants. Growth occurs with peak in spring and fall seasons..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	10	18	15	5	9	15	9	5	5

Pathway 1.1A
Community 1.1 to 1.2

Native Tall/Midgrass Prairie

Mid/Shortgrass Priaire

The Native Tall/Midgrass Prairie Community (1.1) is the Reference Plant Community that would have dominated the Blackland site for thousands of years. Because of human influence this community is rarely found today. The tall grasses that dominated the landscape are highly preferred by livestock and are easily eliminated from the plant community with heavy continuous grazing. This is because less palatable plants are left ungrazed and will eventually be able to out-compete the dominant grasses for resources and space. The historic fire regime has also been changed so that intermittent fires every 3 to 8 years, which would decrease woody plant encroachment and encourage tall/midgrass dominance, have been prevented to protect livestock and societal interests. These factors cause a shift from a Native Tall/Midgrass Prairie Community (1.1) to a Mid/Shortgrass Prairie Community (1.2).

Pathway 1.2A
Community 1.2 to 1.1

Mid/Shortgrass Priaire

Native Tall/Midgrass Prairie

The restoration to the reference plant community (1.1) is relatively simple at this point in time and can be accomplished by installation of prescribed grazing with appropriate stocking rates. If the herbaceous component of this community remains healthy and maintains at least 85 to 90 percent ground cover, including live plants and litter, the woody component of this site will remain stable and new seedling growth will be inhibited. Individual Plant Treatment (IPT) and prescribed burning will be the most efficient and economical ways to manage brush species encroachment. The use of prescribed fire in conjunction with prescribed grazing enhances the recovery process. Mechanical or chemical brush management is also feasible and relatively economical because this community has less than a 10 percent canopy of mesquite or huisache. Once initial woody plant management has been achieved, periodic burning, reduced stocking, and prescribed grazing will cause a transition towards the reference plant community over time. If the landowner wants to speed this transition, some range planting can be done to increase the number of desired species.

State 2
Tree/Shrubland Complex

Dominant plant species

- mesquite (*Prosopis*), tree
- sweet acacia (*Acacia farnesiana*), tree

Community 2.1
Mesquite/Huisache Grassland

Figure 15. 2.1 Mesquite/Huisache Grassland Community

A threshold has been crossed between the Grassland State (1) and the Tree/Shrubland Complex (2). This Mesquite/Huisache Grassland Community (2.1) has developed because of continuous heavy grazing, loss of fire as a management tool, greatly altered water and energy cycles, and invasion of woody plants. Episodic droughts will also hasten this process. The shift from the Mid/Shortgrass Prairie Community (1.2) to the Mesquite/Huisache Grassland Community (2.1) can happen within a period of 5 to 10 years under certain conditions. Mesquite and huisache will be the dominate woody species on this site, but other woody species such as lotebush (Zizyphus obtusifolia), granjeno (*Celtis ehrenbergiana*), whitebrush (*Aloysia gratissima*), desert yaupon (Schaefferia cuneifloia), prickly pear (*Opuntia engelmannii*), and algerita (*Mahonia trifoliolata*) will occur as part of the plant community. Although there has been an increase in woody plant numbers, the amount of canopy cover they create is the main difference driving the transition. The increased size or number of the woody plants creates more canopy cover and shades out the herbaceous component. This state will have an increased amount of bare ground which will negatively affect the amount of available water for plants in the soil. This will favor the woody species because their root systems can out-compete herbaceous plants for water. In this state forbs will respond quickly to rainfall events and in some cases they will also out-compete grass species for resources, causing an overall decrease in grass production. This community can be quite productive for cattle and wildlife and can be maintained indefinitely with continued management. To do so will require judicious grazing, periodic fire(s), and almost continuous brush management on an individual plant basis or other means that can achieve landowner priorities. The community in this state may be much better wildlife habitat than the previous state because of the increased amount of woody cover and the increased production of both perennial and annual forbs. With increased emphasis on white-tailed deer and bobwhite quail many landowners choose to manage their land in this condition to enhance wildlife populations.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2914	3363	3811
Tree	616	701	925
Forb	420	504	616
Shrub/Vine	224	252	280
Total	**4174**	**4820**	**5632**

Figure 17. Plant community growth curve (percent production by month). TX4528, Shrub/Woodland Community, 20-50% canopy. Shrub/Woodland Community with 20-50% woody canopy..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	10	18	15	5	9	15	9	5	5

Community 2.2
Mesquite/Huisache Shrubland

Figure 18. 2.2 Mesquite/Huisache Shrubland Community

Over time, with continued heavy grazing, no fire, and no brush management the Blackland site will be transformed into a Mesquite/Huisache Shrubland Community (2.2) with canopies from 50 to 100 percent. Extended droughts will hasten this process. Once the tree canopy reaches approximately 50 percent, the understory composition and production is driven more by shade than competition for moisture. At this point, no amount of deferred grazing will restore the plant community to the Grassland State. The herbaceous production is dominated by threeawn species, Hall's panicum (*Panicum hallii*), Texas wintergrass, silver bluestem, and annual forbs and grasses. The same grass species present in the Grassland state can be found in this community phase, but they will be much less productive and more infrequent. Because of the higher amounts of bare ground, opportunistic forbs like giant ragweed (*Ambrosia trifida*) and annual broomweed, will be able to quickly take advantage of timely rain events. This allows them to dominate the herbaceous plant community at the expense of grass production. The dramatic increase in brush canopy does not necessarily mean an improvement in deer or wildlife habitat. Although there is adequate visual and thermal protection other components of quality habitat, such as an adequate food source, are missing and will affect this areas use. Livestock management also becomes problematic in this plant community because of drastically reduced grass production.

Table 10. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	1905	2242	2774
Grass/Grasslike	1289	1569	1849
Shrub/Vine	616	701	925
Forb	420	504	616
Total	**4230**	**5016**	**6164**

Figure 20. Plant community growth curve (percent production by month). TX4529, Shrub Woodland Community with >50% Woodies. Shrub Woodland Community with >50% Woodies.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	10	18	15	5	9	15	9	5	5

Pathway 2.1A
Community 2.1 to 2.2


Mesquite/Huisache Grassland


Mesquite/Huisache Shrubland

Without diligent brush management along with prescribed grazing and other conservation practices this phase will inevitably transition from a Mesquite/Huisache Grassland Community (2.1) to a Mesquite/Huisache Shrubland Community (2.2). This transition can happen within a 5 to 10 year period and is based on an increase of woody canopy cover to more than 50 percent and a severe decrease in herbaceous plant production. Short grasses and forbs will dominate the herbaceous vegetation and while this transition may be desirable for some wildlife, it will be detrimental for a cattle or livestock operation. Cool-season grasses like Texas wintergrass will also become a more dominant part of the plant community.

Pathway 2.2A
Community 2.2 to 2.1


Mesquite/Huisache Shrubland


Mesquite/Huisache Grassland

Major inputs, both chemical and mechanical, are often required to restore this community to the Mesquite/Huisache Grassland Community (2.1). A common practice is the use of aerial applied herbicides to reduce the canopy, allow sunlight to penetrate to the soil surface, and grow enough herbaceous fuel loads for suitable burning. Aerial spraying is followed by the use of prescribed fire to remove some of the woody vegetation and maintain semi-open wooded grassland for several years following treatment. Although these practices kill some of the woody vegetation, plants that are not killed by the herbicide application will re-sprout from the crown and in a relatively short period of time, can attain a 90 to 100 percent canopy again. Often with this community, mechanical means such as root plowing and raking are utilized along with dozing and grubbing. Species like mesquite and huisache will re-sprout if not removed completely from the ground. Chaining and roller chopping are mechanical practices which will be short lived and will typically result in thicker, harder to manage brush stands and will encourage brush seedlings. Follow-up conservation practices such as Individual Plant Treatment (IPT) for woody re-growth and new seedlings and prescribed grazing will be necessary for several years after the initial brush management to maintain an improved plant community. Depending on local conditions it may also be necessary to re-introduce a seed source for desired native plant species through range planting.

State 3
Converted Land

Dominant plant species

- sorghum (*Sorghum*), grass

Community 3.1
Planted Pasture/Cropland

Figure 21. 3.1 Planted Pasture/Cropland

To go from the Mesquite/Huisache Shrubland Community (2.2) to the Converted Land State, (3) mechanical brush management must be applied. Typically rootplowing and raking is utilized to remove the woody vegetation. A seedbed is then prepared and the area is planted into grass or crops. Typical crops planted on this site include small grains like oats or feed grains like sorghum and hay grazer. If introduced species are planted with the addition of moderate to high rates of commercial fertilizer, this site may be more productive than the original plant community. Because these soils are so productive, this site has historically been planted to bermudagrass or introduced bluestems. Inputs such as fertilizer, herbicide, and adequate precipitation or irrigation may be necessary to maintain high productivity. Now, because of the availability of seed, landowners can also replant with native species. To maintain this seeded state, herbicides must be used to control woody seedlings that seek to invade as soon as the pasture is established. Not only is there a long-lived seed source of mesquite, huisache, and other woody species, additional seed are brought in by grazing animals and domestic livestock.

Table 11. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	5044	5884	6725
Total	**5044**	**5884**	**6725**

Figure 23. Plant community growth curve (percent production by month). TX4531, Converted Land - Introduced Grass Seeding. Seeding Coverted Land into Introduced grass species..

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

Community 3.2
Go Back Land

Figure 24. 3.2 Go Back Land

This community develops after land has been cropped and left to fallow without management inputs. It can also develop after a mechanical brush management practice has been applied but not followed up with appropriate management practices. It is typified by the dominance of woody species, very little herbaceous grass production, high amounts of annual forbs and grasses and large areas covered by tree leaf litter or bare ground. Because of the seed bank present in the soil and the constant addition of new seed from grazing/browsing animals and seed eating birds, re-infestation of woody seedlings happens in a relatively short time period of 2 to 5 years. Typically, pastureland will transition to the Mesquite/Huisache Grassland Community (2.1) and not to Go Back Land (3.2).

Figure 25. Plant community growth curve (percent production by month). TX4534, Converted Land - Woody Seedlings Encroachment. Woody seedling encroachment on converted lands such as abandoned cropland, native seeded land, and introduced seeding lands..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	5	10	18	15	5	9	15	9	5	5

Pathway 3.1A
Community 3.1 to 3.2


→


Planted Pasture/Cropland **Go Back Land**

The transition from Planted Pasture/Cropland (3.1) to Go Back Land (3.2) can occur when crop fields are left to fallow without management. Generally, pastureland will transition to the Tree/Shrubland Complex (2) and not to the Go Back Land plant community.

Pathway 3.2A
Community 3.2 to 3.1


→


Go Back Land **Planted Pasture/Cropland**

Many land managers may want to utilize this site as cropland or pastureland. To achieve this transition land clearing practices such as land clearing, dozing and raking will be necessary. After the land has been cleared and an appropriate seedbed prepared, the crop or pasture can be planted.

Transition T1A
State 1 to 2

The transition from the Grassland State (1) to the Tree/Shrubland Complex (2) can happen within 5 to 10 years. This transition can be driven by persistently dry weather conditions, grazing management, and the lack of fire and brush management practices. Overstocking the site with grazing animals will put pressure on the herbaceous plant component of the community. This will create a more favorable environment with bare ground and open spaces for woody plants to germinate and grow. If the woody component is not managed it will begin to dominate the landscape and out-compete grasses and forbs for water, sunlight, and other resources.

Transition T1B
State 1 to 3

Land managers may want to utilize this site as cropland or pastureland. To achieve this transition from the Grassland State (1) brush management and heavy disking with a Rhome disk, or other heavy implement, will be necessary to incorporate the vegetation into the soil. Prescribed burning can also be used prior to the disking operation to eliminate excessive vegetation. After the land has been cleared and an appropriate seedbed prepared the crop or pasture can be planted.

Restoration pathway R2A
State 2 to 1

Major inputs, both chemical and mechanical, are often required to restore the Tree/Shrubland Complex State (2) to the Grassland State (1). Often with this community, mechanical means such as rootplowing and raking are utilized along with dozing and grubbing. Species like mesquite and huisache will re-sprout if not removed completely from the ground. Chaining and rollerchopping are mechanical practices which will be short lived and will typically result in thicker, harder to manage brush stands and will encourage brush seedlings. Follow-up conservation practices such as Individual Plant Treatment (IPT) for woody re-growth and new seedlings and prescribed grazing will be necessary for several years after the initial brush management to maintain an improved plant community. Depending on local conditions, it may also be necessary to prepare an appropriate seedbed and, re-introduce a seed source for desired native plant species through range planting.

Transition T2A
State 2 to 3

Land managers may want to utilize this site as cropland or pastureland. To achieve this transition practices such as dozing and raking will be necessary. After the land has been cleared and an appropriate seedbed prepared the crop or pasture can be planted.

Transition T3B
State 3 to 2

In time, this site will revert to the Tree/Shrubland Complex (2) on its own, but usually this timeline is impractical for landowners. Prescribed grazing along with various brush management practices will be necessary to achieve this transition. This phase is very unproductive for herbaceous plants and it could take years for desirable plant species to begin to reestablish.

Additional community tables

Table 12. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial Tall/Midgrasses**			1905–2774	
	little bluestem	SCSC	*Schizachyrium scoparium*	1905–2774	–
	Indiangrass	SONU2	*Sorghastrum nutans*	1905–2774	–

	multiflower false Rhodes grass	TRPL3	*Trichloris pluriflora*	1905–2774	–
2	**Perennial Midgrasses**			639–925	
	Indiangrass	SONU2	*Sorghastrum nutans*	1905–2774	–
	little bluestem	SCSC	*Schizachyrium scoparium*	1905–2774	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–925	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	639–925	–
	silver beardgrass	BOLA2	*Bothriochloa laguroides*	639–925	–
	Arizona cottontop	DICA8	*Digitaria californica*	639–925	–
	Texas cupgrass	ERSE5	*Eriochloa sericea*	426–616	–
	streambed bristlegrass	SELE6	*Setaria leucopila*	426–616	–
	vine mesquite	PAOB	*Panicum obtusum*	426–616	–
	white tridens	TRAL2	*Tridens albescens*	213–308	–
	false Rhodes grass	TRCR9	*Trichloris crinita*	213–308	–
	pink pappusgrass	PABI2	*Pappophorum bicolor*	213–308	–
3	**Perennial Shortgrasses**			426–616	
	buffalograss	BODA2	*Bouteloua dactyloides*	426–616	–
	curly-mesquite	HIBE	*Hilaria belangeri*	426–616	–
4	**Cool Season Grasses**			426–616	
	Texas wintergrass	NALE3	*Nassella leucotricha*	426–616	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	213–308	–
	Virginia wildrye	ELVI3	*Elymus virginicus*	213–308	–
Forb					
5	**Forbs**			213–308	
	Forb, annual	2FA	*Forb, annual*	213–308	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	213–308	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	213–308	–
	snow on the prairie	EUBI2	*Euphorbia bicolor*	213–308	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	213–308	–
	coastal indigo	INMI	*Indigofera miniata*	213–308	–
	dotted blazing star	LIPU	*Liatris punctata*	213–308	–
	yellow puff	NELU2	*Neptunia lutea*	213–308	–
	fogfruit	PHYLA	*Phyla*	213–308	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	213–308	–
	American snoutbean	RHAM	*Rhynchosia americana*	213–308	–
	bushsunflower	SIMSI	*Simsia*	213–308	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	213–308	–
Tree					
6	**Trees/Shrubs**			0–84	
	sweet acacia	ACFA	*Acacia farnesiana*	0–62	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	0–62	–
	hackberry	CELTI	*Celtis*	0–62	–
	honey mesquite	PRGLG	*Prosopis glandulosa var. glandulosa*	0–62	–
	live oak	QUVI	*Quercus virginiana*	0–62	

	live oak	QUVI	*Quercus virginiana*	0–62	–

Animal community

As a historic tall/midgrass prairie, this site was occupied by bison, antelope, deer, quail, turkey, and dove. This site was also used by many species of grassland songbirds, migratory waterfowl, and coyotes. This site now provides forage for livestock and is still used by quail, dove, migratory waterfowl, grassland birds, coyotes, and deer.

Feral hogs (Sus scrofa) can be found on most ecological sites in Texas. Damage caused by feral hogs each year includes, crop damage by rutting up crops, destroyed fences, livestock watering areas, and predation on native wildlife, and ground-nesting birds. Feral hogs have few natural predators, thus allowing their population to grow to high numbers.

Wildlife habitat is a complex of many different plant communities and ecological sites across the landscape. Most animals use the landscape differently to find food, shelter, protection, and mates. Working on a conservation plan for the whole property, with a local professional, will help managers make the decisions that allow them to realize their goals for wildlife and livestock.

Grassland State (1): This state provides the maximum amount of forage for livestock such as cattle. It is also utilized by deer, quail and other birds as a source of food. When a site is in the reference plant community phase (1.1) it will also be used by some birds for nesting, if other habitat requirements like thermal and escape cover are near.

Tree/Shrubland Complex (2): This state can be maintained to meet the habitat requirements of cattle and wildlife. Land managers can find a balance that meets their goals and allows them flexibility to manage for livestock and wildlife. Forbs for deer and birds like quail will be more plentiful in this state. There will also be more trees and shrubs to provide thermal and escape cover for birds as well as cover for deer.

Converted Land State (3): The quality of wildlife habitat this site will produce is extremely variable and is influenced greatly by the timing of rain events. This state is often manipulated to meet landowner goals. If livestock production is the main goal, it can be converted to pastureland. It can also be planted to a mix of grasses and forbs that will benefit both livestock and wildlife. A mix of forbs in the pasture could attract pollinators, birds and other types of wildlife. Food plots can also be planted to provide extra nutrition for deer.

This rating system provides general guidance as to animal preference for plant species. It also indicates possible competition between kinds of herbivores for various plants. Grazing preference changes from time to time, especially between seasons, and between animal kinds and classes. Grazing preference does not necessarily reflect the ecological status of the plant within the plant community. For wildlife, plant preferences for food and plant suitability for cover are rated. Refer to habitat guides for a more complete description of a species habitat needs.

Hydrological functions

Peak rainfall periods occur in May and June from thunderstorms and in September and October from tropical systems. Rainfall events may be high (3 to 5 inches per event) and intense. Extended periods (45 to 60 days) of little to no rainfall during the growing season are common. Because of the flat topography of this site, erosion is minimal however, on more sloping aspects (greater than 3 percent), erosion may be very significant. This site provides little water for aquifer recharge because when wet, infiltration is very slow.

Recreational uses

Hunting and photography are common uses.

Wood products

In the Grassland State, no wood products are available. In a Tree/Shrubland Complex State, the site may grow large numbers of large mesquite trees and these are often cut for firewood and barbecue wood.

Other products

Landowners have the opportunity to explore the many facets of ecotourism, and the potential of the natural resources of their property, to create value from their land.

Inventory data references

Information presented was derived from the revised Range Site, literature, limited NRCS clipping data (417s), field observations, and personal contacts with range-trained personnel.

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Rangeland health reference sheet

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

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Date	08/08/2011
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** Few water flow patterns are normal for this site due to landscape position and slopes.

3. **Number and height of erosional pedestals or terracettes:** Pedestals would have been uncommon for this site.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Less than five percent bare ground.

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

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

7. **Amount of litter movement (describe size and distance expected to travel):** Small-to-medium sized litter may move short distances during intense storms.

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. Soil stability class range is expected to be 4 to 6.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface struture is 10 to 60 inches thick with colors ranging from black to dark grayish brown with subangular blocky structure. Soil organic matter is one to six percent.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** A high canopy cover of bunch, rhizomatous, and stoliniferous grasses will help minimize runoff and maximize infiltration. Grasses and forbs should comprise approximately 90 percent of total plant compostion by weight. Trees and shrubs will comprise about 10 percent by weight.

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

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

    Dominant: Perennial Tall/Midgrasses >> Perennial Midgrasses >>

    Sub-dominant: Perennial Shortgrasses> Forbs > Cool Season grasses>> Trees/Shrubs

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Little apparent mortality or decadence for any functional groups.

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 4,000 to 5,500 pounds per acre.

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

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17. **Perennial plant reproductive capability:** All species should be capable of reproducing.
