USDA Natural Resources Conservation Service

Ecological site R083CY024TX Tight Sandy Loam

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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.

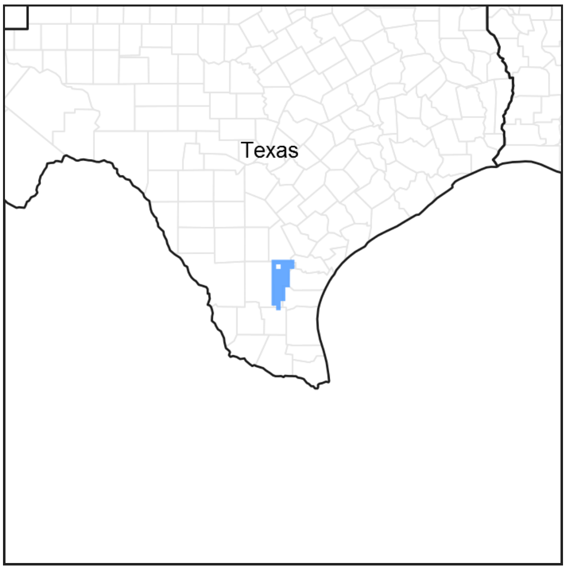


Figure 1. Mapped extent

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): 083C–Central Rio Grande Plain

Major Land Resource Area (MLRA) 83C makes up about 4,275 square miles (11,075 square kilometers). The towns of Freer, George West, and Hebbronville are in this area. The town of Alice is on the east edge of the area. U.S. Highways 59 and 281 cross the area. This area is comprised of inland, dissected coastal plains.

Classification relationships

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

Ecological site concept

Tight sandy loam sites have fine sandy loam and loamy fine sand surface textures that are underlain by a dense argillic horizon at 9 to 14 inches. These contrasting soil textures perch water during rainfall events but become droughty during times of dry weather.

Associated sites

R083CY002TX	**Shallow Ridge**
R083CY019TX	**Gray Sandy Loam**
R083CY023TX	**Sandy Loam**

Similar sites

R083AY024TX	**Tight Sandy Loam**
R083DY024TX	**Tight Sandy Loam**
R083EY024TX	**Tight Sandy Loam**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Celtis ehrenbergiana* (2) *Zanthoxylum fagara*
Herbaceous	(1) *Schizachyrium scoparium* (2) *Bouteloua curtipendula*

Physiographic features

These nearly level to gently sloping soils occur on paleoterraces and interfluves on inland, dissected coastal plains. Slope ranges from 0 to 5 percent

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Paleoterrace (2) Coastal plain > Interfluve
Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None
Elevation	15–305 m
Slope	0–5%
Aspect	Aspect is not a significant factor

Climatic features

MLRA 83C 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. 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)	255-291 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	584-660 mm
Frost-free period (actual range)	255-347 days

Freeze-free period (actual range)	365 days
Precipitation total (actual range)	533-660 mm
Frost-free period (average)	283 days
Freeze-free period (average)	365 days
Precipitation total (average)	635 mm

Climate stations used

- (1) CHOKE CANYON DAM [USC00411720], Three Rivers, TX
- (2) MCCOOK [USC00415721], Edinburg, TX
- (3) CALLIHAM [USC00411337], Calliham, TX
- (4) HEBBRONVILLE [USC00414058], Hebbronville, TX
- (5) FREER [USC00413341], Freer, TX

Influencing water features

Water features are not influential.

Wetland description

N/A

Soil features

The soils are very deep, moderately well to well drained. They are unique because of the abrupt textural change between the surface and subsoil. The surface is typically a fine sandy loam underlain by a heavier-textured clay, or sandy clay loam. Soils correlated to this site include: Delfina, Miguel, Papalote, and Runge.

Table 4. Representative soil features

Parent material	(1) Alluvium–sedimentary rock (2) Residuum–sedimentary rock
Surface texture	(1) Fine sandy loam (2) Sandy clay loam
Family particle size	(1) Fine (2) Fine-loamy
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderate
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	12.7–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0–20%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–3
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4

Subsurface fragment volume <=3" (Depth not specified)	0–2%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Climatic variation and topoedaphic heterogeneity interact to influence vegetation responses to disturbances such as fire and grazing. Plants of the reference plant community evolved with and are generally well adapted to grazing and fire. Prior to European settlement, fires would likely have been frequent, between 5 and 10 years. These fires would have resulted from lightning during the hot, dry summer months or were set by Native Americans. The occurrence of fire promotes grasses while making it difficult for woody plants to achieve dominance. During the Pleistocene, there were significant populations of large-bodied grazers and browsers. Most of these went extinct, so that by the Holocene (about 10,000 years ago) only bison (Bos bison), white-tailed deer (Odocoileus virginianus), and antelope (Antilocapra americana) remained. Archeological evidence indicates that bison occurred in the region, but there is also evidence of centuries of absence. In addition, their numbers may have varied seasonally as herds migrated. When present, bison may have grazed certain areas heavily, but then moved on. Activities of other native herbivores (termites, cutter ants, soil nematodes, kangaroo rats (Dipodomys spp.)) also influenced vegetation productivity and dynamics.

Accounts of earlier explorers and settlers suggest the Rio Grande Plains was likely a mosaic of grasslands, savannahs, shrublands, and woodlands. Historical photographs suggest the nature of the vegetation structure likely varied from place-to-place depending on topography, soil properties and time since the last major disturbances (such as drought or fire). However, the occurrence of extensive grasslands and grassland fauna (antelope, for example) is mentioned in numerous historical accounts. Plants likely at the time of European settlement included little bluestem (*Schizachyrium scoparium*), false Rhodes grass (Chloris crinata), and multiflower false Rhodes grass (Chloris pluriflora), Arizona cottontop (*Digitaria californica*), plains bristlegrass (*Setaria vulpiseta*), and pink pappusgrass (*Pappophorum bicolor*). The composition and productivity of grass communities would have varied with annual rainfall, soil depth and the extent of argillic horizon development. Many sites are now dominated by mesquite (*Prosopis glandulosa*), various acacias (Acacia spp.), granjeno (Celtis pallida), condalia (Condalia obovata), lime prickly ash, and prickly pear (Opuntia spp.). These woody plants are not new arrivals, but are native to the region and have increased in size and abundance within their historic ranges.

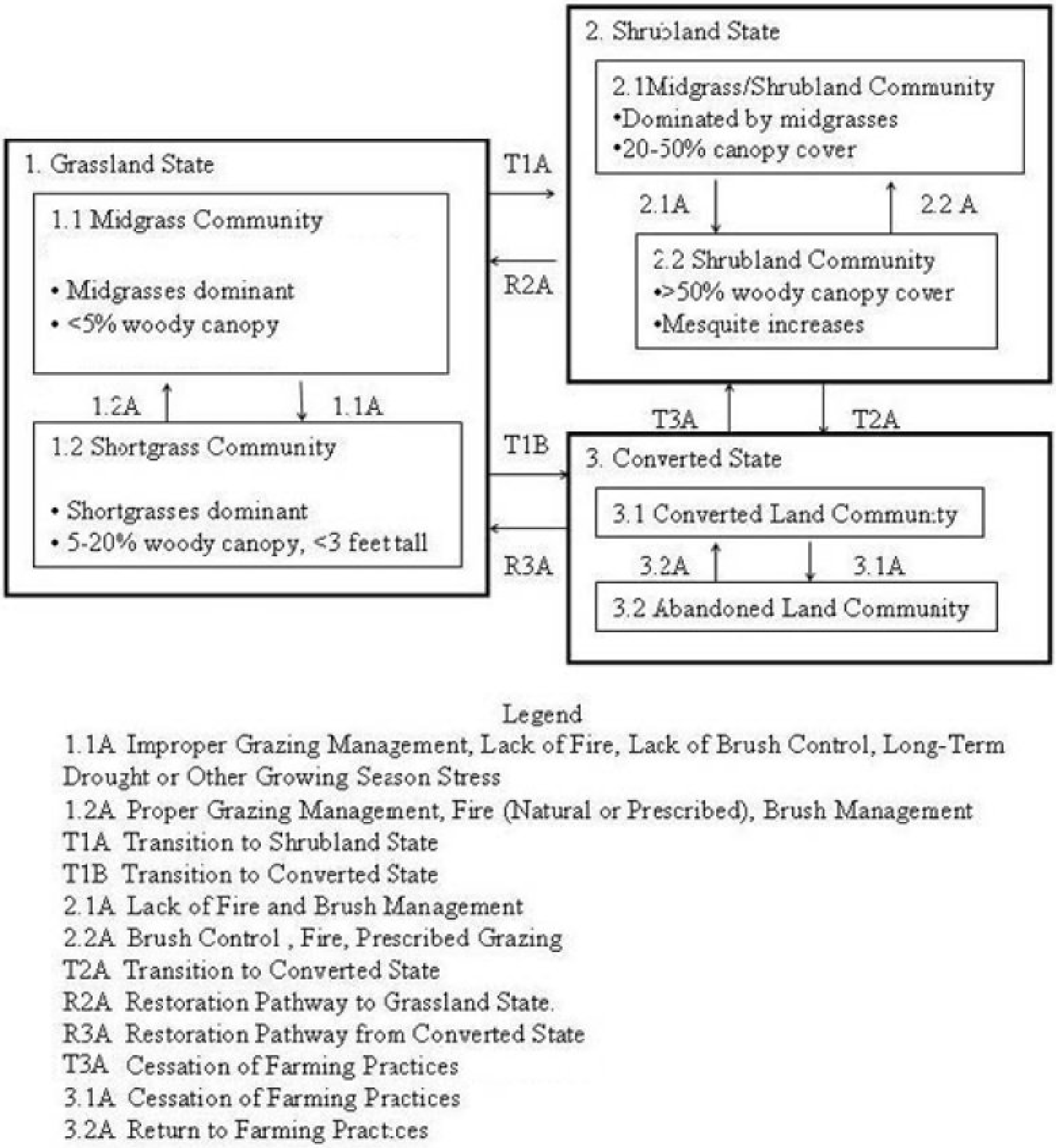
Grazing and fire are two factors that critically influence the relative abundance of grasses and woody plants through time. By the early 1800's cattle and sheep numbers appear to have been quite high in the Rio Grande Plains, resulting in heavy, year-round grazing. The resulting reduction in abundance of late seral grasses lead to a decline in soil organic matter, a reduction in fire frequency/intensity (due to lack of fine fuels), and a shift from midgrass domination to shortgrass, like hooded windmill grass (*Chloris cucullata*), three-awns (Aristida spp.) and forbs, like orange zexmenia (Wedelia hispida), and croton (Croton spp.). These changes would have favored woody plants, most of which are unpalatable to livestock, and enabled them to establish and attain dominance. This would be especially true for leguminous shrubs such as mesquite, whose seeds are widely spread by livestock.

The shift from grass to woody plant domination became the impetus for brush management practices. By the 1950's, large-scale mechanized clearing was common and by the 1970's, aerial herbicide applications were widespread. However, by the 1980's it was clear that brush management practices were often treating symptoms rather than underlying problems and having undesirable environmental consequences, including adverse effects on wildlife populations. Sites cleared of brush regenerated rapidly and often formed thickets that were denser and of lower diversity than the original stands. This realization, coupled with the fact that brush management treatments were typically short-lived, lead to the development of Integrated Brush Management Systems (IBMS). The IBMS approach takes a holistic, large-scale, long-term, whole-farm, ecosystem-based approach to brush management and recognizes multiple-use options for rangeland resources. Shrublands developing on former grasslands have other potential socioeconomic values that should be considered when contemplating brush management. These include alternate classes of livestock, lease hunting, deer and exotic game ranching, and ecotourism.

While shrublands have traditionally been viewed as degraded from a livestock production standpoint, it is important to recognize that they are not necessarily degraded from the ecological perspectives of primary productivity, nutrient cycling and biodiversity. The productivity of shrublands may be comparable to the grassland they replaced.

In addition, shrubs modify soils and microclimate to increase levels of organic matter and nutrients in the upper four inches of the soil profile. This nutrient enrichment by shrubs can offset grazing-induced losses of soil nutrients and contribute to enhance grass production when shrub cover is reduced by natural or management-induced means. While the development of shrub communities may have adverse impacts on grasses and grassland fauna, other plants and animals may benefit. Thus, while ecosystem biodiversity certainly changes, it does not necessarily decrease with a shift from grass to woody plant domination.

State and transition model



State 1
Grassland

Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass
- false Rhodes grass (*Trichloris crinita*), grass

Community 1.1
Midgrass

The Midgrass Community (1.1) developed under natural disturbance regimes spanning thousands of years. Composition of grasses makes up over 90 percent by weight of annual production while forbs, shrubs, and woody species make up the remainder. Shrubs and trees may be found scattered throughout, and without disturbance will grow very large, but will not create a significant canopy cover. Annual forbs occur in varying amounts in response to grazing intensity, fire, drought, or excessive precipitation. This community is greatly affected by variations in plant available water in the soil. This sometimes extreme fluctuation is reflected in the herbaceous plant community and along with grazing may be the most important factor driving species composition within the Grassland State (1). Tall and midgrasses dominate this site under favorable growing conditions and bare ground is limited due to the multi-layered structure of the grass and forb community. The herbaceous cover produces a thermal insulation which reduces evaporation of soil water and greatly reduces ground temperatures. These factors promote the midgrass and forb community. During drought conditions shortgrasses will increase and become larger components of the herbaceous community and bare ground will slightly increase. Differences in rainfall across the region will cause subtle changes in plant community and overall productivity. 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	1569	2802	4035
Shrub/Vine	84	157	224
Forb	84	157	224
Tree	–	28	56
Total	**1737**	**3144**	**4539**

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%	20-40%	5-10%
>0.3 <= 0.6	0-1%	0-1%	40-100%	5-10%
>0.6 <= 1.4	0-1%	–	30-70%	–
>1.4 <= 4	0-1%	–	–	–
>4 <= 12	0-1%	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 9. Plant community growth curve (percent production by month). TX8513, Mid/Tallgrass Community. Mid and tallgrasses dominate the site with few forbs and shrubs..

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
Shortgrass

The Shortgrass Community (1.2) develops because of continued heavy grazing, an absence of the historic fire regime, and lack of brush management. This community could also be driven by precipitation and may have been more common than the reference plant community (1.1) in drier parts of the region. The Shortgrass Prairie Community (1.2) has reduced biomass production and litter accumulation which causes subtle impacts to the water, mineral, and energy cycles. In this phase reduced rainfall and prolonged droughts will begin to have more of an impact on plant production. As midgrasses decrease shortgrasses such as red grama, brownseed paspalum, plains bristlegrass, and perennial three awns increase. Reduced fuel loads result in reduced fire frequency and intensity. Annual and perennial forbs often increase as a result of decreased competition for sunlight and moisture. Introduced grass species such as Kleberg bluestem (Dicanthium annulatum) and other introduced bluestems may start to invade. For the first time on this site, woody invader seedlings, such as mesquite and huisache, gain considerable height and density. This phase will quickly transition to the Shrubland State (2) if herbaceous plant production does not increase and shrub density grows. While the appearance of introduced plants may prevent a full restoration to the reference 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	1093	1933	2802
Shrub/Vine	336	560	785
Forb	252	460	673
Tree	56	140	224
Total	**1737**	**3093**	**4484**

Figure 11. Plant community growth curve (percent production by month). TX8514, Mid/Shortgrass Parkland Community. Mid and shortgrasses dominate while oak mottes and density of mesquite are expanded..

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

Pathway 1.1A
Community 1.1 to 1.2

The midgrasses 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. Rainfall patterns and subsoil moisture variations drive the diversity of the herbaceous component on this site, but prolonged drought and continuous grazing will create conditions that increase bare ground and shortgrass dominance. Invasive shrub species, like mesquite, will begin to encroach. The historic fire regime has also been changed so that intermittent fires every three to eight years, which would decrease woody plant encroachment and encourage midgrass dominance, have been prevented to protect livestock and societal interests. These factors cause a shift from a Midgrass Community (1.1) to a Shortgrass Community (1.2).

Pathway 1.2A
Community 1.2 to 1.1

The restoration to the reference plant community (1.1) can be accomplished by 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. 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 20 percent shrub canopy. Once initial woody plant management has been achieved, periodic burning, reduced stocking rates, 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
Shrubland

Dominant plant species

- desert yaupon (*Schaefferia cuneifolia*), shrub
- cactus apple (*Opuntia engelmannii*), shrub

Community 2.1
Midgrass/Shrubland

A threshold has been crossed between the Grassland State (1) and the Shrubland State (2). This Midgrass/Shrubland 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 can happen within a period of 5 to 10 years under certain conditions. Mesquite will be the dominate woody species on this site, but other woody species such as lime pricklyash, granjeno, desert yaupon (Schaefferia cuneifloia), prickly pear (*Opuntia engelmannii*), and algerita (*Mahonia trifoliolata*) will begin to increase as part of the plant community. Herbaceous production in this state is lower than in the Grassland State (1) and because of an increase in bare ground and shrub canopy cover, the resilience of the grass community is negatively affected. The more productive midgrasses will begin to fade from the plant community while less palatable shortgrasses increase. Plants that will increase in this state include red grama (*Bouteloua trifida*), three awn species (Aristida spp.), brownseed paspalum, and forbs like false broomweed (*Haploesthes greggii*) and dogweed. Grazing management on this site plays an important role in maintaining healthy grass communities that can take advantage of rainfall events and are more capable of withstanding drought conditions. In this state, forbs will respond quickly to rainfall events and can also out-compete grasses for resources, causing an overall decrease in grass production.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	729	1289	1849
Shrub/Vine	448	981	1513
Tree	224	392	560
Forb	336	448	560
Total	**1737**	**3110**	**4482**

Figure 13. Plant community growth curve (percent production by month). TX8507, Woodland Community, 30+% canopy. Woody canopy is greater than 30%..

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 Shrubland

Over time, with continued heavy grazing, no fire, and no brush management the Tight Sandy Loam ecological site will be transformed into a Shrubland Community (2.2) with canopies from 50 to 100 percent. Average shrub canopy heights can vary from 10 to 20 feet depending on the age of the plants and local rainfall history. Extended droughts will hasten this transition process. Once the mesquite community begins to mature, mixed shrubs will begin to increase underneath the canopy creating mottes that will increase in size and density. Shrub species like desert yaupon (Schaefferia cuneifloia), catclaw acacia (Acacia gregii), elbowbush (*Forestiera pubescens*), and the other species already mentioned, will increase in density. At this point, no amount of deferred grazing will restore the plant community to the Grassland State (1). The herbaceous production is dominated by threeawn species, red grama, annual grasses, and annual forbs. The same grass species present in the Grassland State (1) 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 western ragweed (*Ambrosia psilostachya*), annual broomweed (*Amphiachyris amoena*), and dogweed will be able to quickly take advantage of timely rain events. Livestock management becomes problematic in this plant community because of drastically reduced grass production. The community 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 10. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	785	1373	1961
Grass/Grasslike	504	925	1345
Tree	336	588	841
Forb	56	196	336
Total	**1681**	**3082**	**4483**

Figure 15. Plant community growth curve (percent production by month). TX8507, Woodland Community, 30+% canopy. Woody canopy is greater than 30%..

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

Without diligent brush management, prescribed grazing, and other conservation practices, this phase will inevitably transition to a Shrubland Community (2.2). This transition is relatively long-term, but can begin within 5 to 10 years. This transition is based on an increase of woody canopy cover and a severe decrease in herbaceous plant production. Shortgrasses and forbs will dominate the herbaceous vegetation. This transition may be desirable for some wildlife, but it will be detrimental for a cattle operation.

Pathway 2.2A
Community 2.2 to 2.1

Major inputs, both chemical and mechanical, are often required to restore this community to the Mesquite Prairie Community (2.1). Prescribed burning is an effective tool to control the mixed brush community if weather conditions are good and the plant community can produce enough fine fuel to carry a burn. Often with this community, mechanical means such as root plowing and raking are utilized along with dozing and grubbing. Species like mesquite will re-sprout if not removed completely from the ground. Chaining and roller chopping are short-lived mechanical practices typically resulting in thicker, harder to manage brush stands that encourage brush seedlings. Follow-up conservation practices such as Individual Plant Treatment (IPT) for woody re-growth 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 replant seeds for desired native plants.

State 3
Converted Land

Community 3.1
Converted Land

Typically, rootplowing and raking are utilized to remove the woody vegetation. A seedbed is then prepared, and the area is planted into grass or crops. Crops planted on this site include small grains like oats or feed grains. Inputs such as fertilizer, herbicide, and adequate 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 invade. Not only is there a long-lived seed source of mesquite and other woody species, additional seeds 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	1681	3082	4483
Total	**1681**	**3082**	**4483**

Figure 17. Plant community growth curve (percent production by month). TX8513, Mid/Tallgrass Community. Mid and tallgrasses dominate the site with few forbs and shrubs..

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
Abandoned 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 mesquite, very little herbaceous grass production, high amounts of annual forbs and grasses, large areas covered by tree leaf litter, and/or bare ground. This phase does not have a diverse plant community and the shrub canopy cover can be up to 100 percent mesquite. 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 two to five years. Typically, planted pasture will transition directly to the Shrubland State (2).

Figure 18. Plant community growth curve (percent production by month). TX5136, Converted Land Community - Woody Seedling Encroachment. Converted Land Community that has been encroached by woody seedlings due to abandonment of crop and pastureland..

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

The transition from the Converted Land Community (3.1) to the Abandoned Land Community (3.2) can occur when crop fields are left to fallow without management. Shrub species, like mesquite, will begin to grow and dominate the plant community. Generally, planted pasture will transition to the Shrubland State (2).

Pathway 3.2A
Community 3.2 to 3.1

Many land managers may want to utilize this site as cropland or pastureland. To achieve this transition land clearing 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 T1A
State 1 to 2

The transition from the Grassland State (1) to the Shrubland State (2) can happen within 5 to 10 years. This transition is driven by persistently dry weather conditions, grazing management, and the lack of fire and brush management practices. Overstocking 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

Brush management, either mechanical or chemical, is necessary to restore the site to the Grassland State. Removal of woody species to reduce canopy cover will allow light to the herbaceous species. Prescribed grazing and fire will also help.

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 T3A
State 3 to 2

In time, this site will revert to the Shrubland State (2) on its own. If no brush management occurs, woody species will occupy the overstory canopy and shad out herbaceous species.

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	**Tall/Midgrasses**			897–2242	
	little bluestem	SCSC	*Schizachyrium scoparium*	616–1681	–
	false Rhodes grass	TRCR9	*Trichloris crinita*	616–1681	–
	multiflower false Rhodes grass	TRPL3	*Trichloris pluriflora*	616–1681	–
2	**Midgrasses**			448–1345	
	sideoats grama	BOCU	*Bouteloua curtipendula*	280–897	–
	silver beardgrass	BOLA2	*Bothriochloa laguroides*	280–897	–
	Arizona cottontop	DICA8	*Digitaria californica*	280–897	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	280–897	–
	tanglehead	HECO10	*Heteropogon contortus*	280–897	–
	pink pappusgrass	PABI2	*Pappophorum bicolor*	336–897	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	336–897	–
3	**Shortgrasses**			224–448	
	threeawn	ARIST	*Aristida*	84–280	–
	buffalograss	BODA2	*Bouteloua dactyloides*	84–280	–
	slender grama	BORE2	*Bouteloua repens*	84–280	–
	red grama	BOTR2	*Bouteloua trifida*	84–280	–
	coastal sandbur	CESP4	*Cenchrus spinifex*	84–280	–
	hooded windmill grass	CHCU2	*Chloris cucullata*	84–280	–
	fall witchgrass	DICO6	*Digitaria cognata*	84–280	–
	curly-mesquite	HIBE	*Hilaria belangeri*	84–280	–
	brownseed paspalum	PAPL3	*Paspalum plicatulum*	84–280	–
Forb					
4	**Forbs**			84–224	
	Forb, annual	2FA	*Forb, annual*	67–179	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	67–179	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	67–179	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	67–179	–
	coastal indigo	INMI	*Indigofera miniata*	67–179	–
	yellow puff	NELU2	*Neptunia lutea*	67–179	–
	rosy palafox	PARO	*Palafoxia rosea*	67–179	–
	Virginia plantain	PLVI	*Plantago virginica*	67–179	–
	American snoutbean	RHAM	*Rhynchosia americana*	67–179	–
	awnless bushsunflower	SICA7	*Simsia calva*	67–179	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	67–179	–
	fiveneedle pricklyleaf	THPEP	*Thymophylla pentachaeta var.*	67–179	–

			pentachaeta		
Shrub/Vine					
5	**Shrubs**			84–224	
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	28–112	–
	Brazilian bluewood	COHO	*Condalia hookeri*	28–112	–
	lime pricklyash	ZAFA	*Zanthoxylum fagara*	28–112	–
Tree					
6	**Tree**			0–56	
	honey mesquite	PRGLG	*Prosopis glandulosa var. glandulosa*	0–56	–

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 (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 (three to five 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, water erosion is minimal.

Recreational uses

Hunting and photography are common activities.

Wood products

In the Grassland State, no wood products are available. In a Shrubland State, the site may produce many large mesquite trees and these are often cut for firewood and barbecue.

Inventory data references

The data contained in this document is derived from analysis of inventories, clipping studies, and ecological interpretation from field evaluations.

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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	09/17/2012
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:** Water flow pattens are rare for this site due to landscape position and slopes.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are uncommon.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Less than 10 percent bare ground.

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 9 to 14 inches thick with brown colors and with subangular blocky structure. Soil organic matter is less than three percent.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Herbaceous production of bunch, rhizomatous, and stoliniferous grasses will help minimize runoff and maximize infiltration. Grasses should comprise approximately 90 percent of total annual production by weight. Shrubs will comprise about five percent by weight.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** A strong, naturally occuring argillic horizon is commonly found within 9 to 14 inches of the soil surface.

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 Midgrasses = Perennial Shortgrasses > Perennial Tall/Midgrasses >

    Sub-dominant: Forbs > Shrubs >> Trees

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Potential for 5 to 15 percent plant mortality of perennial bunchgrasses during extreme drought.

14. **Average percent litter cover (%) and depth (in):** 5 to 15 percent litter cover.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1,500 to 4,050 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, Old World bluestems, buffelgrass, guineagrass, false broomweed, goldenweed, and tanglehead.

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